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GLOBAL GENDER AND ENVIRONMENT OUTLOOK

GGEO

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Welcome to the Global Gender and Environment Outlook (GGEO). In this report the authors and the UNEP Secretariat look at the links between gender and the environment and their importance for gender-sensitive policy-making and actions.

The GGEO was first proposed to UNEP by the Network of Women Ministers and Leaders for the Environment (NWMLE) at the 2012 United Nations Conference on Sustainable Development (Rio+20). In 2014 the United Nations Environment Assembly welcomed the development of the GGEO, together with the use of social science information and gender-relevant indicators to examine links between gender and the environment.

The GGEO was developed and written by a global team of almost 50 experts, with inputs from major groups and international organizations as well as guidance from dozens of reviewers.

Gender inequality is one of the most pervasive threats to sustainable development. It has negative impacts on access to, use of and control over a wide range of resources, and on the ability to meet human rights obligations with respect to enjoyment – by women and men – of a clean, safe, healthy and sustainable environment.

The GGEO provides an overview of current knowledge and gives a first set of answers to the following key policy-relevant questions:

- What social forces are producing the changes seen in the environment, and are they gender-dependent?
- What are the large-scale consequences of on-going environmental changes for social systems and human security, and are these consequences gender-differentiated?
- What do future projections and outlooks look like, are they gender-differentiated, and will there be different outcomes for women and men?
- What actions could be taken for a more sustainable future that would position women and men as equal agents in taking such actions, and which socio-economic factors could shape different outcomes and responses for women and men?

We look forward to the uptake of GGEO's findings throughout the environmental sector at international and national levels.



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Foreword



Virtually everywhere in the world, environmental change has different impacts on women and men. Gender also has a role in determining how – and sometimes whether – people are able to act as agents of change on their own natural environments.

Perhaps recognizing this reality, the poet Maya Angelou has called on us "to recognize and celebrate our heroes and she-roes". For me, these include people such as Rachel Carson, the author of *Silent Spring,* and Professor Wangari Maathai, who founded the Greenbelt movement in Kenya. It also includes the villagers in India who started the Chipko movement against deforestation, as well as the many people around the world who are protesting environmental degradation and the effects of climate change.

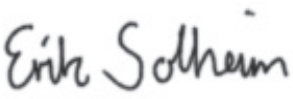
At the 2012 United Nations Conference on Sustainable Development (Rio+20), UNEP, in response to a request from the Network of Women Ministers and Leaders for Environment, committed to undertake a global assessment of the environment, focusing on gender. The result – which reflects the joint efforts of UNEP, UN Women and other partners – is the Global Gender and Environment Outlook (GGEO) report, the first comprehensive global assessment of the gender-and-environment nexus.

The GGEO report is essential reading for those interested in the social dimensions of environmental issues. For readers who want to better understand current environmental challenges, and for those seeking innovative and effective solutions, the report describes policy options and concrete opportunities to contribute to the future we want: a future of justice and equality that leaves no one behind. It reflects and builds on the groundbreaking work of hundreds of scientists, policy experts, gender advocates and members of community groups. And it examines a wide range of topics, including food production, water and sanitation, energy, sustainable consumption and production, fisheries and fishing communities, and forests and those who depend on them for their livelihoods.

The 2030 Agenda for Sustainable Development highlights the close links between gender and environment, and between gender and sustainable development more broadly. By working to eliminate gender inequalities in communities and societies around the world, we can open up new environmental solutions, and we can go a long way toward realizing all 17 Sustainable Development Goals.

There has already been progress on many fronts. The importance of the gender-and-environment nexus has been acknowledged in several international agreements and many national policies. Analyses of gender-environment links are driving efforts such as the development of cleaner-burning cookstoves and more equitable water distribution schemes. The number of Global Environment Facility projects that take gender into account has more than doubled following the organization's adoption of a gender-mainstreaming plan.

But there is still a long way to go before both gender equality and a healthy environment are realized around the globe. The GGEO report represents an important step toward the development of more sustainable, just and equitable people-and-environment policies.



Erik Solheim

United Nations Under-Secretary-General and
Executive Director, United Nations Environment Programme

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Acronyms and Abbreviations

ASM	artisanal and small-scale mining
BAU	business-as-usual
BPA	bisphenol-A
BRS	Basel, Rotterdam and Stockholm Conventions
CBD	United Nations Convention on Biological Diversity
CDKN	Climate and Development Knowledge Network
CEDAW	United Nations Convention on the Elimination of All Forms of Discrimination Against Women
CGIAR	Consultative Group on International Agricultural Research
CIFOR	Center for International Forestry Research
CO_2	carbon dioxide
COP	Conference of the Parties
COP21	21st Conference of the Parties to the United Nations Framework Convention on Climate Change, Paris, 2015
DALYs	disability-adjusted life years
DCPI	Division of Communication and Public Information (UNEP)
DESA	Department of Economic and Social Affairs (UN)
DEWA	Division of Early Warning and Assessment (UNEP)
DDT	dichlorodiphenyltrichloroethane
DRR	disaster risk reduction
DPSIR	drivers, pressures, states, impacts, responses
ECOSOC	Economic and Social Commission of the United Nations
EGI	Environment and Gender Index (IUCN)
ENERGIA	International Network on Gender and Sustainable Energy
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
FUGs	forest user groups
GBV	gender-based violence
GDP	gross domestic product
GEO	Global Environment Outlook (UNEP)
GGCA	Global Gender and Climate Alliance
GGEO	Global Gender and Environment Outlook
GIAs	gender impact assessments
GLASS	Global Analysis and Assessment of Sanitation and Drinking Water (UN-Water)
GM	genetically modified
GSSU	Gender and Social Safeguards Unit (UNEP)
GWA	Gender and Water Alliance
HAP	household air pollution
ICRW	International Center for Research on Women
IDRC	International Development Research Centre
IISD	International Institute for Sustainable Development
ILO	International Labour Organization
IMF	International Monetary Fund
INDC	Intended Nationally Determined Contributions (greenhouse gas emissions reductions)
IPCC	Intergovernmental Panel on Climate Change

IUCN	International Union for Conservation of Nature
IUU	illegal, unregulated and unreported (fishing)
LGBT	lesbian, gay, bisexual and transgender
MeHg	methyl mercury
MHM	menstrual hygiene management
NGO	non-governmental organization
NTFP	non-timber forest product
NWMLE	Network of Women Ministers and Leaders for the Environment
OECD	Organisation for Economic Co-operation and Development
OHCHR	Office of the United Nations High Commissioner for Human Rights
PAN	Pesticide Action Network
PCBs	polychlorinated biphenyls
PM2.5, PM10	particulate matter 2.5 micrometres or less, and 10 micrometres or less, in diameter
REDD/REDD+	United Nations collaborative initiative on Reducing Emissions from Deforestation and forest Degradation in developing countries
Rio+20	United Nations Conference on Sustainable Development, Rio de Janeiro, 2012
SIGI	Social Institutions and Gender Index (OECD)
UNCCD	United Nations Convention to Combat Desertification
UNCED	UN Conference for Environment and Development, Rio de Janeiro,1992
UNDP	United Nations Development Programme
UNEA-2	Second United Nations Environment Assembly (2016)
UNEP	United Nations Environment Programme
UNESCO	United Nationsl Educational, Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
UNICEF	United Nations Children's Fund
SDGs	Sustainable Development Goals
SIGI	Social Institutions and Gender Index (OECD)
SIDS	Small Island Developing States
STEM	Science, Technology, Engineering and Mathematics
UNON	United Nations Office at Nairobi
UNSD	United Nations Statistics Division
UNU	United Nations University
WASH	water, sanitation and hygiene
WECAN	Women's Earth and Climate Network
WECF	Women in Europe for a Common Future
WEDO	Women's Environment and Development Organisation
WEF	World Economic Forum
WEN	Women's Environment Network
WEP	Women's Environment Programme
WGC	Women and Gender Constituency
WHO	World Health Organization
WOCAN	Women Organizing for Change in Agriculture and Natural Resource Management
wPOWER	Partnership on Women's Entrepreneurship in Renewables
WWAP	World Water Assessment Programme (UNESCO)
ZIKV	Zika virus

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Table of Contents

Foreword v
Acronyms and Abbreviations vi
Acknowledgements viii

1. THE GENDER-ENVIRONMENT NEXUS: TOWARDS MORE EQUITABLE AND INCLUSIVE FORMS OF SUSTAINABILITY 1
Why the Global Gender and Environment Outlook is needed 2
Environmental feminist movements: inspiration, activism and analysis 2
International commitments to gender equality and to sustainable development 4
Women's representation in formal global gender and environmental policies, programmes and projects 7
The need for gender-disaggregated information 8
Inequality and gaps in gender inclusion 9
The gender-and-environment nexus: priority issues 10
References 14

2. THE GENDER AND ENVIRONMENT DIMENSION OF SUSTAINABLE DEVELOPMENT 19
Introduction 20
The GGEO methodology framework 20
Understanding drivers, trends and interconnections 21
Scarcity of gender-disaggregated data 22
References 25

2.1 FOOD PRODUCTION AND FOOD SECURITY 27
Key Messages 27
Gender aspects of agricultural production and food (in)security 28
Key trends in food production 35
Policy and the way forward 42
References 42

2.2 DOMESTIC WATER AND SANITATION 49
Key Messages 49
Recognizing the gendered dimensions of water, sanitation and hygiene 50
Water use, access, quality, production and distribution 52
Sanitation and wastewater 59
The "missing half": the need for gender-disaggregated data on water and sanitation 65
References 67

2.3 ENERGY 75
Key Messages 75
The global energy context 76
Gendered aspects of centralized energy planning and policy 80
Energy production, supply and consumption 83
Energy and health 86
Gender, energy transitions, and renewable energy 89
References 93

2.4 SUSTAINABLE CONSUMPTION AND PRODUCTION 99
Key Messages 99
The nature of consumption 100
Structural factors in unsustainable consumption 105
Production and waste 108
Transformational change – moving forward 115
References 117

2.5 MARINE AND COASTAL COMMUNITIES AND ECOSYSTEMS 125
Key Messages 125
"What we take out": fish, fishing and livelihoods 126
"What we put in": contaminants and pollutants 130
References 138

2.6 FORESTS 145
Key Messages 145
Forest resources: supporting lives and livelihoods 146
Degradation of forest resources: increasing scale and impacts 147
Equal rights and participation – a key to solving forest degradation issues 153
Biodiversity and forest management policy – towards a green economy and gender equality 157
References 161

2.7 IN A HIGHLY CONNECTED AND CHANGING WORLD: CROSS-CUTTING ISSUES 167
Introduction 168
Disasters 168
Climate change 169
Conflicts 170
Health 173
References 176

3. OUTLOOK FOR A SUSTAINABLE AND JUST FUTURE – FROM BUSINESS-AS-USUAL TOWARDS TRANSFORMATIONAL CHANGE 179
Key Messages 180
It is not "development" if it is not inclusive, equitable and sustainable 180
Signs of progress in moving beyond business-as-usual towards the future we want 182
Large-scale structural forces holding back transformational change 188
References 192

4. AN AGENDA FOR TRANSFORMATIONAL CHANGE 197
Gender equality and sustainable development – connecting the dots 198
Key conclusions 199
References 203

Annex 1: Gender-Environment Datasets with Broadest Country Coverage 204

Glossary 210

List of Figures

Figure 1.1: Participation of women in three Rio Conventions 7
Figure 1.2: Percentage of gender-responsive GEF projects: regional comparisons, before and after) implementation of the 2011 gender policy 8
Figure 1.3: Percentage distribution of the water collection burden in Sub-Saharan African households without piped water on the premises, 2006-2009 9
Figure 1.4: Proportion of countries falling under the three tiers of women's secure access to land 11
Figure 1.5: Female agricultural landowners as percent of all agricultural landowners, 2000 - 2012 12
Figure 1.6: Percentage of women who reported difficulties in accessing health care, by wealth quintile, 2010-2013 14
Figure 2.1: GGEO methodological model 20
Figure 2.1.1: Shares of rural households that are female-headed and of agricultural land holders who are female, sample countries 33
Figure 2.1.2: Percentage of women interviewed who reported handling pesticides directly 36
Figure 2.1.3: Percentage of women who did not directly handle pesticides but washed pesticide-contaminated clothes by hand 36
Figure 2.1.4: In a sample of 37 Sub-Saharan African countries in 2011, 22% of agricultural researchers were women. 40
Figure 2.1.5 Gender of farm managers of organic and conventional farms in the EU in 2010, percentages 41
Figure 2.2.1: GLAAS survey of governments: Do national sanitation and drinking-water policies/strategies include specific provisions to meet women's needs, including menstrual hygiene management? 50
Figure 2.2.2: Access to clean water 53
Figure 2.2.3: Distribution of households by person responsible for water collection, by region and by urban and rural areas, 2005-13 54
Figure 2.2.4: Share of population using improved sanitation, 2015 60
Figure 2.2.5: Urban and rural trends in sanitation coverage (%) 60
Figure 2.2.6: Ratio of treated to untreated wastewater reaching water bodies in ten regions. 61
Figure 2.2.7: Access to water and sanitation facilities by women and men in Mongolia, Nigeria and Niger 61
Figure 2.3.1: The energy sector is responsible for the largest share of the anthropogenic greenhouse gas (GHG) emissions that contribute to climate change 76
Figure 2.3.2: Global differences in per capita electricity consumption, 2015 77
Figure 2.3.3: Night-time satellite image indicates differences in countries' access to electricity. 78
Figure 2.3.4: Number of people who use biomass for cooking and do not have electricity 78
Figure 2.3.5: Global access to clean cooking facilities and to electricity 79
Figure 2.3.6: Opinions on increased use of fracking, United States, 2014. 85
Figure 2.3.7: Number and share of premature deaths attributable to household air pollution, by disease 87
Figure 2.4.1: Ecological footprint of the United Arab Emirates by demand sector 101
Figure 2.5.1: Number of people in Iceland employed full-time as commercial fishers, 2004-14: male, female and % female 128
Figure 2.5.2: Public warning about seafood for women and children 132
Figure 2.6.1: Shares of unprocessed forest products collected by women, men and both at global and regional levels 147
Figure 2.6.2: Large-scale land transfers, 2004-09 151
Figure 2.6.3: Participation of women and men in forest user groups (FUGs) 153

Figure 2.6.4: REDD+ and gender and REDD+ readiness preparation analysis 159
Figure 2.7.1: The world conflict map: active armed conflicts in March 2016 171
Figure 3.1: The 17 Sustainable Development Goals 181
Figure 3.2: Time spent per day on unpaid care work, by gender and region. 191
Figure 4.1: The environment affects women and men differently due to gender inequality 200
Figure 4.2: Heads of national environmental sector ministries in UN Member States (women and men) in 2015 202

List of Tables

Table 2.1: Contribution of environmental factors to human health, 2012 22
Table 2.1.1: Estimated increases in crop production, GDP, and number of people lifted out of poverty that could be obtained by closing the gender gap in Malawi, Tanzania and Uganda 28
Table 2.1.2: Percent of adults in the United States who experienced food insecurity for themselves or their families (in the previous year), by sexual orientation, 2012 30
Table 2.2.1: Deaths and disability-adjusted life years (DALYs) from diarrhoea due to poor water and sanitation 57
Table 2.2.2: Ranking by women of their access to different types of urban infrastructure 62
Table 2.2.3: Percentage of governments "regularly" producing gender-disaggregated statistics in different areas 66
Table 2.4.1: Fertility disorders are increasing in industrialized societies, many of which are associated with chemical exposures. 104
Table 2.5.1: Global profile of small-and large-scale fisheries 127
Table 2.5.2: Percentage of sewage treated, by region 132
Table 2.5.3: Countries most vulnerable to food security threats from ocean acidification 137
Table 2.6.1: Common non-timber forest products (NTFPs) and their uses 146
Table 2.6.2: Number of women in small-scale mining in selected countries 150
Table 3.1: Women's representation in governments as of 1 May 2016 189

List of Boxes

Box 2.1: Gender statistics 24
Box 2.1.1 Micronutrients and food security 30
Box 2.1.2: Gender-disaggregated experiences of food insecurity within households in Bangladesh 31
Box 2.1.3. Subsistence farming and fishery tasks are essential to many households' livelihoods 32
Box 2.1.4: Using mobile phones to share information useful to farmer 34
Box 2.1.5: Application of pesticides 36
Box 2.1.6: Pesticides in breast milk 37
Box 2.1.7: Suicides and intentional poisoning using pesticides 37
Box 2.1.8: Gender differences in perceptions of GM foods 38
Box 2.1.9: Gendered views on animal rights 39
Box 2.1.10: Organic farming results in good productivity 41
Box 2.1.11: Key drivers of global food production and insecurity 42
Box 2.2.1: Involving women in water and sanitation management at the local level in Kyrgyzstan 52
Box 2.2.2: Sexual assault while collecting water and firewood 56
Box 2.2.3: Health and environmental concerns about fracking 59
Box 2.3.1: Gender aspects of energy policies in Kenya 81
Box 2.3.2: The Clean Energy Education and Empowerment Initiative 82
Box 2.3.3: Gender differences in views on nuclear power 84

Box 2.3.4: Development of energy technologies with women and men for mutual benefits: solar water heaters in Georgia 85
Box 2.3.5: Average weight of fuelwood head-loads 88
Box 2.3.6: Testimony of a Native American woman on the impacts of uranium mining 89
Box 2.3.7: Entrepreneurial opportunities for women in renewables 91
Box 2.3.8: Barefoot College – women supporting other women..... 91
Box 2.4.1: Components of household ecological footprints – examples from Canada and the United Arab Emirates (% of total household demand, 2010) 102
Box 2.4.2: Shares of total marketed world energy use by end-sector users, 2011 102
Box 2.4.3: Gendered decision making in household consumption 103
Box 2.4.4: Urbanism and the gender profile of economic inequality 106
Box 2.4.5: Norms of femininity and masculinity as drivers of meat consumption 109
Box 2.4.6: Gender and the use and ownership of cars 110
Box 2.4.7: Norms of femininity and masculinity in cosmetics consumption 112
Box 2.5.1: Women's protests against seabed mining 130
Box 2.5.2: Gender, HIV/AIDS and fishing communities..... 134
Box 2.5.3: Bargaining power and sex in the context of declining fish catch..... 135
Box 2.5.4: Exploitation of child labour in fisheries..... 136
Box 2.5.5: Saltwater intrusion and coerced marriages..... 136

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Box 2.6.1: Women's role in conservation of high mountain ecosystems in central Tien Shan, Kyrgyzstan 148
Box 2.6.2: Characteristics of artisanal and small-scale mining (ASM) 149
Box 2.6.3: Poor working conditions on biofuel feedstock plantations 151
Box 2.6.4: Industrial tree plantations 152
Box 2.6.5: Reasons for women's lack of participation in local governance 153
Box 2.6.6: The impacts of male migration on gender equality 154
Box 2.6.7: Valuing of forests' nutritional, cultural and social aspects by women 155
Box 2.6.8: Rooibos 158
Box 2.6.9: Gender-equitable forest landscape restoration in a changing climate 160
Box 2.7.1: UN Security Council Resolution 1325: Women, Peace and Security 173
Box 2.7.2: The Zika virus - a convergence of unsustainable development, gender politics and ecological disruption 175
Box 3.1: Environmental violence against indigenous women 183
Box 3.2: Climate change-related lawsuits in the North and South 184
Box 3.3: Gender in the COP-21 2015 climate agreements 185
Box 3.4: Cambodia: gender in climate policies and actions 185
Box 3.5: Rwanda: linking gender and environment in national policies and budgets 186
Box 3.6: Community Practitioners Platform: multi-stakeholder collaboration and sustainability 187
Box 3.7: Counting out women and nature: reframing economics 190





THE GENDER-ENVIRONMENT NEXUS: TOWARDS MORE EQUITABLE AND INCLUSIVE FORMS OF SUSTAINABILITY



A moment of happiness, Nobel laureate Professor Wangari Maathai and former Swedish Environment Minister Lena Sommestad, after the 2004 Nobel Peace prize announced in Nairobi, Kenya

1

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> We envisage a world of universal respect for human rights and human dignity, the rule of law, justice, equality and non-discrimination; of respect for race, ethnicity and cultural diversity; and of equal opportunity permitting the full realization of human potential and contributing to shared prosperity. A world which invests in its children and in which every child grows up free from violence and exploitation. A world in which every woman and girl enjoys full gender equality and all legal, social and economic barriers to their empowerment have been removed. A just, equitable, tolerant, open and socially inclusive world in which the needs of the most vulnerable are met.
>
> Transforming our world: The 2030 Agenda for Sustainable Development, adopted at the UN Sustainable Development Summit, September 2015

Why the *Global Gender and Environment Outlook* is needed

The *Global Gender and Environment Outlook (GGEO)* occupies a unique space in the landscape of global assessments, highlighting a new framework with which to look at social and economic development. The purpose of the GGEO is not simply to "add women to the environment and stir". It makes use of gender-based assessment frameworks along with the more traditional environmental assessment approach of the Drivers-Pressures-State-Impacts-Responses (DPSIR) methodology (UNEP 2012), thus requiring new questions and new methods.

Much economic growth in recent decades has been driven by the rapid expansion of natural resource use, especially in developing and emerging economies, and by the processing and consumption of fossil fuels. This has led to a concentration of environmental pressures in some parts of the world (UNEP 2016). Many environmental problems have been compounded by the risks and impacts of extreme weather and climate events, which disproportionately affect the world's poorest populations (UNEP 2016, IPCC 2014).

The drivers of environmental change are also differentiated by gender. Whether environmental change is acute or slow and chronic, it has specific differentiated impacts on women and girls or on men and boys. Moreover, austerity measures and public spending cuts in recent years have exacerbated gender inequalities and increasingly shifted the burden of ensuring the survival of individuals and households onto the shoulders of women and girls (including through their use of natural resources), adding to their unpaid domestic and care work and time poverty (UN Women 2014). Using a gender-specific approach is an appropriate way to investigate the dynamic relationships between environmental change and gender equality, as well as between environmental sustainablity and the realization of women's rights and empowerment (Leach 2015, Seager 2014a).

Growing recognition of the impacts of human activity on the environment is taking place at the same time as global policy and advocacy efforts to achieve gender equality together with equality for class/ income, race/ ethnicity and other differences) are gaining traction. As demonstrated in the GGEO, the push for gender equality is shaping a better understanding of the environment, while notions of gender equality are also shaped by environmental imperatives including the need for equal access to – and sharing of – the benefits of using and protecting ecosystems and natural resources (UN Women 2014, MEA 2005).

Environmental feminist movements: inspiration, activism and analysis

Path-breaking work by hundreds of scientists, researchers, policy experts, community groups, gender advocates and others, particularly since the 1970s, leads to today's focus on the gender-environment nexus. Rachel Carson's book *Silent Spring* (Carson 1962) sparked contemporary environmental movements around the world with its analysis of the environmental havoc wrought by human efforts to control nature using harmful chemical technologies, especially pesticides. Her analysis provoked immediate policy responses. Her work and that of others who were inspired by it led to a ban on general use of DDT in the United States in 1972 (Seager 2014b, Kolbert 2007, Lewis 1985). This was followed by global bans on other persistent organic pollutants (POPs) (Stockholm Convention n.d.). *Silent Spring* continues to inspire environmentalists and environmental movements.

In the 1970s some of the earliest "ecofeminist" writing constructed powerful narratives about women's deep connection to nature and the environment, often with a strong spiritual grounding (Griffin 1978, Diamond and Orenstein, 1990). While ecofeminism located women at the centre of the environmental agenda, much of this writing has been criticized for presenting a largely mythical and essentialized representation of women (Gaard 2011, Leach 2007, Sturgeon 1997). Women were often portrayed as more vulnerable than men with respect to environmental challenges, and at the same time as innate protectors of and carers for the environment, – sometimes without adequate consideration of the historical, economic, social, political and cultural factors that shape these vulnerabilities and roles. Such representations resurface repeatedly, as women continue to be inappropriately portrayed as innate stewards and nurturers of nature (Leach 2007, Jackson 1993).

Internationally, women's peace movements that gathered force in the 1970s and 1980s synthesized concerns about sustainability, environmental protection, environmental health and women's equality. One of the best known of these was the Greenham Women's Peace Camp in the United Kingdom. In 1981, a group from Wales, "Women for Life on Earth", marched 125 miles to the Greenham Common air force base in Berkshire, England, to protest the siting of nuclear capable cruise missiles there (Kidron 2013, Stead 2006). The participants' letter to the base commander ("We fear for the future of all our children and for the future of the living world which is the basis of all life") emphasized their environmental concerns (Greenham Common Women's Peace Camp n.d.). The Greenham Common protest inspired other peace camps in the United Kingdom and elsewhere. People from many countries visited it, including Pacific island women who had experienced atomic bomb tests and who encouraged the Greenham Common women to adopt an anti-racist, anti-colonial stance (Kirk n.d.). The Greenham Common Women's Peace Camp remained active until 2000.

Other powerful community-based environmental movements in which women have played a major part have set the stage for ambitious and deep-rooted transformational approaches. In India the Chipko movement to protect forests essential for community livelihoods against destructive logging began in 1973 (Jain n.d.). The work of Indian scientist and environmental activist Vandana Shiva, including on food sovereignty and biodiversity conservation, has had a global impact (Shiva 2016a, Shiva 2016b). In Kenya, the Green Belt Movement launched by Nobel laureate Wangari Maathai (Maathai 2003) has planted over 51 million trees. These movements are not only symbols of women's environmental agency, but have helped broaden conceptions of the gender-and-environment nexus.

Indigenous peoples in many parts of the world have protested (and continue to protest) against damage to their lands and health (UN 2014, OHCHR 2013). For example, Navajo activists in the United States have demanded justice and compensation for exposures to the environmental and health effects of uranium mining (US EPA 2016, US DOJ 2015, Brugge and Goble 2002). Indigenous women are in the forefront of adaptation activism on climate change in Papua New Guinea, environmental activism against dams in the Philippines, demanding accountability for damage





The Chipko Movement in India Photo credit: © Wangari Maathai, 2004 Nobel Peace laureate and founder of the Green Belt Movement Photo credit: © Joseph Sohm / Shutterstock.com; Vandana Shiva, food sovereignty and biodiversity activist Photo credit: © www.navdanya.org

from extractive industries in Indonesia, and Ecuador, among many other places (Cimons 2016, Taui-Corpuz 2015).

In the 1980s and 1990s research and writing pushed forward more grounded and materialist gendered environmental analyses (UN Women 2014). Women, Environment and Development (WED) approaches that emerged in the 1980s were based on research and policy development by non-governmental organizations (NGOs), development agencies and others. Initially, such approaches typically positioned women as victims of environmental degradation; later there was more emphasis on women's importance to community-based environmental conservation and management and to environmentally related livelihood opportunities (Douma *et al.* 1994, Green *et al.* 1998, Schultz *et al.* 2001, Tondi 2001). In this sense, WED was aligned with ecofeminism's belief in women's closeness to nature and the symmetry between violence against nature and violence against women. Women's roles, viewed through a WED lens, lens, thus tended to be conceived of as natural, universal, and rooted in reproductive and subsistence activities such as small-scale agriculture and food processing and water and fuel collection, rather than shaped by historical, social and economic forces and gender relations. WED approaches have been found particularly attractive for development policies and that depend on women's labour, skills and knowledge as essential for development (Agarwal 1992). One of the drawbacks of this approach is that the unpaid work and time burdens of women and girls often increase without these women and girls necessarily receiving the benefits of development (ADB 2015).

Feminist analysis of sustainable development since the 1990s yielded critiques of WED and ecofeminism, and offered new analytical frames grounded in feminist political economy and dynamic understandings of gender relations and social, economic and environmental (un)sustainability. These newer approaches, loosely described as "feminist environmentalism" or "feminist political ecology", emphasize that environmental rights and responsibilities are often contingent on class, kin, and household and governance arrangements and negotiations, which are critical to the realization of women's rights and agency (Elmhirst 2011, Rocheleau *et al*. 1996). Such approaches share a number of core ideas, including: women's and men's relationships with the environment are embedded in the social, political and economic context of dynamic gender relations, rather than in an essential unchanging relationship with nature; different groups of women and men have different interactions with natural resources, and with ecosystems and habitats, because of their class, age, race/ethnicity, geographic location and other characteristics; it cannot be taken for granted that women's participation in environmental projects means they will benefit, or that greater gender equality will be achieved without specific attention, monitoring and follow-up to ensure positive outcomes; and gender-specific land tenure and property relations and control over labour, resources, products and decisions should be at the forefront in environmental analysis.

The overall conclusion of several decades of feminist theory, perspectives and initiatives is that the holistic nature of the gender-and-environment nexus requires:

- analysing the different dimensions of relationships between humans and the environment across geographic scales;
- establishing how environmental conditions shape the lives of women and men in different ways as a result of gender and other differentiators;
- developing frameworks and perspectives that allow an understanding that women and men are not only affected by, but also have important roles to play in, enabling environmental sustainability;
- demonstrating that ignoring these issues in environmental and climate policies and programmes (based on the erroneous assumption that the environment is gender-neutral) is a recipe for failure (Aguilar *et al*. 2015, Nightingale 2006).

International commitments to gender equality and to sustainable development

During several decades of women's environmental movements and activism there has been an evolution from silence on gender differences in international environmental agreements and commitments, to gender equality being at the core of the 2030 Agenda for Sustainable Development and the 17 Sustainable Development Goals (UN 2015b).

In 1979 the Convention on the Elimination of All Forms of Discrimination against Women (CEDAW) was adopted by the UN General Assembly to provide for the advancement of non-discrimination and rights through the obligations of governments to promote, protect and fulfil the equal rights of women and men (UN 1979). The CEDAW has been ratified by more countries than any other UN convention. Yet despite progress in areas including girls' education, women's entry into the workforce, and improvements in maternal health and reproductive rights, eliminating discrimination has been slow, with violence against women and gender inequality remaining the most pervasive inequality challenges in all countries (WHO *et al*. 2013). Women still earn less than men for work of equal value and still have unequal access to land and other productive assets. Combined with unpaid domestic and care work (most of the burden of which continues to be borne by women and girls), this limits livelihood opportunities. Likewise, political participation by women has increased in recent years, but they remain largely excluded from (or under-represented at) the highest levels of decision-making, including in the private sector and all branches of governments.

The 1995 Beijing Declaration and Platform for Action called for building on the progress made at the UN Conference on Environment and Development (UNCED) in Rio de Janeiro, Brazil, in 1992, and for full and equal participation by women and men as agents and beneficiaries of sustainable development (conceived of as sustained economic growth for poverty eradication, environmental conservation and protection, social justice, solidarity, peace, respect for human rights, and gender equality) (UN 1995). The Beijing Platform identified unsustainable patterns of production and consumption – especially in developed countries – as an engine for poverty, inequality and environmental destruction. It noted that all human beings suffer from the consequences of widespread and worsening environmental degradation and disasters, including exacerbated poverty and migration and displacement of peoples, but that women and girls, particularly rural and indigenous ones, are disproportionately affected by ill health, damaged livelihoods, increased unpaid work and compromised well-being (UNEP 1995).

The Beijing Platform for Action also enjoined governments, civil society, the private sector and the international community to take action in the critical area of gender inequalities in the management of natural resources and in safeguarding the environment. It recognized that women's active participation is essential for sustainable consumption and production and sound natural resource management, as well as for ensuring the quality and sustainability of life for present and future generations. The Platform noted women's relative absence from environmental and sustainable development policy- and decision-making, and the lack of recognition and support for their critical involvement in environmental and natural resource education, training, conservation and management. The Beijing Platform established a number of objectives, including: active involvement of women in environmental decision-making at all levels; integration of gender concerns and perspectives in sustainable development policies and programmes; improving the assessment of development and environmental policies on women, including compliance with international obligations (UNEP 1995).

The three Rio Conventions on biodiversity, desertification and climate change, resulting from UNCED, address gender concerns in varying ways. The Preamble to the Convention on Biological Diversity (CBD) recognizes the vital role women play in the conservation and sustainable use of biodiversity. It promotes their full participation at all levels of policy-making and implementation with respect to biodiversity conservation activities. In response to the CBD 2008 Gender Plan of Action, Parties committed to gender mainstreaming in their 2010 COP11 decision and to integration of gender equality in the Strategic Plan for Biodiversity 2011-20. In addition, the Nagoya (Japan) Protocol to the CBD on access to genetic resources, and the fair and equitable sharing of benefits arising from their utilization, acknowledged the key role women play in access and benefit-sharing. In regard to traditional knowledge, the Nagoya Protocol also calls for Parties to support, as appropriate, the sharing of benefits arising from the use of genetic resources in a fair and equitable way by indigenous and local communities, including women within these communities (CBD and WEDO 2012). Most recently, the 2015-20 CBD Gender Plan of Action pursues these strategic objectives among others:

- mainstreaming a gender perspective into implementation of the Convention on Biological Diversity and the associated work of Parties and the Secretariat;

- promoting gender equality in achieving the objectives of the Convention, the Strategic Plan for Biodiversity 2011-2020 and the Aichi (Japan) Biodiversity Targets;

- demonstrating the benefits of gender mainstreaming in measures aimed at biodiversity conservation, sustainable use of the components of biodiversity, and fair and equitable sharing of benefits arising out of utilization of genetic resources.

The UN Convention to Combat Desertification (UNCCD) has mainstreamed gender issues since its inception. Its prologue emphasizes the central role women play in regions affected by desertification and/or drought, particularly in rural areas of developing countries, and the importance of ensuring full participation by women and men at all levels in programmes to combat desertification and mitigate the effects of drought. UNCCD National Action Programmes provide for effective participation at the local, national and regional levels by NGOs and local populations, both women and men (particularly resource users, farmers, pastoralists and their representative organizations), in policy planning, decision-making, implementation and review. The 2011 UNCCD Advocacy Policy Framework on Gender affirms the necessity of full participation by local people, especially women, so that efforts to combat desertification can be most effective. It contains 20 time-bound targets for taking action to mainstream gender in terms of policy, organization, constituency and delivery (UNCCD 2012).

The UN Framework Convention on Climate Change (UNFCCC) first addressed gender in 2001 at COP7, when it mandated that national adaptation programmes of action should be guided by gender equality. COP13 in Bali, Indonesia, in 2007 saw the launch of groups such as the Women for Climate Justice Network and the Global Gender and Climate Alliance. Supported by the advocacy of these and other groups, COP18 in Doha, Qatar, in 2012 adopted a decision to promote the goal of gender balance in bodies of (and delegations to) the UNFCCC, and to include gender and climate change as a standing item on the COP agenda. Since then the UNFCCC Secretariat has tracked gender balance in UNFCCC constituted bodies and at relevant meetings. At COP20 in Lima, Peru, in 2014, the UNFCCC called for an action plan to develop a two-year programme on gender (the Lima Work Programme on Gender). This work programme included mapping of decisions and conclusions on gender and climate change adopted under the UNFCCC and its Kyoto Protocol, in order to identify areas of progress, potential gaps, and areas where further support and greater collaboration are needed (UNFCCC 2014).

In late 2015 the UNFCCC Paris Agreement recognized the intersection of climate change and gender equality, empowerment of women, and realization of their rights:

> Acknowledging that climate change is a common concern of humankind, Parties should, when taking action to address climate change, respect, promote and consider their respective obligations on human rights, the right to health, the rights of indigenous peoples, local communities, migrants, children, persons with disabilities and people in vulnerable situations and the right to development, as well as gender equality, empowerment of women and intergenerational equity". UNFCCC (2015).

During the 2015 Conferences of the Parties to the Basel, Rotterdam and Stockholm Conventions, commitments were made on mainstreaming gender within the Secretariat (including a "gender parity pledge") and on programmatic mainstreaming of gender issues in Secretariat training activities, projects and programmes (BRS, n.d.). The main gender focus in these Conventions is on the impact of poor management of hazardous chemicals and wastes on vulnerable groups, including women and young children. There is now greater recognition of the links between gender, poverty, and



Marching through central Oslo, Norway, to support action on global climate change, September 21, 2014.
Photo credit: © Ryan Rodrick Beiler/ shutterstock.com

hazardous chemicals and wastes, as well as of the profound significance the gender/poverty nexus can have for both sensitivity and exposure over time – and thus on economic, social and environmental well-being.

In September 2015 world leaders committed to the 2030 Agenda on Sustainable Development, in which gender issues are not only mainstreamed but taken forward through a global push to create lasting change based on one simple principle: everything is connected. The Sustainable Development Goals (SDGs) of the 2030 Agenda aim to address inequalities among all population groups, especially children, women and the impoverished. In particular, they address human rights and well-being through a common understanding that a healthy environment is integral to the full enjoyment of basic human rights, including the rights to life, health, food, water and sanitation, and quality of life. Interwoven into the SDGs is the concept that by directly addressing the links between gender and the environment, new opportunities will arise to help achieve them in a more effective, sustainable and beneficial manner.

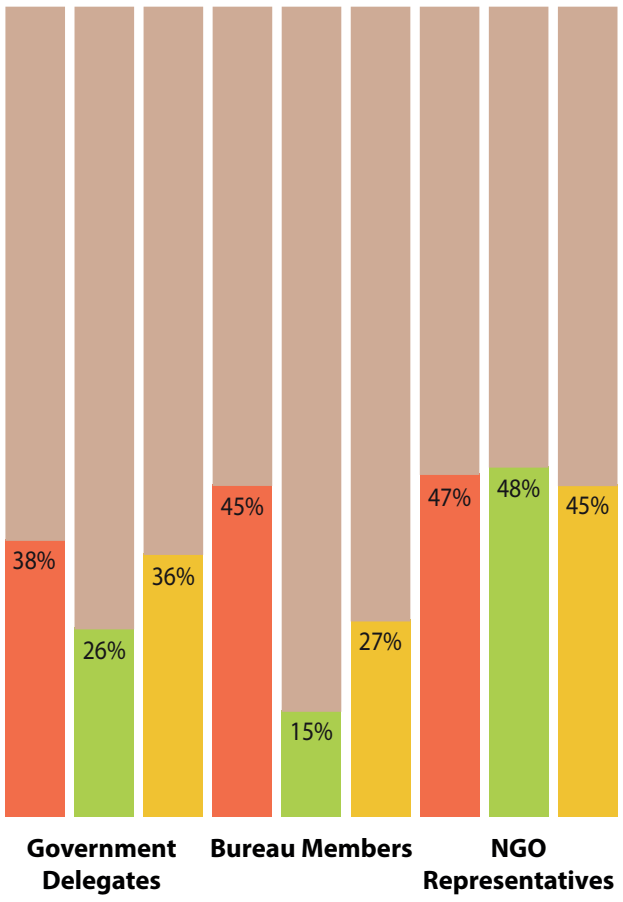
Overall, the international community's level of engagement in addressing gender-and-environment issues has significantly increased since the 1970s. The question remains, however, whether efforts to achieve the SDGs will bring about greater gender equality in terms of natural resource access, livelihood opportunities, and a clean, safe, healthy and sustainable environment.

Women's representation in formal global gender and environmental policies, programmes and projects

Women's organizations, networks and environmental actions have been fundamental in highlighting the gender-and-environment nexus at local and national levels. However, progress on women's participation and representation in global environmental policies, programmes and projects has been slow and uneven.

The IUCN's Environment Gender Index (EGI) reports on the participation of women in the three Rio conventions; they find that "there is much higher percentage of women NGO Representatives, with an average of 47%, than Government Delegates, with an average of 33%" **(Figure 1.1)** (IUCN 2015).

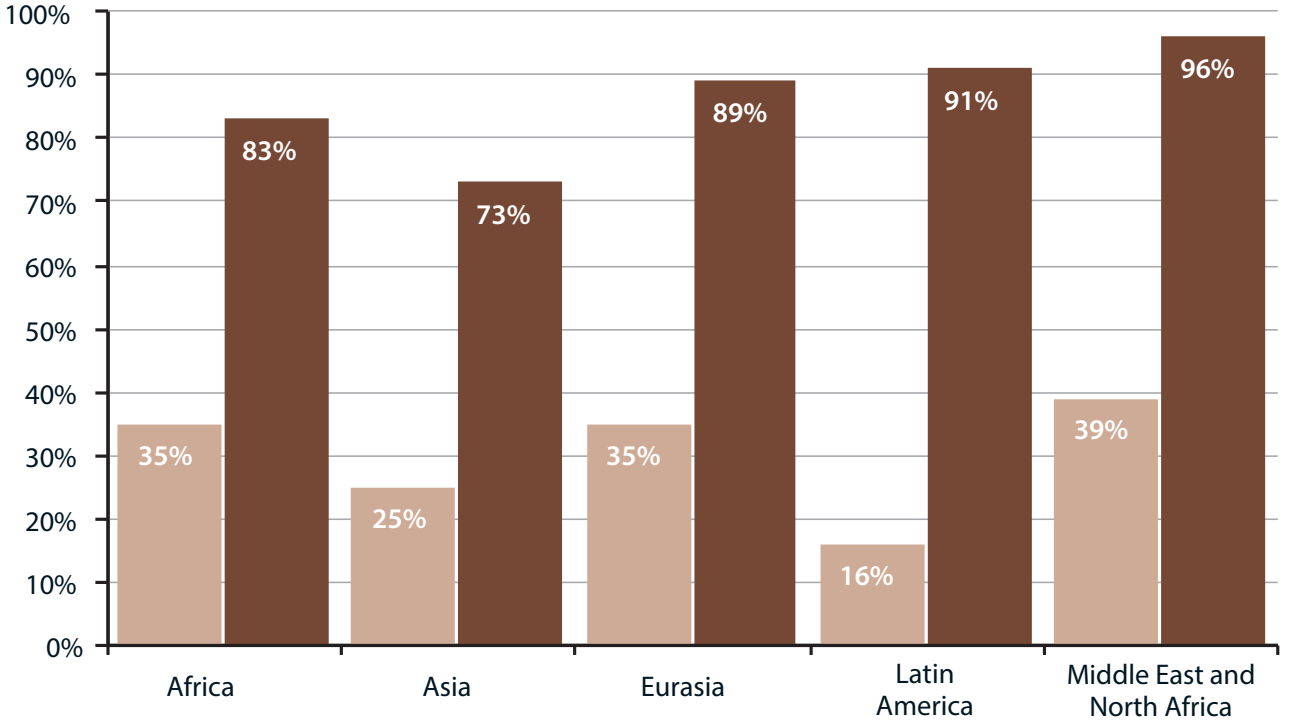
Figure 1.1: Participation of women in three Rio Conventions



Source: IUCN (2015)

The Global Environment Facility (GEF), the financial mechanism for the Rio conventions, (and some other multilateral environmental agreements), is the largest source of funding for investments in environmental projects in developing countries. In 2011 the GEF adopted a gender mainstreaming policy. According to an IUCN analysis, the proportion of gender-responsive projects more than doubled in every region as a result of this policy's implementation **(Figure 1.2)**. The success of GEF's gender mainstreaming policy clearly indicates that global gender policies, coupled with country-driven implementation, can have a significant impact in bringing gender into environmental programming.

Figure 1.2: Percentage of gender-responsive GEF projects: regional comparisons, before (light brown) and after (dark brown) implementation of the 2011 gender policy



Source: IUCN (2013)

The need for gender-disaggregated information

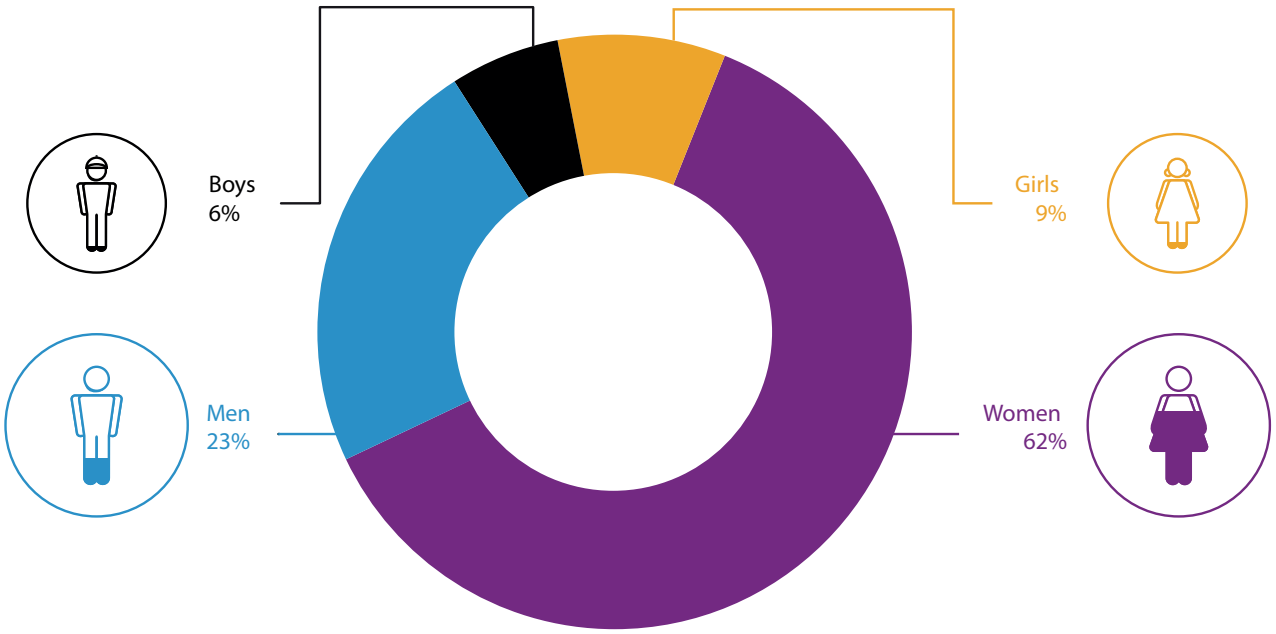
One of the strongest messages emerging from the body of analyses and reports on the gender-and-environment nexus is the crucial need for gender-disaggregated information. In its absence, environmental analyses remain inadequate and partial while establishing baselines, monitoring progress and assessing outcomes are almost impossible.

Even simple data-based analyses, such as that of the water collection burden in Sub-Saharan households in **Figure 1.3**, can reveal important gender dynamics with respect to labour, equity, responsibility, and environmental use and management. These are especially relevant in policy formulation.

Progress on reducing gender gaps is difficult to measure if data only "count women" without deeper consideration of gender discrimination and power relations, which by excluding women (or men) from certain rights, privileges and institutions can result in an imbalance of numbers and data. The consideration of gender, in both policy and practice, is generally couched in heteronormative terms such as the binary sex variable: male or female. "Gender is used as an umbrella term for two mutually exclusive and stable categories of men and women (and sometimes boys and girls), but most often refers euphemistically to women. Little attention, if any, is given to the construction of masculinities and femininities, and practically none to the assemblage of biologies and sexualities … Gender equality or inequality is most often presented as a comparative metric between the two sexes with little reference to structural origins or relations of power and domination" (Razavi and Qayum 2015).

In practice, the term "gender" is still used as a proxy for "women" with little or no analysis of power relations between women and men within households and broadly in society, or of intersecting inequalities based on class/income, race/ethnicity, age, geographic location, and other characteristics (Harris 2011). Moreover, intersectionality (multiple and intersecting forms of societal structures which create inequalities encompassing, inter alia, gender, race and class) is rarely considered. Crenshaw (1989) refers to these inequalities as "intersecting oppressions", as they can refer to different genders and sexualities in relation to disparities in terms of, for example, class/income, race/ethnicity, age and geographic location as well as indigenous, migrant and disability status, among others. Addressing gender inequalities thus requires focusing on social, economic and political structures that can subordinate particular genders and ultimately lead to exclusion.

Figure 1.3: Percentage distribution of the water collection burden in Sub-Saharan African households without piped water on the premises, 2006-2009



Source: UN Women (2015)

Linked to this is the need to "lift the roof off the household" (Seager 2014a) in order to shape our understanding of (and responses to) where change can happen. Almost all the available evidence, much of it reported in the GGEO, makes clear that, within a household, resource use, priorities and decisions are gender-differentiated (Himmelweit *et al*. 2013, Bittman *et al*. 2003, Haddad *et al*. 1997). Household-based, environmentally relevant decisions and behaviours are negotiated, often unequally, between women and men inside the household on matters such as water use, division of labour, energy-source choices, or financial allocations for agricultural adaptation. Intra-household dynamics are important in terms of resources and their use, conservation, consumption, and the ways women and men (may) act as agents of change. Many environmentally consequential decisions made within households are filtered through gender norms and roles (UN Women 2014).

Inequality and gaps in gender inclusion

Out of a world population of 7.4 billion, some 836 million people still live in extreme poverty and many more do not have access to basic services or social protection (UN 2016). Although rates of extreme poverty have been cut by more than half since 1990, one in five people in developing regions still live on less than US$1.25 a day and millions more do not earn much above this amount. In addition, many people risk slipping back into poverty (UN 2016). Economic growth needs to be gender-inclusive to provide sustainable jobs for women and men and promote gender equality. However, recurrent economic and financial crises, on-going armed conflict and civil strife, growing food insecurity, epidemics of infectious diseases, and escalating biodiversity loss, climate change and occurrences of natural disasters have intensified inequalities and risks everywhere. Each of these has different impacts on women and men, including on the realization of women's rights and empowerment (UN Women 2015, UN Women 2014, UNDP 2013).

In many places in the world women's ability to fully participate in decision-making within different economic and environmental sectors is limited despite their significant role in production and consumption. In part, their lack of empowerment stems from reduced bargaining power within communities and households. Bargaining power is determined by a number of variables, including a person's sex, age, family structure, number of children, education, financial assets, and control or ownership of land. The specific mix of factors contributing to women's influence can vary considerably from one region to another.

The 2000-2015 Millennium Development Goals (MDGs) promoted gender equality and women's

empowerment and made them key components in the progress that was to be achieved by 2015. However, specific gender target areas were limited in the MDGs to maternal mortality and reproductive health, primary and secondary education, and decent employment; gender targets were separate from the environmental sustainability goal and targets (UN 2015a). The Sustainable Development Goals (SDGs) not only include a specific gender goal and targets, but also integrate gender targets with other goals through explicit indicators or gender-disaggregated data and analysis (UN 2015b).

Another major challenge in regard to gender equality is the persistence of current societal structures, norms and practices, which perpetuate power imbalances between women and men and constrain women's ability to act and to take decisions – both within the household and in public spheres – and impede their access to resources. Men's decision-making power and action remain profoundly shaped by social, economic and cultural expectations and ideas of masculinity, with clear implications for the need to involve men and boys in addressing gender inequalities (MenEngage *et al*. 2014). Gender inclusion gaps occur in all spheres of life. For example, in the latest assessment of the 34 European Bank for Reconstruction and Development (EBRD) Countries of Operation, indicators focusing on social norms and women's agency, female decision-making in employment, business and administrations, and female graduates in science, technology, engineering and mathematics (STEM) show medium to large gaps in 2015 in legal regulations and social norms in the southern and eastern Mediterranean region, and increases from small to medium-sized gaps across parts of eastern Europe and the Caucasus and Central Asia. Gaps in education and training have grown in central Europe and in some Central Asian countries (e.g. the Kyrgyz Republic, Mongolia and Uzbekistan), while gaps in access to finance, and labour policies and practices, remain broadly unchanged across all regions (EBRD 2016).

Part of the solution is to replace discriminatory laws, regulations and policies with those that promote gender equality. Some progress has been made in this regard in recent decades: as of 2014, 143 countries guaranteed equality of women and men in their Constitutions although 52 did not. In 132 countries the statutory legal age at marriage is equal for women and men, but in 63 it is lower for women (UN Women 2015). The indicators for monitoring SDG Target 5.1 ("End all forms of discrimination against all women and girls everywhere") will require monitoring the existence and implementation of legislation that promotes gender equality and non-discrimination against women and girls.

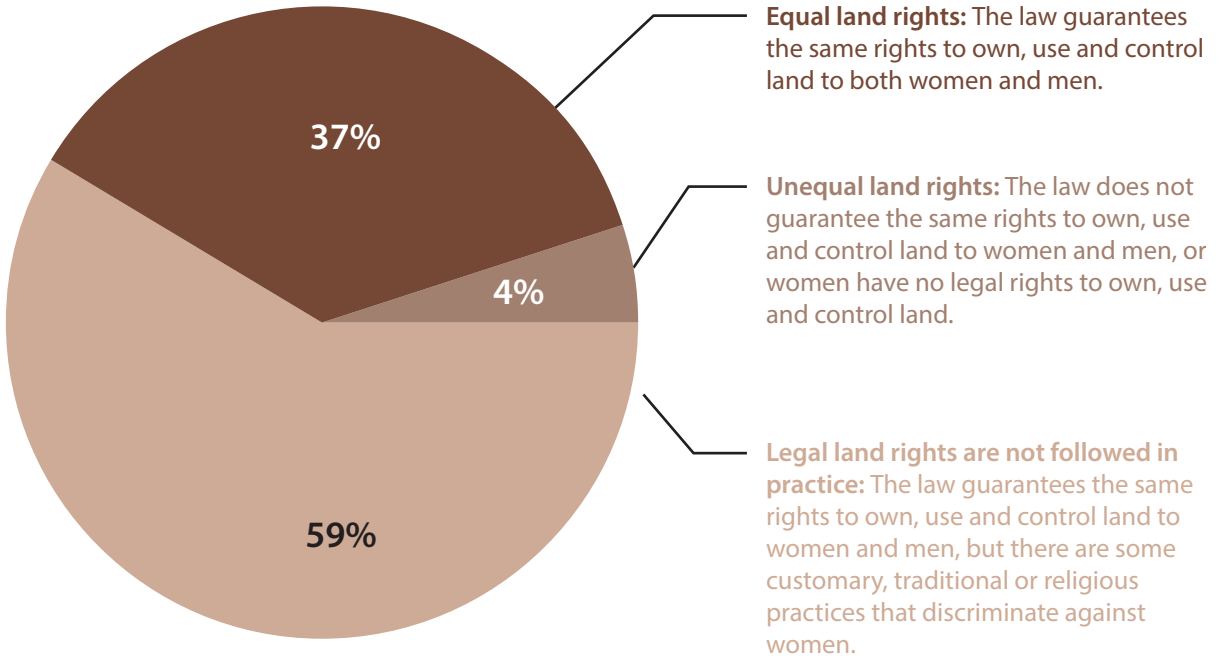
The gender-and-environment nexus: priority issues

Rights to land, natural resources and biodiversity

The livelihoods for the vast majority of local populations worldwide depend on natural resources. Their revitalized management is often of basic importance to economic recovery and development in conflict-affected settings. Persistent restrictions imposed on access to natural resources by certain communities (and groups of people) are examples of the structural inequalities and discriminations that can potentially destabilize a peaceful society. While this is particularly evident with respect to land tenure, it also extends to access and usage rights for renewable resources such as water, as well as the equitable distribution of benefits from extractive resources including minerals, metals, timber and oil and gas. There is clearly a need to create more sustainable pathways for use of natural resources and the enjoyment of their benefits by all. Addressing gender and other inequalities related to environmental sustainability and access to natural resources, including in participation and decision-making, can further efforts to achieve lasting peace and sustainable development (UN Women 2014).

Studies carried out throughout the world have demonstrated that secure land tenure is fundamental to women's economic, social and political empowerment, as well as to increased prosperity for their families and communities (Klugman and Morton 2013, Sattar 2012, Field 2007, Udry *et al*. 1995). Research on women and sustainability indicates that it is security of tenure – rather than ownership per se – that is critical (Meinzen-Dick *et al*. 2014). Women's participation in local institutions governing the use of natural resources is also critical for sustainable management (Agarwal 2010, Ray 2007). Yet despite significant investments in public policy reforms in many regions during recent decades, institutional frameworks have been neither consistent nor fully successful in delivering on

Figure 1.4: Proportion of countries falling under the three tiers of women's secure access to land



Source: OECD (2014)

the promise of gender equality in land and resource rights. For reforms to be successful, they need to be specific about ownership and inheritance, movable and immovable property, joint titling, and disposal of marital property (Yeboah 2014, Hallward-Driemeier *et al*. 2013).

According to the OECD's Social Institutions and Gender Index (OECD 2014), in only 37% of the 160 countries on which data were collected do women and men have equal rights to own, use and control land **(Figure 1.4).** In more than half, while the law guarantees women and men the same rights to own, use and control land, customary, traditional and religious practices prevent access for women. In 4% of these countries women explicitly have no legal right to own, use and control land.

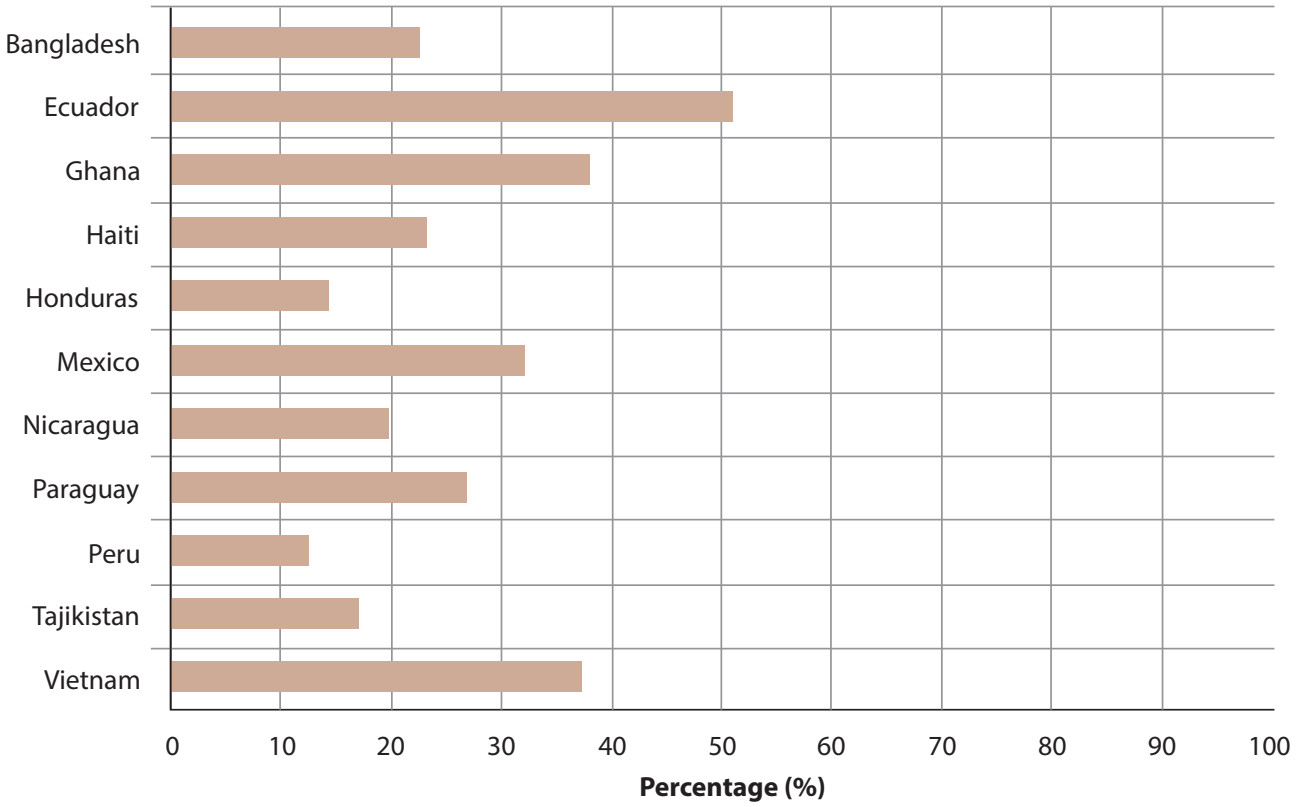
It is difficult to identify trends in women's access to land and assets, or in related changes in decision-making power and the capacity to, for example, open bank accounts and obtain credit. However, a World Bank database on women's property rights and legal capacity, covering 100 countries over 50 years (1960-2010), indicates that over half of key constraints on women's and girls' equal rights to property in existence in the 1960s had been removed by 2010 (although progress was uneven across regions). Between 1960 and 2010 the number of constraints on land rights decreased significantly in Sub-Saharan Africa, Latin America and the Caribbean, and East Asia and the Pacific; they did not shift significantly in the Middle East, North Africa or South Asia (Hallward-Driemeier *et al*. 2013).

The nature of these constraints is significant. While most constraints on women's "permission to act" have been resolved, or barriers have decreased considerably, some key rights related to inheritance, economic activity, and designation as head of household remain difficult to shift. Even in Latin America and the Caribbean, where there has been considerable progress, the level of land ownership by women in some countries (including Honduras, Mexico, Nicaragua, Paraguay and Peru) is still negligible; out of six countries in the region, only in Ecuador has the share of women agricultural landowners reached parity **(Figure 1.5).**

With respect to biodiversity, and in terms of agrobiodiversity, different roles are played by women and men. Women often take on roles as custodians, users and adapters of traditional knowledge, thus contributing to food security and conserving a stock of plant material and seeds for on-going and future production.

The increasing global trend towards privatization of biological resources, sometimes in an effort to better define rights but also for economic gain, can cause long-term shifts in these roles and patterns (Bechtel

Figure 1.5: Female agricultural landowners as percent of all agricultural landowners, 2000 - 2012



Source: (FAO 2015)

2010, Momsen 2007, Shiva 2016a, Zilberman *et al*. 2005, Gari 1999). Emerging global intellectual property right and trade regimes tend to favour intensive high-input agricultural value chains and neglect small-scale subsistence farming. The costs to most small farmers in poor rural communities, including women, of the shift away from being able to use free and self-replicating seeds to purchasing patent-protected seeds that cannot be reused due to restrictions imposed by the manufacturer, are beyond their means (Borowiak 2004, Sahai 2004).

Access to genetic resources and benefit-sharing legislation has now become a critical element for securing rights in real terms and balancing the interests of marginalized farmers and indigenous groups against multinationals and other powerful actors. The Nagoya Protocol, which focuses on access and benefit sharing (ABS), potentially provides an important route by which governments and civil society groups could secure agrobiological resources and preserve practices which are critical for adaptation to climate change. At a minimum, ABS legislation can protect the right of communities to decide whether they will allow access to biological resources on their lands and provide for (and furnish links to) other protective measures. In the context of the gender-and-environment nexus, the roles women and men play in ecosystem functions related to agricultural production need to be better valued and integrated in policy and planning, particularly in the case of agricultural diversity, plant breeding, pest control, and ecosystem management and resilience. This includes recognizing traditionally unpaid and undervalued work, especially by women and girls.

Access to food, energy, water and sanitation

Unpaid domestic and care work by women and girls is particularly relevant in terms of their access to food, energy, water and sanitation. In both rural and urban areas, especially in urban slums and low-income neighbourhoods, lack of basic infrastructure and of energy, water and sanitation services leads to time poverty and social and economic pressures. Women tend to be the primary energy, water and sanitation managers for their households and families for their households and families in most developing countries. Together with children, they bear a disproportionate burden with respect to finding and fetching water and fuel (Grassi *et al*. 2015, UNICEF and WHO 2015, UNSD 2015, UN Women 2015, UNSD 2010).

The food and nutrition security of women and girls can be disproportionately compromised because

women assume primary responsibility for feeding their families and often their communities, but often last and least. Although women produce a significant proportion of food in the developing world, mainly through smallholder farming, they often remain worse fed and more undernourished than men and boys because of cultural and social norms. Thus food and nutrition security for women and girls is of foremost importance. The productivity of women farmers also tends to be lower than that of their male counterparts due to prevailing inequalities in access to productive resources including land (UN Women/UNDP/UNEP/WB 2015, FAO 2011). For women farmers to be more productive, they need equal access to environmentally and socially sustainable agricultural inputs, markets, and (in view of the rapidly changing climate) climate-resilient farming technologies and climate information. Gender equality is essential for improved performance of the agricultural sector through climate resilience, and thereby to increasing food and nutrition security for all, especially women and girls.

Well-being: climate change, sustainable consumption and production, and health

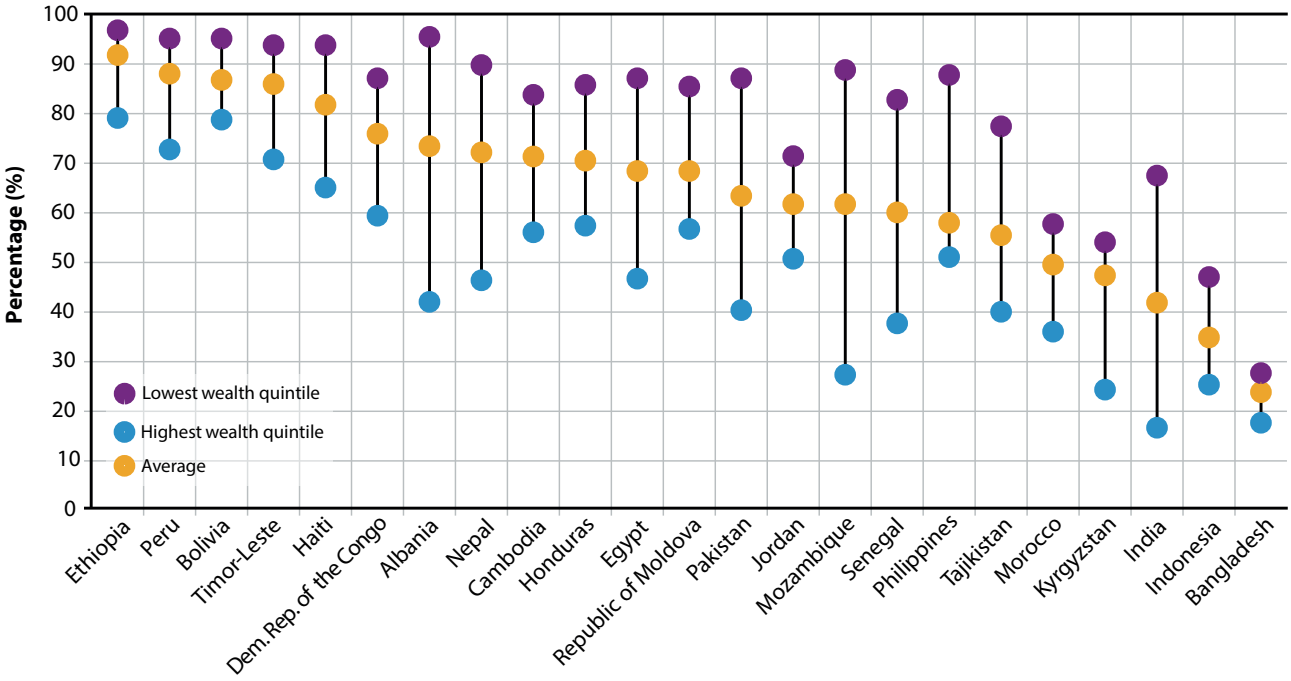
The impacts of climate change, including biodiversity loss and constraints on access to productive and natural resources, amplify existing gender inequalities and jeopardize the well-being of all. Climate change and the uncertainties related to it put further pressure on already fragile, undervalued and precarious gendered roles and responsibilities at community level, which affect the nature and extent of exposure, sensitivity and impacts. The gender-differentiated consequences of climate change can intensify the factors that place women who rely on agriculture and use of natural resources for their livelihoods. As agricultural work becomes more labour-intensive or alternative sources of food and income need to be found, the burden of additional work often falls on women. Climate- and disaster-related health risks and water and fuel scarcity further add to women's unpaid care work.

Women have differentiated vulnerabilities to climate change due to gendered labour and care roles and social status, both in the case of disasters and in their everyday livelihood choices, constraints and expectations. From initial analyses focusing on women's seemingly universalized vulnerability there is now a more nuanced understanding of intersecting power relations, including clear shifts in the adoption of new roles by women and men as climate change coping strategies (Arora-Jonsson 2011, Denton 2002). Women's responsibilities for household food management include water provisioning; thus changes in water availability affect the time and level of effort required to collect, secure, distribute and store water resources (Babugura *et al*. 2010). The agricultural landscape impacts of climate change linked to gender inequality become particularly prominent when few alternative forms of employment and livelihood exist (Alston 2011). The gender gap in agriculture, a pattern documented worldwide and one which means women have less access to productive resources, financial capital and advisory services than men, will be disproportionately exacerbated by climate (change; this is particularly relevant in the context of the development of climate-smart agriculture programmes (Perch 2015, FAO 2013). The impacts of environmental and climate challenges on family and community well-being (and on women's unpaid care work) are especially severe when health facilities and services are unavailable or unaffordable. As seen in **Figure 1.6**, across a wide range of countries, women in the poorest segments of society ("lowest wealth quintiles") have great difficulty in accessing health care; in many countries, this is also the case for a high proportion of even relatively wealthy women.

Women's empowerment is essential to build resilience and adapt to climate change. Gender-responsive climate change policy needs to be cognizant of (and sensitive to) the nuances of local and intra-household dynamics in efforts to mitigate and transform these patterns, as well as farsighted enough to support building resilience and preventing these gendered impacts from occurring. Public policy efforts are still struggling to address this dynamism; policy readiness and policy responsiveness are relatively weak in terms of identifying clear strategies to tackle the intersections between gender and climate.

Intensification of the use of chemicals in both agricultural and industrial production has led to land degradation and water and air pollution, as well as human health impacts (Prüss-Ustün *et al*. 2016, Prüss-Ustün *et al*. 2014, Prüss-Ustün *et al*. 2011). Greater consumption of goods containing toxic chemicals is also closely linked to increased wealth and disposable income. Above a certain income threshold, household consumption patterns shift to the acquisition of refrigerators, televisions and other appliances and eventually to cars – which entails a greater petrochemical impact on

Figure 1.6: Percentage of women who reported difficulties in accessing health care, by wealth quintile, 2010-2013



Source: UN Women (2015)

health and the environment. Rapid urbanization and the intensification of water demand accompanying it, especially in megacities, have increased the need for water and wastewater treatment, which is generally highly chemical intensive.

The prevalence of petrochemicals, household and food chemicals, pesticides and other pollutants (including in pharmaceutical and beauty products) has gendered health effects. Studies have linked these chemicals to cancers, including breast cancer, and infertility problems for both women and men. Male infertility, in particular, is strongly influenced by chemical exposures (UNEP and WHO 2013). Moreover, a strong connection exists between pesticides and breast cancer rates (Watts 2013, Watts 2007). Studies on breast cancer in Scandinavian twins indicate that environmental factors not common to the pair contributed 67% to the cancer, environmental factors shared by both twins explained another 6% and inherited traits accounted for 27% (Lichtenstein *et al*. 2000). As more data become available on environmental and health effects, environmental initiatives and movements that target harmful chemicals and pollutants – harking back to the appearance of Rachel Carson's *Silent Spring* in 1962 – are once again being proven right about the magnitude of the challenge (Prüss-Ustün *et al*. 2016, WECF 2016, Prüss-Ustün *et al*. 2011).

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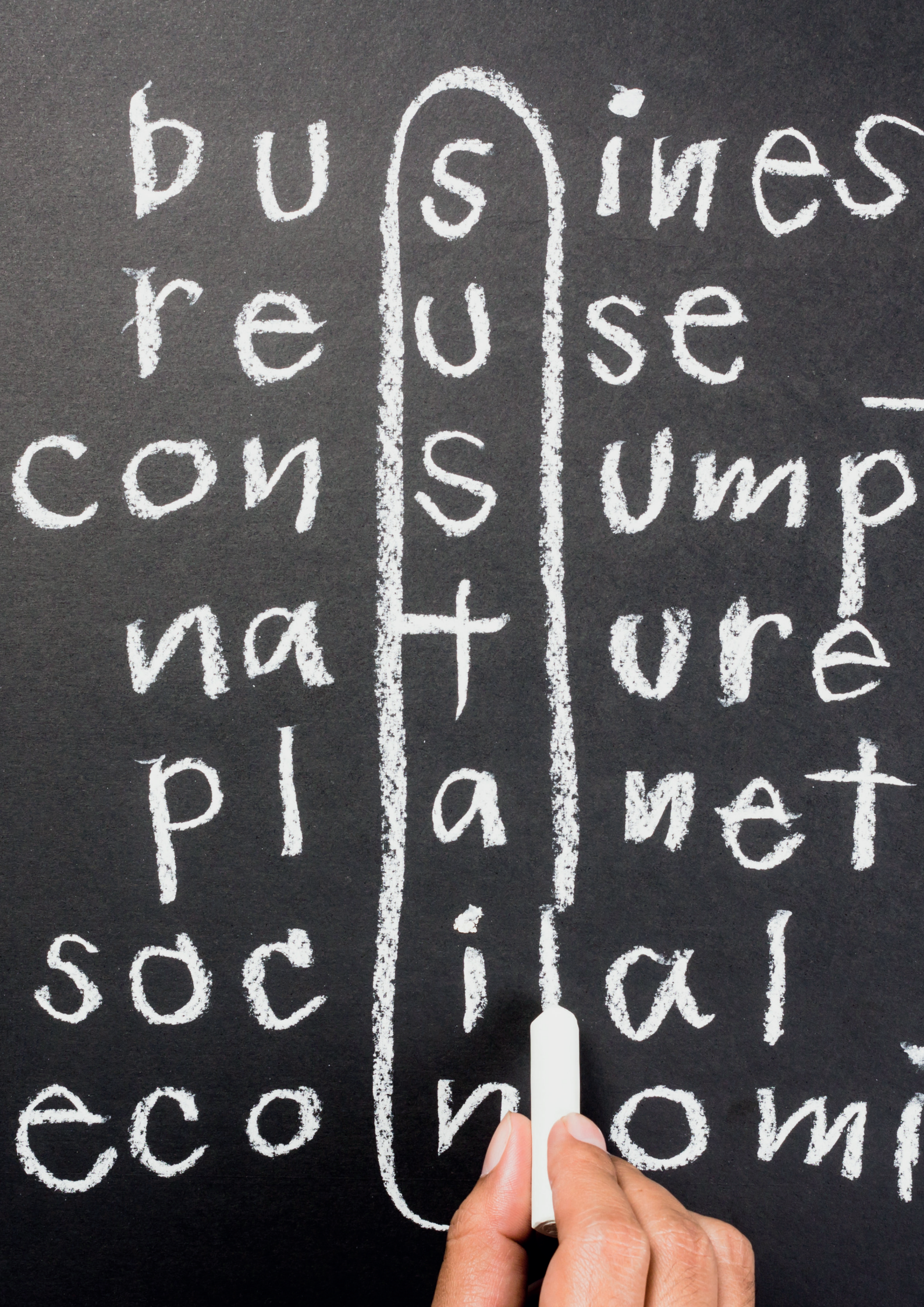
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business
resource
consumption
nature
planet
social
economic
sustainability

THE GENDER AND ENVIRONMENT DIMENSION OF SUSTAINABLE DEVELOPMENT



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Introduction

Socially constructed gender roles create differences in the ways women and men behave in relation to the environment, and in the ways they are enabled to act (or prevented from acting) as agents of environmental change. Even relatively simple gender-based divisions of labour can affect how they experience the environment. If only men fish in the open sea and only women fish in coastal mangroves, they will inevitably have different sets of environmental knowledge and experiences. Or if most men drive to work in a car while most women use public transportation, they will see the environment and changes in it from different vantage points.

Their different environmental positioning may mean women and men have exposures to very different environmental problems and risks, and have very different ideas about the seriousness of environmental problems and appropriate interventions, adaptations and solutions. Further, because of the social construction of gender roles, they may have different – usually unequal – capacities and approaches with respect to environmental interpretation and change.

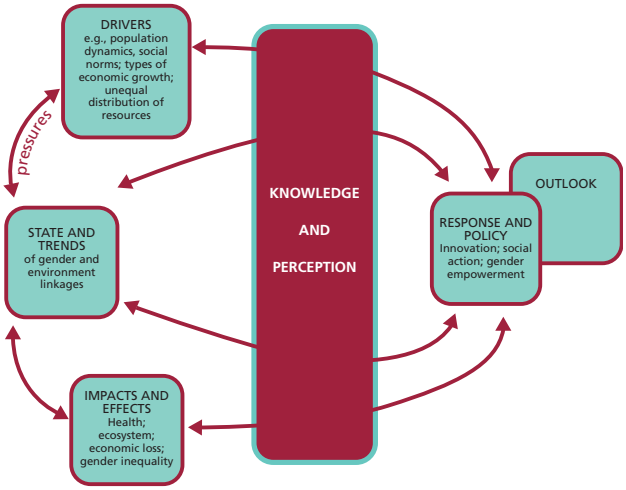
The GGEO methodology framework

At the heart of gender and environment analyses is curiosity about whether women and men (and girls and boys) experience "the environment" differently; how their needs, encounters, vulnerability, and resilience differ. This necessitates a basic curiosity about gender equality and inequality – how inequalities are created, perpetuated, and sometimes effectively challenged and changed.

The GGEO methodological model **(Figure 2.1)** shows the analytical flow among Drivers-Pressures-State-Effects/Impacts-Response/Policies, which are mediated through Knowledge/Perceptions including traditional and indigenous knowledge. These inform the Outlook on the transformative changes needed to achieve a sustainable and just future.

To emphasize its people-oriented character and address the key challenge of lack of gender-disaggregated information in many of the assessed areas, the GGEO methodology employs several analytical approaches:

Figure 2.1: GGEO methodological model



Source: Seager (2014)

- A human-centred analytical approach: It is essential for gendered environmental analysis to put people first, redefining environmental relationships through the lens of social relationships and in the context of human economic activities rather than defining the environment primarily in physical terms.

- Incorporating the social construction of knowledge: Shifting the boundaries of environmental assessment to include qualitative *and* quantitative information broadens the range of expertise on which we can draw. The need to include different "ways of knowing" has been acknowledged in previous Global Environment Outlooks (GEO), primarily through recognizing indigenous perspectives and traditional knowledge (UNEP 2012). Responses to environmental problems do not follow a straight line from facts about the environment. Among other social forces, perceptions intervene, and these are almost always gender-differentiated.

- "Lifting the roof off the household": "Household"-based, environmentally relevant decisions and behaviours are negotiated, often unequally, between women and men inside households – on matters such as water use, the division of labour, energy-source choices, and financial allocations for agricultural adaptation. Intra-household dynamics are critically important in terms of the use, conservation and consumption of resources, as well as the ways women and men (may) act as agents of change. All environmentally consequential decisions made within households are filtered through gender norms and roles.

- Drawing on a diverse mix of information sources: As indicated above, gendered environmental analysis recognizes the value of both qualitative and quantitative information. Quantitative information is necessary, but not sufficient; it does not capture "experience" nor can it capture most aspects of "empowerment." Qualitative understanding is all the more important in view of the lack of sufficient gender-disaggregated quantitative information to carry out environmental assessments.

- Combining macro and micro data: The value of small-scale environmental data is well known. As the 2009 UN/DESA Expert Group on gender-disaggregated water data affirmed, a smaller scale often provides the most appropriate and fruitful information (Seager *et al*. 2009). Local data provide the basis for most of the knowledge we have on gender and the environment. Given the lack of gender-disaggregated global-level environmental data, the GGEO includes regional and local-level information.

- Implications for policies: Asking questions "on the ground" related to gender and the environment provides the basis for a more comprehensive, 360° view of environmental issues, which can lead to more effective policies. Just as gendered information flows upstream to inform policy, gender-sensitive policies can have enormous consequences on the ground. Most mainstream environmental policies do not currently incorporate the concerns or insights provided by gender analysis. To this extent, they do not fully serve environmental or social interests.

Understanding drivers, trends and interconnections

Human relationships with environments work both ways: social forces exert pressures on environments, and environmental conditions (and changes in those conditions) can shape human relationships. A gendered approach to environmental assessment also examines the ways environments and environmental relationships shape, create and sustain gender norms. What are the social costs and consequences of differential gendered environmental relationships? And what is the dynamic relationship between environmental conditions and changes and gender inequality?

The interconnections among drivers, pressures and impacts on gender equality and environmental sustainability are complex. The fifth *Global Environmental Outlook* identified population and economic development as two major drivers of environmental changes and impacts, while a range of economic activities and natural resource exploitation were also considered to exert pressures on the environment (UNEP 2012). Assessing gender and environmental linkages requires a different perspective on what are the drivers and pressures of gender inequality in relation to achieving a healthy environment, as well as their contributions as agents of change. In addition to demographic changes and economic development, this includes the social and political structures, and gender norms, of a society.

GGEO demonstrates that gender norms and environmental changes affect each other, and that their roles as drivers/pressures and effects/impacts could in some cases be interchanged. For example, environmental factors have a significant influence on the global burden of disease; an estimated 23% of years lost due to ill health (DALYs) in males, and more than 20% in females, are attributable to environmental factors **(Table 2.1)**. Children under five are among the most affected group; up to 26% of all deaths among children of this age could be prevented by an improved environment (Prüss-Ustün *et al*. 2016). Environmental factors have a negative impact on maternal health and child mortality in many regions – often in least developed and developing countries, where they frequently contribute to high fertility rates (in order to counter the risks of high child mortality). This in turn may increase population pressures on the environment (Kaplan *et al*. 2015, Kreager *et al*. 2015, Cleland 2013, Lawson *et al*. 2012, Hartmann 2010).

Armed conflicts, which usually cause heavy and long-term damage to the environment and natural resources, affect women and men differently in terms of migration processes, livelihood viability, resource scarcity, experiences of violence, and, in some settings, the ability to carry out basic support activities such as water and fuelwood collection. There is some evidence that social inequality and unsound environmental management and environmental scarcity may lead to conflicts between different groups of users and stakeholders. However, relationships between conflicts and resource scarcity are complex; conclusions about causality are contested, and gender implications are

Table 2.1: Contribution of environmental factors to human health, 2012

Disease group	Males			Females		
	Total DALYs ('000)	DALYs attributable to the environment ('000)	Percentage attributable to the environment	Total DALYs ('000)	DALYs attributable to the environment ('000)	Percentage attributable to the environment
Infectious, parasitic, maternal, neonatal and nutritional causes	481 530	105 513	21.9	443 308	96 209	21.7
Noncommunicable diseases	790 449	154 587	19.6	715 852	121 637	17.0
Injuries	206 480	77 628	37.6	98 155	40 838	41.6
Total	**1 478 459**	**337 728**	**22.8**	**1 257 315**	**258 684**	**20.6**

Source: Prüss-Ustün *et al*. (2016)

seldom drawn (Koubi *et al*. 2014, Mildner *et al*. 2011, Kennedy 2001, Hartmann 1998).

Gender-differentiated vulnerability resulting from disasters, climate change, poverty and conflicts is related not only to health impacts, but also to access to and control over natural resources as well as access to basic services such as loans and credit, agricultural extension, market information, safe and affordable energy, and water and sanitation. The issue of vulnerability cuts across many of the assessed thematic areas, in the form of impacts due to gender inequality and pressures on natural resources and on progress towards sustainable development.

There is much interconnectivity among the issues assessed in this *Global Gender and Environment Outlook*, including land tenure in agriculture and food production; land grabbing for bioenergy and other agricultural projects, and pressures on forest land; competing water demands, including for agriculture, energy production, mining and drinking water supply; and the importance of biodiversity for food security, sustainable management of forest resources (including non-timber forest products), and marine ecosystems and the livelihoods of coastal communities. Often these issues have greater relevance than in the specific context where they are mentioned. For example, animal rights have a broader context than in livestock production, and herbicides are used not only in agricultural production but also in wide rural and urban contexts.

Global drivers and trends establish the overarching context of life on this planet. They are ideologically and culturally rooted and include gender norms. Moreover, the forces that create environmental unsustainability have often been responsible for social inequality, prominently including gender inequity. The forces that shape ecological and social systems include: political systems; economic assumptions and the financial systems that operate on those assumptions; gender power relations; and conflicts. For a more comprehensive understanding of gender equality issues, the root causes of gender inequalities need to be examined: that is, socially constructed roles and responsibilities that have resulted in centuries of domination by "masculinist" attitudes and perceptions, definitions of problems, and setting of norms and values (thereby defining deviations from the norms).

Scarcity of gender-disaggregated data

Environmental-related gender-disaggregated data are crucial for gender and environment analysis. However, in all of the assessed environmental areas, there are very limited environment-related gender-disaggregated data that can show direct links between gender inequality and environmental changes. Gender-disaggregated data, where available, are often fragmented at the level of a country or group of countries, making it almost impossible to aggregate and compare some issues among different regions.

The lack of sufficient long-term ("longitudinal") data is a further impediment to gendered environmental assessment. Correlations between gender and the environment may only become evident over long

time intervals. In several cases, although there appear to be causal relationships between gender and the environment, available evidence and data are insufficient to demonstrate that these relationships exist. For example, the impacts of extreme environmental changes, especially disasters, are almost always gender-differentiated in the short term; in the long term they may change gender roles and relationships, which would take longer to document. Reconstruction following disasters is both social and physical. Gender inequalities are often altered, for better or worse, during post-disaster social reconstruction.

Some significant large-scale efforts are under way to collect and analyze environment-related gender-disaggregated data, among them **(see Annex 1)**:

- The International Union for Conservation of Nature's (IUCN) Environment and Gender Information (EGI) platform aims to close information gaps at the nexus of gender equality and environmental sustainability by providing global data on gender and environment (IUCN 2016). Originally launched in its 2013 pilot phase as a gender-environment index, the EGI project is being transformed into an umbrella gender-environment knowledge platform.

- In 2014 UNESCO's World Water Assessment Programme (WWAP) launched a groundbreaking project to develop and test sex-disaggregated indicators for the collection of global water (UNESCO/WWAP, n.d.). Having developed a methodology and toolkit for almost 50 high-priority gender and water indicators, WWAP plans to pilot test the project. The African Ministers' Council on Water (AMCOW) made a formal commitment in 2014 to use those indicators for water assessment in Africa through country-based surveys.

- The World Bank, the Food and Agriculture Organization of the United Nations (FAO) and the World Health Organization (WHO) have all launched major efforts to collect gender-disaggregated data, some of it environment-related. FAO's Gender and Land Rights Database (GLRD) was launched in 2010 to highlight the major political, legal and cultural factors that influence realisation of women's land rights throughout the world (FAO 2016). It also serves as a platform for addressing, discussing and providing information about gender and land issues.

Nevertheless, in some areas progress on data collection has actually been reversed. The UN-Water Global Analysis and Assessment of Sanitation and Drinking-Water (GLAAS) by WHO collects specialized data on water and sanitation services through a survey of national governments. The 2011 survey collected gender-disaggregated data on human resources and on provisioning for women in water, sanitation and hygiene (WASH) programmes. The gender focus entirely disappeared in the 2013-14 survey and there are no gender-disaggregated data in the 2014 report (Fletcher and Schonewille 2015, WHO and UN Water 2014, WHO and UN Water 2012).

The most recent Framework for the Development of Environment Statistics (FDES) (2016) prepared by the UN Statistics Division to provide guidance for nationally based environment statistical systems recommends only five topics (all under the rubric of environmental health) out of a total of 60 for gathering gender-disaggregated data. While the FDES recommends data collection on topics such as environmental perception and awareness, preparedness for disasters, deaths in natural disasters, and access to basic human settlement services (including water, sanitation and electricity), recommendations on gender disaggregation are not included. In the real world, as this GGEO report and dozens of others establish, all these topics are significantly gender-differentiated, yet the high-profile and highly influential global statistical regime established by the FDES does not reflect the importance of gender in regard to them (UN/DESA 2016).

The requirements of data collection for the Sustainable Development Goals (SDGs) are likely to accelerate efforts to systematically collect not only sex-disaggregated but also gender-disaggregated environmental data **(Box 2.1).**

Box 2.1: Gender statistics

"Gender statistics are defined as statistics that adequately reflect differences and inequalities in the situation of women and men in all areas of life… First, gender statistics have to reflect gender issues, that is, questions, problems and concerns related to all aspects of women's and men's lives, including their specific needs, opportunities and contributions to society. In every society, there are differences between what is expected, allowed and valued in a woman and what is expected, allowed and valued in a man. These differences have a specific impact on women's and men's lives throughout all life stages and determine, for example, differences in health, education, work, family life or general well-being. Producing gender statistics entails disaggregating data by sex and other characteristics to reveal those differences or inequalities and collecting data on specific issues that affect one sex more than the other or relate to gender relations between women and men. Second, gender statistics should adequately reflect differences and inequalities in the situation of women and men. In other words, concepts and definitions used in data collection must be developed in such a way as to ensure that the diversity of various groups of women and men and their specific activities and challenges are captured. In addition, data collection methods that induce gender bias in data collection, such as underreporting of women's economic activity, underreporting of violence against women and undercounting of girls, their births and their deaths should be avoided…"

Source: UNSD (2015)



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FOOD PRODUCTION AND FOOD SECURITY

Key Messages

- Closing the gender gap in access to and control over resources such as land and production inputs, and in access to information and technology, would increase agricultural productivity and therefore reduce poverty and hunger.
- Subsistence farming, home food production and wild food collection (sectors heavily dominated by women) are not sufficiently valued in national and global data sets, nor by research and extension services. Yet they contribute more to household food security and gender equality than does the production of commodity crops, especially in times of price and market instability.
- The environmental impacts of the currently dominant high-input, large-scale model of agriculture and the failure to meet food security goals, together with the onset of the effects of climate change, have led to widespread acknowledgement that a "business-as-usual" approach to agriculture is inadequate.
- Women and men may be exposed to agricultural pesticides and related hazards along different pathways. The health effects of chronic pesticide exposures on women and men vary considerably.
- The prevalence and nature of food insecurity differ across types of households and within households. Within food-scarce households, women and men typically use different strategies to cope with food insecurity.
- Agroecological approaches that consider the entire food system (including ecological, economic and social dimensions) supports gender equality. Such approaches can reduce the environmental impacts of agriculture, promote participation and decision-making by women and men, and so contribute to both food security and food sovereignty.

2.1

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> Women in agriculture and rural areas have one thing in common across regions: they have less access than men to productive resources and opportunities. The gender gap exists for many assets, inputs and services, including land, livestock, labour, education, extension and financial services, and technology. It imposes costs not only on women themselves, but on the agriculture sector, the broader economy and society as a whole. Closing the gender gap in agriculture would generate significant gains for the agriculture sector and for society. If women had the same access to productive resources as men, they could increase yields on their farms by 20-30%. This could raise total agricultural output in developing countries by 2.5-4%, which could in turn reduce the number of hungry people in the world by 12-17%.
>
> State of Food and Agriculture. Women in Agriculture: Closing the Gender Gap for Development (FAO 2011)

Gender aspects of agricultural production and food (in)security

Globally, food production systems are under stress and are largely unsustainable in their present form. The Food and Agriculture Organization of the United Nations (FAO) has warned that the current dominant model of food production cannot meet the food security challenges of the 21st century and that food production systems need to become more sustainable, inclusive and resilient (FAO 2015a, FAO, IFAD and WFP 2015, FAO 2015c). The negative environmental impacts of current agricultural practices include soil erosion and damaged soil structure; altered food web structure and function; contamination of the atmosphere, soil, groundwater and surface waters; deforestation to meet new needs for farmland; nitrogen and phosphorous losses to the ocean and inland water bodies, resulting in algal blooms and reduced fishery resources and biodiversity; greenhouse gas emissions; disrupted marine food webs; and unsustainable water use (UNEP 2012).

Gender inequality is one of the main reasons the "agricultural sector is underperforming in many countries" (FAO 2011). In a study of three Sub-Saharan African countries, "unconditional" and "conditional" values were calculated for the gender gap in agricultural productivity. The unconditional gender gap is the difference in the value of output per hectare between women and men farmers; the conditional gender gap takes into account the plot areas farmed and agroclimatic conditions (UN Women, UNDP-UNEP PEI and World Bank 2015). (The conditional gender gap in these countries is even wider than the unconditional gender gap). Closing the gender gaps will result in increases in GDP, in crop productions, and poverty alleviation **(Table 2.1.1)**.

In addition to increased productivity and income for both women and men, closing the gender gap in agriculture can generate a range of other social and economic benefits (FAO 2011). For example, women spend a larger share of their income on children's nutrition, health and education than men (UN Women, UNDP-UNEP PEI and World Bank 2015, World Bank and ONE 2014).

Global climate change undermines efforts to produce high-quality, nutritious food. A recent modelling study predicts that it could have substantial future dietary health effects, and that these could exceed other climate-related health impacts (Springmann *et al*. 2016). At the same time, much of the food currently grown for human consumption is never eaten, with significant economic, social and environmental effects (WRI 2016, IMECHE 2013, FAO 2013, IIED 2013). Sustainable Development Goal 12 ("Ensure sustainable consumption and production patterns") includes a specific food waste reduction target: "by 2030, to halve per capita global food waste at the retail

Table 2.1.1: Estimated increases in crop production, GDP, and number of people lifted out of poverty that could be obtained by closing the gender gap in Malawi, Tanzania and Uganda

Country	Unconditional gender gap %	↑ In crop production (%)	↑ In total GDP (US$ million)	↓ In poverty (people)
Malawi	28	7.3	100	238,000
Tanzania	16	2.1	105	80,000; + 80,000 better nourished
Uganda	13	2.8	67	119,000

Source: UN Women, UNDP-UNEP PEI and World Bank (2015)

and consumer levels and reduce food losses along production and supply chains, including post-harvest losses". Greenhouse gas (GHG) emissions generated as a result of global food loss and waste are almost equivalent to those from global road transport (FAO 2015b, Hanson *et al*. 2015).

While climate change affects everyone, its impacts on food security are not gender neutral. Women in developing countries are often largely responsible for tasks such as procuring water and fuel for heating and cooking, which will become more difficult as the effects of climate change become more severe (Temm 2015, Habtezion 2013, Habtezion 2012). The need to better understand and respond to climate change can bring women and men together, including through becoming more aware of the importance of gender in regard to the causes of climate change and mitigation and adaptation strategies (Jin *et al*. 2015, Dankelman 2010, Roehr 2007). The latest report by the International Panel on Climate Change (IPCC 2014) highlights vulnerability to climate change (and to the impacts of some mitigation and adaptation responses) due to gender and other factors, including class, ethnicity and age. A recent study by the RIO+ Centre and the Food, Agriculture and Natural Resources Policy Analysis Network which looks at the complex relationship between gender and climate-smart agriculture (CSA) emphasizes the need for both gender-smartness and people-smartness in achieving CSA's aims of food security, higher farmer incomes, and low-carbon agricultural practices (Perch 2015).

The 1996 World Food Summit defined food security as existing "when all people at all times have access to sufficient, safe, nutritious food to maintain a healthy and active life" (FAO 1996). Nevertheless, food security, as the World Health Organization (WHO) points out, is "a complex sustainable development issue, linked to health through malnutrition, but also to sustainable economic development, environment and trade" (WHO 2016a). Greater gender equality is essential to achieve global food security (Carliez 2015, FAO and ADB 2013, Sachs 2013).

Food sovereignty was defined in the 2007 Declaration of the Forum for Food Security (Nyéléni Declaration) as "the right of peoples to healthy and culturally appropriate food produced through ecologically sound and sustainable methods, and their right to define their own food and agriculture systems" (Nyéléni 2007). Food sovereignty is "more fluid and nuanced than the concept of food security" (Sachs 2013). Its key components include the right to food, valuing farmers and farmworkers, local production and control, and environmental sustainability (Sachs 2013, Patel 2012, Pimbert 2010). While women's rights are central to food sovereignty in view of the key role they play in food production, procurement and preparation, family food security and food culture, attempts to systematically integrate gender into food sovereignty analyses have so far been inadequate (Park *et al*. 2015). In the context of globalization, a persistent focus on producing more food to "feed the world" can be seen as undermining the need to focus on local food availability (Billen *et al*. 2015). This focus may also detract from the importance of gender equality in production and distribution, as well as from the policy alternatives that would promote sustainable agriculture and local food security (UN Women 2014, Sachs 2013).

Both food security and food sovereignty are gender-differentiated and demographically differentiated. Although there has been progress in alleviating poverty and reducing hunger in the world, the number of undernourished people has increased in the last two decades in Africa (to 232.5 million) and Oceania (to 1.4 million) (FAO, IFAD and WFP 2015). Those most at risk of going hungry are often directly involved in producing food. Small-scale African farmers, around 70% of whom are women, are a prominent example (Kenton 2012). However, in every country food security is a challenge. No gender-disaggregated data exist for the total number of undernourished people at global or regional levels, but women are at higher risk of being undernourished than men; during periods of food scarcity they eat less than men in terms of both quality and quantity **(Box 2.1.1)** (Habtezion 2012, Sethuraman and Duvvury 2007).

There are clear gender differences in food security within households, even in predominantly food-secure countries **(Box 2.1.2)**. In many cultures, perhaps most, presumptions are widespread that men deserve or need to have access to the best food, the most food, and the most protein-rich types of food. Periods of acute food scarcity and famine render such inequalities even starker (Bridge Development 2014). Greater empowerment of women can be a potent tool for combating hunger as women prioritize expenditures on food and health – especially for children – with consequent reductions of malnutrition (FAO and ADB 2013, FAO 2011). Food

Box 2.1.1: Micronutrients and food security

Food security is about both food quality and quantity. Even if the amount of food available is sufficient, lack of dietary diversity may persist as well as micronutrient deficiency. For example, iron deficiency anaemia is the most frequent nutritional problem in both developing and developed countries, affecting mainly infants, children during early childhood, and pregnant women. Some 2 billion people (over 30% of the world population) are anaemic, many due to iron deficiency; in resource-poor areas this problem is frequently exacerbated by infectious diseases (WHO 2016). Over 1 billion women and girls suffer from micronutrient deficiencies. Over 500 million of them are anaemic, millions are stunted, and their growth and development are compromised (Spicer 2015, Darnton-Hill *et al*. 2005). The "homogenization" of agricultural production systems, mainly through intensification coupled with specialization by plant and livestock breeders and the harmonizing effects of globalization (CBD n.d.), leads to the loss of micronutrient-rich traditional crops and of wild foods including leafy vegetables (Bharucha and Pretty 2010). Above all, this affects the poor, especially women and girls who too often have little else to eat (Koningstein 2013, Pingali 2012).

security is more precarious where men control the use of household income, as they tend to spend a smaller share on food compared to women (UNEP-UNCTAD 2008).

The prevalence and nature of food insecurity vary considerably across types of households. Households headed by women, by youth (female or male), and by lesbian, gay, bisexual and transgender (LGBT) individuals are particularly affected by food insecurity (UN 2014, Boris *et al*. 2008, Gates, 2014). In the United States, where 14% of all households were identified as "food insecure", the highest rate of food insecurity (34%) was found in female-headed households; 23% of male-headed households were food insecure (Coleman-Jensen *et al*. 2014). There is some evidence that LGBT people in the United States, especially those raising children, experience disproportionate levels of food insecurity (defined as not having enough money to feed themselves or their families at some point in the previous year) **(Table 2.1.2)**. In Rwanda, where many orphaned children were left to fend for themselves and their siblings following the conflict in the 1990s, food insecurity among youth-headed households was very high. Almost half (44%) of these households reported eating only one meal per day during the previous week (Boris *et al*. 2008).

Table 2.1.2: Percent of adults in the United States who experienced food insecurity for themselves or their families (in the previous year), by sexual orientation, 2012

Sexual orientation (self-identified)	Percentage
LGBT adults	29
LGBT-identified women	34
Non-LGBT women	20
LGBT-identified men	24
Non-LGBT adults	18

Source: Gates 2014

Access to work, land, inputs and services

Women and men tend to have different roles and responsibilities in food production. While gender-based patterns are context-specific, global trends indicate that while women play important roles in agriculture, fishing and non-timber forest product activities, they have limited access to or control of land, labour and finance. These inequalities are reinforced by development processes in many countries that are unfavourable to women (e.g. where there is male bias in agricultural extension programmes) (IAASTD 2009).

Agricultural work: In 2015, 43% of those economically active in agriculture globally were women (FAO 2015d). The level of female agricultural employment is generally higher in developing countries than in developed ones. However, in 2010 the agricultural sector in Canada had 52.6% female workers (compared with 25.9% in the United States); the State of Palestine had a very high share of female agricultural workers (72.5%), while seven countries (mainly in West Asia and Africa) had a share greater than 60% (FAO 2011). In countries and cultures where women do most of the farming in rural areas, they are also likely to be responsible for most urban agriculture (Pimbert 2010). In more than 20 countries (including Qatar and Tuvalu) there are reportedly "no women" employed in agriculture (FAO 2011).

Often contributions by women to agriculture are hidden or underestimated in formal statistics. Statistical systems typically focus on formal employment in agricultural sectors and on commercially related agriculture. This

Box 2.1.2: Gender-disaggregated experiences of food insecurity within households in Bangladesh

Women and men in the same households in Bangladesh were asked about their experiences of food insecurity. The authors of the study concluded that the notion of "household" food insecurity is not particularly useful, given their findings that "certain food insecurity-related manifestations are not collectively or similarly shared by members of the same living space". Some of the greatest differences between responses by adult female and adult male householders included:

	% women reporting "yes"	% men reporting "yes"
Personally could not buy snacks for family	66.8	20.5
Personally took food on credit from a local shop	20.8	41.5
Personally borrowed food from neighbours	31.1	13.4
Reporting the family did not eat meat	54.3	38.0
Personally ate less food	45.8	37.2

Source: Coates *et al*. (2010)

bias shrouds the considerable contributions to food security made by women through activities such as subsistence agriculture **(Box 2.1.3)**, collection of wild foods and home gardening. For example, official statistical data provided to FAO reported that although 25% of Tuvalu's workforce was employed in agriculture, no women were "economically active" in that sector (FAO 2011). However, it was also reported that Tuvalu's female rural employment rate is 11.8%, but that women mainly work in the informal subsistence economy – a sector not recognized in the FAO figures (UN Women 2015).

Failure to include subsistence agriculture in national and global datasets might suggest that this type of agriculture is relatively unproductive and unimportant. In reality it provides millions of people with food security. The diverse types of food produced in subsistence systems contribute more to household food security and to women's autonomy than do commodity crops, especially in periods of price and market instability (Sachs 2013). Subsistence agriculture should therefore not be seen as a "primitive" stage on the way to commercial agriculture; along with wild food collection and home food production, it needs to be accorded its real value, consistent with the growing emphasis on valuing "uncommodified work", agroecological systems, and home gardening to feed households in developed countries (Bharucha and Pretty 2010). Most agroecological systems in the world are operated by networks of smallholders (Scialabba *et al*. 2014).

Access to land: Access to and ownership of land are of fundamental importance for food production and food security. Gender equality – or inequality – in land access and ownership are determined by who owns the land, who is the titular head of household, and who has decision-making power over the land and its uses (Akinboade 2008, Deere and Doss 2006, Deere and de Leon 2001, Agarwal 1994). FAO's *Voluntary Guidelines on the Responsible Governance of Tenure of Land, Fisheries and Forests in the Context of National Food Security* (2012) promote gender-equal tenure rights. These *Guidelines* recognize that women who are already socially and economically marginalized are particularly vulnerable when land tenure governance is weak.

A recent study on the gender dimensions of land governance transformation reviewed 14 empirical community case studies from several countries. It found that tenure reforms appeared to solidify men's access to (and control of) land and other natural resources, even in cases where women were the dominant agricultural producers and male outmigration was increasing. This phenomenon is referred to by the authors as the "masculinization of rural space" (Archambault 2015).

There are significant gender gaps in many countries with respect to access and legal rights to land resources (FAO 2011). In more than half the countries in the world customary, traditional and religious practices discriminate against women even when statutory law guarantees them the same rights as men to own, control or use land. Thus cultural norms prevent full implementation of equal-tenure legislative efforts. In 4% of countries women explicitly have no legal right to own, use and control land **(see Figure 1.4 in Chapter 1)**.

Box 2.1.3. Subsistence farming and fishery tasks are essential to many households' livelihoods

Subsistence agricultural and fishery workers grow and harvest field or tree and shrub crops, grow vegetables and fruit, gather wild fruits, medicinal and other plants, tend or hunt animals, catch fish, and gather various forms of aquatic life in order to provide food, shelter and a minimum of cash income for themselves and their households. Tasks include:

- preparing the soil, sowing, planting, tending and harvesting field crops;
- growing vegetables, fruit and other tree and shrub crops;
- gathering wild fruits, medicinal and other plants;
- tending, feeding or hunting animals mainly to obtain meat, milk, hair, skin or other products;
- fetching water and gathering firewood;
- catching fish and gathering other forms of aquatic life;
- storing or carrying out some basic processing of their produce;
- building shelters and making tools, clothes and utensils for use by the household;
- selling some products at local markets;
- performing related tasks.

Source: ISCO (2004)

In a number of countries there is a significant disparity between the share of agricultural land holders who are female and the share of women who are heads of rural households **(Figure 2.1.1)**.

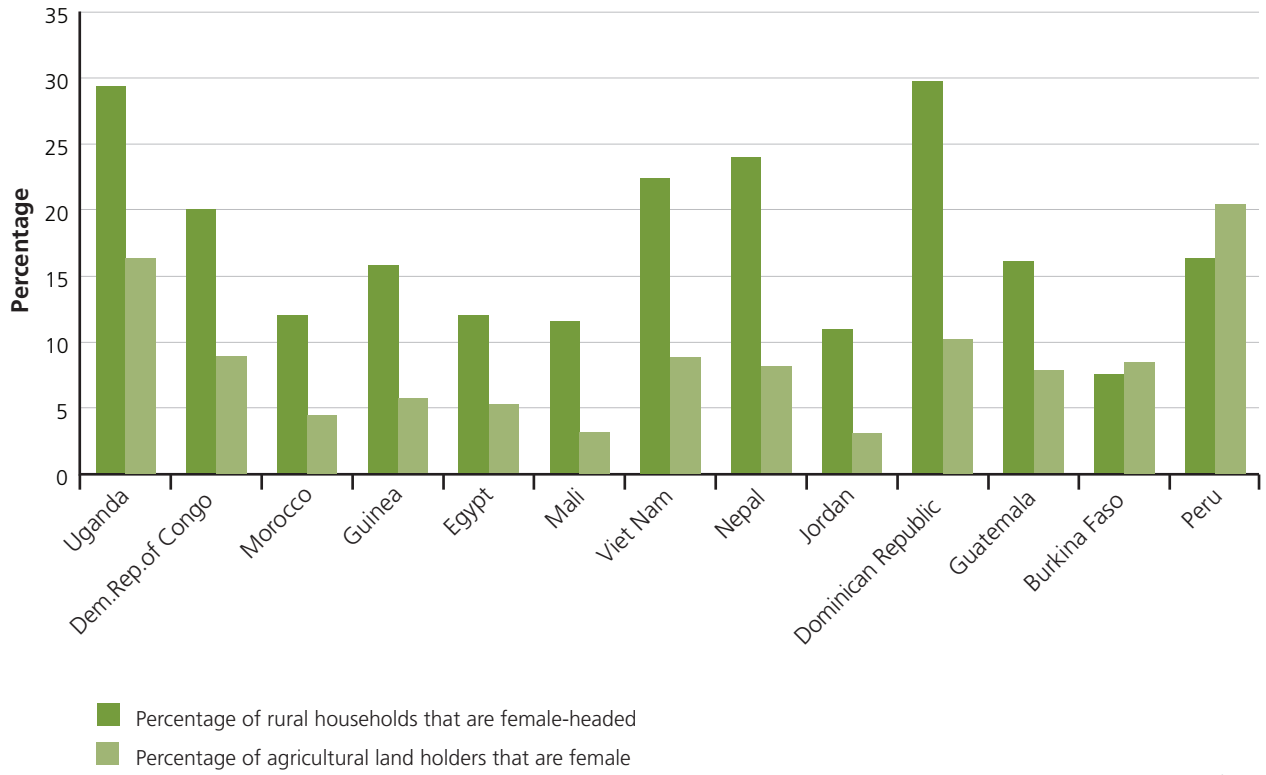
Assessments of gender equality need to include evaluations of the qualitative aspects of land ownership. Evidence from South Asia suggests that even when women own land, the plots they are allocated are often smaller and less fertile than those belonging to men (Rao 2011). Inheritance laws can have a direct impact on land ownership. By determining who will have access to land, or whether land being used by individuals will legally continue to be used by them, inheritance laws (and procedures for implementing these laws) may either stabilize families or produce conflict. Divorced and widowed women and orphaned children are particularly vulnerable to being evicted from land on which they depend for their survival (Rafia 2014, Habib 2013, Budlender and Alma 2011, Izumi 2007).

When land is in the hands of women, their decision-making capacity and livelihoods are improved, which is likely to have a positive impact on the health and well-being of their children (Paris *et al*. 2015). The consequences for women farmers of lacking security of land tenure include inefficient land use (resulting in lower yields) and reduced access to credit and to external inputs (World Bank 2011).

Gender and agricultural irrigation: Infrastructure to irrigate, store, and direct water to meet food-production needs is essential for most agricultural systems in the world. It may become even more important as a way to increase resilience against climate variability and climate change. However, the current management of and access to irrigation water are not equally distributed between men and women.

Larger-scale and publically funded systems are almost universally controlled by men and favor male farmers. In some countries this reflects a colonial legacy: as documented in Latin America (Boelens and Bustamante 2007; Vera Delgado 2012), Africa (Rogers 1981; Van Koppen *et al* 2006), and South Asia (Zwarteveen 2008), this was justified by an ideology of male heads of households and providers occupying the public sphere, while women were domesticated as housewives in the private sphere. In decolonizing, most newly-independent government irrigation departments largely continued this. Women were discriminated against in the allocation of irrigable land, in membership of water user associations, and they were excluded from technical training to construct, operate and maintain infrastructure. Men were also the sole beneficiaries of other agricultural support provided in irrigated areas, such as training, credit schemes, inputs, and markets (Merrey and Baviskar 1997). Even when land ownership is formally the key criterion for membership in water user associations and irrigation committees, women

Figure 2.1.1: Shares of rural households that are female-headed and of agricultural land holders who are female, sample countries



Source: FAO (2011)

land owners can be excluded in practice (Agarwal 1994; Van Koppen 2002; Vera Delgado 2011). Women farmers who are often the most in need of irrigation water are excluded from the formal and informal decisions about allocation schedules in male-dominated public spaces. So they have to accept the less advantageous irrigation turns, including night irrigation. Yet, social norms forbid women to be out in the night, so they are even more vulnerable to gender-based violence. Taboos against women undertaking technical construction and maintenance work on irrigation systems can be particularly strong. Yet, participation in these works are the primary way to confirm rights to the water of the infrastructure. Thus, women farmers are left with the choice to claim their right to construction work (Van der Grift 1993), to face the taboos at a greater risk of violence, or ask male kin or paid labourers to work on their behalf.

Since the financial and food crisis of 2008, foreign and national corporate agri-businesses have acquired large tracts of (potentially) well-watered land. Driven by a goal of profit making, these corporations typically co-opt local male elites to facilitate land wand water-grabs, while women and poor men are marginalized and dispossessed from their local land and water resource management (Mehta *et al* 2013).

Access to financial services: Access to financial services is generally a challenge for women and men living below the poverty line. In most parts of the world, female farmers and fishers generally have less access to financial services than their male counterparts. Within households access to credit may not be gender neutral, as women often have less control over fixed assets that can be used as collateral. Even if women can obtain credit, traditional cultural practices often require them to relinquish control of a loan to male household members (FAO 2011). Where formal credit is not readily available, in many cases women have organized to assist each other through self-help microfinance groups. With sufficient resources, microfinance services can help women and their families address short-term household food insecurity, as they may be able to, for example, start small livestock schemes or invest in agricultural inputs (Gameen Bank 2016, KIVA 2016, WMI 2016, World Bank 2015).

Access to production inputs: The need of rural women and men for microfinancing is often driven by the high costs of external inputs including commercial fertilizers, pesticides and seeds, all of which could increase agricultural productivity. In the study of the cost of the gender gap in agricultural productivity in three Sub-Saharan countries **(Table 2.1.1)**, lack of

access to agricultural inputs and machinery explains a considerable gap in agricultural production between women and men in Malawi (18%), Uganda (9%) and Tanzania (8%) (UN Women, UNDP-UNEP PEI and World Bank 2015). In nearly all countries for which data exist, male-headed households are more likely to use commercial fertilizers than female-headed ones. They are also much more likely to use insecticides, improved seeds and mechanized agriculture (Peterman *et al*. 2010). Lower use of agricultural inputs by women reflects not only credit constraints, but also lack of access to extension services and markets (Dolan 2004).

In addition, these differences reflect women's interest in sustaining their traditional role as seed collectors and savers, a role that gives them a special status (IRDP 2014). The widespread shift to hybrid seed varieties in recent decades prevents women collecting seeds, undermining their status as well as food security, especially in developing countries (Bhutani 2013). In many cultures, women have traditionally been the keepers of deep knowledge of the plants, animals and ecological processes around them. The erosion of biodiversity driven forward by industrial agriculture has therefore had specific impacts for women as food producers and caregivers, including a loss of knowledge related to seeds, food processing and cooking (IPES-Food 2016).

In recent years, community seed banks that preserve local seeds have been re-established in some areas and are frequently managed by women. This activity gives women a measure of autonomy while contributing to agrobiodiversity and climate change resilience. Participatory plant-breeding schemes to improve seeds further enhance women's status in farming (Fitzpatrick 2015).

Access to appropriate tools and information: Even where access to mechanized farm equipment such as tractors, tillers, mechanical weeders and seeders is relatively gender-equitable, women are disadvantaged since such equipment is often designed for use by an "average" male. Women's average lower weight and height, and lesser muscular power, mean tools and equipment may not be well suited to most of them or indeed to small men. Yet women perform much of the physical work required in agriculture, such as weeding. Redesigning or making available better farming tools and equipment (and introducing or increasing the use of personal protective equipment) would improve efficiency, reduce the number of accidents in which women, men and children are harmed, and contribute to gender equity (Molineri *et al*. 2015, FAO 2011).

Access to extension services: Extension and other rural advisory services help farmers learn about new crop varieties, livestock breeds and agricultural best practices, among other types of practical information. They may learn about environment-friendly techniques of seedling production, soil conservation, pest management and post-harvest processing (Petrics *et al*. 2015, Ragasa 2014, Jafry and Sulaiman 2013, GFRAS 2012). However, according to a 2011 FAO report on 97 countries, only 5% of extension services were directed to women; further, only 15% of extension personnel were women so that in some cultures women engaged in agriculture were effectively barred from participating.

In Ethiopia, where traditional gender divisions of

Box 2.1.4: Using mobile phones to share information useful to farmer

Globally, the use of mobile phone technology to share agricultural information (e.g. on markets, weather conditions and farming best practices) has greatly increased in the last decade or so. However, women and men do not always have equal access to information or to technology such as mobile phones, internet connections and computers. In several countries, micro-insurance drought protection schemes are operated almost entirely through deploying mobile phone technology to provide information about growing conditions and to pay out insurance settlements (Burness Communications 2010). In Ethiopia the government piloted a programme in 2014 to provide agricultural extension services via mobile phones (Ethiopia ATA 2014). Programmes for disseminating advice and best-practices knowledge also exist in other countries. Nevertheless, using mobile technology may exacerbate gender differences in access to information. A global survey of mobile phone use found that women were significantly less likely than men to own a mobile phone: in Africa, 23% less likely; in the Middle East, 24%; and in South Asia, 37%. "Household" ownership of a mobile phone did not mean women and men had equal access to it: 82% of married women reported that using these phones made their husbands suspicious and, in many cases, husbands would not allow their wives to use the phone at all (GSMA Development Fund 2012).

agricultural activities constrain women's access to extension services (World Bank and IFPRI 2010), 12-22% of agricultural extension workers (district agents) on duty in 2009 were women (Davis *et al*. 2010). A later study in Ethiopia (Elias *et al*. 2015) highlighted the biased attitudes of extension workers and underscored linkages between lack of credit access and level of education: extension workers were encouraged to target resource-rich farmers, while women, who typically had poorer access to resources, were neglected. The authors recommend that differences between women and men in terms of productive assets be considered in the design of gender-responsive services, along with the importance of minimizing the effect of quantitative targeting of clients.

There is also inequitable access to these services in developed countries. For example, in the United States in 2011 systematic discriminatory behaviour by extension workers resulted in a class action suit being settled in favour of female farmers (Croppenstedt 2013). "Non-traditional" farming households (e.g. youth-headed households, same-sex households, or alternative communes and collective living arrangements) are often not recognized by authorities or agencies and thus cannot access the usual types of assistance. In many countries LGBT relationships are illegal and same-sex households face considerable social hostility. In a few places, traditional attitudes have begun to change: for example, the Department of Agriculture in the United States has introduced an LGBT liaison office (USDA 2015).

Unequal power in households: Farmers' decisions about adopting new technologies and strategies for food production are usually made within the context of households, where women and men typically have unequal power. Household members often hold different views on priorities and on which decisions will be in the household's interest. This is particularly true where adopting technologies and strategies involves higher risk, requires longer-term commitments or could have uncertain outcomes. The bargaining and decision-making power of different members of households therefore influence food production.

Strengthening women's bargaining power and overall empowerment in households is important intrinsically, but also because equity in decision-making has been linked to positive outcomes with respect to food security and the well-being of children; women's disempowerment, on the other hand, is associated with poor nutritional outcomes for themselves and children (Ziaei *et al*. 2014, World Bank 2010).

Key trends in food production

Women and men in developing and developed countries engage in food production at all levels – from home gardening (rural and urban) through subsistence farming (ISCO 2004), smallholder farming and large-scale commercial and contract farming to industrial-scale monoculture farming and work on plantations (IPES-Food 2016).

Commercialization: In many developing countries, agricultural production is increasingly shifting from the household subsistence level to a larger scale, under the influence of either community-based co-operative models or large commercial schemes. This has changed the roles of women and men and influenced intra-household power dynamics. In most cases women are excluded from large-scale, industrial and contract farming because of their lack of secure control over land, labour and resources (IIED 2015, FAO 2011). Many of the cultural impacts of industrial agriculture have accrued disproportionately to women. The general shift from traditional food crops to high-value cash crops has been associated with men taking control of land, water and productive resources at the expense of women (Monsalve Suárez & Emanuelli, 2009).

Evidence from Asia, in particular, shows that the trend towards commercial and export agriculture marginalizes and displaces women farmers (UNESCAP 2009). There is an increasing tendency to "find ways to integrate women into the globalization of food and agribusiness rather than questioning the structural politics of these processes"; they are typically allocated the worst paid jobs in commercial agricultural production and, while assuming the burden of domestic responsibilities, work extremely long hours relative to men in order to achieve "positive economic and well-being outcomes" (Joshi 2015).

Reliable data are unavailable on women's involvement in the subsistence farming, gathering of wild food, and home garden production that are essential to household food security – activities which may fall outside definitions of "employment". However, they are important actors even if they do not heavily dominate in these food production systems. Women's

home gardens in Southeast Asia and the Pacific are regarded as among the most self-sustaining agricultural systems in the world (UNESCAP 2009).

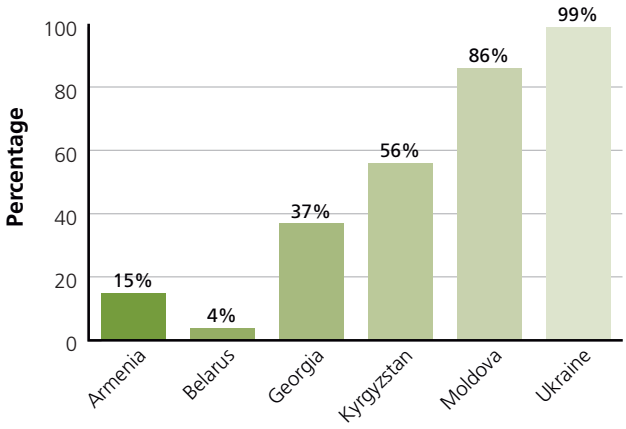
Women's roles also include processing and preparing food, which are not necessarily identified as agricultural labour but are an essential part of food production and security (UN Women 2014). While gendered roles in agriculture vary within and between countries, women everywhere spend more time on food preparation than do men (FAO 2011).

Pesticides: Pesticides are widely used in agriculture, particularly on industrial farms and plantations but also on many smallholder farms. Pesticide poisoning is a significant global public health problem; according to WHO data, an estimated 3 million cases occur every year, resulting in over 250,000 deaths worldwide (Zhang 2013). There are gender differences in pesticide use, exposures, health outcomes and environmental impacts. For example, women may be at greater risk of adverse effects from pesticides partly because of lower literacy rates, as well as limited access to training and to personal protective equipment (Jors *et al*. 2013, Naidoo *et al*. 2010).

Data on pesticide use by women and men in food production are incomplete and inconsistent. In a number of production systems in selected countries it is predominantly men who apply pesticides and are at great risk; in other countries, and on other crops, mainly women apply them **(Box 2.1.5)**. The reasons for these differences include cultural and social norms, educational levels and awareness (Gupta *et al*. 2012).

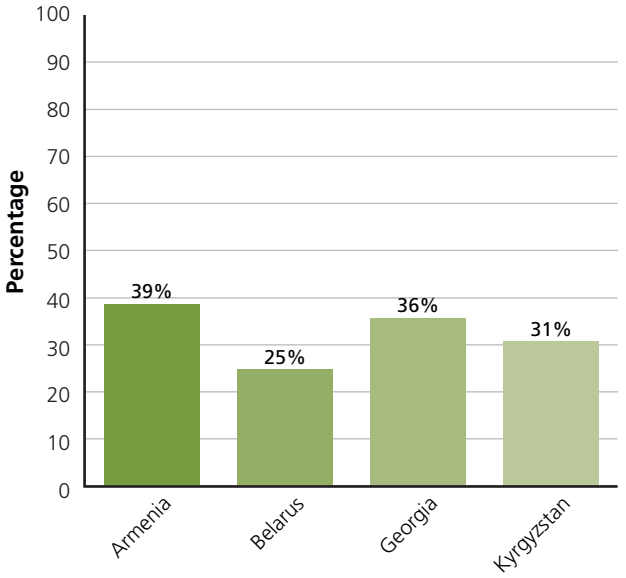
A recent small pilot study carried out by the Pesticide Action Network (PAN) UK, FAO and local NGOs in Eastern Europe and Central Asia found wide variations in the percentage of women directly handling pesticides **(Figure 2.1.2 and 2.1.3)**. However, this study identified gender variants in pathways to pesticide

Figure 2.1.2: Percentage of women interviewed who reported handling pesticides directly



Source: FAO and PAN UK (2015)

Figure 2.1.3: Percentage of women who did not directly handle pesticides but washed pesticide-contaminated clothes by hand



Source: FAO and PAN UK (2015)

Box 2.1.5: Application of pesticides

In a survey of 911 South African women farmers, 45.6% (52.5% in the drylands and 35.6% in an irrigated area) indicated they were usually responsible for spraying on their farms, some as often as twice a week during the crop cycle (Naidoo *et al*. 2008). In Indonesia women carry out the bulk of spraying on oil palm plantations in Kalimantan, using highly hazardous pesticides under unsafe conditions (e.g. leaking backpack sprayers and lack of personal protective equipment) for very low wages. These women became plantation labourers following the shifting of land ownership from the community to an oil palm company (White and White 2011). A study on pesticide use in smallholder rice production in northern Ghana found that male farmers were much more likely to use pesticides than were female farmers (82.6% compared with 17.4%) (Anang and Amikuzuno 2015).

exposure. Exposure occurs not only during spraying, but also during mixing and loading of sprayers, working in recently sprayed crops, and other activities such as weeding, thinning, harvesting, washing out of pesticide containers and, importantly, hand-washing of pesticide-contaminated clothes. Women are responsible for most of this work in most countries. Further, pesticides and sprayers may be present in domestic spaces where food is prepared. A study in South Africa found a higher frequency of pesticide poisoning symptoms among planters, weeders and harvesters (61.6% of whom were female) than among sprayers (Tsimbiri *et al*. 2015).

Gender differences in chronic effects from exposures to pesticides are also related to biological differences. Women's higher level of hormonally sensitive tissues make them more vulnerable to the effects of the endocrine-disrupting in pesticides (Howard 2003). Pregnant and breast-feeding women are at particular risk from these chemicals, as are children exposed at a time when they are developmentally vulnerable (WHO 2006). Overall, women's generally higher percentage of body fat than men means they carry more lipophilic pesticides (and for longer periods), resulting in greater internal exposure (Watts 2007, Hardell 2003). Almost 100 pesticides have been identified as potentially contributing to increased risk of breast cancer, and of these at least 63 are known to have estrogenic effects in laboratory studies (Watts 2007). On the other hand, there are some pesticides to which males are more sensitive or that may have effects specific to their physiologies, such as those that increase risk of prostate cancer (Slotkin *et al*. 2008).

Genetically modified food crops: Commercial production of genetically modified (GM) crops began in the late 1990s. These crops are increasingly embedded in industrialized and commercial food systems in several countries. More than 90% of the world's GM crops are currently grown in four countries, the United States, Brazil, Canada and Argentina. There is an extensive and growing body of literature on the economic impacts of adopting GM crops in developing and developed countries, but little evidence exists of specific impacts on female and male farmers. A gender-specific study of the introduction of insect resistant (Bt) and herbicide-tolerant (HT) maize grown by smallholder farmers in South Africa indicates that women farmers value the labour-saving benefits of HT maize and of varieties offering both insect control and labour-saving. While higher yields are the main reason for male adoption,

Box 2.1.6: Pesticides in breast milk

At least 35 pesticides have been found in breast milk in a wide range of countries, indicating exposures not only of the women concerned but also of new-born children. These exposures occur at a critical period in the child's development, when exposure to endocrine-disrupting substances can have profound and life-long impacts. Pesticides in breast milk include persistent organochlorines such as DDT as well as organophosphates, synthetic pyrethroids, and herbicides such as atrazine (Watts 2013).

More recently, the widely used herbicide glyphosate, classified by the International Agency for Research on Cancer in 2015 as a "probable human carcinogen" (IARC 2015), has been measured in breast milk in the United States (MAA and SP 2014).

Box 2.1.7: Suicides and intentional poisoning using pesticides

Ingestion of pesticides is the single most common means of suicide globally, accounting for one out of three suicides or about 300,000 annually (WHO 2014). In the Punjab region of India in the late 1990s and early 2000s, suicides by male farmers using pesticides were so common that the pesticides became known as "farmercides" (IATP 2002). Failed crops, the spiralling costs of inputs, financial hardship and loss of land are often behind farmer suicides. While global attention has been drawn to the male farmer pesticide-suicide epidemic, in rural areas of India and Sri Lanka, rates of suicide by pesticides are higher for young females aged 15-24 (Gunnell and Eddleston 2003). In China, the only country with a higher overall rate of female than male suicides (mostly by young rural women), 62% of suicide deaths resulted from ingestion of pesticides, including rat poison (Yip and Liu 2006). In a few cases documented in India and Afghanistan (and widely suspected elsewhere) women have been murdered by being forced to drink pesticides in a form of chemical "honour killing" (Economist 2010, Kumar *et al*. 2009).

female farmers tend to favour aspects such as taste, quality, and the ease of farming herbicide-tolerant (HT) crops. Women (and also children) saved significant time because less weeding (a traditional female responsibility) was required (Gouse *et al*. 2016).

Despite intense commercial pressure from GM producers and repeated assurances of the safety of GM food, there are public concerns in most countries about introducing this new technology, especially in regard to long-term health and environmental consequences **(Box 2.1.8)**. These concerns, widely shared by policy-makers, have resulted in heavy regulatory actions: far more countries ban or heavily restrict the importation, production and sale of GM seeds than allow them (Adenle 2011).

Patenting of food seeds, which is integral to the profitability of GM technology, has also raised concerns, including among small farmers (particularly women farmers) who have traditionally been the keepers of the world's seed diversity. Vandana Shiva, an Indian scientist who is highly critical of GM technology, predicts that the spread of GM agriculture will have destructive effects on both biodiversity and many women's livelihoods (Shiva 2016a, Shiva 2016b, Shiva 1999). Many agricultural analysts in developing countries view the turn to GM food as primarily driven by developed country needs: the *2006 African Environmental Outlook* notes that the high level of investment needed in GM research and its application has constrained African participation, has led to research that primarily focuses on developed country needs and, further, that "terminator technologies" will lead to increased African dependence on industrialized nations and domination of food production by a few multinational companies (UNEP and AEO2, 2006).

Gender roles in livestock tending: Of the world's 1 billion livestock tenders, almost two-thirds are rural women. Women generally manage poultry, small dairy animals, and other livestock housed and fed within a homestead, while men are more prominent in the management of grazing and larger animals such as cattle, horses and camels. The gender balance of ownership, decision-making, livestock management and marketing of livestock products is highly variable. Sometimes women own (generally small) livestock, have control over the use and marketing of products such as eggs, milk and poultry meat, and make management decisions; in other cases men exercise these functions (Staal *et al*. 2014). When livestock-based production is scaled up, control over decision-making and income often shifts to men. Male-headed households generally have larger livestock holdings (FAO 2016, FAO 2011).

Climate change is affecting gender roles in livestock tending. In the Lake Faguibine area of northern Mali, for example, as the lake has dried up men have migrated as an adaptive strategy. Women who stay behind have perceived this change as increasing their vulnerability since livestock herding, which has become more risky due to climatic changes, has been added to their workloads (Djoudi and Brockhaus 2011). An earlier study in Africa's Sahel region showed that as men migrated and women took over livestock management, the herd composition shifted away from cattle towards the smaller ruminants, goats and sheep, resulting in less damage to vegetation and lower methane emissions (Turner 1999).

Animal rights in industrializing livestock production: In developed countries an increasing share of the food supply is produced in industrialized, high-intensity agricultural operations. At the same time that animals are being treated as industrial commodities in large-scale food production systems, scientific research is increasingly establishing that non-human animals are sentient beings with complex emotional and cognitive lives (Berkoff 2013). This convergence is reinvigorating the animal rights movement. Although animal rights movements are sometimes criticized as developed world liberalism (Donaldson and Kymlicka 2011), in developing countries animal welfare and

Box 2.1.8: Gender differences in perceptions of GM foods

Where data exist, women are revealed to be generally more sceptical than men about the safety of GM food. In the United States, a survey in 2015 identified significant racial and gender differences: 47% of men but only 28% of women believed eating GM foods was safe; 41% of white Americans, 32% of Hispanics and 24% of African Americans believed it was safe (Pew Research Centre 2015). In a 2003 global survey, 73% of Canadian women believed "genetic foods are bad" compared to 52% of men; in Japan 82% of women and 69% of men believed GM foods were "bad" (Pew Research Center 2003).

protection issues are also becoming more pressing as factory farming becomes increasing prevalent. In many developing economies, conspicuous consumption of animal products, from leather to meats, by elite and upwardly mobile social groups has increased; such consumption can be interpreted as a symbol as well as a benefit of modernity and "development" (Dave 2014).

Animal rights have long been integrated with feminist environmentalism. Since the 1970s, notably in India, Oceania, the United States and Europe, women activists have constituted the primary driver of animal rights movements. Recent analyses conclude that women constitute 68-80% of participants in animal rights movements in the United States and the United Kingdom (Kruse *et al*. 2011, Lowe and Ginsberg 2002). Public opinion surveys reinforce these findings **(Box 2.1.9).**

Inland fisheries and aquaculture: Because aquaculture provides a highly nutritious source of protein and micronutrients, it is important for food security. Women tend to predominate in aquaculture (GIZ 2013, Baluyut n.d.). In India their work includes fingerling stocking, preparing and feeding fish, fertilizing and liming ponds, making and repairing nets, harvesting, and drying and marketing fish. In Bangladesh women are involved in raising fish in cages (Yadava 2014). However, aquaculture is associated with a number of environmental risks, including dependency on usually imported feed, fertilizer, antibiotics and other chemicals, as well as destruction of (or damage to) sensitive coastal ecosystems (IFPRI 2015).

In inland fisheries men tend to fish for cash, and women for sustenance. For example, in the Democratic Republic of the Congo one study found that 60% of women's catch is kept for home consumption compared with only 27% of men's (Béné *et al*. 2009). Women generally use simpler technology than men in near-coastal and inland fisheries. In parts of India they net prawns from backwaters, and in Laos they fish in canals (Diamond *et al*. 2003).

Engagement in open-sea and near-coastal fishing is highly gendered **(see section 2.5)**.

Knowledge production and expert structures in agriculture: Across low and middle income countries there are significant variations in the share of total agricultural researchers who are women **(Figure 2.1.4)** (IFPRI 2015). In Nepal, for example, where more than 60% of the agricultural work force consists of women, only 13% of agricultural researchers were women in 2012 (Stads *et al*. 2015). The higher up the research ladder, the fewer women are found on the rungs (FAO 2011).

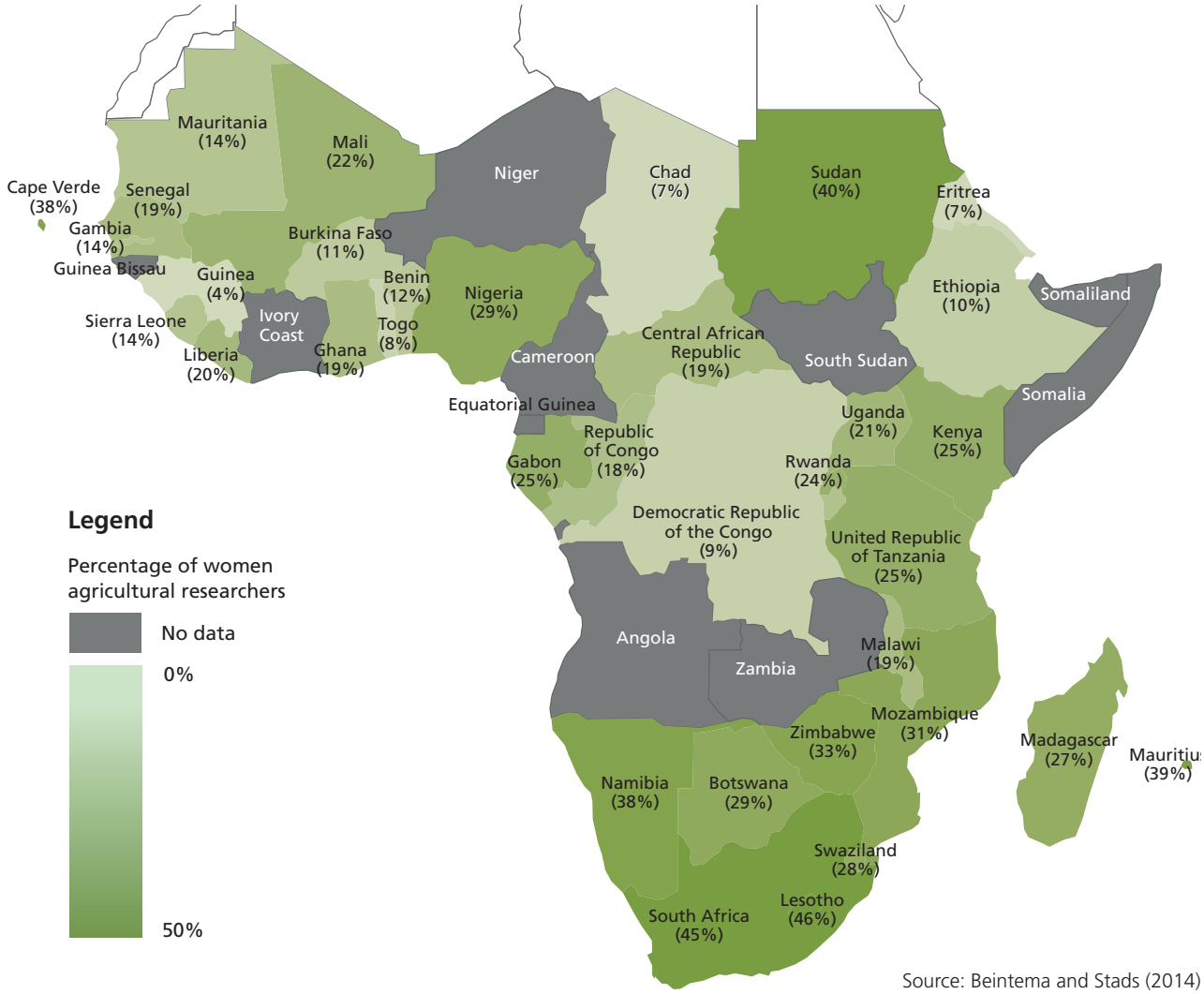
Gendered aspects of agricultural research also vary with the types of agricultural systems being researched. Often the perspectives and interests of women scientists, researchers and research managers differ from those of their male counterparts (FAO 2011). Evidence from Europe suggests that agroecological research may attract more women than men. For example, some male scientists from the National Institute of Research in Agriculture (INRA) in France have indicated that work on participatory agroecological plant breeding would not advance their careers (Levidow *et al*. 2014). The Peasant Seeds Network (RSP), created in France in 2003, has worked with a small group of plant breeders from the INRA on participatory plant breeding; all of the INRA scientists working with the RSP are women (Pimbert 2011).

In the last decade or so, there has been considerable expansion of research on gender and agriculture/food security by organizations such as the CGIAR consortium and on projects to support women smallholder farmers (CGIAR 2016).

Box 2.1.9: Gendered views on animal rights

In a 2015 Gallup opinion survey of attitudes to animal rights in the United States, 42% of women said they wanted the same rights for animals as for people compared with 22% of men (Gallup 2015). In a 2003 survey, women were 14 percentage points more likely than men to support strict laws for treatment of farm animals, 19 points more likely to support banning product testing on laboratory animals, 14 points more likely to support banning medical research on laboratory animals, and 10 points more likely to support banning all types of hunting (Gallup 2003).

Figure 2.1.4: In a sample of 37 Sub-Saharan African countries in 2011, 22% of agricultural researchers were women. Relatively more female researchers were employed in Southern Africa than in other sub-regions. 10% or fewer of agricultural researchers in West Africa, Eritrea, Ethiopia and the Democratic Republic of the Congo were women



Source: Beintema and Stads (2014)

Impacts of conflict and disasters: Conflicts, civil wars, weather-related disasters and outbreaks of diseases such as the Ebola virus result in disruptions of food production, marketing and trade. These disruptions cause potential long-term damage to the health and well-being of the poor, especially women and children (IFPRI 2015). In a number of countries, particularly in Sub-Saharan Africa, the combination of conflicts, HIV/AIDS and migration have resulted in substantial increases in the female share of the agricultural labour force (FAO 2011).

Conflict almost invariably has an impact on the availability and use of natural resources, including land and agricultural crops (Lukatela 2012). In rural settings particularly, where women directly depend on natural resources for their livelihoods and are most often responsible for acquiring them in order to meet daily household needs, women tend to be disproportionately affected by conflict.

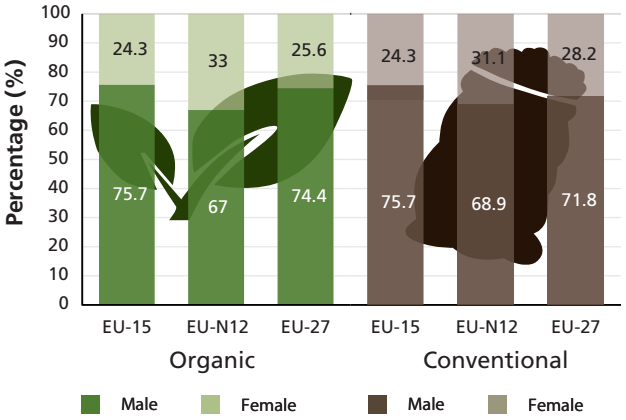
Agroecology and organic farming: The environmental impacts of the currently dominant intensive farming model of agriculture, together with the increasingly apparent effects of climate change, have led to widespread acknowledgement that a business-as-usual approach to agriculture is no longer tenable (IPES-Food 2016, IAASTD 2009). The former UN Special Rapporteur on the Right to Food, Oliver De Schutter, among others, has identified global adoption of agroecology as the best way to meet food security goals (De Schutter 2014). In 2015 the global voluntary agreement on chemicals management, the "Strategic Approach to International Chemical Management"

(SAICM), encouraged stakeholders to take concerted action to phase out the use of highly hazardous pesticides, specifically recommending the promotion of agroecological alternatives (SAICM 2015).

Agroecological techniques such as use of nitrogen-fixing green manure crops, diversified cropping, agroforestry and the use of beneficial insects to control pests focus on building healthy soils, replacing external inputs with internally generated nutrients, and relying on ecosystem balance. These techniques form the basis of organic agriculture, ecosystem-based Integrated Pest Management, sustainable forms of climate-smart agriculture, FAO's "sustainable intensification" and many subsistence farming systems. They significantly reduce the environmental impacts of food production – decreasing greenhouse gas emissions, enhancing climate mitigation and resiliency, improving soil health, enhancing biodiversity, and decreasing energy and water usage. At the same time, they provide food security for food producers and for consumers (Watts and Williamson 2015).

Case studies from South Asian countries, Brazil and Malawi confirm there is a positive linkage between an agroecological approach, especially when it is supported by participatory, farmer-led group activities, and improved gender relations and social equality in farming communities (Chan and Fantle-Lepzcyk 2015, Kerr *et al*. 2013, Lopes and Jomalinis 2011). However, there are limited gender-specific data on agroecology, and gender-differentiated trends in practising agroecology cannot be identified. For example, in Uganda female farm owners reported higher manure use than males while the reverse was true in Nigeria and Ethiopia (Peterman *et al*. 2010). A 2010 assessment of organic farm management in the European Union showed

Figure 2.1.5: Gender of farm managers of organic and conventional farms in the EU in 2010, percentages



Source: EU (2013)

virtually no gender differences between organic and conventional farmers **(Figure 2.1.5)**, while evidence for the United States suggests that women are much more likely to use sustainable and organic agricultural practices (Sachs 2013, Barbercheck *et al*. 2014).

In recent years an increasing number of projects have worked with farmers in developing countries to assist them in improving production and food security through implementing agroecological techniques. There are numerous examples of farmers having converted from chemical-intensive farming to agroecology, with resulting improvement in food security and sovereignty for both genders (FAO and PAN 2015, Watts and Williamson 2015, De Schutter 2014). This could partly result from increased household income, but more importantly it derives from increased crop diversity, which provides a wider range of food over a longer part of the year. Food diversity also provides improved nutritional value. Putting farmers, particularly women, at the centre of production and marketing decisions is a key benefit of both agroecology and food sovereignty.

Box 2.1.10: Organic farming results in good productivity

In the Philippines a study of 840 farmers found that twice as many organic as conventional farmers had increased their personal food security since 2000. Organic farmers also had a more diverse diet: they ate 68% more vegetables, 56% more fruit, 55% more protein-rich staples and 40% more meat than in 2000. Increases in consumption for organic farmers were double those of conventional farmers for vegetables, 2.7 times higher for fruit, 3.7 times higher for protein-rich staples and 2.5 times higher for meat (Bachmann *et al*. 2009).

Policy and the way forward

Increasing international attention is focused on the gender gap in food production and its costs in terms of productivity, economic performance and poverty reduction. The critical question is how to close the gender gap in agriculture in the face of the dominant trends and global drivers of food production systems **(Box 2.1.11).** Several gendered dimensions must be incorporated into policy solutions to this critical question if they are to be successful: (1) gender inequality is at least partly a result of the dominant food production system and its drivers; (2) under-representation of subsistence farmers in national and global records skews our understanding of women's true contributions to food production; (3) women's expertise, skills, knowledge, and the genetic material in seeds are more heavily oriented towards organic, agroecological farming systems that prioritize local seed varieties, biodiversity, farm-family self-provisioning, and provision to local markets where poor and hungry people can access food (Brownhill *et al*. 2016); and (4) subsistence and semi-subsistence farming are not well supported by research and extension services (IAASTD 2009).

Box 2.1.11: Key drivers of global food production and insecurity

A number of factors drive global food production and insecurity. Many reflect the influence of prevailing gender roles and norms, while the outcomes often increase gender inequality as well as negative environmental impacts. These factors include:

- policy and governance for global food production and security that encourage unsustainable use of fertilizers, pesticides, water and energy;
- increasing industrialization of agriculture, and conflicting approaches to agricultural production techniques such as genetic modification and agroecology;
- global corporate control of large sectors of land and the global food chain;
- climate change and inadequate responses through policies and governance;
- futures markets and their impact on prices, and agricultural policies that can distort world food markets;
- increasing consumption of beef and dairy products and the consequent diversion of food crops to animal feed;
- large-scale land acquisitions ("land grabbing") that displace indigenous peoples, subsistence farmers and smallholders, among others.

Sources: (IFPRI 2013, UNEP 2012, FAO 2011, IAASTD 2009)

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DOMESTIC WATER AND SANITATION

Key Messages

- Water use, supply and access are conventionally associated primarily with the hydrological cycle. Understanding that there is also a "hydro-social cycle" draws attention to gender dimensions. At every stage of the hydro-social cycle there are different demands, risks and benefits for women and for men.
- It is largely women's responsibility, everywhere, to manage household needs for water. This responsibility becomes even greater in the face of pervasive water quality problems in both developed and developing countries, which will become worse with climate disruption.
- Within households, women and men typically express different views on water priorities and the solutions to water deficits.
- Women and girls remain the primary water collectors in households where piped water is unavailable, which can place them at risk of harassment, sexual assault and rape.
- The gendered profile of water collection varies with access to mechanization: men assume water collection responsibilities mostly when mechanized transport is available.
- The health effects of polluted or poor-quality water are gendered. More males than females suffer and die from diarrhoea in every region except South-East Asia.
- Public toilet provision for women, almost everywhere in the world, lags far behind that for men. Absence or inadequate provision of public toilets for women reflects – and reinforces – women's exclusion from public power and public spaces more generally.
- Gender inequity in access to toilets has stimulated robust activist movements that are shifting women's toilet and menstrual hygiene needs from being considered a private or "hidden" concern to a more public one.
- Women are poorly represented at the decision-making level in the water and sanitation sectors.

2.2

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Recognizing the gendered dimensions of water, sanitation and hygiene

Clean water and sanitation are the basis of life and livelihoods, social capacity, health, and environmental sustainability. Yet many millions of people in the world lack even the most rudimentary means of obtaining safe water, while billions do not have sanitation facilities that are protected from outside contamination (UN 2015, UN 2014, UN-Women 2014, WHO and UNICEF 2014). Water and sanitation access, demand, provision, priority, health, organization and policy are gendered, even if this is manifested in different ways in different places. The gendered dimensions of the water, sanitation and hygiene (WASH) sector are increasingly reflected in public policy agendas, but concrete results have been partial and uneven.

The hydro-social cycle

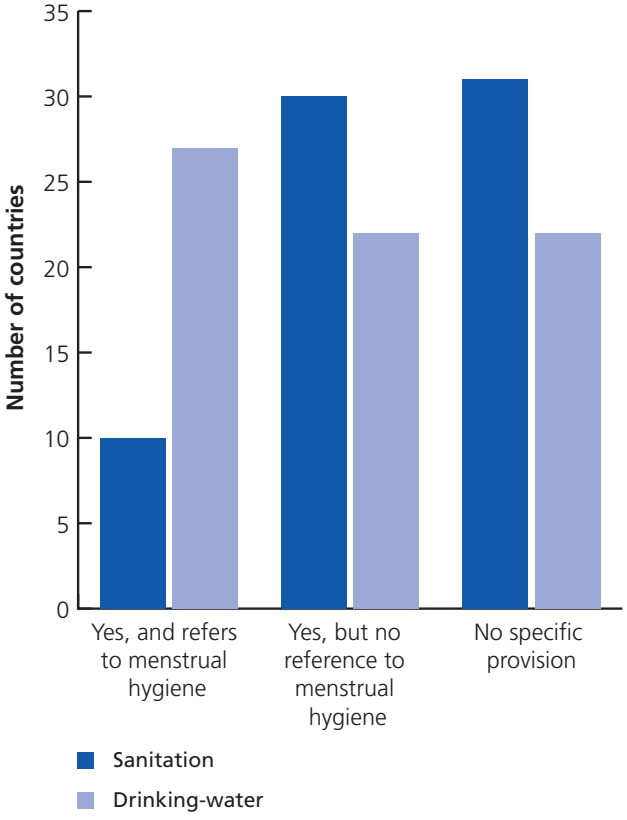
Until the 1990s, water management concepts drew heavily on the physical sciences. Water was generally thought of as a physical resource whose provision was determined, for the most part, by the hydrological cycle and physical infrastructure. However, there is growing understanding that a "hydro-social cycle" also exists (Linton and Budds 2014, Budds 2008, Swyngedouw 2006). Access to and control over water, and its management and use, are shaped as much by social factors (including gendered power relations) as by physical ones, and every stage in the hydro-social cycle involves different demands, risks and benefits for women and men (Joshi 2015, Zwarteveen *et al*. 2012, Seager *et al*. 2009, Sultana 2007, UN-Water 2006). The gendered dimensions of both the hydrological and hydro-social cycles will be disrupted by global climate change, in ways that are both predictable and unpredictable (UNFCCC 2016, World Bank 2016).

Policy and legislation

The need for gender equality in provision of clean water and sanitation has been recognized in numerous national policies and multilateral agreements since the late 1970s. However, gender analysis is still limited overall and has been introduced unevenly. A 2012 UN-Water report on national water and sanitation policies revealed that fewer than 40% of the 64 responding countries included specific equity provisions in national strategy or funding decisions that addressed women's right to water, and fewer than 20% had applied or implemented such provisions in regard to women's human right to sanitation (WHO and UN-Water 2012). Only a few countries had national policies that included specific provisions to meet women's needs, including menstrual hygiene management **(Figure 2.2.1)**.

It can be very difficult or dangerous for women and girls to attempt to meet their sanitation needs in public spaces, or even in their homes or the communities where they live. In most countries public sanitary facilities tend to be regulated at the local level. Such facilities are inadequate – especially for women and girls – almost everywhere in the world, including in markets, train and bus stations, and public event venues. The problem is compounded for women and girls living in slums and informal settlements without access to improved drinking water sources and sanitation facilities, or to durable housing, sufficient living area and security of tenure.

Figure 2.2.1: GLAAS survey of governments: Do national sanitation and drinking-water policies/strategies include specific provisions to meet women's needs, including menstrual hygiene management?



Source: WHO and UN-Water (2012)

A number of countries have recognized the human right to clean and safe water in national legislation or their constitutions (WASH United/Freshwater Action Network/WaterLex 2012, UN 2010). In the Netherlands a law passed in 2004 prohibits drinking water (but not sewerage or wastewater treatment) services from being privately owned (Hall *et al*. 2004). Many developing countries have policies in place to make safe water accessible to low-income users for reasons including social and public health objectives, environmental concerns and political considerations (African Development Bank 2016, OECD 2009, Le Blanc 2007). In 2001 the Government of South Africa made a policy decision to provide a basic amount of water to all citizens at no cost (Muller 2008).

Integrated Water Resource Management (IWRM): Managing competing economic, social and ecological water demands, especially for agricultural and industrial uses, requires a co-ordinated policy approach. Over 80% of countries have Integrated Water Resource Management (IWRM) principles in their water laws or policies and two-thirds have developed IWRM plans (African Development Bank 2016, Cherlet 2012). Studies of IWRM practices and policies reveal persistent problems related to participation, elite capture of processes and resources, and lack of awareness of the importance of local social, gender and power relations (Van Koppen *et al*. 2007). In Africa such policies may tend towards (re)centralizing power (Movik 2010) and facilitating the dominance of expert authorities (who are most likely to be male) over local knowledge and management practices (which are most likely to include women) (Shah and Van Koppen 2005, Biswas 2004). Many countries have plural, overlapping and competing formal and informal legal and customary systems; most countries in Sub-Saharan Africa, for example, are characterized by primarily informal water user practices that cannot be easily integrated into IWRM (Shah and Van Koppen 2005, Biswas 2004).

Transboundary waters: Water is almost always a transboundary resource. Aquifers, lakes, rivers and rainfall cross national borders. Almost 40% of the world population lives in some 276 transboundary rivers (GEF TWAP 2016 in press, World Bank 2016, UN-Water 2008). Multilateral and transboundary river basin and water management policies exist in many regions to address competing demands for water extraction and to share management of monitoring, pollution response, flood control and other infrastructure. Most transboundary watersheds have some form of co-operative management body (WWF and DFID 2010, Wolf *et al*. 2003). Only a minority of these bodies incorporate a substantial gender-sensitive approach. One of the few that has made strong commitments to gender mainstreaming is the Mekong River Commission, whose members are Cambodia, the Lao People's Democratic Republic, Thailand and Viet Nam. Among other elements, it requires detailed social (and gendered) impact analysis of the impacts of dams and other water resource developments (MRC 2016).

Transboundary agreements are typically negotiated at high policy levels, far removed from the users and local informal managers of water. Often they do not include use of a gender lens, although they are created out of highly gendered processes: both the political domains and the corps of professional water managers are highly masculinized (Earle *et al*. 2010). Most international transboundary water management processes are driven by a conceptual frame rooted in the "hydraulic mission" (Molle *et al*. 2009), which is manifested primarily in a preference for constructing mega-infrastructure such as dams and water transfer schemes. Such "heroic" engineering approaches are rooted in a masculinized discourse, with its emphasis on construction, command and control. The best-fit actors within this discourse are technical, economic and political elites operating in what is generally referred to as the national interest. Left out of such an approach are local communities that rely on these resources directly, including water users, women, the poor and other (overlapping) groups (UN-Water 2008).

Formal employment and decision-making

Women are poorly represented in staffing and formal employment in the water and sanitation sectors. Half the governments that responded to the 2011 GLAAS survey reported that women made up less than 10% of the professional and managerial staff in these sectors (WHO and UN-Water 2012). Since comparable data were not reported in the 2015 GLAAS update, it is not possible to assess trends.

Even when women are participants in formal decision-making processes, their interests are rarely taken into account due to gender-related inequalities and restrictive definitions of appropriate female behaviour. They are often discouraged from speaking in public fora by norms of female decorum. Women usually have less

Box 2.2.1: Involving women in water and sanitation management at the local level in Kyrgyzstan

In most Kyrgyz villages the condition of the water supply deteriorated following the collapse of the Soviet Union. In 2002 the World Bank and the United Kingdom's Department for International Development (DFID) initiated a project to improve the rural water supply by establishing community-based drinking water users' unions (CDWUUs) in rural villages in northern Kyrgyzstan. Communities were required to make a 5% cash contribution towards rehabilitation of their water systems, which was made possible through a World Bank loan. CDWUUs took responsibility for operating and maintaining drinking water supplies in the villages and for financial management, including calculation and collection of drinking water fees. While overall representation of women was low, the most successful CDWUUs were those in which women were part of the management team as bookkeepers, water quarter leaders or CDWUU chairs (UNDP and WECF 2014, Wardle 2010).

time to participate due to a heavier burden of work, which includes household tasks and childcare in addition to income generation or home-based agricultural production. Because of their inequitable upbringing and unequal access to education, as well as cultural and social norms, women often have less experience expressing their views confidently. In addition, they may be reluctant to invest time in participation, based on a strategic calculation that they have little to gain from doing so – particularly if "participation" is limited to token consultation. In the context of access to water and sanitation, decision-makers seldom take women's roles and needs into consideration even though this can be shown to work **(Box 2.2.1)**.

Water use, access, quality, production and distribution

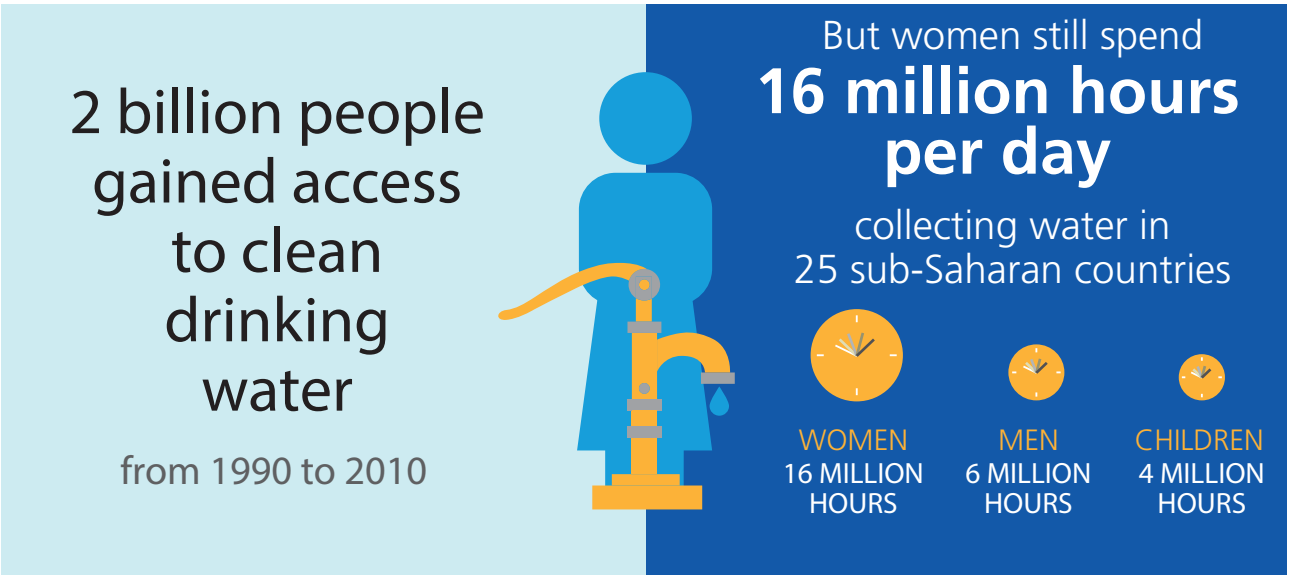
Water poverty, time poverty, access and use

Globally, about 80% of people living in urban areas (and considerably fewer in rural areas) have access to piped drinking water on the premises (UNICEF and WHO 2015). On a smaller scale there is great variability: between 2000 and 2008, 84% of households in Asia, 90% in Latin America and the Caribbean, and 97% in Eastern Europe were within a short distance ("15-minute access") of a water source (UN DESA 2010). Households in Sub-Saharan Africa, overall, had the lowest rates of 15-minute water access: only 74% of urban households in this region were within that distance of a drinking water source, and this share dropped to 42% among rural households (UN DESA 2010). In Eastern Africa 15-minute access to drinking water was particularly low (46% of households). Fewer than one-quarter of households in Burundi and Mozambique (fewer than 15% in Eritrea, Uganda and Somalia) had 15-minute water access.

Women and men everywhere are affected by water availability, access and quality, but in different ways due to prevailing gender roles and norms. In settings where water has to be collected from a source outside the home, women and girls have the main responsibility for collecting it. A 2012 survey showed women were primarily responsible for water collection in 62% of households in Sub-Saharan Africa where water needed to be collected outside the home, and girls for another 9%. In 25 Sub-Saharan countries women spent a combined total of at least 16 million hours per day, men 6 million, and children 4 million collecting drinking water **(Figure 2.2.2)** (UNICEF and WHO 2012). A 2013 study reported that in Pakistan, women spent an average of 27 hours a month (approximately 15% of their monthly work time) collecting water for household use (Agénor and Canuto 2013).

The time burden of water collection has serious ripple effects throughout women's and girls' lives. For school-age girls, time spent on water collection competes with the time they can spend on schooling. Evidence from around the world shows that water-related chores keep girls out of school **(Figure 2.2.3)** (UNICEF 2012, Haggart and McGuire, n.d). Time spent collecting water diminishes women's overall ability to control their own time and participate in other pursuits, whether waged work, recreation, cultural activities or political involvement. It also represents a tremendous economic loss: in Sub-Saharan Africa 40 billion working hours are lost every year in water collection; across India it has been estimated that women spend 150 million work days per year fetching and carrying water, the equivalent of national loss of income of 10 billion rupees (some US$160 million) (WaterAid/WaterAid/Unilever/Oxfam/NextDrop 2015). The impact of women reclaiming their time should not be underestimated. Economic surveys show women typically reinvest up to 90% of their income within their families, improving family health and nutrition and access to schooling for children (WaterAid/WaterAid/Unilever/Oxfam/NextDrop 2015).

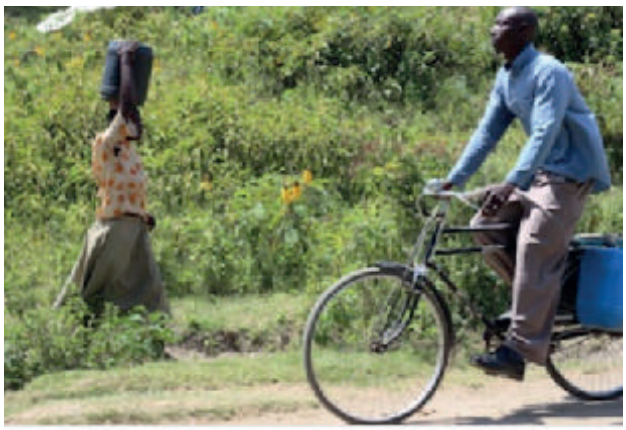
Figure 2.2.2: Access to clean water



Source: UN Women (2016)

Entrenched gendering of water-related roles creates expectations that do not serve either women or men well and are barriers to social change. In Uganda, for example, men who collect water for domestic use are negatively perceived by women as unable to afford water from vendors, as not having children, or even as being mentally unstable (UNEP/UN Women/UNPSO/UNDP 2013).

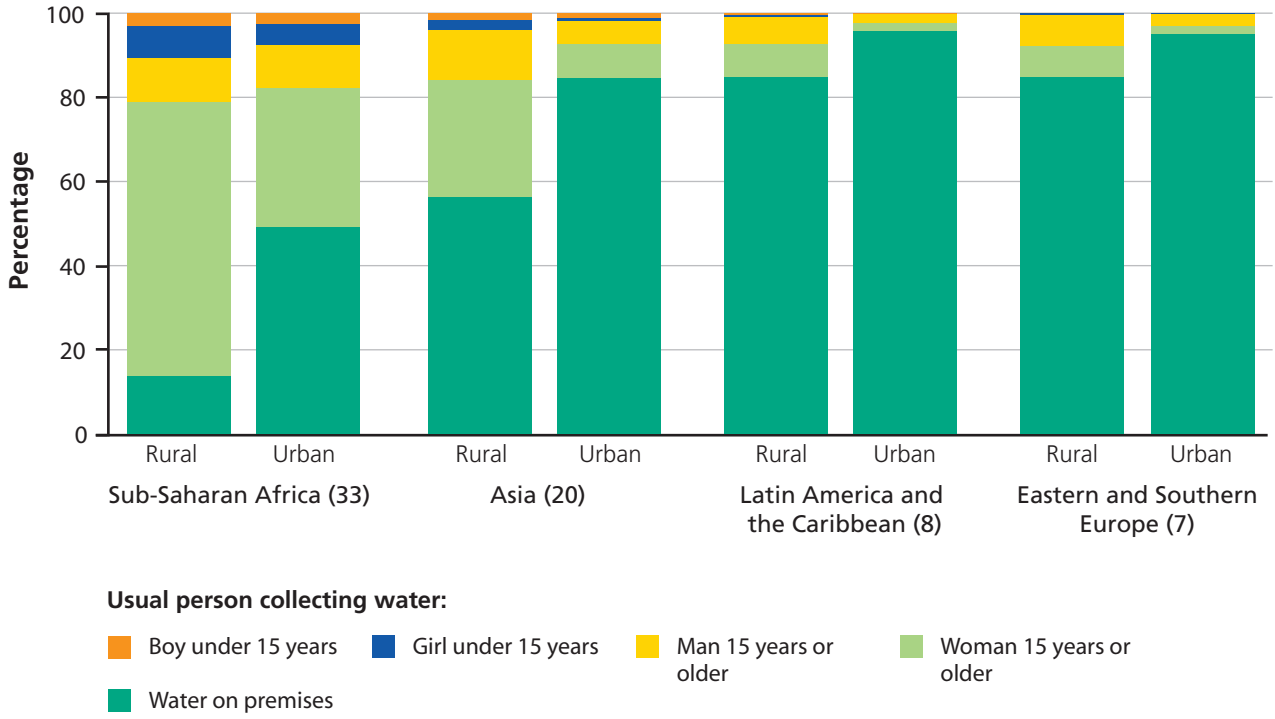
In many cases the water collection burden could be alleviated through changes in transport. However, access to wheelbarrows, carts, bicycles, scooters and draught animals, among other types of transport, is heavily gendered. There are major gender inequalities in access to such transport, as it is mostly owned and used by men. Indeed, most transport programmes and initiatives are determined by men and designed for men, and men are the major beneficiaries (Bamberger and Davis 2001, Starkey 2001, Fernando 1997). Men are also much more likely to adopt new forms of transport: women are marginalized in using these means of transport by their lower purchasing power and because acquiring and using them is often restricted by notions of cultural impropriety (Bryceson *et al*. 2003, Bamberger and Davis 2001). Cultural norms in many countries prohibit women and girls riding bicycles, driving motorized vehicles or using what are considered to be male tools. Even where such norms do not exist, men in many countries tend to appropriate the most efficient types of transport (Bamberger and Davis 2001).



Gender divisions of transportation and labour exacerbate women's burdens. Rural Kenya, 2014.
Photo credit: © Gemma Bulos

The gendered profile of water collection varies with access to mechanization. Men and boys are much more likely to collect water when they can use mechanized transport like bikes, scooters and trucks. A survey of water collection in Mongolia showed that in Ulaanbaatar men made up the majority of water collectors across all forms of water collection, but were particularly prominent in water collection by vehicle and by animal (Hawkins and Seager 2010). In 70% of urban households that collected water by vehicle men were the sole collectors, and in urban households that used horses to collect water only men performed this task. In rural Mongolian households in which water was collected by vehicle (mainly motorbike) men had sole responsibility for 48% of water collection; when it was collected by hand cart, they had sole responsibility for 31%, and in households that collected water by hand they had sole responsibility for 25% (Hawkins and Seager 2010). In rural Kenya, a study similarly showed that 87% of women who collected water reportedly

Figure 2.2.3: Distribution of households by person responsible for water collection, by region and by urban and rural areas, 2005-13 (latest available)



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

Source: UNSD (2015)

did so without mechanical assistance compared with 42% of men (WHO 2011).

Gendered labour distributions within households typically result in women and men having different priorities for water use. In rural areas men often focus on water for farming and raising livestock, and women on water for domestic needs and health and hygiene. Several studies show wide gender differences in water priorities: in India, for example, a study on the effect of women's participation in local governing councils found that female council heads tended to prioritize issues around drinking water provision while male heads put more emphasis on irrigation systems (UN Statistics 2015). Women may define themselves primarily as users of water in domestic situations and rarely be involved in other water management practices such as disinfection and well cleaning; men in charge of water management and safety, on the other hand, may have little involvement in its end use. The result can be poor water quality, chronically compromised health, and a contradictory double burden on women who are primarily responsible for household members' health but do not have the knowledge they need to meet this responsibility fully (Bader 2014). Recognizing differences such as these is particularly important in water management when there are droughts or water shortages.

While access to water depends on women's labour in many parts of the world, it also depends almost everywhere on income. In most countries potable water is not a free resource. As neoliberal economic models that emphasize privatization and the withdrawal of the state from providing public services have been adopted internationally, many governments have reduced subsidies for meeting basic needs including water (Boelens 2015, Furlong 2010). Water privatization is a key feature accompanying governments' withdrawal from the role of providing basic needs. Pressures on poor countries to privatize municipal services such as water provision often serve the interests of water corporations rather than those of the poor (UN-Habitat 2006). A convergence of pressures on developing country governments in the early 2000s (including increasing urbanization, global financial crises, falling national tax revenues and reduced international development assistance) caused many governments to cut public sector budgets and to consider withdrawing from water supply responsibilities and handing off to the private sector, especially in urban areas (Prasad 2007, Megginson and Netter 2001).

Studies of the impacts of water privatization present a mixed picture. UN-Habitat research in cities including Buenos Aires and Manila indicated that water corporations failed to expand their services to the poor in urban slums (UN-Habitat 2006). According to another study, however, child mortality in Argentina fell 8% in areas where water services had been privatized and the effect was greatest (26%) in the poorest areas (Galiani *et al*. 2005).

Generally, evidence to date concerning privatization suggests it often leads to increased water use efficiency but also to increased pressure on the poorest, who may be almost entirely unable to pay. In many cases water privatization has led to considerable cost increases for the most vulnerable groups, poor service, and disconnection of public access points. The economic crises that in many instances propelled governments to get out of the water-supply business leave individuals less able to pay for privatized water: economic crises further reduce the ability of poor households, especially women, to pay for water by severely limiting their access to income and credit. In a further ripple effect, the credit freeze at national levels, combined with shrinking donor financing, means microfinance institutions have fewer funds to loan to clients (mainly women) (CAP-NET and GWA 2014).

Water, health, and security

Water collection can be dangerous, especially for women. Walking to remote locations to collect water for drinking, cooking and clothes-washing or to use water, sanitation and hygiene (WASH) facilities, particularly after dark, puts women and girls at risk of harassment, sexual assault and rape (Anand 2014, Amnesty International 2010). Sexual minorities and other marginalized (often despised) groups may be at even greater risk. Lack of access to water can contribute to tensions and sometimes violence between spouses or partners, particularly in water-scarce or drought-affected areas. Queuing for water not infrequently leads to disputes among water users, particularly when newcomers such as refugees or other displaced people need water previously only or mainly used by the host community (House *et al*. 2014).

Women and girls in conflict-affected settings routinely experience physical insecurity, including sexual violence, when performing daily tasks linked to use of natural resources such as fuel, wood and water



A queue of water collectors in Karachi, Pakistan
Photo credit: © Asianet-Pakistan/ shutterstock.com

(Box 2.2.2) (UNEP/UN Women/UNPSO/UNDP 2013). It is not uncommon in conflict and post-conflict situations for men and boys, too, to be vulnerable to abduction, murder or rape when they visit water points outside camp boundaries (House *et al*. 2014). The aid community increasingly recognizes these problems. In 2011 the African Union/United Nations Hybrid operation in Darfur (UNAMID) distributed 30,000 rolling 75-litre containers to women in eight villages in North Darfur (Sudan) who had poor access to water and were severely affected by drought in the dry season. While the project mainly focused on facilitating water access, this simple solution helped limit the amount of time women spent fetching water, reducing their exposure to danger (UNAMID 2011). WASH teams increasingly work closely with "protection" teams in humanitarian settings to ensure that sanitation facilities not only meet women's needs, but are safe to use. This type of rolling container is being used increasingly in other countries as an alternative to head-loading.

Water shortages due to long-term climate change, short-term weather fluctuations, disasters and conflict have gendered dimensions. Individuals' capacities to cope with physical and food insecurity, displacement, loss of livelihood assets, social exclusion and other impacts are strongly influenced by gendered roles and



Women in Darfur using "hippo rollers"; the rollers ease the task of water collection, saving women time and energy.
Photo credit: © Albert Gonzalez Farran / UNAMID

responsibilities. Violent conflict can have negative effects on water quality; for example, access may be cut off by fighting, water sources and distribution infrastructure may be deliberately targeted, or institutional collapse may undermine regulation, maintenance and service provision (Troell and Weinthal 2014, USAID 2014). Changes in water availability, in turn, contribute to migration and civil conflict (World Bank 2016). Women and men in conflict-affected developing countries are more than twice as likely to lack clean water as those in other developing countries (World Bank 2011), compounding livelihood challenges and increasing the risk of disease by requiring them to rely on sub-standard sanitation and water facilities. Women in rural settings are generally highly dependent on natural resources (and thus particularly vulnerable to changes in these resources' availability and quality during and after conflicts) since they are the primary providers of water, food and energy at the household and community levels (UNEP/UN Women/UNPSO/UNDP 2013).

At every stage in the hydro-social cycle there are different health risks for women and men. Head-loading, a common way to carry water in several parts of the world, is gendered. Almost no men carry water in this way. The health effects of head-loading water and other types of burdens (such as fuelwood) are under-studied, but in one study in South Africa women who head-loaded suffered neck, spinal and head pain; catastrophic spinal injury and knee injuries were not uncommon, and there were frequent accidents as women and girls carried water burdens that could easily weigh 40% of their own body weight along uneven pathways and roads (Geere *et al*. 2010).

Poor water quality and inadequate access to safe water supply and sanitation are major threats to human health. Burden-of-disease analysis suggests lack of access to safe water supply, sanitation and hygiene is the third most significant risk factor for health in developing countries, with high mortality rates (Haller *et al*. 2007). Improving water, sanitation and hygiene globally has the potential to prevent at least 9.1% of the global disease burden and 6.3% of all deaths (Prüss-Üstün *et al*. 2008). Of the almost 2 million total global deaths in 2004 attributed to unsafe WASH, 48% were female and 52% male (UN DESA 2012).

Some specific WASH-related disease demographics show variably gendered patterns that are difficult to generalize. For example, cholera can strike anyone, but sex, age and social status can magnify or diminish individuals' vulnerability. Overall, linkages between gender and vulnerability to cholera are not well understood and there is not much literature on the topic (Rancourt 2013). Evidence on specific vulnerabilities to date show little pattern: of all cholera cases in Uganda in 2005-10, 54% were female and 46% male (Bwire *et al*. 2013); of more than 11,000 cases recorded in Kenya in 2009-10, 51% were males and 49% females

Box 2.2.2: Sexual assault while collecting water and firewood

Médecins Sans Frontières/Doctors without Borders (MSF) reported that between October 2004 and February 2005 MSF clinics in West Darfur treated 297 rape victims, 99% of whom were women. Almost 90% said rape occurred outside a populated village; 82% were raped while pursuing ordinary daily activities such as searching for firewood or thatch, working in their fields, fetching water from riverbeds or travelling to a market. On top of the physical and emotional trauma, harassment and rape often also results in social exclusion and abandonment by husbands and families (House *et al*. 2014).

(Mutonga *et al*. 2013); and of 23,000 cases during a 2012 outbreak in Sierra Leone, 52% were women and girls and 48% men and boys, figures that roughly correspond with the overall population balance (Rancourt 2013).

A large share of deaths from water-borne diseases in poorer countries is caused by faecal contamination of water supplies (Bain *et al*. 2014). According to recent WHO estimates, 58% of total cases of diarrhoea in low- and middle-income countries are attributable to environmental factors (Prüss-Ustün *et al*. 2016). The gender profile for deaths from diarrhoea due to poor water and sanitation is consistent across most regions: more males suffer and die from diarrhoea everywhere except South-East Asia, where the share of female deaths and illness is notable and produces a global tilt towards higher female deaths and DALYs overall **(Table 2.2.1).**

Children are particularly vulnerable to diseases such as diarrhoea, parasite infections and acute respiratory infections, which are spread as a result of poor WASH provision. The World Health Organization (WHO) estimates that this is the main cause of around 28% of child deaths worldwide (WaterAid 2009a). Among children under five diarrhoea is a leading cause of morbidity and mortality, responsible for 20% of total deaths in this age group (WHO 2015, Walker *et al*. 2012). WASH-related diseases, especially parasitic infections, can severely impede children's physical and intellectual development (Ziegelbauer *et al*. 2012). For children with HIV/AIDS, diarrhoea is particularly deadly: the fatality rate for these children is 11 times higher than for those who do not have it (CDC 2015).

Water shortages accelerate and facilitate the spread of disease. For example, trachoma is the leading infectious cause of blindness globally. Survey data consistently show that trachoma-related blindness is two to four times higher in women than men. Disease transmission occurs primarily between children and the women who care for them, especially where water is in short supply, flies are numerous, and living conditions are crowded (WHO 2006, Coutright and West 2004). People who are already sick, particularly if suffering from long-term debilitating illnesses such as HIV/AIDS, have greater water and sanitation needs than healthy ones, and water scarcity accelerates health impairment. Good access to safe water and sanitation is indispensable for people living with HIV/AIDS and for those providing home-based care. Water is needed to bathe patients and wash clothing and bedding, while safe drinking water is necessary in order to take medications. Latrines need to be located nearby for weak patients. Water is also required to keep homes and latrines clean to reduce the risks of opportunistic infections. Adequate water and sanitation also increase the sense of dignity of both patients and caregivers (Kamminga and Wegelin-Schuringa 2003).

In both developed and developing countries water supplies are threatened by many types of pollution, and protecting drinking water from chemical and pesticide pollution is a continuous challenge (K'oreje *et al*. 2016, Tahrani *et al*. 2016, Amar 2010, Clasen 2015, Diamond *et al*. 2015, Crocker and Bartram 2014). In the United States a recent crisis in Flint, the fourth-largest city in the state of Michigan, revealed the dimensions of this problem. In 2014, in an effort to save money, municipal authorities in Flint switched the city's public water supply from a municipal

Table 2.2.1: Deaths and disability-adjusted life years (DALYs) from diarrhoea due to poor water and sanitation

Region	Deaths (male)	Deaths (female)	DALY (male)	DALY (female)
Africa	186 130	181 476	14 408 971	13 764 653
Americas (low and middle income)	6 021	5 525	498 565	443 354
Eastern Mediterranean (low and middle income)	41 227	39 838	3 337 950	3 154 444
Europe (low and middle income)	1 890	1 675	191 048	175 136
Southeast Asia	150 179	213 725	8 101 272	10 786 489
Western Pacific region (low and middle income)	7 626	6 536	869 126	740 089
Total	393 073	448 775	27 406 932	29 064 165

Source: Data based on Prüss-Üstün *et al*. (2014)

system to the nearby heavily-polluted Flint River. Flint is an industrial city with an official poverty rate of over 40%, a majority African-American population and a female-headed household rate of almost 30% (US Census 2015, State of Michigan 2015). Residents (especially mothers) complained about poor water quality almost immediately following the switchover, but the authorities repeatedly dismissed their concerns and issued strong denials that there was a problem. In 2015 independent investigations undertaken by a local paediatrician and an outside water engineering analyst provided scientific evidence to support residents' complaints: the water supply was dangerously contaminated with lead, bacteria and industrial pollutants (Bellinger 2016, Carasik 2016, Hanna-Attisha *et al*. 2015). Childhood lead poisoning can have life-long cognitive and developmental consequences. The magnitude of the Flint crisis brought national attention to its intersecting gender, class, and race dimensions.

Pesticides are commonly found in surface and groundwater, in both public systems and private sources and in rich and poor countries. Few of the world's municipal or local water management bodies have the capacity to detect (l*et al*one regulate) pesticide residues in water supplies. According to a 2015 global meta-analysis (Stehle and Schulz 2015), agricultural insecticide concentrations exceeded regulatory thresholds in 52% of sediment and water samples taken at more than 2500 sites in 73 countries. The authors conclude that pesticide contamination of surface water threatens the biological integrity of global water resources and that the ubiquity of the contamination calls into question the effectiveness of existing regulation of these chemicals. Pesticide residues even at low concentrations (such as residues of pesticides responsible for hormone-related cancers such as breast cancer) are health hazards (Mnif *et al*. 2011, Watts 2007). Not even advanced water treatment systems can remove low concentrations of these contaminants, and few if any regulatory agencies have legislation that adequately protects citizens against pesticide residues in water supplies (Bienkowski 2013, Stackelberg *et al*. 2007, Daughton 2004, Stackelberg *et al*. 2004). For a variety of reasons, it can be difficult for regulatory agencies to respond adequately to newly introduced industrial processes such as mining and fracking **(Box 2.2.3)**.

Policies are in place in many locations to ensure water quality in cases of industrial or mining accidents, but their application can be inadequate in developed and developing countries. In January 2014 chemical



Residents of Flint, United States, protest during a government hearing into the water crisis in that city, 2016.
Photo credit: © Jake May | MLive.com

contamination of the Elk River in West Virginia (United States) disrupted public water supply to approximately 300,000 homes, closed schools and businesses, and caused hundreds of people to seek medical care for symptoms they associated with water exposure (Goldenberg 2014). This was the largest outbreak of acute illness related to chemical contamination of water in the United States up to then. The response of regulatory agencies (and of the company responsible for the toxic release) was widely interpreted as "too little and too late". The industrial site that was source of the chemical spill had not been inspected by environmental regulators since 1991 and was legally exempt from most environmental inspections, which apply to chemical production facilities but not to "storage sites"; the company was required to maintain a groundwater protection plan in the event of a spill, but none was in evidence; and the toxicity of the contaminant, last tested in 1990, was largely unknown (Bumgardner 2014). A gendered analysis of the accident, response and possible long-term health effects remains to be carried out. Early analysis suggests gender differences in responses to the disaster: male respondents reported more "unapproved" household water use than females (30% compared with 19%) in the period when a no-use order from officials was in effect; psychological distress during and after the contamination was

Box 2.2.3: Health and environmental concerns about fracking

Improvements in technologies for horizontal drilling and hydraulic fracturing (fracking) have made it possible to produce large volumes of natural gas, particularly shale gas, from low-permeability geological formations. Fracking typically involves high-pressure injection of chemicals deep underground. The most significant development and exploitation of shale gas has taken place in North America, but shale deposits containing potentially large amounts of natural gas and oil exist in other parts of the world. Fracking is controversial because of widespread concerns about its health and environmental effects (Carpenter 2016, Porter *et al*. 2015, Jackson *et al*. 2014, Manuel 2010). These concerns include: drinking water contamination resulting from the injection of chemicals deep underground during the fracking process (US EPA 2015, Vidic *et al*. 2013, Entrekin *et al*. 2011); emissions of greenhouse gases associated with fracking operations, including fugitive methane emissions (Miller *et al*. 2013); and seismic activity, which can occur when water or other fluids are injected deep underground. Chemicals used in fracking can enter both surface and groundwater.

Despite growing concerns about rapid and extensive fracking, the data required to address these health and environmental threats (e.g. on the chemicals used, construction standards for wells, and means of disposing of contaminated water) are extremely difficult to obtain (Polson, Drajem and Harris 2015). Confidentiality requirements related to legal investigations, combined with the rapid rate of development and limited funding for research, are among impediments to peer-reviewed research on fracking's impacts. Scientists and members of the public have called for a moratorium on fracking, but this call has up until now mostly been unheeded (Phillips 2016, Revkin 2014, Howarth *et al*. 2011). Medical research, which in general is often flawed by failure to examine gender differences, is particularly lacking in this field (Westerveldt 2015, Johnson *et al*. 2014, UNDP 2011). Very little published data on the public health effects of fracking include gender analysis. A recent study by Casey *et al*. (2016) suggests an association between unconventional natural gas development activity and preterm birth. Concerns about the health effects of fracking on women can be evaluated against the general understanding that health problems related to chemicals are frequently gender-differentiated, and that gender-differentiated data on these exposures is therefore badly needed (Labrèche *et al*. 2015, UNDP 2011, WHO 2004).

gendered, with females, younger respondents and respondents in larger households experiencing more distress than males, older respondents or respondents in smaller households (Schade *et al*. 2015).

Sanitation and wastewater

Sanitation access, use, and toilet debates

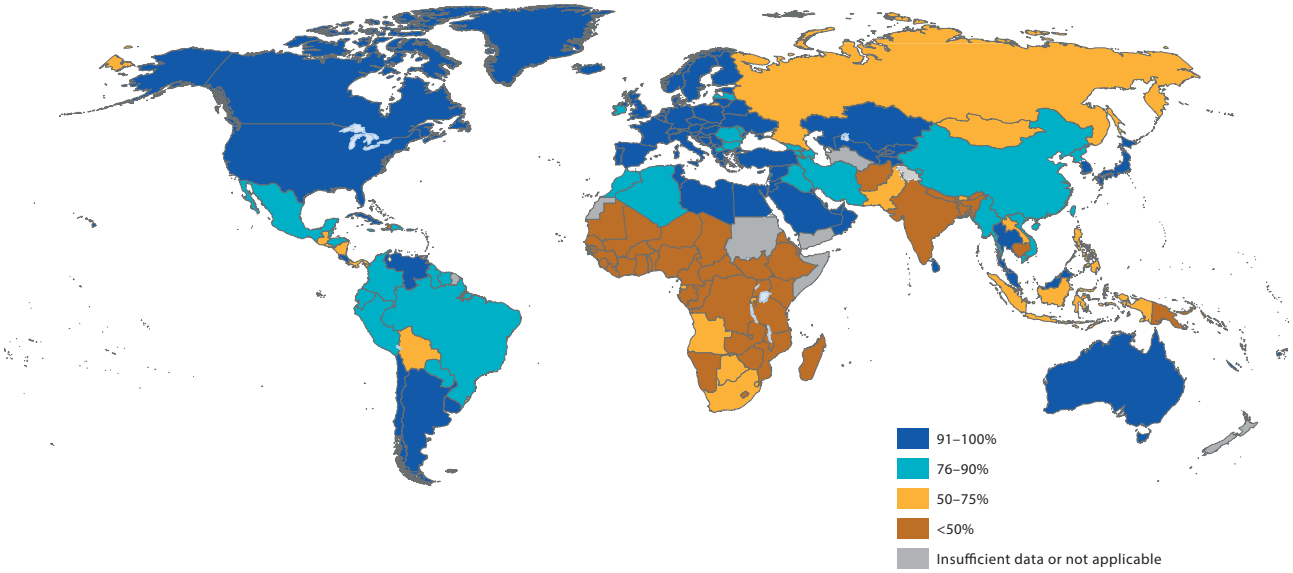
In 2015 an estimated 2.4 billion people did not have access to "improved" sanitation (WHO 2016, UNICEF and WHO 2015). The number of people without access to *safe* sanitation is unrecorded, but is likely to be several orders of magnitude higher. According to official estimates, during the period of the Millennium Development Goals (1990-2015) use of "unimproved" sanitation facilities fell from 46% to 32% globally. That means the MDG target to halve the proportion of the population without sustainable access to basic sanitation was missed by around 700 million people (UNICEF and WHO 2015).

While almost all developed countries had achieved "universal sanitation coverage" by 2015, only four of nine developing regions had met the sanitation target. The share of the population served by improved sanitation was particularly low in parts of Oceania, Sub-Saharan Africa and Southern Asia **(Figure 2.2.4)** (UNICEF and WHO 2015).

In addition to large discrepancies in sanitation coverage and its progress in different world regions, there are significant inequalities in access to improved sanitation between rural and urban areas. Despite the overall reduction of inequalities during the MDG period, sanitation provision in rural areas lags far behind that in urban ones (UNICEF and WHO 2015): 82% of the urban global population – but only 51% of the rural global population – has access to improved sanitation. From 1990 to 2015 the number of people living in rural areas without access to improved sanitation fell by 16%, and open defecation rates in these areas decreased by only 13% **(Figure 2.2.5)**.

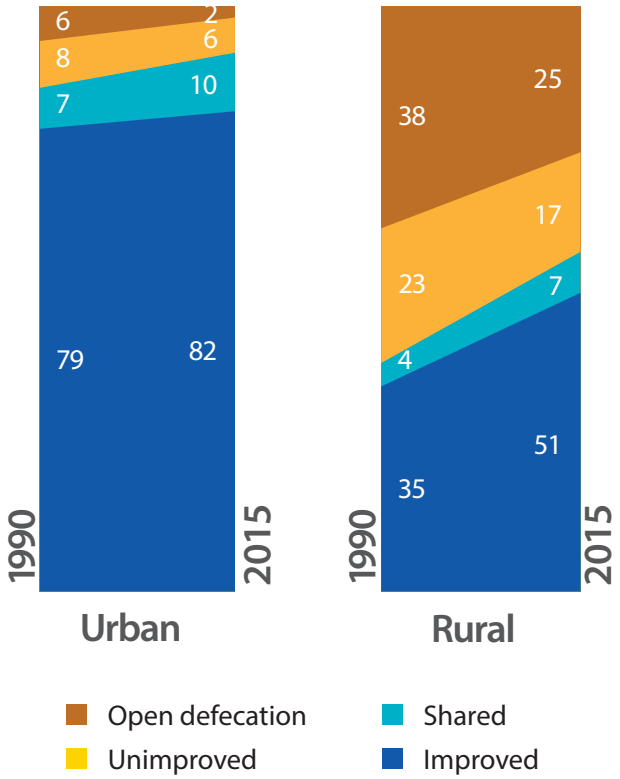
In areas that are not very densely populated, centralized sanitation and wastewater systems are often not considered affordable for public investment, while commercial sanitation companies have shown little interest in investing in rural and remote areas. This means the capital cost of establishing a safe sanitation

Figure 2.2.4: Share of population using improved sanitation, 2015



Source: UNICEF and WHO (2015)

Figure 2.2.5: Urban and rural trends in sanitation coverage (%)



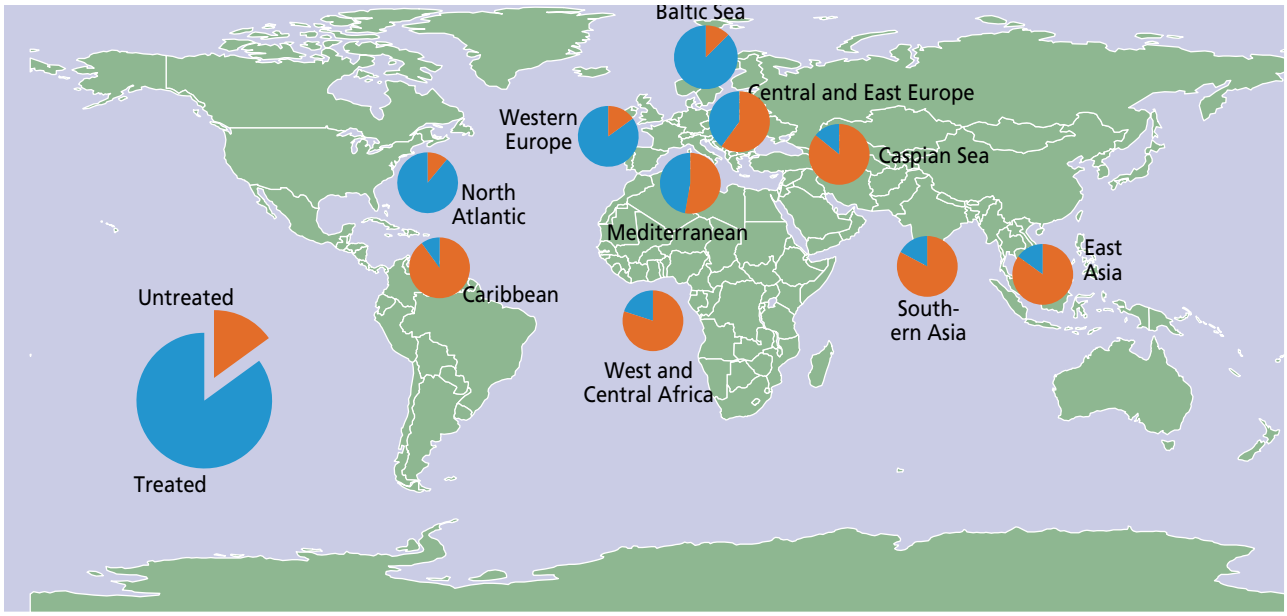
Source: UNICEF and WHO (2015)

and wastewater system in rural areas is often entirely on the shoulders of the users, whereas in urbanized areas public or private investors typically bear the capital costs and users pay user fees. For many developing countries these options are not within reach: most wastewater is discharged directly into waterways **(Figure 2.2.6)**.

Monitoring gender differences in access to improved sanitation is challenging. While some cross-sectional surveys (e.g. on health) may assess disparities in access to sanitation between female- and male-headed households, they seldom provide data at the intrahousehold level, where access to sanitation really counts. Available data on gender differences in access to sanitation show mixed findings. In 2006 female-headed households in Mongolia had 10% higher access to sanitation than male-headed ones, but 10% lower access to water, which might be a function of the cost of a water connection **(Figure 2.2.7)**. However, in Niger in 2008 female-headed households had lower access to sanitation but higher access to water (UNSD, 2015). To better understand the gendered nature of access to improved sanitation, new indicators are required that will provide detailed micro-level gender-disaggregated data.

The great majority of rural households rely on pit latrines outside their dwellings. If there is no space for latrines, individuals resort to open defecation. In urban slums and informal settlements there is usually no room to build latrines, or there are no tenure or property rights that would make this possible, so defecation in the open, open sewage canals and shared public latrines are the only options. Open defecation rates are declining almost everywhere except Sub-Saharan Africa, where rates are still increasing; however, it is the only resort for about a billion people in the world (UNDESA 2014).

Figure 2.2.6: Ratio of treated to untreated wastewater reaching water bodies in ten regions. An estimated 90% of all wastewater in developing countries is discharged untreated directly into rivers, lakes or oceans

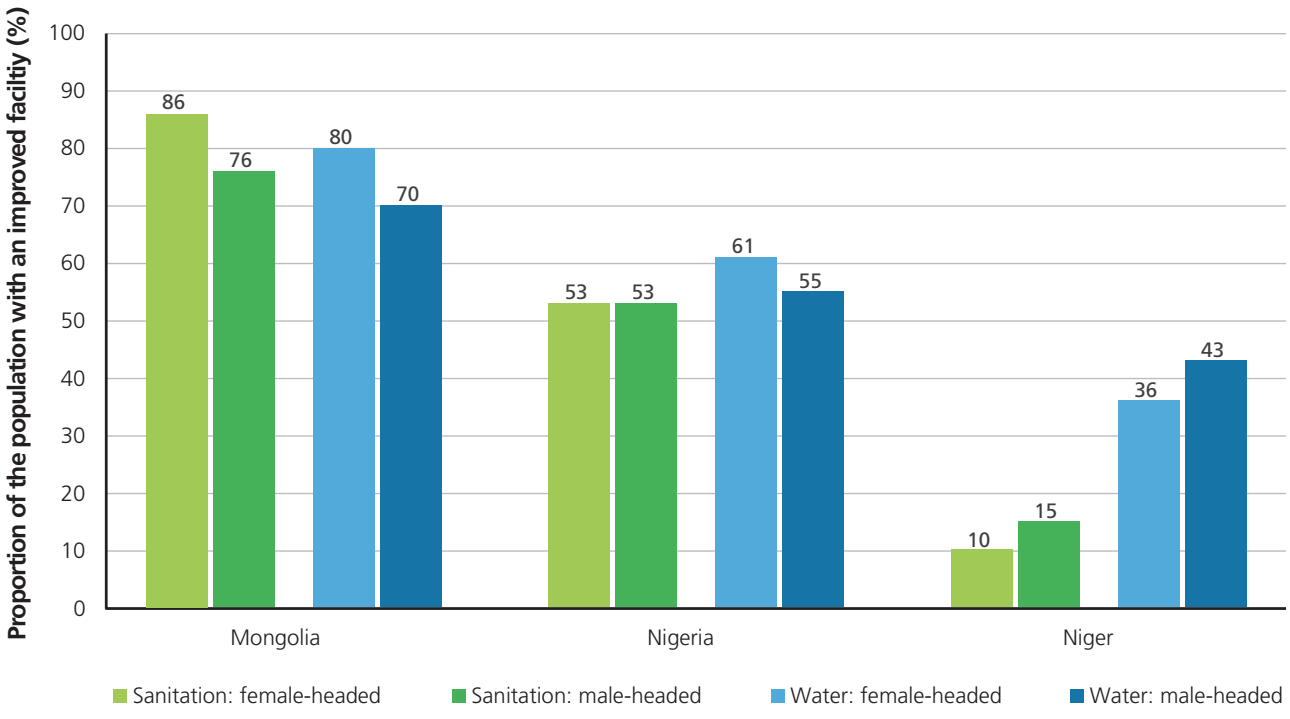


Source: Corcoran *et al*. (2010)

Open defecation is generally a greater health and safety risk for women and girls, especially during menstruation; it may also put them in a position of contravening socially constructed notions of appropriate feminine behaviour (Wendland *et al*. 2012). WaterAid, an NGO, has estimated that one in three women worldwide lacks access to safe toilets, risking not only shame and disease but also sexual assaults and attacks. Some 526 million of these women have no choice but to practise open defecation, and to do so they spend an estimated 97 billion hours per year looking for locations that are as private as possible (WaterAid 2012).

Defecation should be understood as both a biological need and a culturally defined issue. It is a culturally embedded function that reflects and reinforces gender

Figure 2.2.7: Access to water and sanitation facilities by women and men in Mongolia, Nigeria and Niger



Source: UNSD (2015)

norms (Cornwall 2007, West and Zimmerman 1987). A gender-responsive approach to sanitation is required which acknowledges that people's intimate needs are socially intertwined and culturally embedded (Tilley *et al*. 2013). Such an approach is necessary not only in order to address the specific needs and preferences of women, but to create spaces where taboo personal activities can be carried out without exposure to danger and shame.

Access to toilets is a prerequisite for full public participation and citizenship (Plaskow 2008). In most of the world women do not have the same access to toilets as men. In the UN-Habitat report *State of Women in Cities 2012-2013* sanitation and the burden of disease associated with unsafe sanitation was the most commonly identified infrastructure barrier to women's prosperity (UN-Habitat 2013). In this survey across a range of cities, women ranked their access to sanitation as considerably less advanced than their access to other types of infrastructure such as transport **(Table 2.2.2)**.

Provision of public toilets often discriminates against women. In Mumbai, India, there are 40% fewer public toilets for women than for men. The municipal government reportedly provided almost 6000 public toilets for men compared with 3536 for women; men had an additional publically provided 2466 urinals; and increasing the disparity, the urinals were free while women were charged to use their facilities (Yardley 2012). An even greater imbalance was reported in New Delhi, with 1534 public toilets for men and 132 for women (Yardley 2012).

Even in public spaces with the most modern toilet facilities, gender equality needs are seldom met. Women's toilets typically have long queues, while men seldom wait long to use such facilities. Women also use them for longer periods for many reasons, including menstruation, social expectations around childcare (children typically use such facilities with their mothers), and social norms in regard to femininity and more binding and cumbersome clothing than men (Chemaly 2015). When women are pregnant, disabled or infirm, these constraints are even greater. Yet the design and provision of public toilets typically take little account of these differences.

On a larger scale, toilet provision reflects broad equality struggles. The absence of public toilets for women is associated with the exclusion of women from public power, and from public spaces more generally. Women's empowerment activists have sparked toilet access equality movements, including a global "right to pee" women's movement (Right to pee movement 2015). In many parts of the world, gay rights and transgender rights movements include, prominently, demands for appropriate toilet needs for sexual minorities and that recognize transgender choices (McGee 2016; Johnston 2016).

Lack of suitable sanitation provision in schools can prevent girls receiving an education. Schools without toilets, or with shared toilets, pose health and safety risks. They are also a significant cultural barrier that keeps girls away from these schools (Roma and Pugh, 2012). One of every three primary schools in Africa does not have any toilet (Mundy *et al*. 2015). The evidence base on the relationship between schooling

Table 2.2.2: Ranking by women of their access to different types of urban infrastructure

Cities	Bangalore (India)	Johannesburg (South Africa)	Kampala (Uganda)	Kingston (Jamaica)	Rio de Janeiro (Brazil)
1= least; 5: most					
Transport	3.15	3.33	2.93	3.70	2.53
Water	2.60	3.48	2.97	3.92	3.09
Electricity	2.90	3.34	2.88	3.96	3.23
Sanitation	2.52	3.25	2.98	3.41	2.59
Telecommunications	3.38	3.34	3.11	4.02	3.18
Recreational	2.68	3.19	2.87	3.28	2.78

Source: UN-Habitat (2013)



In many parts of the world gay rights and transgender rights movements also prominently include demands to meet appropriate toilet needs of sexual minorities and to respect transgender choices
Photo Credit: © John Arehart/Shutterstock

and sanitation is still undeveloped (Birdthistle *et al*. 2011), but most research suggests that girls' school absences are directly related to sanitation provision. In Bangladesh, for example, when separate facilities for boys and girls were provided in schools, the girls' attendance increased by 11% per year (GWTF 2006).

Sanitation, health and security

The consequences of limited safe access to improved sanitation by women and girls are manifold. The UN Special Rapporteur on the sale of children, child prostitution and child pornography, Maud de Boer-Buquicchio, has observed that "A prevailing climate of discrimination, insecurity and violence, combined with lack of access to adequate sanitation facilities for girls and women in public spaces, enhances considerably the risk of being subject to acts of sexual violence" (Albuquerque *et al*. 2014). Inadequate access to sanitation facilities results in shame, fear, violence, health impairment, economic implications and social injustice.

If women lack safe access to a toilet or have no other option than to urinate and defecate in the open, they are at increased risk of being shamed, sexually harassed, abused and attacked. Women often wait until dark to relieve themselves because they want to avoid using a toilet during the day; this means women without private access to a toilet often avoid drinking fluids, leading to dehydration, long-term damage to the bladder and bowels, urinary tract infections and gastric disorders (Anand 2014, WaterAid 2012, COHRE *et al*. 2007).

Menstrual hygiene provision and management

Menstrual hygiene management (MHM) is essential to ensure gender equality. Without provisions for menstruation, women cannot fully participate in all aspects of society and the economy. Absence of adequate sanitation facilities for menstrual hygiene has direct impacts on women's right to education, right to work and right to health (George 2013). Yet MHM is largely ignored in policies, research priorities, programmes and resource allocations even within the WASH sector. Although MHM is an integral part of WASH requirements, it remains a marginalized topic in WASH discourse, policy and practice (Winkler and Roaf 2014). Very few countries have national targets for menstrual hygiene promotion programmes, and only about 2% of total WASH expenditure is used for hygiene promotion (WHO and UN-Water 2012).

Until women's activism brought attention to this issue in the past decade, menstrual shame and the complexities of menstrual management were perceived as private and an inevitable part of the social order, while other priorities for limited existing resources consumed attention (Sommer *et al*. 2015). Neglect of MHM in the WASH sector and in national policies reflects the persistence of cultural taboos. It also reflects a gender bias: the male expert structure of WASH and its origins as an engineering-oriented field are among the reasons MHM has not received adequate attention (Sommer *et al*. 2015).

A consequence of this bias (as well as a cause of official inattention to MHM) is the lack of robust gender-segregated data on sanitation policies and technologies. Progress in verifying the need for and impacts of gender-responsive sanitation is hampered by an almost complete absence of data (Tilley *et al*. 2013). Even the evidence base for examining the posited relationship between poor MHM and reproductive tract infections in women, for example, is underdeveloped and only the most limited evidence exists to map the impact of good MHM on health (Sumpter and Torondel 2013, Biran *et al*. 2012).

In many cultures menstruating women are perceived as "dirty", "shameful", "impure" or "contaminated" – characterizations that they have internalized. Women have long been told, implicitly or explicitly, that menstruation should be hidden and managed in secret. In some cultures menstruating women are expected



On Menstrual Hygiene Day, Mera Parivar and The Helping Hand (THH) organized an awareness event with teenage school girls in Gurgaon, India.
Photo Credit: © Mera Parivar NGO

to be invisible and silent (George 2013, Elamon *et al*. 2010): their participation in cultural, social and religious activities is restricted and their mobility is limited.

Menstruating women who live in poverty frequently do not have access to safe sanitary materials, or to a clean and private place where they can change these materials, wash themselves, and dry the materials when they are re-used. Disposal of sanitary materials can be a health and environmental challenge where there is limited access to waste management systems (WSSC 2013). For example, many schools do not provide appropriate waste receptacles.

Significant progress in regard to MHM has occurred as a result of community activism, which is breaking taboos and gaining popular and official attention. In 2015 a "Breaking the Silence" campaign in South Asia won a national media awareness award (Chanam 2015); in 2013 WASH United, an NGO, initiated a global Menstrual Hygiene Day on 28 May (Keiser 2013). Internet sites and social media can be used by women and girls in many countries to share experiences and participate in what has come to be called "menstrual activism" (Kutner 2014). Among other issues addressed, campaigns have recently been launched internationally, including in the United Kingdom and the European Union, demanding the removal of sales taxes from tampons and sanitary towels, which in the eyes of campaigners constitute a hidden surcharge on being a woman (BBC 2015b).

Sustainable sanitation and wastewater management

While large-scale wastewater management and treatment are often mistakenly perceived as not having gender dimensions, decision-making, technology choices, employment and impacts in this field are all gendered. Provision and management of sustainable sanitation and wastewater management are of basic importance not only for environmental sustainability, but also for gender equality. Sustainability is a particular challenge for sanitation and wastewater management systems, as wastewater disposal (including of raw sewage) is one of the major causes of water pollution.

The Sustainable Sanitation Alliance (SuSanA) has defined five sustainability criteria for sanitation management: it should be economically viable, socially acceptable, institutionally appropriate and technically appropriate, and it should protect human health as well as the environment and natural resources (SuSanA 2008). Long experience has shown that sustainability in sanitation and wastewater management requires more than toilets and infrastructure. It also requires social change in which women play a key role, together with reliable long-term financing, new or adapted institutional structures, monitoring and testing, and co-ordination and joint planning across government sectors including health, water, energy, agriculture and environment.

In many urban areas, especially small and medium-sized ones, wastewater infrastructure is wearing out or no longer appropriate. Construction and maintenance of centralized wastewater treatment systems is very expensive: it has been estimated that by 2025 the capital investment required for "modern" water and sewer systems globally will reach US$75 billion per year (Corcoran *et al*. 2010). In addition to high financial costs there are high environmental costs: water-borne sewerage systems rely on a regular supply of water (Corcoran *et al*. 2010). By 2050 at least one in four people is likely to live in a country affected by chronic or recurring shortages of fresh water (UN 2016). Estimates are that more than 80% of wastewater in developing countries is discharged untreated directly into rivers, lakes or the oceans (UN 2016, Corcoran *et al*. 2010). From the perspective of some municipal governments, dumping untreated wastewater and other types of pollution directly into waterways may seem a good short-term solution since the pollution is transferred to downstream communities. However, the

health and environmental effects of such a strategy can be disastrous.

About 2.7 billion people use some type of local on-site sanitation system such as pit latrines or septic tanks, and the number is expected to increase to about 5 billion by 2030 (Strande *et al*. 2014). Local systems require local faecal sludge management (that is, excreta removal and treatment). Excreta management is gender-segregated and often racially differentiated. A 2014 Human Rights Watch report on the caste and gender profile of manual excreta cleaners in India revealed that 95% of private and village latrines were cleaned by women; both women and men cleaned open defecation from roads, open areas and open gutters, while men typically cleaned septic tanks, closed gutters and sewers (HRW 2014).

There are recent trends towards the development of environmentally sustainable sanitation systems, which are increasingly under consideration as feasible and affordable alternatives for rural municipalities, low-income small communities or groups of households (Wendland and Albold 2010). These systems range from natural approaches such as the use of ponds and constructed wetlands (which are low-tech and low-maintenance) as filters and for cleaning wastewater, to high-tech vacuum biogas installations. Bacterial contamination from faeces can be broken down quickly in natural systems such as wetlands and planted soil filters.

Modern on-site sanitation systems that allow the reuse of nutrients and organic matter present in human excreta, as recommended by WHO (2006), are also being developed as alternatives to septic tanks and individual household systems. Retrieving nutrients from human and animal waste, at source, for reuse has received increasing attention in recent years (Schröder *et al*. 2010). "Productive sanitation" is the overall term for sanitation systems that focus on increased crop yields by using treated excreta and grey water in agriculture. The gendered dimensions of productive sanitation projects have not yet been fully explored, although some aspects are already apparent (Wendland *et al*. 2012).

In terms of impact, women would benefit directly from the increased availability of nutrients that can be used for rural and urban agriculture (Hannan and Andersson 2002). For example, the urine diversion dehydration toilet requires no water for flushing, reducing the workload of women if they have to fetch water for sanitation (Wendland *et al*. 2011). In Zimbabwe women in some rural areas have indicated they prefer an ecological sanitation alternative that can be built closer to their homes (the "Arborloo") than conventional pit latrines. When Arborloo pits are full, women plant fruit trees in them; men also prefer an Arborloo since the pits are shallower and require less work to dig (Wendland *et al*. 2012).

The disposal of ready-made sanitary pads – which contain significant amounts of plastic – could be another threat to human health, rural and urban environments, and social relations. It requires not only a proper sanitary disposal system, but also awareness-raising programmes (particularly in rural areas) on safe disposal methods and available alternative technologies. Waste management strategies need to give adequate consideration to MHM (SSWM 2016, House *et al*. 2012, Ten 2007).

The "missing half": the need for gender-disaggregated data on water and sanitation

One of the worst stumbling blocks in regard to achieving a more robust gender-integrated international policy regime is lack of comparable international data on gender-sensitive water and sanitation indicators. International policy mechanisms are driven by data. Without gender-disaggregated data it is impossible to fully measure progress towards sustainable development goals, or to make effective analytical assessments of the comparative situations of women and men in different communities or parts of the world (UN-DESA and UNW-DPC 2009). The Gender and Water Alliance has identified gender-disaggregated data collection as a key component of a "minimum agenda" for making a difference in water management (GWA 2006b). The International Fund for Agricultural Development (IFAD) has also identified the "unavailability of gender-disaggregated data" as one of the main reasons for the gap between policy commitments on water and gender and actual practice (IFAD 2007).

In 2013 the United Nations Economic and Social Council (ECOSOC) reported on the state of gender statistics across the UN system and across national platforms. Gender-disaggregated water and sanitation

statistics were among those that were least available **(Table 2.2.3).**

A study prepared for the World Water Assessment Programme (WWAP) shows the gender focus in major international data compilations is actually declining (Fletcher and Schonewille 2015). The two major water data collection entities, the UN-Water/WHO Global Analysis and Assessment of Sanitation and Drinking Water (GLAAS) and the WHO/UNICEF Joint Monitoring Programme (JMP), have stopped including gender-disaggregated data in their main statistical reports; JMP reports from 2008, 2010 and 2012 included gender-disaggregated data on water collection, but this type of data is absent from the JMP 2013 update and the 2014 statistical table (WHO and UNICEF 2014) as well as from the 2015 report (UNICEF and WHO 2015). Similarly, while the 2011 GLAAS survey collected gender-disaggregated data on women in public water institutions and the provisioning of women in water programmes, this gender focus disappeared in the 2013-14 GLAAS survey instrument (WHO and UNICEF 2014).

Table 2.2.3: Percentage of governments "regularly" producing gender-disaggregated statistics in different areas

Region	Percent of sewage treated
Mortality	85 (highest)
Labour force	83
Education and training	81
Poverty	71
Agriculture	44
Access to sanitation	39
Access to clean water	37 (4th lowest % of 22 indicators)
Informal employment	37
Media	15

Source: UN ECOSOC (2013)

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ENERGY

Key Messages

- Using renewable and sustainable energy can catalyze gender equality, but this type of energy is not inevitably socially or environmentally friendly. Without employing a social justice lens for energy planning, large-scale renewable projects can be environmentally damaging and may do little to enhance gender equality.
- Decision-making in formal energy sectors is heavily gender-skewed, as is staffing and employment. Women are often excluded from decision-making, while the industry's energy policies are mostly gender-unaware.
- There are significant gender differences in perceptions of current energy options, and of the risks and choices relating to various energy technologies.
- Insecure land ownership and energy-related land grabbing have different gendered impacts.
- At the community and grassroots levels, women and men are not waiting for top-down energy transformation. In many cases they are creating their own pathways to clean energy technology that level the playing field in regard to economic and social opportunity.
- In developing countries the time spent, predominantly by women, collecting biomass-based energy supplies is responsible for tremendous time poverty and foregone opportunities.
- In both developed and developing countries energy poverty is a large and often invisible problem, and one that is gendered.
- Pervasive lack of gender-differentiated data has implications for the assessment of technology needs with respect to technical training and capacity-building activities. It has the potential to reduce development initiatives directed at gender and energy as the deep inequalities in the energy sector cannot easily be quantified.
- A priority for all energy plans should be to make safe and sustainable household energy available to the 3 billion people who currently do not have it. Enabling the creation of local renewable energy user groups and co-operatives, and empowering women to fully participate at all levels of decision-making, is essential for sustainable energy provision.

2.3

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The global energy context

Energy production, particularly conventional production based on coal, oil, gas or uranium, is one of the most powerful sectors of the global economy – and provides a primary basis for all other economic sectors. Energy production and consumption are key drivers of livelihoods, economies and environmental conditions. Fossil fuel burning is the largest source of the anthropogenic greenhouse gas (GHG) emissions that are the main cause of global climate change (US EPA 2016, IPPC 2015): roughly two-thirds of all GHG emissions come from the energy sector (IEA 2015) **(Figure 2.3.1).** Energy use is at the centre of global climate debates and is one of the domains where it is most urgent to take action to mitigate climate change. Large-scale energy infrastructure and the related extractive industries have irreversible impacts on ecosystems and biodiversity, as well as on communities (UNEP 2012b).

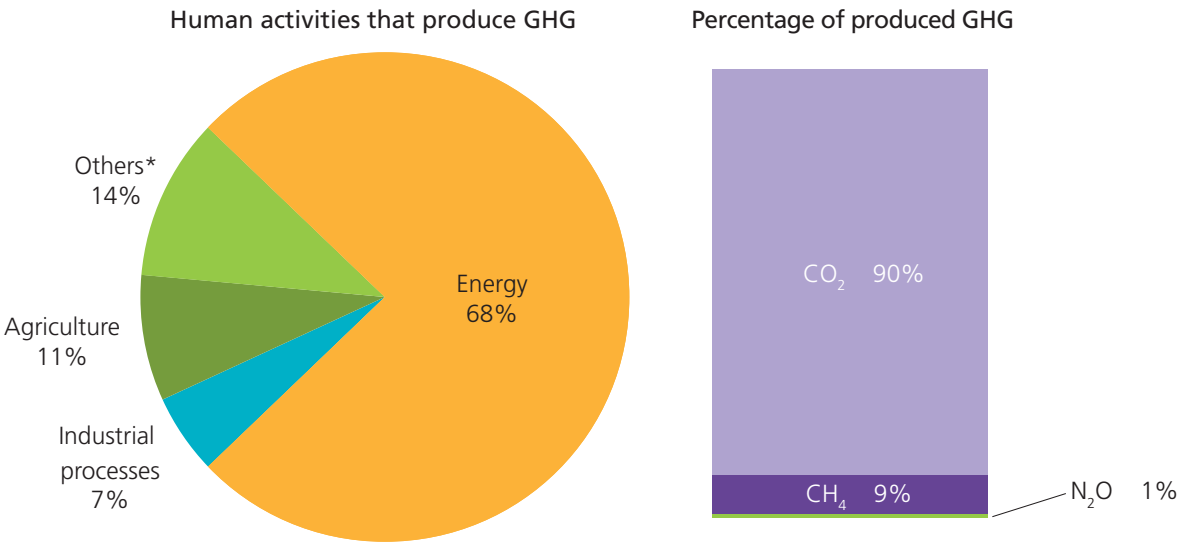
Although 85% of primary energy used is currently produced from finite sources, the renewable energy sector is steadily expanding, having doubled its share between 2006 and 2012 (GCEC 2014). Strong growth of interest in renewable energy is mainly motivated by recognition of the need for climate change mitigation and initiatives to extend energy access to rural areas not currently connected to the grid. Given increasing awareness of the contribution of finite energy sources to climate change – along with public resistance to nuclear energy following the accidents at Chernobyl (Ukraine) and Fukushima (Japan) – transition to renewable energy for power generation, heating and cooling, and transport has increasingly become a priority for governments, households and investors (Harlan 2013, Moe 2013, Wharton 2013). At the United Nations Framework Convention on Climate Change (UNFCCC) Conference of the Parties (COP21) in Paris in 2015, all countries agreed on a long-term goal to keep the average global temperature increase below 2°C compared with pre-industrial levels, and to aim to limit this increase to 1.5°C (UNFCCC 2015). Meeting that commitment will require rapid transition from fossil fuels to renewable energy sources such as solar, wind, geothermal, hydropower, and ocean power.

Energy divides: global, social and gendered

Since 1990, overall global energy use has increased by more than 50%; in 2015, ten countries consumed about two-thirds of this energy (Enerdata 2015, GCEC 2014). Energy consumption is currently highest in developed countries, but the biggest consumers include large emerging economies, prominently China and India. Rapid increases in energy use are projected in other developing countries if poverty reduction strategies are successful; many of these countries are pursuing more sustainable energy supplies and end-uses (Leach 2015, Pearl-Martinez 2014, OECD 2007).

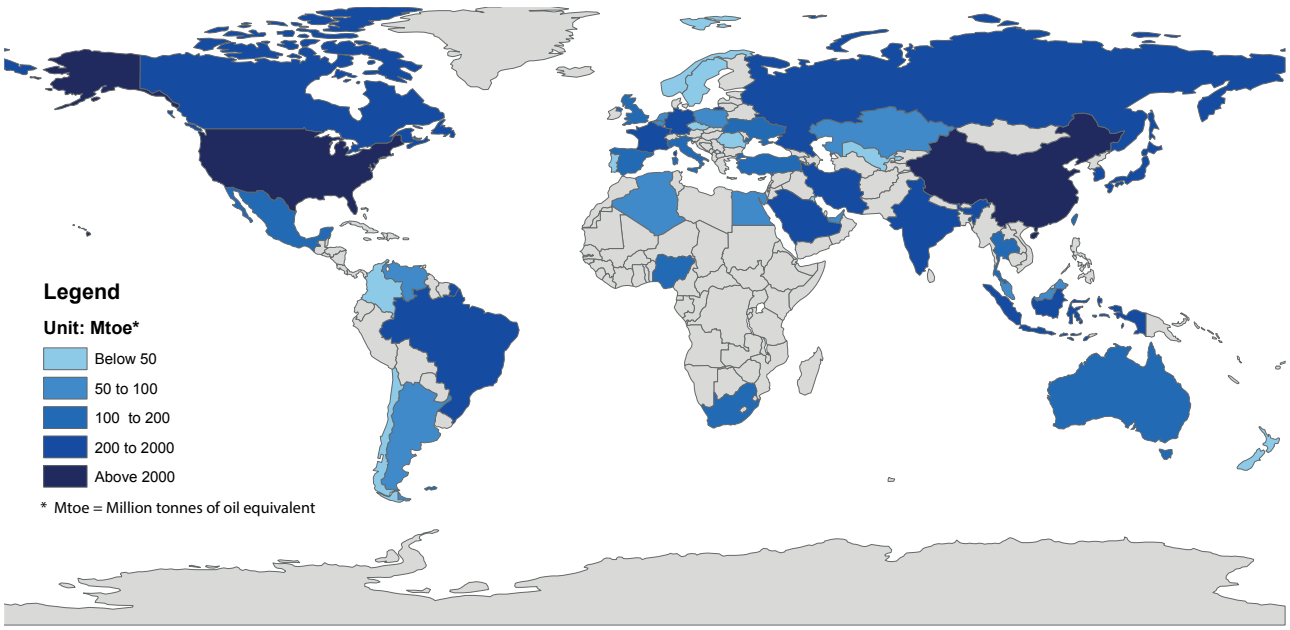
Average per capita energy consumption is high in developed countries and lowest in the least developed ones (World Bank 2015) **(Figure 2.3.2)**. Since lack

Figure 2.3.1: The energy sector is responsible for the largest share of the anthropogenic greenhouse gas (GHG) emissions that contribute to climate change



Source: IEA (2015)

Figure 2.3.2: Global differences in per capita electricity consumption, 2015



Source. Enerdata. https://www.wec-indicators.enerdata.eu/electricity-use-per-capita.html

of energy is a barrier to development, international agreements recognize the principle of Common but Differentiated Responsibilities (CBDR), which acknowledges the need for low-income countries to increase their access to energy (even from non-renewable sources) while acknowledging that the worst polluters should make the greatest efforts to support global transformation to safe and sustainable decarbonized energy.

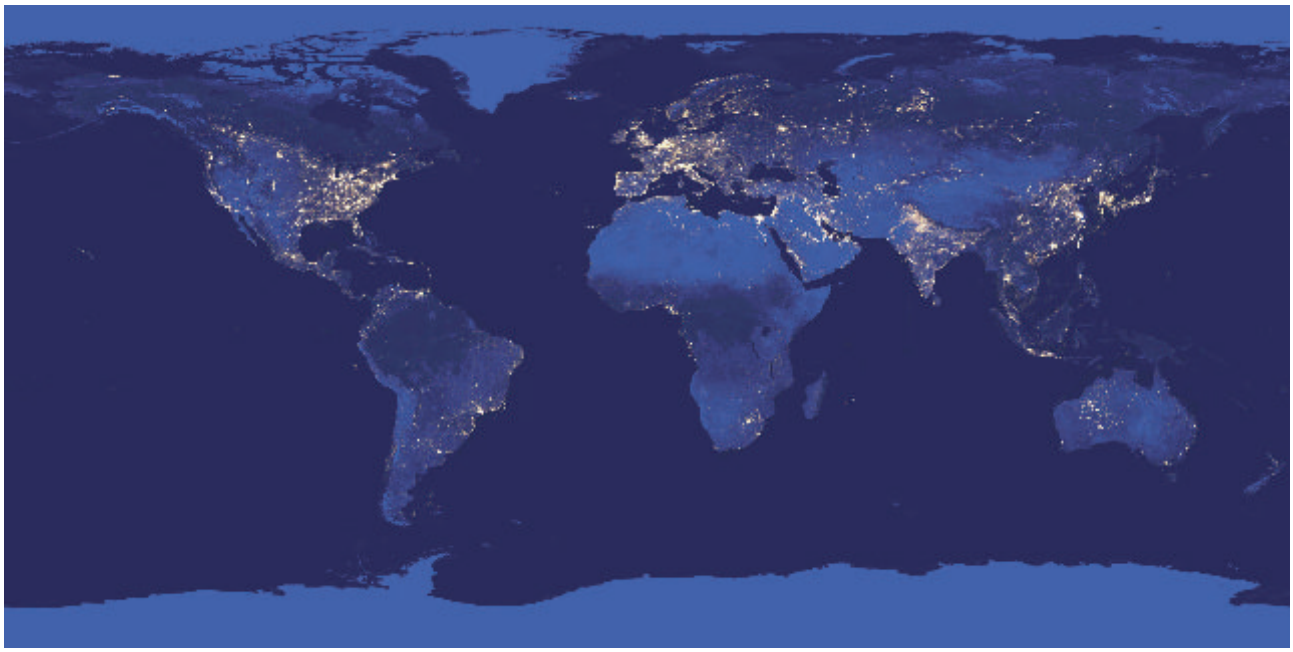
Energy resources are divided inequitably between high-income and low-income countries **(Figures 2.3.2-2.3.5),** as well as within countries, among social groups, and between women and men. Energy poverty both signifies and drives overall poverty. More than 95% of the world population without electricity lives in Sub-Saharan Africa and developing Asia. In Sub-Saharan Africa, two-thirds of the population (620 million people) does not have access to electricity (IEA 2015a).

Within countries there are considerable differences in access to electricity. Lack of electricity is generally most prevalent in rural areas. Even with new renewable and modern off-grid solutions that offer rural communities the potential to acquire affordable energy quickly, there is still a wide gap. In rural Sub-Saharan Africa, for example, only 15% of the population has access to electricity (REN21 2015). Lack of electricity in public service sectors (including health facilities in energy-poor regions) has ripple effects on the well-being of entire communities. One in four health facilities in Sub-Saharan Africa has no access to electricity (Adair-Rohani *et al*. 2013), while 72% of health facilities and 66% of hospitals lack reliable access (WHO 2014a). In Uganda only 6% of rural health facilities and 16% of all health facilities are connected to grid energy (UN Women, UNDP and UNEP 2015).

There is a clear gendered energy divide globally. Socially constructed gender roles, identities and underlying power dynamics affect whether (and how) women and men access and use energy and participate in decisions and investments. Surveys have repeatedly shown that women and men express different energy needs and priorities and perceive different risks in regard to energy choices (as discussed below).

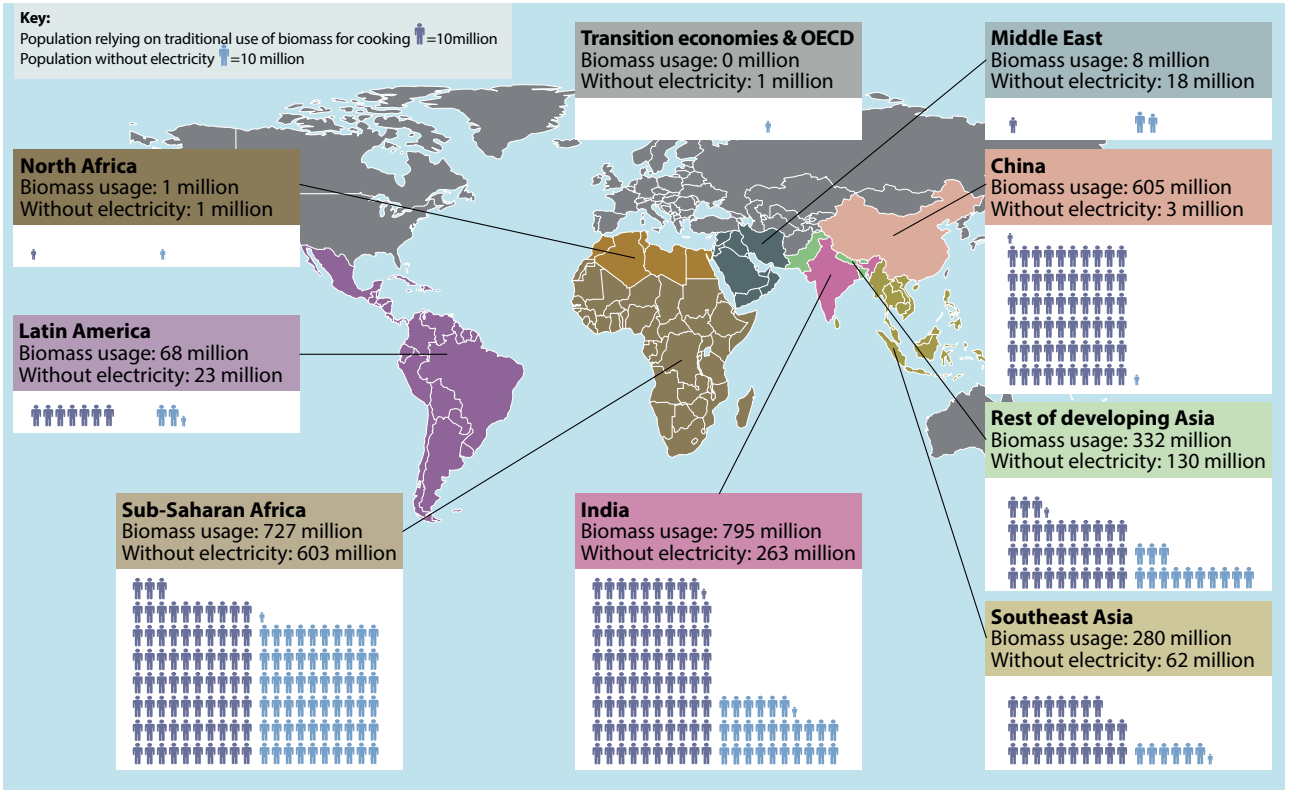
These differences vary among regions, and according to the extent to which roles within the home and in society are gender stratified. Often differences between women and men in their perceptions and attitudes, needs, vulnerabilities and use of resources are the prevalent entry point for addressing gender issues in regard to energy, as in other environmental policy areas (Clancy and Roehr 2003). Simply noting these differences without analyzing the underlying societal dynamics that give rise to them runs the risk of reproducing traditional gender roles and stereotypes. Therefore, it is critical to shift from a "gender difference" framework to one in which the complexity, tensions and contradictions among different gender

Figure 2.3.3: Night-time satellite image indicates differences in countries' access to electricity



Source. NASA GSFC

Figure 2.3.4: Number of people who use biomass for cooking and do not have electricity

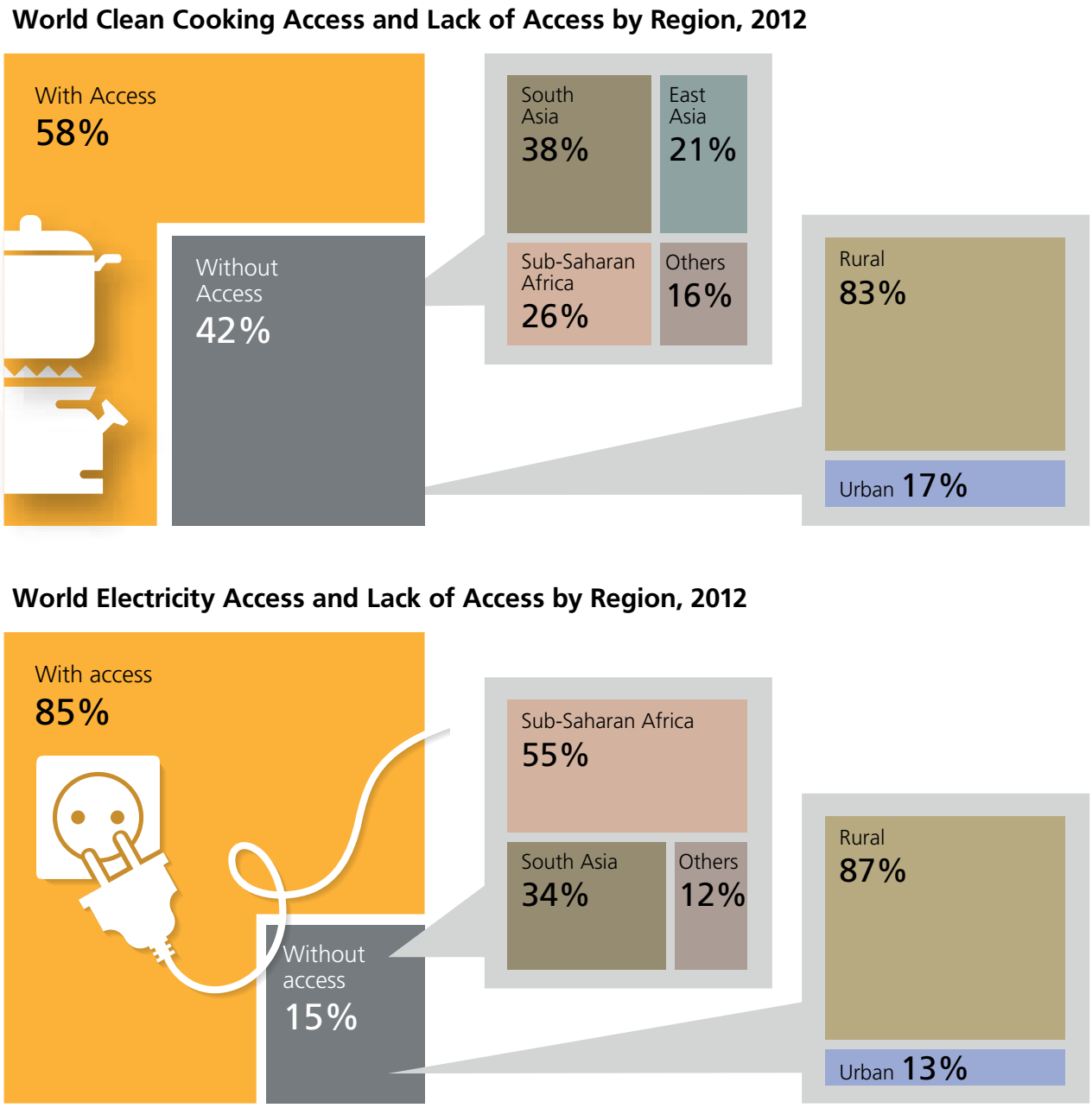


Source. CAFOD (2015)

dimensions are analyzed, which can make the gender and energy nexus more understandable and easier to research (Henwood *et al*. 2008).

Energy is a prerequisite for economic development (Guruswamy and Neville 2016). It is also a specific prerequisite for gender equality. Access to sustainable energy can transform the lives of women and men by reducing time poverty (Blackden and Wodon 2006), by enabling them to pursue (and broaden their options for) economic or other activities, and by improving their quality of life. Women's access to sustainable

Figure 2.3.5: Global access to clean cooking facilities and to electricity



Source: REN21 (2015)

energy can also be socially empowering, helping them negotiate strategic needs in the household and community (ENERGIA and DFID 2006).

In the least developed countries, women who perform traditional roles as primary household managers suffer most from lack of access to adequate energy. Accessing modern energy services is a major livelihood challenge for the poorest people on the planet. It is even more difficult for poor women and girls to access basic energy financing than for poor men and boys. Decentralized renewable and efficient energy-related technologies could make a major economic and social difference to many rural women if they resulted in increased incomes. However, acquiring energy equipment is expensive. The lending expectations of banks and credit institutions often disadvantage women, and in many countries women still face legal restrictions that keep them from accessing credit in their own name or without the consent of their husbands. Women may also be discouraged by social and cultural barriers from borrowing or from opening businesses in societies where they are traditionally expected to take care of the household and leave money-making to men. Without substantial collateral, women are seen as riskier borrowers, further reducing their chances of obtaining loans (Daniels 2015).

In addition to the deep energy poverty in low-income countries, energy poverty is also a significant problem in higher-income countries (CAFOD 2015). In these countries, too, energy poverty is gendered, affecting elderly women and female single parents in particular (Pye and Dobbin 2015). More than 2 million people in North America, Eastern Europe, Central Asia and other parts of the developed world currently suffer from energy poverty (CAFOD 2015). The number of households whose energy supply is interrupted because of unpaid bills is growing in many European countries, with recent research showing that the number of countries in which there are "vulnerable consumers" is increasing (Pye and Dobbin 2015). There is no consistent definition of energy poverty or of "vulnerable consumers". While guidance is lacking on what constitutes vulnerability to energy poverty, indicators include income, level of energy consumption (the higher the level, the more vulnerable users are to price increases), status of tenure and dwelling type (e.g. type of insulation). Very little research includes gender as a social category in vulnerability assessments. In a 2012 European study, more women than men reported they could not afford adequate heating (EIGE 2012). Even in the absence of a comparative data base, it can be assumed that women are particularly affected by higher energy prices given that elderly women and single mothers make up the largest share of the poorest in most European countries, that there is a gender income gap, and that the housing tenure status of women is typically less secure than that of men.

Gendered aspects of centralized energy planning and policy

Gender in energy planning

Formal planning and policy-making in the energy industry tend to be highly centralized. Governments as well as the private sector play strong policy and planning roles. This is partly because energy production has distinctive characteristics, including its strategic role in the economy, the tendency for monopolies to control grid-based energy sectors, high investments and long lead times, and often lightly regulated access to primary energy resources. Energy planning allows governments to assess energy options and their consequences for society, the economy and the environment.

Energy planning and policy-making at this scale typically focuses on aspects such as energy production capacities, regional or national energy needs and trends, the global energy mix, connectivity and access to modern energy services, and climate change mitigation. Recently, consideration of the public health aspects of energy production has become increasingly prominent with respect to the global energy agenda (IEA 2016, WHO 2012, Osterholm and Kelly 2009).

Gender aspects of the planning and policy cycles and sectors have little visibility in this policy framework, perpetuating strong inequalities in the energy industry. Globally gender is scarcely mainstreamed in energy policies, even in the case of the newest energy sectors. As of early 2015, 145 countries had enacted policies to regulate and promote renewables in power generation, heating and cooling, and transport (e.g. the European Union had established new regulations governing the energy sector beyond 2020, setting a region-wide goal of a 27% renewable energy share by 2030) (REN21 2015). However, the large majority of these renewable energy support policies (which are driven by the need to mitigate climate change, reduce dependence on imported fuels, develop more flexible and resilient energy systems, and create economic opportunities) are not gender-sensitive (REN21 2015).

Nevertheless, some shifts are evident. Uganda's Renewable Energy Policy has special gender strategies, including the promotion of microfinance, to ensure that women can benefit from renewable energy technologies when carrying out their household tasks. India's national biofuels programme specifically refers to the role of women in cultivating biodiesel crops. The Kenyan government has made considerable progress on recognizing the gender-environment nexus **(Box 2.3.1).** At COP21, where 140 countries presented their plans for emission reductions (Intended Nationally Determined Contributions, or INDCs), the plans of some 50 countries referred to the importance of gender in combatting climate change (Rojas *et al*. 2015).

Energy policy is often erroneously considered gender-neutral. However, issues such as investment, tariffs, pricing, access, availability, and infrastructure development that are the traditional purview of energy policy-making are all intrinsically linked to gender roles and responsibilities (Woroniuk and Schalkwyk 1998).

Box 2.3.1: Gender aspects of energy policies in Kenya

In Kenya, studies undertaken in the 1990s showed that national energy policy decisions affect women and men differently. Subsequently, notable progress has been made on the gender-and-energy nexus in targeting both rural and urban populations. The government has promulgated a number of policies addressing energy issues to support meeting development challenges. These policies include:

- Kenya's National Policy on Gender and Development, which aims to facilitate mainstreaming the needs and concerns of women and men in aspects of development;
- the Women's Enterprise Development Fund, intended to facilitate the availability of funds and training for women entrepreneurs;
- a Gender Data Sheet, providing a general overview of gender positions and conditions across social, economic, political, education, health and energy categories;
- the Uwezo Fund for Women and Youth empowerment.

Despite these initiatives, implementation is slow and gender gaps remain, especially in energy access. Women continue to have less access to energy services than men. However, increasing gender awareness at the policy and operational levels is a first step towards meeting women's energy needs.

Source: Malonza and Fedha (2015)

Investment: Energy policy determines energy priority sectors. Investment projects such as construction of dams producing hydroelectricity, improvement of fossil fuel distribution systems, or provision of off-grid renewable energy options all have gender implications. For example, without gender-disaggregated data on non-connected households there is a strong risk of disadvantaging female-led households, many of which are among the poorest of the poor, especially in rural areas of developing countries. Involving women in energy investment planning will help ensure that their identified needs, interests and preferences are addressed. Further, in the provision of off-grid renewable energy services gender-sensitive and responsive approaches can provide women and men with more equal new employment opportunities and basic energy services.

Pricing and tariffs: Pricing decisions may have different implications for women and men due to prevailing patterns of gender differences in income and wealth. A gender-sensitive energy pricing policy that aims to increase gender-equitable access to energy services could, for example, charge lower rates for initial usage and higher rates as consumption rises. Other approaches, such as loans or staggered payment options, could address high start-up/hook-up costs.

Access and availability of energy supply: Since different energy needs are associated with traditional gender roles and responsibilities, women and men are affected differently by the availability or lack of energy.

Participation: The most effective policies are developed in an inclusive, equitable and participatory manner. Gender equality through the qualitative (not just quantitative) inclusion of women will help ensure gender-equal participation in contributing to energy policy and planning, which in turn is likely to result in more gender-just policies.

Environment: Energy policy should take environmental concerns into account. Surveys (discussed below) show that women and men have different perceptions of and attitudes to energy choices and the environmental implications of these choices. Traditional gendered roles and responsibilities result in different uses of environmental services and different exposures to environmental hazards.

Infrastructure development: Implementing energy policies requires infrastructure investment. Gender-sensitive large-scale infrastructure planning can help create equal employment opportunities and contribute to closing the gender gap in the energy industry. In addition, social impact evaluations can help determine how women and men will be affected by energy projects.

Gender-disaggregated data: In the absence of gender-disaggregated data on energy use, needs and access, macro-level energy policies that focus on, for example, investment, imports and pricing will continue to be gender-blind. Throughout the energy sector, in

all its diversity, gender-disaggregated data are mostly missing (and are needed) on energy-related needs, preferences, income and expenditures, decision-making, benefits and impacts, staffing, employment, and access to credit and information (Cecelski 2002).

Other policies and legislation which are not directly energy-related can also have gendered impacts on energy use and access. Persistent income gaps between women and men (despite equal-pay legislation in some countries) will continue to influence gender differences in access to energy. Land tenure, ownership and inheritance systems can limit women's access to land and financial resources, thus reducing their access to collateral for investments including in sustainable energy.

Gendered leadership and participation in formal planning and policy

The leadership and employment profile of the energy industry is profoundly gender-skewed. Women are under-represented in national government positions of importance to the sector, with only 7% female ministers in the fields of environment, natural resources and energy, and 3% in science and technology (UNIDO and UN Women 2013). In the European Union in 2011, 66.1% of high-level positions in national ministries covering environmental affairs were occupied by men (EIGE 2012). A study in three EU Member States (Sweden, Germany and Spain) showed that 64% of the largest energy companies in these countries had no women on their executive boards or in executive management groups (Carlsson-Kanyama *et al*. 2010).

In international decision-making processes for responding to climate change, which will require transformation of the energy industry, most negotiators are men. Consequently, the fora in which energy issues are identified and potential solutions proposed are likely to have an inadvertent male bias (WEDO 2016, UNIDO and UN Women 2013).

There is room for debate on whether a larger number of women in decision-making positions would make a difference to the nature of energy policy – and how large the number would need to be to make a difference. Because masculine norms and power are deeply institutionalized in energy and climate-relevant institutions, policy-makers, regardless of their sex, often accept (and adapt their views to) the masculinized institutional environment (Magnusdottir and Kronsell 2015, Kronsell 2011). Structural transformation in energy institutions is needed in order to reach the goals of innovation, sustainability and gender equality (Kronsell 2011). However, greater diversity in energy planning and policy-making would at a minimum lead to a wider perspective, better taking into account the diversity of social groups (e.g. children, the elderly and migrants) and their life situations. The misconception that energy policy and planning are gender-neutral leads to the perpetuation of gender inequalities and has the potential to render energy policy less effective in both developed and developing countries. "There is a serious risk that by failing to take into account underlying gender inequalities, the very policies that aim to address the problem may magnify existing inequalities" (Skinner 2011).

In addition to the leadership gap, the share of women in the workforce in the energy industry is generally low **(Box 2.3.2).** In the EU in 2010, 22% of employees in electricity, gas, steam and air conditioning supply activities were women (EIGE 2012). As the industry is predominantly technical, women with professional training in STEM (Science, Technology, Engineering and Mathematics) are likely to look for work there. Gender equality is somewhat higher in employment in the renewable energy sector. The International Renewable Energy Agency (Irena) reported in 2016 that 35% of renewable energy sector jobs were held by women, compared to 20-25% in the wider energy sector, although it pointed out that this percentage was lower than women's overall share in employment of 40-50% in most Organisation for Economic Co-operation and

Box 2.3.2: The Clean Energy Education and Empowerment Initiative

In 2012 a coalition of nine countries launched the Clean Energy Education and Empowerment Initiative (C3E) to attract more young women to energy careers and enable greater gender diversity in clean energy professions. The member countries, which are part of the Clean Energy Ministerial (CEM), are Australia, Denmark, Mexico, Norway, South Africa, Sweden, the United Arab Emirates, the United Kingdom and the United States. To date, seven CEM governments have named a total of 46 C3E Ambassadors. In the first three years of the C3E programme in the United States, 20 mid-career women were recognized with C3E Awards for their accomplishments and leadership (CEM 2014).

Development (OECD) countries (Carrington 2016). In a 2011 study, women in Germany were reported to make up 24% of the renewable energy workforce (ILO and EU 2011). A study in 2010 revealed that on the governing boards of smaller companies in the renewable energy sector in Europe there were an average of 15% women (EWN 2010).

Energy production, supply and consumption

Energy production at "zero monetary cost": on the shoulders of women

Almost 3 billion people, most of whom live in Asia, Sub-Saharan Africa, rely on open fires and traditional biomass such as wood, dung and crop waste for cooking and heating (WHO 2015, IEA 2014). Reflecting gendered social norms, women and children perform a large share of the unpaid work required to collect biomass fuels, with differences according to regions and types of fuel. Depending on the region, season and availability, average biomass collection time in Africa is estimated to be four to ten hours per week (World LP Gas Association 2014, Matinga 2010).

In developing countries nearly all households in rural areas, and a large share in urban areas, use biomass as fuel. More time is spent collecting for poorer households (who are more dependent on this type of fuel) than those with higher incomes. Not only is fuel collection extremely time-consuming and laborious **(Figure 2.3.6)**, but particularly in conflict settings women and girls are more vulnerable to harassment and sexual violence when they leave the relative safety of their communities or refugee camps (GACC 2013).

While biomass energy sources are collected without direct financial outlays ("at no cost"), indirect economic costs – especially for women -- are enormous in terms of missed opportunities for employment, education and self-improvement, all of which are essential to improve community livelihoods. A World Bank report argues that much of this unpaid work could be reduced or eliminated by, among other interventions, improving infrastructure for energy and other services. These interventions would result in higher gross domestic product (GDP), lead to women's financial independence and possibly have a ripple effect on intergenerational benefits, as research in 24 countries has shown that daughters of mothers who work for pay are more likely to be employed themselves (World Bank 2015).

Social costs and benefits of expanding the electrical grid

As electrification comes to rural communities, more women engage in economic activities. In Brazil, girls in rural areas with access to electricity have been shown to be 59% more likely to complete primary education by the time they are 18 than those without (O'Dell 2014). In Guatemala and South Africa, electrification resulted in a 9% increase in female employment with no comparable increase in male employment; in Nicaragua access to electricity increased work by rural women outside the home by about 23%, although there was no effect on participation by the male labour force (Grogan and Sadanand 2013). Similar effects have been observed in Bhutan and Bangladesh (Al-Amin and Chowdhury 2010, Barkat 2002).

Expanding the grid and extending the reach of electricity are critical for gender empowerment, social equity and eliminating poverty. In low- and middle-income countries energy expansion is proceeding rapidly, often by means of large-scale energy projects. Social safeguards and thorough gender analysis are of crucial importance in the case of large-scale energy projects, as well as in that of compensation funding.

Large-scale energy projects (including for renewable energy such as hydropower) not uncommonly result in displacement of local communities. Although there has been progress in recent years regarding laws that recognize women's land ownership, women are still particularly disadvantaged by displacement (Davis and Fisk 2014). Globally less than 20% of land titles are registered in women's names (less than 10% in most parts of Africa) (FAO 2010). If compensation is provided for dislocation of communities due to large-scale energy projects, women are compensated at lower levels – if at all – because of their invisibility in land titling and claims processes (IIED 2015, Skinner 2016). Other documented gendered impacts during the realization of large-scale energy projects include greater sexual harassment and violence, as well as increased prostitution and human trafficking during and after large-scale infrastructure construction (ADB 2011).

Women may have more difficulty than men in recovering from dislocation. If compensation by governments or companies for large-scale project displacement includes consideration for lost employment, women who work in the informal sector and do not have an official employment record will have no basis for a formal claim. Construction of large energy installations often provides employment to local people. Although there has been little research on this topic, given patterns in other labour sectors – in industrialized countries 65-90% of all part-time workers are women (ILO and EU 2011, ILO 1995) – if women are hired they are likely to make up a greater share of the informal and part-time workers such projects require. To the extent that jobs are not covered by labour regulations and inspections, these women are more likely to be exploited.

Women's entrepreneurship in small-scale energy service delivery

In both developed and developing countries, women's best chance of becoming involved in sustainable energy provision is at the community level. Many women-led sustainable energy initiatives in the community energy sector have been successful. Business models for small-scale energy production range from consignment arrangements, to linking of entrepreneurs to micro-financing institutions (possibly through the use of loan guarantee funds, which lowers the risk for financing institutions), to women individually or in groups manufacturing or assembling devices (sometimes as part of family businesses), to women's networks raising awareness of, for example, policy, options, pricing and safety. The primary objective of many of these initiatives is to empower women entrepreneurs. A continuing challenge is that not as many women as men have obtained lasting employment in the renewable energy sector, partly because of persisting ideas about gender roles (Hanson and Peek 2014).

Gendered perceptions of energy technology choices

A wide range of research reveals that women are less positive than men about emerging and possibly risky energy technologies (Clarke *et al*. 2013).

Nuclear energy: The views of women and men on the use of nuclear energy differ considerably, as shown in several studies **(Box 2.3.3)**.

Hydraulic fracturing ("fracking"): Similar results have been found in attitudes to hydraulic fracturing ("fracking") to extract natural gas trapped in shale formations. Studies, mainly in the United States where a large share of global fracking takes place, show considerable demographic differences in support for fracking, chief among them a sizeable gender gap: in 2014, 46% of men were in favor of increased fracking, compared with only 33% of women **(Figure 2.3.6)** (Pew Research Center 2015, Boudet *et al*. 2014, Brasier *et al*. 2013).

Some evidence suggests that women also show more support than men for the transition to renewable energy. In Australia wind power was preferred by more women (76%) than men (60%); according to the same survey, women were slightly more likely to favour solar power (Hasham 2015). Even when asked to take higher energy prices into account, women in Germany were more in favour of the transition to renewable energy (Verbraucherzentrale Bundesverband 2013).

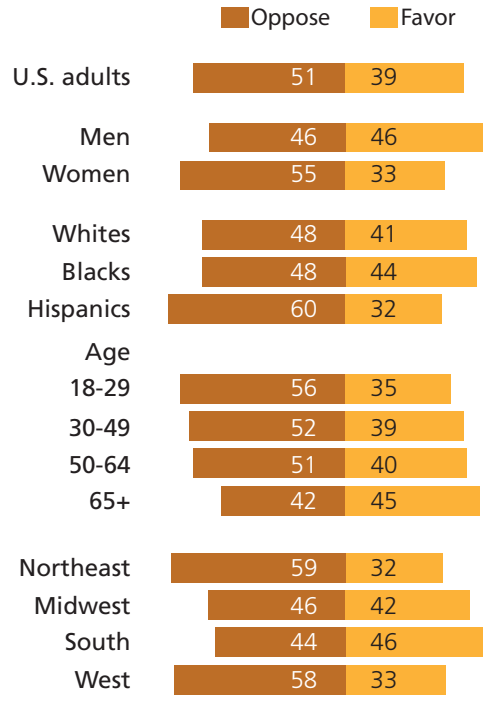
Gender equality in the development and choice of technologies

Technologies to enable a transition to better household energy solutions have often proved unsatisfactory when the specific needs of women (as the main users, in their traditional roles) were not taken into

Box 2.3.3: Gender differences in views on nuclear power

In a European Union survey more women than men said nuclear energy should provide a lower share of overall energy production (EC 2007b). In the United Kingdom the level of support for building new nuclear power stations showed a 40% discrepancy, with considerably more men wanting to see new power plants built (Populus 2011). In Canada the gender preference gap on this topic was 17 percentage points in 2003; an assertive campaign by the nuclear industry led to a higher level of acceptance by both women and men in 2005, but the gender difference remained constant (Brissette 2006). In the United States in 2015, 54% of men and 36% of women favoured building more nuclear power plants to generate electricity (Funk and Rainie 2015). In Australia in the same year, 19% of men favoured nuclear power as one of three energy preferences compared with 8% of women (Hasham 2015).

Figure 2.3.6: Opinions on increased use of fracking, United States, 2014.



Source: Pew Research Center (2015)

account. For example, solar cookers, which only work during the day, do not allow for flexibility in meal preparation times. In a survey of 42 renewable energy companies in Asia, Africa and Latin America a number of entrepreneurs indicated that they believed involving women in the design of equipment (e.g. improved cookstoves) for use in the home was important to their products' success (REN1 2015). Involving women and men in the development of technologies to ensure the transition to safe and more sustainable energy is crucial, as both need to identify benefits **(Box 2.3.4)**. For example, if fuelwood is gathered by women in a household ("for free") but a fuel-efficient stove would require the household's income earner (often the man) to pay for it, the man may not want to buy such a stove.

Gender differences in energy consumption

To better address energy consumption issues, it is crucial to "lift the roof off the household" in order to analyze access, use and needs not only by "households" but by gender. Analysis of gender differences in energy consumption is an emerging area of research that is not yet well developed.

The prevailing gender pay gap and differences in income and assets might be expected to lead to lower energy consumption by women since, as a general rule, the higher the income, the higher the energy consumption. This income association has been observed for households in many countries and at macro levels, but the correlation has not yet been validated for gender differences (Nguyen-Van 2010, Hertwich *et al*. 2009,

Box 2.3.4: Development of energy technologies with women and men for mutual benefits: solar water heaters in Georgia

In rural areas of Georgia, 78-97% of people rely on (often illegally logged) fuelwood for hot water used in washing, heating and cooking. In a five-year programme by women's environmental organizations, a total of 400 households were equipped with solar water heaters (using local materials), which are serviced and monitored by locally trained women and men. The project's main aim was to develop safe and climate-friendly energy solutions for low-income rural households in the most gender-equitable way possible.

In rural areas both women's and men's roles are strictly defined; for women this includes large amounts of unpaid care work. In this project women and men could choose vocational training in order to learn either to build solar water heaters or to be a maintenance and monitoring expert. The majority of women did not choose to become builders, while men mainly did not choose to be involved with maintenance and monitoring. Building was perceived as heavy and dangerous (suitable for men), while maintenance and monitoring was closely associated with housework and thus more suitable for women.

While the programme did not lead to major changes in gender roles, it resulted in better understanding of the different needs and priorities of women and men. The government has adopted this concept in its national climate mitigation proposal (its "Nationally Appropriate Mitigation Action" plan, NAMA), with the aim of providing 10 000 people in the coming five years (and 500 000 by 2030) with solar water heaters. Georgia's NAMA proposal has been registered with the UNFCCC.

Source: WECF (2015)

Druckman and Jackson 2008). In fact, no clear gender pattern in energy use has emerged from field studies. The findings of a study systematically analyzing energy consumption in single-person households in Sweden showed that single men with no children used 20% more energy than women in a similar family situation, and that men used substantially more energy for transport than women. In all income groups the energy intensity of men's expenditures was higher than that of women. For men 40% of total energy use was attributable to transport, while the corresponding figure for women was 25% (Carlsson-Kanyama *et al*. 2008). In contrast, according to a study in the United States there was 80% higher energy consumption in female-headed households in Texas than in male-headed ones. This is ascribed to the likelihood that female-headed households were in older and less energy-efficient houses; to a widely reported preference by women for higher ambient temperatures in their houses; and to more frequent cooking and clothes and dish washing by women. The study concludes that targeting women in their intrinsic role within the household could be a promising step towards raising awareness of energy efficiency (Elnakat 2015).

Concerning energy use in the transport sector, gender differences seem fairly consistent across countries. Since transport is a great and growing source of pollution (producing 23% of overall CO2 emissions globally with a high growth rate), it is useful to look at these differences (Kahn *et al*. 2007). A recent study in Spain reflects almost universal findings that women make greater use of more sustainable (walking and public) transport than men in both urban and rural areas: in urban municipalities in the Spanish study 48% of women's trips were made by walking and by public transport, compared to 34% and 19%, respectively, of men's trips; in rural areas fewer women used private transport than men (62% and 75%, respectively). The study concluded that the modal asymmetry between women and men is structural and related to masculinity expressed in relation to private transport and the "performance" of gender in everyday life (Miralles-Guasch *et al*. 2015).

Energy and health

Energy production and use have a number of health dimensions. Gender differences in health outcomes are shaped by how women and men use energy, and how they are exposed to the related emissions.

Biomass health impacts

Cooking and heating with solid fuels (wood, charcoal, crop waste, dung and coal) produces high levels of indoor air pollution, especially particles, that can lead to a wide range of child and adult diseases, including acute and chronic respiratory conditions such as pneumonia and chronic obstructive pulmonary disease (WHO 2015). A 2012 WHO assessment reported that people in low- and middle-income countries had the highest mortality rate associated with household air pollution (HAP) from solid fuel use for cooking (WHO-GHO 2015).

Exposure to household air pollution from biomass burning kills nearly 4 million people per year **(Figure 2.3.7)**. Millions more suffer from cancer, pneumonia, heart and lung disease, blindness and burns, while smoke from cooking fires is associated with cataracts, the leading cause of blindness in the world (GACC 2013, WHO n.d.). The premature deaths of more than 2 million women and children annually due to household air pollution are directly related to use of solid fuels for cooking and heating (Prüss-Ustün *et al*. 2016, WHO 2014, GACC 2013). Women spend more time cooking than men, and in the case of unsafe fuels and stoves they are more exposed to smoke from cooking with solid fuels. In the premature deaths of almost 2 million men associated with HAP other factors such as smoking also play an important role (WHO 2016, WHO 2014). The first step towards cleaner and safer use of fuels is to move away from the use of open fires to better cooking technologies, including improved cookstoves.

In addition to biomass, waste including plastics is often burned, emitting additional hazardous fumes and increasing negative health impacts (WECF n.d.).

The extent to which the use of such fuels is dangerous depends on how they are used (Sacks *et al*. 2011). For example, if animal dung is burnt directly it produces hazardous emissions, but if it is used to produce biogas in a digester it becomes a modern and safe cooking gas (ENERGIA 2016b). In the past kerosene was considered a cleaner fuel than biomass, but this is now known to be untrue. Kerosene burning emits health-damaging particulate matter, carbon monoxide and formaldehyde. In some countries, including Eritrea, Indonesia, Maldives and Nigeria, 20-40% of households cook with kerosene (SE4All2015).

The physical burden of collecting, transporting and processing solid fuels also creates significant health

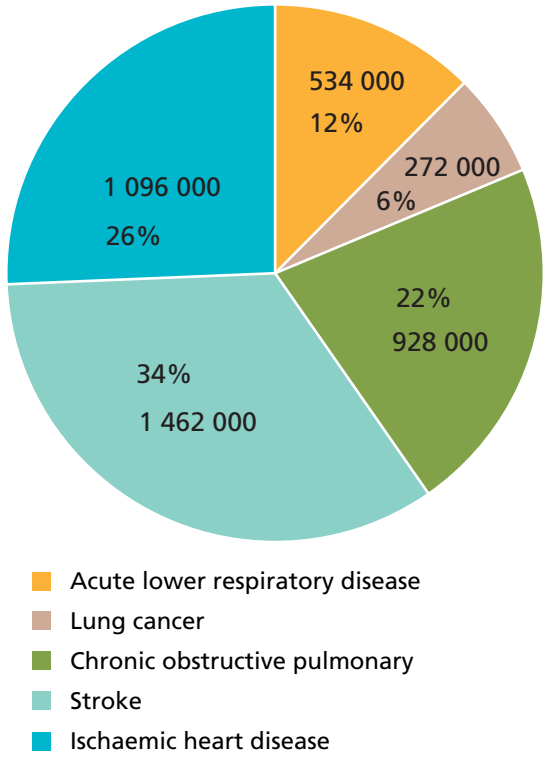




Burning plastic for cooking and heating in Georgia.

Source: WECF

Figure 2.3.7: Number and share of premature deaths attributable to household air pollution, by disease



Source: WHO (2014)

problems. Carrying extreme head-load weights **(Box 2.3.5)** is very damaging to women's bodies with long-term consequences – just as is head-loading of water **(Section 2.2)** (Geere *et al*. 2010, Mtinga 2010).

Pollution from conventional energy production

Non-renewable energy production is responsible for large amounts of pollution that harm human health as well as ecosystems and biodiversity, including through on-site pollutant releases and releases of airborne particles when fuels are burned. These impacts are not experienced evenly across societies: the class, race, age and geographical location of the people exposed to contaminants, among other factors, intersect with gender to magnify disadvantages (Gochfeld and Burger 2011).

Ambient air pollution is responsible for major environmental and health problems (e.g. cardiovascular and respiratory diseases, cancers) affecting people in developed and developing countries. Globally more than 3 million deaths per year are related to this type of pollution, which is also linked to energy choices made in other sectors (WHO 2014b).





Bamboo-based biogas system are among the most affordable versions in India and Uganda. a) Traditional weaving skills are a basis for bamboo-reinforced biogas domes and can provide additional income for women; b) Clean gas is led into the kitchen to a gas stove for cooking. Photo credit for the left image: © WECF

Airborne pollution has become an especially pressing issue in countries where industrial growth has been rapid but environmental controls are weak. Technologies currently used in many rapidly industrializing countries produce high air pollutant emissions. Many premature deaths are caused by air pollution linked small particles and mercury emitted from coal-fired power plants. Emissions from these plants are associated with dozens of diseases including cancer and asthma (WHO 2013). A study of 16 Chinese cities revealed that emissions of PM10 (particulate matter 10 micrometres or less in diameter) are significantly associated with mortality from all causes, particularly cardiopulmonary diseases (Chen *et al*. 2012). There is preliminary evidence that women, children and older adults are especially vulnerable to PM10 and to PM2.5 (Villeneuve *et al*. 2015, Sacks *et al*. 2011).

Box 2.3.5: Average weight of fuelwood head-loads

Malawi, Tanzania and Botswana: 27-31 kg
Ethiopia: 36 kg
DR Congo: 25-50 kg
South Africa: 24 and 38 kg in different regions

Source: Matinga (2010)



Women and boys carrying fuelwood in Karoma, Rwanda 2016
Photo credit : © DaisyOuyalCRAF

"Even in high-income countries, many people live in fuel poverty, and throughout the world, increasingly sedentary lifestyles (to which fossil-fuel-dependent transport systems contribute) are leading to chronic disease and injuries" (Wilkinson, *et al*. 2007). The inability to pay for energy can result in poor thermal control of the home, inefficient heating and cooking equipment, an increase in sedentary lifestyles due to transportation costs, and health impacts of inadequate (sometimes entirely absent) home heating or cooling (EIGE 2012).

Nuclear energy and human health

Nuclear energy production leaves a legacy of lethal nuclear waste from mining operations, nuclear facility accidents, storage leaks, and decommissioned facilities. Uranium mining has a long history of devastating health and environmental impacts. Indigenous low-income communities have often suffered from expulsion from or pollution of their lands for mining **(Box 2.3.6).** The Navajo in the United States, for example, have paid a high price: a legacy of uranium contamination remains across Navajo lands in the southwestern United States, including over 500 now-abandoned uranium mines as well as homes and drinking water sources with elevated levels of radiation (US EPA 2014). Women's health has been affected both directly through pollution of water sources and employment as mine workers,

Box 2.3.6: Testimony of a Native American woman on the impacts of uranium mining

The world's largest open-pit uranium mine once operated next to the village where Carletta Garcia grew up. "We were sitting at lunch and sometimes the wind was just coming right from the uranium mine and the dust would settle on our dinner and we would eat that along with our food. The ladies at that time would dry food and deer meat outside and all of that would be contaminated and we ate that. They brought home their laundry and it was being washed with the family's wash. What people didn't realize is, if their parents worked in the mines, they were bringing the contamination into their homes. Now we are still fighting the effects of what the mine has left for us. There are a lot of people who are sick, a lot of people dying. I myself have thyroid disease. My mother discovered two lumps under her arm; she died from cancer. My husband died four years ago from pancreatic cancer."

Source: WECF (2011)

and indirectly through washing family members' contaminated work clothes. The health effects of radiation exposure include thyroid cancer, lung cancer, bone cancer, impaired kidney function due to exposure to radionuclides in drinking water, reduced immunity, fertility disorders and birth defects (US EPA 2014, Olson 2011, National Research Council 2006).

Gender, energy transitions, and renewable energy

The global energy sector appears to be at a tipping point of rapid transition from fossil fuels. At the current high levels of investment, and following more than a decade of dramatic market growth, proliferation of support policies and cost reductions, renewable energy is projected to grow significantly in the near future. Moderate-growth scenarios project a renewable energy share of 30-45% by 2050 (REN21 2013); the International Energy Agency (IEA) has projected a share of up to 50-95% in the near future (REN21 2013). While national renewable energy markets are projected to grow strongly in the coming decade and beyond, new visions of a future of renewables proliferating at the local level have the potential to shift the gender dynamics of energy provision.

Renewable energy is not inherently socially and environmentally benign. Large-scale renewable energy projects (including for hydropower and other types of renewable energy) not uncommonly result in displacement of local communities (Davis and Fisk 2014). Biofuel production can diminish food security through land use change or rising food prices. Gender gaps and inequalities in the renewable energy sector, in terms of employment and education, are in many instances comparable to those in the fossil fuel-based energy industry. Nevertheless, positive examples point towards the possibilities of a gender-balanced and gender-responsive renewable energy sector (**Boxes 2.3.7 and 2.3.8).** Active evaluation and monitoring for gender, social and environmental impacts are just as important for sustainable and gender-just renewable energy as in the fossil fuel-based energy industry.

Programmes aimed at achieving transitions to sustainable energy need to take account of gender and geographical inequalities and focus on the most urgent priorities first – chiefly providing secure access to safe and reliable energy to those who are currently without it. Many years of experience in promoting clean cooking fuels and technologies demonstrates that even if technological solutions are available, traditional energy use patterns are slow to change (including with respect to gender roles such as who decides on purchases of fuels and technologies). To enable a shift towards safer and more sustainable energy, attitudes to traditional gender roles may also need to shift.

Renewables and energy poverty

The use of the various forms of renewable energy and greater energy efficiency can be game changers for energy poverty. More renewable energy and greater energy efficiency are critical not only in order to address climate change, but also to create new economic opportunities and provide energy access to the billions of people who still do not have modern energy services (REN21 2015). Conventional energy systems are currently unavailable to millions of poor people, especially those who live in remote areas or urban slums; even if it were accessible, it would often too expensive for the poorest to afford (Flavin and Aeck 2013).

The rapid recent growth in solar, wind, geothermal, and biomass energy, coupled with ongoing technology improvements and costs reductions, is increasing renewable energy availability. Many renewable energy technologies are already significantly cheaper than diesel- or kerosene-based systems and, in the longer run, using them would be cheaper than extending the grid in areas with low energy demand per capita. Renewable energy also offers more security and greater reliability than fossil fuels (with no need for imported fuel).

Renewables have become vital to rural electrification programmes in many countries in recent years. Over the past decade advances in renewable energy and energy-efficient technologies, global increases in capacity, and rapid cost reductions have made both renewables and greater energy efficiency increasingly attractive to private and public investors.

Renewables and gender empowerment

Safe and affordable energy is essential for women's empowerment, for reducing their unpaid work burden, for improving health and quality of life, and for overall development (ENERGIA *et al*. 2006). To the extent that renewable technology extends energy to communities and households that were previously not served, the potential for gender empowerment is also increased.

A comprehensive analysis of the incomes of women entrepreneurs in the renewable energy sector has not been undertaken. However, there is increasing evidence of entrepreneurial success in the renewables field **(Box 2.3.7, 2.3.8)**. Moreover, a "solidarity economy" is developing around renewables. There are many successful examples of renewable energy co-operatives in which women work together to provide mutual support. Small-scale renewable projects are business, training and empowerment entry points for women: the transition to sustainable energy may signal a change in the current paradigm from one where women are passive providers and users of energy, to one where they have agency and leadership roles in promoting sustainable energy technologies and inclusive growth.



Engineers working by wind turbines field
Photo Credit: © Jgoodluz/Shutterstock

The way forward

Renewable energies are projected to grow significantly in the near future. Moderate outlooks project a renewable energy share of 30-45% by 2050 (REN21 2013). Energy efficiency is predicted to make even greater advances. Governments will need to have effective support policies to enable this major transformation in the energy markets and infrastructure. If the following conditions are met, renewable energy development will be a very powerful catalyst for gender equality.

- Avoid the negative gender and human rights impacts of large-scale renewable energy development. From monoculture biomass plantations to hydropower dams, gender-equality safeguards and women's equal participation in all stages of the renewable energy cycle need to be ensured, including through monitoring, evaluation and verification schemes and participation by women's civil society organizations in these schemes.

- A foremost priority for all energy plans must be to enable safe and sustainable household energy. Enabling the creation of local renewable energy user groups and cooperatives, and empowering women to fully participate in all levels of decision-making, will be essential for sustainable success.

- Financial mechanisms need to be created; low-interest rate loans, start-up and capacity building grants, solidarity pricing mechanisms and specific access for women to funding should be developed.

- Ensure that policies, programmes and projects equitably valorize women's and men's time and labour burdens and expenditures (UNIDO and UN Women 2013).

Box 2.3.7: Entrepreneurial opportunities for women in renewables

wPower: The United States State Department launched the Partnership on Women's Entrepreneurship in Renewables (wPOWER) in January 2013. wPOWER aims to empower more than 8000 women clean energy entrepreneurs in East Africa, Nigeria and India, who will deliver clean energy access to more than 3.5 million people over the next three years.

A wPower partner in India, Swayam Shikshan Prayog, has trained more than 1000 women to be entrepreneurs selling clean energy and renewable household technologies (SSP, 2016). Another wPower partner, Solar Sister, established in 2010, has worked with more than 1200 women entrepreneurs in Uganda, Nigeria and Tanzania. Solar Sister equips women to build their own technology-driven businesses by providing a holistic package of inputs including business and technical training, access to products and services, marketing support and on-going coaching. A study conducted by the International Center for Research on Women (ICRW) in 2012 showed that the Solar Sister Entrepreneurs earn an average of US$48 a month, a significant amount compared to average incomes in the region. There were also indirect economic benefits: as users of solar lanterns, the women can spend about 30% less, compared to kerosene, while less time is spent collecting fuelwood means more time for other pursuits (Gill *et al*, 2012).

Box 2.3.8: Barefoot College – women supporting other women

Barefoot College, an NGO located in India, has provided basic services and training to bring sustainable solutions to rural communities for over 40 years. With a geographic focus on the least developed countries, it emphasizes empowering women as agents of sustainable change. It trains middle-aged women from rural villages worldwide to become solar engineers. In partnership with local and national organizations, the Barefoot team establishes relationships with village elders who help identify trainees and implement community support. Trainees are often illiterate or semi-literate grandmothers who maintain strong roots in their villages and play a major role in community development, bringing sustainable electricity to remote, inaccessible villages. Barefoot College also trains women to run solar desalinization plants, water heaters and solar cookers.



Barefoot College invests up to US$50,000 in solar equipment for 120 households in the participant's village. When the course is finished, the women go back to their villages where they help install solar lamp kits. Each household contributes to maintenance and upgrading of the solar installation, the same amount they previously spent on kerosene, candles or batteries. The women solar engineers are paid a monthly salary for repairing the solar lamps or kits; a committee headed by four women and three men from the village remains in charge of the equipment. In the last decade 1083 villages in 63 countries in Latin America, Africa, the Middle East, Asia and the South Pacific islands, have been electrified by 604 women solar engineers from Barefoot College, bringing domestic lighting to over 45,000 houses.

Source: Barefoot College (2016), Bhowmick (2011)

- Recognize women as independent users of energy solutions and enable them to benefit from energy access, taking into consideration the challenges of land ownership/rights, access to credit, and social constraints (UNIDO and UN Women 2013).

With increasingly rapid divestment from finite energy sources, the risk of accidents could increase. Insurance and liability should become mandatory for the entire energy industry, including nuclear energy, to fully cover the costs of decommissioning, tailings clean-up and accidents, and compensation to direct and indirect victims. Free and affordable legal support for women and men in land rights, pollution and compensation cases should be made available.

For effective risk prevention and management, existing environmental and social safeguards for development projects need to be strengthened, including their gender components, and compliance with these safeguards must be ensured.

The planned increase in renewable small-grid and off-grid energy solutions has great potential to address the gendered face of energy poverty by reducing unpaid work burdens and increasing economic and personal development opportunities for women and men.

Increasingly, governments and the private sector are convinced of the need for greater parity in decision-making. A trend towards the presence of more women on boards and in government positions is expected to continue; however, technical areas such as the energy sector should be a specific focus.

Policy-makers need to recognize the importance of women in the energy sector and to engage them directly in policy-making and project design (Alber 2015, UNIDO and UN Women 2013). Strengthening women's leadership and participation in sustainable energy solutions is critical in the transition to sustainable energy for all and to reaching internationally agreed development goals (UNIDO and UN Women 2013).

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SUSTAINABLE CONSUMPTION AND PRODUCTION

Key Messages

- Households are seen as primary sites of consumption, but prevailing assumptions that women "control" household-based consumption choices oversimplify gender dynamics within the household.
- Gendering of consumer products is used to increase demand. Notions of masculinity and femininity shape consumption and production decisions, from cars to cosmetics to recreational goods.
- Chronic exposure to now-ubiquitous plastics and industrial chemicals causes millions of deaths each year, and even more disease and disability. The health effects of such exposures are markedly gender-differentiated.
- Many developing countries rely on economic growth strategies based on export-oriented industrial production. The economic benefits of these strategies are unevenly distributed, and pre-existing gender inequalities in wages are often used as a selling point to attract low-entry industrial investment.
- While women and men both express a considerable commitment to more sustainable futures, they have different levels of personal commitment to enabling transformations towards sustainability.

2.4

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The nature of consumption

Types of consumption

Unsustainable consumption and production has been identified as a high-priority global environmental issue for decades. Agenda 21, adopted at the United Nations Conference on Environment and Development in 1992 (the Rio Earth Summit), stated that "While poverty results in certain kinds of environmental stress, the major cause of the continued deterioration of the global environment is the unsustainable pattern of consumption and production, particularly in industrialized countries, which is a matter of grave concern, aggravating poverty and imbalances" (Sustainable Development Knowledge Platform 2016a). The Johannesburg Plan of Implementation, adopted at the 2002 World Summit on Sustainable Development, recognized that sustainable consumption and production (SCP) is essential for sustainable development and called for accelerating "the shift towards sustainable consumption and production to promote social and economic development within the carrying capacity of ecosystems" (UNEP 2012a). Goal 12 of the 2030 Agenda for Sustainable Development, adopted by world leaders in 2015, is "Ensure sustainable consumption and production patterns" (UN 2016).

The current global pace and trajectory of consumption and production are environmentally unsustainable and socially inequitable (WWF 2014, Hoekstra and Wiedmann 2014). In 2012, the European Environment Agency dubbed unsustainable consumption the "mother of all environmental issues" (EEA 2012). Rapid economic growth and human development since the 1950s have been achieved at a heavy cost in terms of environmental pressures and impacts. Global use of natural resources including biomass, fossil fuels, ores, minerals and water increased from less than 10 billion tonnes in 1950 to over 70 billion tonnes in 2010 and could reach 140 billion tonnes by 2050 unless economic growth is decoupled from the rate of natural resource consumption (UNEP 2011a, FOE *et al*. 2009). Accelerating global resource use has produced concomitantly rapid growth in wastes and emissions that are now driving global environmental crises including climate change, degradation of marine and terrestrial ecosystems, threats to food security, water scarcity, and nearly-ubiquitous chemical pollution.

Over-consumption as a cultural norm – and a conspicuous signifier of modernity and class status – is a defining characteristic of developed countries. A "modern" (western) lifestyle is increasingly characterized by its consumption and production patterns. In a lifetime, on average, a European uses four times more resources than someone in Africa and three times more than someone in Asia (but only half as many as someone in the United States) (EEA 2012). Dramatic differences in consumption between rich and poor countries raise obvious questions about environmental equity and responsibility (Wilk 2002).

As more governments and individuals aspire to higher levels of consumption, and in the absence of any change in the pace of growth in this development model of development, by 2050 global material and resource use of materials and resources could dwarf today's (UNEP 2015). The resources needed to sustain this level of consumption are simply not available on anything except the most short-term basis, and the pollution and waste absorptive capacities of the earth's ecosystems are already strained. The 2014 *Living Planet Report* estimated that the equivalent of one and a half Earths would be needed to support the global population if population and consumption trends continue in a BAU (business as usual) manner (WWF 2014).

At the same time, this "global" view is misleading in that consumption, economic growth, development, resource depletion, and the environmental consequences of all of these are not evenly distributed globally (WWF 2014, FOE *et al*. 2009). Neither are they evenly distributed at smaller scales, including the intra-household level. "Average" consumption rates hide significant gender and class differences at the high and low ends of "average" consumption. The social benefits, social inequities, depletion of resources and environmental degradation that accompany current unsustainable models of consumption and production shape (and are shaped by) gender, class, age, race and locational differences. This is also true of people's relationships to economic growth and their perceptions of environmental problems and solutions.

Many forms of consumption and production place unsustainable pressures on ecosystems. The need to meet urgent human needs, including in disaster or refugee situations, during conflicts and where there is chronic or acute poverty, can result in poor

environmental management and resource-raiding at local scales. Such consumption pressures often produce localized environmental pressures that, while consequential, seldom have global impacts. On the other hand, the consumption and production of affluence create *global* pressures, including climate change and other transformations of ecosystems at global scales. In terms of climate change, the relationship between 'lifestyle consumption' and emissions presents a reverse portrait: the poorest 50% of the global population is responsible for around 10% of global greenhouse gas emissions, while the richest 10% of people in the world are responsible for around 50% of global emissions (Oxfam 2015, 2016).

The world's poor, who produce the least greenhouse gas emissions, are the most vulnerable to the effects of climate change. A recent World Bank analysis found that most people live in countries where the poorest 20% of the population are more exposed to disasters such as droughts, floods and heat waves than the average population as a whole – significantly so in many countries in Africa and South East Asia (Hallegate *et al*. 2016). In most countries it is the poorest people who face the greatest environmental risks overall, including through exposures to air, water and soil pollution, hazardous waste and degraded environments (OHCHR 2016, UNEP 2012b, WHO 2010).

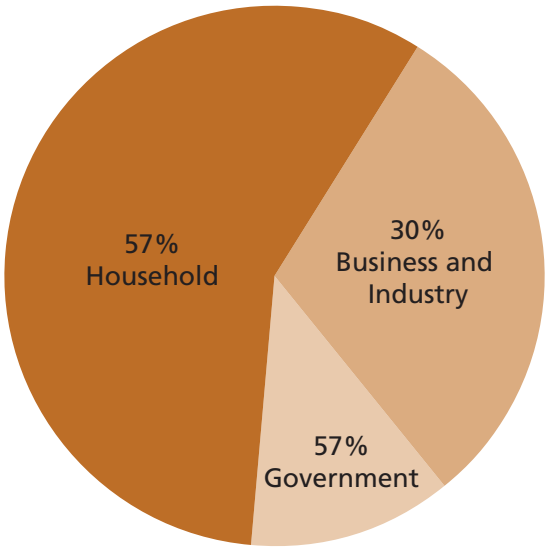
Such inequalities are manifested along several social axes. Women often face greater environmental risks than men, rural communities may be more exposed than urban ones, and groups who are marginalized because of race, ethnicity or other factors are likely to be affected disproportionately (Oxfam 2015, Ringquist 2005). Poverty is an environmental threat-multiplier and, in most parts of the world, women are more likely than men to live in extreme poverty (UN 2015, UNDP 2015c, USAID 2015, UNDP n.d.).

People in developing countries have the right to aspire to and achieve a higher standard of living. As individuals and economies emulate the patterns of affluent developing countries, however, there will be global-scale environmental impacts. The consumption patterns of the new consumer classes will result in larger houses and apartments fitted with new appliances, increasing private car ownership, more air travel, a range of new manufactured goods, and new diets based on much larger amounts of meat and dairy. Without interventions to suggest and support more sustainable paths, emulation of developed countries' consumption patterns in emerging and developing economies threatens to overwhelm ecosystems already on the verge of collapse following decades of over-consumption in the developed world (UNEP 2015a, UNEP 2015b, UNEP 2010).

Households as sites of consumption

How to measure consumption, particularly as a driver of environmental change, is a challenge. In measuring greenhouse gas emissions, for example, it is extremely difficult to separate consumption emissions from production emissions (Oxfam 2015). One approach is to determine "ecological footprints", which usually measure consumption as end-user demand. Consumption of resources by industrial sectors is typically not represented as intrinsic to those sectors, but rather as embedded in end-user sectors such as governments or households. Using this footprint lens, the household is positioned as the primary locus of consumption demand in most countries. In the United Arab Emirates, for example, which has an extremely high per capita ecological footprint, a 2010 study found that household demand represented 57% of the country's total ecological footprint **(Figure 2.4.1)** (EWS-WWF 2010). Household demand can be divided into separate components (e.g. food, mobility, goods, housing) **(Box 2.4.1)**.

Figure 2.4.1: Ecological footprint of the United Arab Emirates by demand sector.



Source: EWS-WWF (2010)

Box 2.4.1: Components of household ecological footprints – examples from Canada and the United Arab Emirates (% of total household demand, 2010)

	food	mobility	goods	housing
Ontario, Canada	28	16	18	14
United Arab Emirates	23	21	19	17

Source:EWS-WWF (2010), Global Footprint Network (2010)

Box 2.4.2: Shares of total marketed world energy use by end-sector users, 2011

Industrial	51%
Transportation	20%
Residential	18%
Commercial	12%

Source: United States Energy Information Administration (2015).

Within households, food is typically the highest demand sector. Situating the footprint of food consumption in the end-using household sector ignores the reality that this footprint actually comprises all emissions resulting from the production, transportation and storage of the food that is eventually consumed in the household. For example, in the United States the production of food (including planting, growing and harvesting crops and feeding and rearing livestock) accounts for 83% of the carbon footprint of household-based food consumption and its transportation accounts for 11% (Center for Sustainable Systems 2015).

As countries, households and individuals become wealthier, they consume more. However, generalizations about "richer" and "poorer" countries or regions do not necessarily provide adequate explanations of excess consumption and material use patterns at smaller scales. In the richer countries overall, the consumption and environmental costs gap at individual or household levels is enormous. A 2013 study in Switzerland, for example, showed that only 21% of the households in one mid-sized community were responsible for 50% of total greenhouse gas emissions; if their emissions were halved, the community's total emissions would therefore be reduced by 25% (Saner 2013).

Understanding the intra-household gender dynamics of consumption requires even more nuanced analysis. For developed countries the prevailing assumption is that, following traditional gender roles, women do most of the shopping for households. But there is little evidence to support the widespread corollary assumption that being the "principal shopper" in the household also means that women make the majority of decisions about household purchases. Taking on a shopping role does not necessarily mean that women have greater agency and autonomy in decision-making about consumption. Gender analysts caution that "Evidence that women played a role in making decisions which were of little consequence or which were assigned to women anyway by the pre- existing gender division of roles and responsibilities, tell us far less about their power to choose than evidence on decisions which relate to strategic life choices or to choices which had been denied to them in the past" (Kabeer 1999).

Assumptions about women's control of household-based consumption choices often prove to be wrong when micro-scale analysis is available. For example, in the 1990s kerosene (parrafin) continued to be the principal fuel used for cooking in many poor townships in South Africa despite its dangers (e.g. flammability, toxicity) and despite the wide availability of safer gas and electricity. An analysis in one township revealed that the choice to continue using kerosene was embedded in a wide range of cultural, social and economic aspects of gender relations and the local economy. Buying, selling and using kerosene were considered women's work, while men were more involved in providing and paying for electricity and gas. Men therefore resisted a shift away from kerosene since it increased their obligation with respect to family budgets, while many women preferred kerosene because they could obtain it informally by borrowing from friends when cash was short (Bank 1997).

These caveats aside, the evidence that women play important roles, across cultures, as major household consumers and sometimes decision-makers suggests that women can play a significant role in shifting towards sustainable consumption. Women's ownership of assets, control of income, and degree of authority

Box 2.4.3: Gendered decision making in household consumption

- Broadly speaking, evidence from South Asia suggests that, within the family purchases of food and other items for household consumption (as well as decisions about children's health) fall within women's area of decision-making (Kabeer 1999);
- Data from several rural regions in Pakistan reveal that the only area of decision-making in which women reported playing a major decision-making role was in relation to the purchase of food: 71% of women reported having a say in the purchase of food, but only 17% report having a say in major household purchases (Sathar and Kazi 2000);
- Estimates of consumer spending that women "control" (without this term being defined in the original research) are as follows: Canada, 75%; United States, 73%; Germany, 70%; United Kingdom, 66%; Japan, 62%; Italy, 57%; China, 50% (Silverstein and Sayer 2009);
- In the United States there are higher rates of consumption and spending in lesbian, gay, bisexual and transsexual (LGBT) households than in non-gay households, and higher rates in gay male households than in lesbian ones: male same-sex partnered households make 22% more "shopping trips" (term not defined) per year than the average non-gay household, and female same-sex households 9% more. Average annual spending on consumer packaged goods is 30% higher in male same-sex partnered households and 21% higher in female same-sex households compared with average spending in households in the United States (Catalyst 2015, Nielsen Reports 2013).

in household financial decision-making also results in distinctive expenditure patterns: in households with children, women tend to spend more on children's needs, and households where women own assets have better child survival, nutrition, and education outcomes (Unicef 2011, World Bank 2011).

Shining the environmental spotlight on unsustainable consumption in developed countries is an important and necessary strategy for directing attention to the major drivers of global environmental degradation. But identifying the "household" as a primary site of unsustainability has the distortive effect of placing global responsibility on feminized sites (households and individual consumer choices) while deflecting attention from masculinized constellations of unsustainable consumption such as militaries and extractive industries.

Consumption of plastics and chemicals

The types of materials being consumed globally have changed dramatically in recent decades. Plastics and synthetic chemicals have become globally ubiquitous. Between 1950 and 2012, world plastics production grew by an average 8.7% per year, rising from 1.7 million tons to the nearly 300 million tons of 2015 (Globalist 2015, PlasticsEurope 2015). Virtually everyone in the world is continually exposed in daily life to potentially hazardous chemicals; once these chemicals are in the air we breathe, the water we drink and the food we eat, they will end up in our bodies. That harmful chemicals enter the human body can be shown by measuring the body burden (the total amount of a chemical present in the body). In the average person, even in people who live in isolated regions, dozens of hazardous chemicals have been identified in samples of blood, the umbilical cord, the placenta, breast milk, urine, hair, sperm and fatty tissue (CDC 2015, CDC 2009, COPHES 2012, Schuiling and van der Naald 2005).

In a 2011 World Health Organization (WHO) review, the global burden of disease from exposure to the small number of chemicals on which data were available was calculated. The authors concluded that, in 2004, 4.9 million deaths (8.3% of the total) were attributable to exposures to those chemicals (Prüss-Ustün *et al*. 2011). Some chemicals with known health effects, such as dioxins, cadmium, and mercury, as well as chronic exposure to pesticides, could not be included in the study due to incomplete data and information. The conclusions highlight that while the global disease burden due to exposures to hazardous chemicals is known to be considerable, it is underestimated due to very limited data. "Non-communicable diseases", a broad category that includes deaths due to exposures to chemical and other environmental contaminants, were responsible for 68% of the 56 million deaths in the world in 2012 (WHO 2014). There is an emerging scientific consensus that previous estimates of the share of non-communicable diseases attributable to environmental contaminants significantly underestimated the actual contribution of these contaminants; this is largely because direct connections between early life exposures to chemical contaminants, although clearly associated

with an elevated risk of disease later in life, are difficult to establish (Norman *et al*. 2013).

While exposures to many chemicals pose a constant risk, there are windows of susceptibility for both women and men when these exposures can have critical effects in regard to development and disease **(Table 2.4.1)**. For both girl and boy infants the weeks just before and after birth are high-risk, as is puberty for both; pregnancy, lactation and menopause are windows of susceptibility for women. Hormone-disrupting chemicals, in particular, can influence proper development of a multiplicity of organ systems and tissues, with those of the reproductive tract, brain and neuroendocrine system the most prominent. Exposure to endocrine-disrupting chemicals (EDCs) can have effects on early development which are often irreversible but may not become evident until later in life (Prüss-Üstün 2016, WHO 2014, Bergman *et al*. 2011, Kortenkamp *et al*. 2011).

Women's global breast cancer incidence rates have increased dramatically in recent years. This trend cannot be fully explained by improvements in diagnosis or changes in established risk factors (e.g. age at menarche or menopause, genetic susceptibility, age of having babies). Increasing epidemiological evidence points to strong links between breast cancer and exposures to chemicals such as polychlorinated biphenyls (PCBs), organic solvents, DDT/DDE (Cohn *et al*. 2007), bisphenol A (BPA) (Murray *et al*. 2007), polycyclic aromatic hydrocarbons (PAHs), phenols, alkylphenols, phthalates, parabens, styrene, metals, phytoestrogens, chemicals in first- or second-hand smoke, and heavy metals such as cadmium (WECF 2016, WHO and UNEP 2013, Watts 2013, Kortenkamp 2008, Lynn 2007, Brody *et al*. 2007).

Male reproductive health is also influenced by chemical exposures, which can lead to diseases including testicular cancer and to subfertile semen quality (WHO

Table 2.4.1: Fertility disorders are increasing in industrialized societies, many of which are associated with chemical exposures.

Chemical Exposures During Development and Fertility/Fecundity Related Impacts		
Exposure (sources)	Potential female effects	Potential male effects
Bisphenol A (BPA) monomer used to make polycarbonate plastic, resins	**altered puberty onset (A)** **obesity** (A)	**altered prostate development** (A) **decreased semen quality *** (A) **hormonal changes** (A)
Chlorinated hydrocarbons dioxins/furans, PCBs, some	**malformations of the reproductive tract ^** (A) **altered estrous cycle** (A) **reduced fertility ‡** (A) **hormonal changes** (H, A) (conflicting) **altered sex ratio** (H,A) **altered puberty onset** (H)	**malformations of the reproductive tract ^** (H,A) (conflicting) **decreased semen quality *** (H,A) **altered sex ratio** (H,A) **altered puberty onset** (H)
Organochlorine pesticides DDT/DDE, linuron, others	**delayed time to pregnancy** (H)	**malformations of reproductive tract ^** (A)
Pesticides broad category that includes many classes of insecticides, fungicides, herbicides, rodenticides, and fumigants	**altered sex ratio** (H,A) **altered puberty onset** (A)	**altered sex ratio** (H,A) **altered puberty onset** (A) **malformations of reproductive tract ^** (H,A) **reduced fertility** (A)
Cigarette smoke maternal smoking		**decreased semen quality *** (H)
DES	**malformations of reproductive tract ^** (H,A) **altered hormone response (A)** **menstrual irregularities** (H,A) **reduced fertility ‡** (H,A) **uterine fibroids** (A) **miscarriage** (H)	**malformations of reproductive tract ^** (H,A) **altered hormone response** (A)

Exposure (sources)	Potential female effects	Potential male effects
Heavy Metals lead, mercury, manganese, cadmium	**Heavy Metals** lead, mercury, manganese, cadmium	
Phthalates plasticizers added to soften plastics; also found in cosmetics, toys, pharmaceuticals, and medical devices		**shortened anogenital distance** (H) **malformations of reproductive tract** (A) **hormonal changes** (A) **decreased semen quality *** (A)
Perfluorinated compounds (PFOS, PFOA) used to make fabrics stain-resistant/water-repellant; in coating of cooking pans, floor polish, insecticides	**hormonal changes** (A)	**hormonal changes** (A)
Polybrominated Diphenyl Ethers (PBDEs) flame retardants found in furniture foam, mattresses, textiles, and electronics		decreased semen quality * (A)
Octylphenol/nonylphenol surfactants	**hormonal changes** (A) **altered puberty onset** (A)	**hormonal changes** (A) **decreased semen quality *** (A) **decreased testes size** (A)

(H) evidence from human studies. (A) evidence from animal studies. (H,A) evidence from human and animal studies.

* decreased semen quality could include low semen volume, abnormal sperm shapes or motility, decreased sperm counts.

‡ - reduced fertility could include both infertility and increased time to pregnancy (reduced fecundity).

△ - menstrual irregularities could include short or long menstrual cycles, missed periods, abnormal bleeding, anovulation.

^ malformations of the reproductive tract: In males, could include shortened ano-genital distance in animals or hypospadias (humans), undescended testicles (cryptorchidism), small testicles (hypoplasia), and structural abnormalities of the epididymis. In females, could include small ovaries, reduced number of follicles (eggs), and structural abnormalities of the oviducts, uterus, cervix, and/or vagina.

Source: Luoma (2005)

and UNEP 2013). In studies conducted since 2001 in Germany, Denmark, Finland, Norway and Sweden, 20-40% of young men in the general population had sperm counts in the subfertile range (Skakkebaek 2010, Guzick *et al*. 2001). Testicular cancer has increased 400% over the last 50 years in industrialized countries; by the early 2000s it was the most common cancer in men between 20 and 45 (Richiardi *et al*. 2004, Huyghe *et al*. 2003).

Structural factors in unsustainable consumption

Many large-scale social and economic forces drive unsustainable consumption and production, including:

Normative economic models

The model of growth that drives unsustainable consumption and production is largely based on mainstream economic presumptions that continuous growth is possible even in closed systems such as the planet (UNEP 2015). The primary metric of mainstream economics, Gross Domestic Product (GDP), is a measure of output, income and spending (Economist 2016, Stiglitz *et al*. 2010). In all capitalist economies and in most global financial circles, the health of an economy and its "progress" are judged primarily by whether GDP continues to grow; indeed, most conventional economists define a healthy economy exclusively as one with high rate of growth (Constanza 1989). Western governments and international financial institutions actively export this economic orthodoxy encouraging continuous consumption and production as the dominant economic policy for development. A number

of scientists, economists and others have maintained for decades that infinite growth will be impossible on a finite planet (Sachs 2015, Shiva 2013, Brown 2011). The platform of the International Women's Earth and Climate Initiative calls for "new economic structures and indicators that move us away from endless economic growth" (IWECI 2013).

Ecological economics, which emerged in the 1980s, challenges the economic orthodoxy of measuring progress using only the production-based market metric of GDP (van Dieren 1995, Constanza 1989). GDP-based economic accounting counts all economic activity as good (regardless of the origins of such activity or the consequences). Among other ironies, this means that environmental disasters can be considered economically beneficial due to spending on reconstruction in the aftermath; wars usually turn up as a positive for GDP due to escalating spending on armaments, fuel, transport and personnel (Hardisty 2010). On the other hand, pollution, resource degradation and waste are not counted against GDP (Economist 2016, Stiglitz *et al*. 2010).

GDP-based economic orthodoxy reflects deeply gendered norms and assumptions about what counts as economic activity. Just as the normative economic model of GDP measurement does not appropriately reflect environmental costs and benefits, neither does it count most of the actual work done in an economy, including "wellbeing" and "care" work. In the 1980s the economist Marilyn Waring (1988) laid the groundwork for feminist economics by making the case that the contributions of most of the world's women were left out of the conventional global economic model. Reproductive work, unpaid caring labour, unpaid household labour, child care, volunteer work, artisanal work that is not market-based, subsistence labour, and bartering and informal activities – a large share of which are done by women – are invisible in conventional global and national accounts (Ghosh 2015, Boris and Parrenas 2010, Folbre 2006, Folbre 2003). It is estimated that three out of every four hours of unpaid work is done by women (UNDP 2015a, UNDP 2015b).

None of those activities is counted in GDP-based economic measurements. Some estimates suggest that if this invisible work were counted, it would be apparent that nearly two-thirds of the world's wealth is created by women (Duhagon 2010). Efforts to give a monetary value to unpaid and "care" work are increasing. In countries attempting to measure the value of unpaid care work, estimates range up to 60% of GDP (UNDP 2015). In India and South Africa, unpaid care is estimated at 39% and 15% of GDP, respectively. It is estimated at 26-34% of official GDP in Guatemala and 32% in El Salvador. Estimates of household production in 27 countries, using a replacement cost approach, shows that the value of household production as a share of GDP varies considerably across countries, from above 35% in Australia, Japan and New Zealand to below 20% in the Republic of Korea and Mexico (UNDP 2015).

Urbanization and consumption

The proportion of the world's population living in urban areas is expected to increase to 66% by 2050 (UN/DESA 2014). Population growth and continuing urbanization are projected to add 2.5 billion people to the world's

Box 2.4.4: Urbanism and the gender profile of economic inequality

While urbanization is seen as an economic driver overall, the general increase in incomes associated with it is unevenly distributed. Overall, growing income inequality is strongly associated with emerging economy urbanization, especially in the most rapidly urbanizing settings (Ukhova 2015; Oxfam 2011). This income inequality is also strongly associated with gender inequality. The emerging urban discretionary-income, high-consumption class is not equally populated by women and men, although much of the gender-specific effect is masked by the standard practice of collecting information on consumption and spending by "household" units.

Men dominate the ranks of the rich, high-consuming urban class, especially at the top of the wealth pyramid. A recent International Monetary Fund (IMF) study examining the linkages of gender and income inequality revealed that, at the top of the income ladder, higher gender inequality is strongly associated with higher income shares in the top 10% income group (Gonzales *et al*. 2015). In preparation for the World Economic Forum Annual Meeting in Davos, Switzerland in 2016, Oxfam prepared an analysis which showed that the top 62 richest people in the world own as much wealth as the bottom half of the world population (some 3.6 billion people) (Oxfam 2016). Of these 62 wealthiest individuals, 56 (90%) are men, 6 (10%) are women (Forbes 2016).

urban population by 2050, with nearly 90% of the increase concentrated in Asia and Africa. If this growth follows BAU models, the ecological footprint of cities will increase (WWF 2014). Cities are the source of up to an estimated 70% of global greenhouse gas emissions (UN-Habitat 2011). While urban density can make use of public transport and other services more efficient, lowering direct energy use and emissions, urban sprawl reduces efficiency and exerts greater environmental pressures (Luque 2015, Poumanyvong and Kaneko 2010). Per capita emissions in New York City are 30% less than the United States average; Barcelona, London, Tokyo, Rio de Janeiro, and São Paolo all have much lower average emissions per capita than the national averages (WWF 2012, Dodman 2009). .Nevertheless, with growing urbanism the efficiency of resource use achieved as a result of urban density is wiped out by the increased consumption of the people who live in cities (Isenhour and Feng 2014). City dwellers are consumers; indeed, in most of the world the fact that cities are centres of consumption drives urban growth much more than their functions as production centres.

The shift to urban living is increasing the incomes of millions of people in the world. In cities it is estimated that a billion people will enter the global "consuming class" by 2025, with incomes high enough for them to become significant consumers of goods and services. The incomes of these new consumers are rising even more rapidly than the number of people in the consuming class. This means many products and services have reached take-off points from which their consumption will rise swiftly and steeply. By 2025 urban consumers are likely to inject around US$20 trillion per year in additional spending into the world economy. "Discretionary income", which allows luxury consumption, tend to rise even more rapidly than overall incomes in cities; for example, in India discretionary spending increased from 35% of average household consumption in 1985 to 52% in 2005 and is expected to reach 70% by 2025 (McKinsey Global Institute 2012).

It is more difficult to measure gender ratios at the bottom of the wealth scale accurately, in large part because poverty is typically counted at the household level instead of the individual level. However, according to recent assessments women are much more likely than men to live in poverty (UN Women 2015). Latin America and the Caribbean is the only region where analysis of the poorest households by gender composition has been carried out over time: women in that region outnumber men in households below the poverty line, and the proportion of women compared to men in poor households increased from 108.7 women for every 100 men in 1997 to 117.2 in 2012. This upward trend has taken place in the context of declining poverty rates in the region as a whole (UN Women 2015).

The current state of many urban environments, particularly lack of infrastructure and basic services in urban slums and low-income areas, leads to stress and time poverty, for example in regard to access to safe water, sanitation, education and health care. Environmental health challenges in urban contexts increase women's unpaid care work in terms of meeting family and community nutrition and health needs, especially when health facilities and services are unavailable or unaffordable.

Driving consumer aspiration through advertising

Advertising creates demand for consumer goods, even those for which there was previously limited or no demand. It influences consumer choices, creates an identification with brands, and shapes perceptions about the roles of commodities and consumption in signifying personal identity, success and accomplishments. Linked to globalization trends and the spread of developed world lifestyles, advertising is widely seen as a primary driver in disseminating unsustainable consumption patterns around the world and stimulating excessive consumption in developed countries (Sheehan 2014, Henderson 2012, World Federation of Advertisers 2002).

Through the lens of marketing and advertising, developing countries, especially the young people in these countries (UNEP and UNESCO 2016), represent "emerging markets". Considerable neurological, psychological and marketing research shows that young people are more susceptible to advertising than adults and are more impulsive consumers (Pechmann *et al*. 2005). Buoyed by success in developed countries, global advertisers see youth in the developing world as the next marketing and consumption frontier (Atsmon *et al*. 2012, Mahajan and Banga 2005).

Gendering is used as a tool to increase demand for consumer goods. Advertising encourages adolescents

to adopt identities through consuming goods that are presented as being appropriate to particular social and gender roles. Despite increasing recognition of gender fluidity and role shifts, much contemporary marketing of commodities in developed markets is traditionally gender stereotyped: goods destined for the domestic sphere and home life, such as laundry detergents and kitchen equipment, are marketed to women, while sports, electronics and public-sphere products are typically presented as male commodities (Alozie 2013, Sheehan 2014, Roberts 1998, Flrat 1991). As global commodity producers enter "emerging" markets, they bring similarly normatively gendered messages along with these commodities.

In addition to selling goods based on gendered associations, marketing strives to embed gender identities in specific commodities that have no innate gender-differentiated characteristics. Gendering commodities, or associating them exclusively with women or men, can allow manufacturers to double their potential market. If they are able to persuade women and men that they need their own gender-distinct type of deodorants, running shoes, toys, pens, watches, cars, soap, skin cream and bicycles, among many other products, gender manipulation becomes a driver of greater consumption and of gender-specialized production. Symbolic associations between a commodity and its gender identity are mutually reinforcing: these commodities reinforce gender identities while gender identities become ever more intertwined with particular goods (Scanlon 2000, Fournier 1998, McCracken 1986). This intertwining can be so strong that "brand gender contamination" has become an advertising term for attempts to switch or loosen gender identification with certain brands (Avery 2012).

There is considerable interest in the potential to use marketing and advertising tools to promote sustainability and environmental agendas (UNEP and UNESCO 2016, Henderson 2012, World Federation of Advertisers 2002). Commercial advertising can encourage sustainable consumption by highlighting the sustainability dimensions of certain goods and services and persuading consumers to purchase them, in some cases regardless of the price (OECD 2008). There is some debate about the effectiveness of using tools designed to encourage more consumption in order to promote sustainable – and less – consumption.

Norms of feminist and masculinity as high environmental impact consumption drivers:

The three case studies that follow **(Boxes 2.4.5-2.4.7)** illustrate that unsustainable consumption is often deeply and intentionally gendered. Situating the consumption of meat, cars and cosmetics as gendered environmental problems does not mean individual women and men are responsible for these global problems, nor for solving them. Gender identities in these instances are constructed through a combination of complex social forces including large, profitable industrial and marketing structures that create and support gendered associations. These case studies demonstrate that social constructions of femininity and masculinity need to be taken seriously in environmental policy arenas if we are to shift away from unsustainable consumption patterns.

Production and waste

Sustainable consumption and production (SCP) is about "the use of services and related products, which respond to basic needs and bring a better quality of life while minimizing the use of natural resources and toxic materials as well as the emissions of waste and pollutants over the life cycle of the service or product so as not to jeopardize the needs of further generations" (Sustainable Development Knowledge Platform 2016b). Two of the targets on which United Nations Member States have agreed under Sustainable Development Goal 12 ("Ensure sustainable consumption and production patterns") are: "By 2020, achieve the environmentally sound management of chemicals and all wastes throughout their life cycle, in accordance with agreed international frameworks, and significantly reduce their release to air, water and soil in order to minimize their adverse impacts on human health and the environment"; and "By 2030, substantially reduce waste generation through prevention, reduction, recycling and reuse" (UN 2016).

Box 2.4.5: Norms of femininity and masculinity as drivers of meat consumption

The consumption and production of meat are receiving increasing attention as a global environmental threat (UNEP-GEAS 2012, UNEP 2009, York and Gossard 2004). Meat production is resource intensive, requiring up to ten times the quantities of land, energy and water as equivalent amounts of vegetarian food (York and Gossard 2004, Dutilh and Kramer 2000). Beef production has the most damaging environmental impacts, for example contributing to deforestation, desertification and global warming. Recent estimates of animal agriculture's share of total global GHG emissions range between 10% and 25%; the higher figure includes the effects of deforestation and other land use changes and the lower one does not. According to recent analyses, GHG emissions from livestock production represent nearly 80% of all agricultural GHG emissions (UNEP-GEAS 2012).

Global meat consumption is growing rapidly and is closely associated with increases in urbanization and individual purchasing power (FAO 2002). Economic development is generally associated with increases in per capita food consumption and a higher proportion of meat as part of that increase, although this is not true everywhere (UNEP 2009, York and Gossard 2004, Rosegrant *et al*. 2001)

Eating meat is closely gendered: meat is symbolically and socially associated with manhood (Wellesley *et al*. 2015, Adams 2010). The nature of the male-meat association varies around the world, and cultural differences interact with the availability of meat to shape somewhat different versions of the meat-masculinity association (Schösler *et al*. 2015). Nevertheless, it is a global pattern that men emphasize meat and women minimize it as part of their gender identity: men are perceived as "needing" meat more than women and eating meat is considered a male prerogative; taboos about eating it are applied more often to women than to men; and when poverty or food insecurity compel a deliberate restriction of meat, women eat it last and least (Rothgerber 2013, Sobal 2005, Leghorn and Roodkowsky 1977). Eating meat reflects and reinforces male privilege and power, although specific historical and socio-cultural explanations for the meat-masculinity complex vary widely. Systematic and comparative data on gender and meat consumption are not fully available, but two examples are illustrative:

In the United States adult women eat about 20% less meat on average than adult men (44% less beef, 39% less pork and 23% less poultry) (USDA 2012):

Daily meat consumption in the United States, 2012 (grams per day)

	Beef	Pork	Poultry	Total
Men	78.16	38.07	61.53	177.76
Women	43.64	23.08	47.18	113.90

In São Paolo, Brazil, the ratio is similar:

Daily beef and pork consumption, São Paolo, Brazil, 2008 (grams per day)

Men	104.1
Women	59.4

Source: de Carvalho *et al*. (2014)

Most environmental analysts agree that changes in meat eating are required for environmental sustainability. Scientists suggest that to keep global GHG emissions to 2000 levels, the over 9 billion people projected to live in the world in 2050 will need to consume no more than an average 70-90 grams of meat per day (UNEP-GEAS 2012). To meet this target, substantial reductions in meat consumption in developed countries and less rapid growth of demand in developing ones are required (UNEP-GEAS 2012). Such a shift in consumption will only be successful if the gender-specific social embeddedness of meat is addressed: a dietary shift needs to be accompanied or preceded by a shift in the gender relations and associations of meat eating (Schösler *et al*. 2015, Wellesley *et al*. 2015).

Box 2.4.6: Gender and the use and ownership of cars

Global automobile use and ownership grow as economic development increases individual consumer capacity. Until recently the largest number of cars, and the greatest share of individual car ownership, were in the United States and, to a lesser extent, Europe. The emerging economies currently surpass developed countries in the rate of growth of car sales and will soon surpass them in total number of cars:

Annual average car sales, millions of units:

	1990-99	2015	% change
China	0.43	19.47	4428%
India	0.31	1.99	542%
Mexico	0.54	1.36	152%
Russia	0.78	1.74	123%
Brazil	0.94	2.00	113%
United States	14.55	17.40	20%
Western Europe	13.11	12.95	-1%
Germany	3.57	3.19	-10.6%

Source: ScotiaBank (2015)

In both emerging and developed economies car ownership is a status symbol, a powerful tool for economic and employment improvement, and an enabler of autonomy and mobility. Car ownership globally is heavily gender-skewed: women walk, or use bicycles and public transport, more than men; fewer women than men own or control access to individual cars; and when women have access to cars they use them less than men. In a German study, 72% of car owners were men and 28% were women; men drove 17,500 km a year on average compared with 10,142 km for women (Vinz 2009). In the 27 Member States of the European Union in 2007, 61% of men and 47% of women reported that "individual motorized transportation" was their main transport mode; 23% of women and 18% of men said public transport was their main mode (Eurobarometer 2007). In a study in the United Kingdom 75% of women had no or "restricted" access to a car compared to 15% of men (Kuneida and Gauthier 2007).

Vehicle ownership, 2010 (percentage of men and women who own cars, trucks, motorcycles and scooters)

	Men	Women
Karnataka, India	15%	8%
Ghana	9%	2%
Ecuador	13%	7%

Source: Doss *et al.* (2011)

Percentage of women and men who intended to purchase a new or used car in the next two years.

	Men	Women
India	82%	18%
Indonesia	66%	34%
Germany	56%	44%
China	55%	45%
United States	54%	46%
Mexico	52%	48%
Thailand	52%	48%
Brazil	50%	50%

Source: Nielsen Reports (2014)

The evidence base for the relationship between gender and transportation in developing countries is more limited, but similar (perhaps even more heavily skewed) gendered patterns can be identified as use of private cars becomes more widespread (Peters 2013, Roy 2010, Porter 2008). In most emerging countries ownership figures are low for men and lower still for women: in Nairobi, Kenya, 9% of female heads of households had a car compared to 24% of men; in Belo Horizonte, Brazil, 6% of women used a car to get to work compared to 23% of men (Kuneida and Gauthier 2007). Men are typically the first to motorize. However, there is a trickle-down effect as women gain access to older vehicles such as bicycles when men move to motorcycles, motorcycles when men move to cars, and so on.

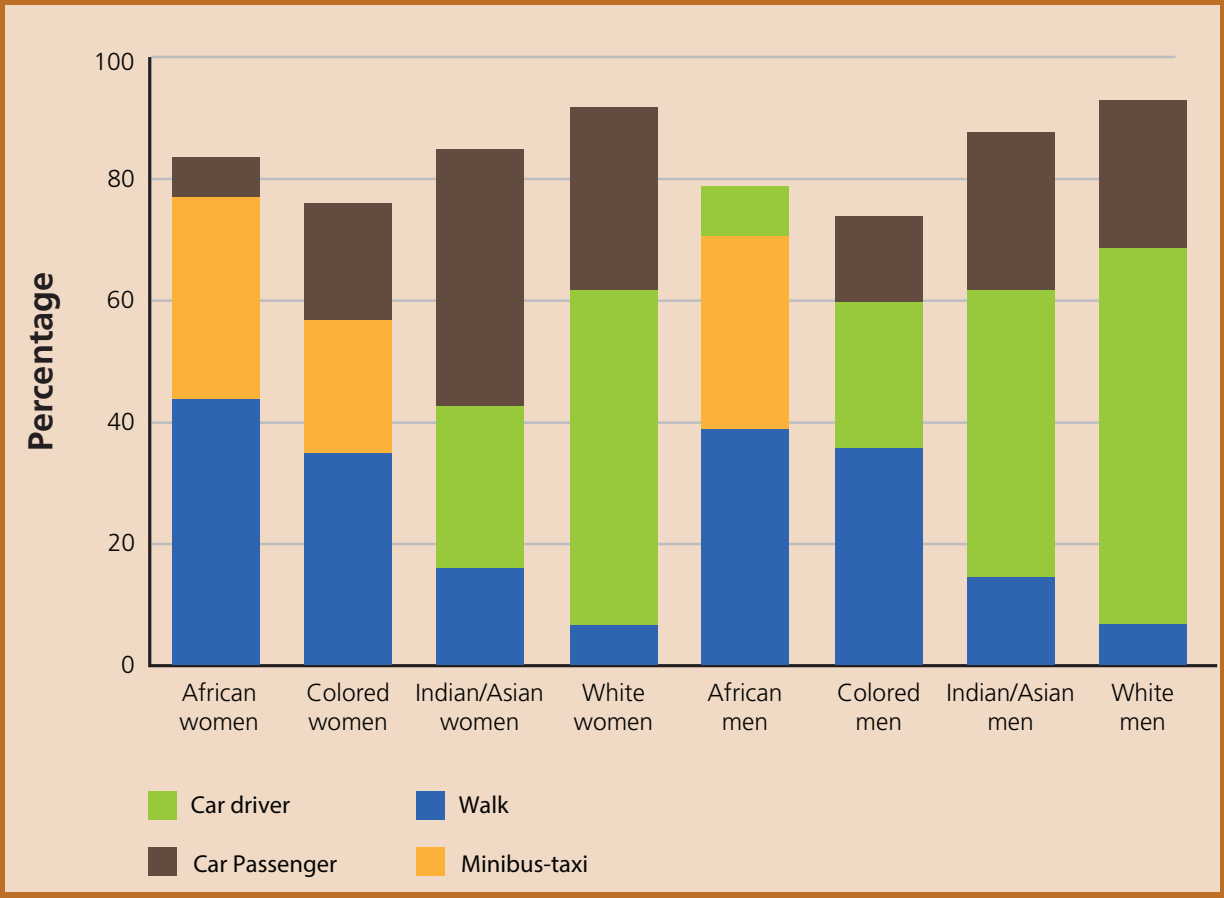
In both developed and developing countries gender-specific patterns of car use reflect a convergence of social forces and cultural norms. These include income differences between women and men; cultural norms about appropriate degrees of autonomy and mobility for women and men; cultural norms about appropriate expressions of femininity and masculinity in relation to machines and technology; gender-distinct concerns about safety and mobility, whether public or private; and associations of masculinity with power and freedom.

Contd...

Structural gender disadvantages can compound to hinder women's access to car ownership or use. In India for example, (as in many other countries), proof of residence is needed in order to obtain a driver's license. This requirement is difficult for poor women and men to meet if they live in informal or slum communities but it is particularly difficult for women since they are less likely than the men in their households to have documents such as electricity or water bills in their names (Baruah 2015). Having a license can facilitate other officially regulated activities such as opening a bank account, so that women's disadvantage in car licensing can have wide ripple effects.

While other characteristics, especially class and race, influence the types of transport people use, gender is an important factor within each group.

Transport modes by race and gender in Johannesburg, South Africa



Source: Kuneida and Gauthier (2007)

Box 2.4.7: Norms of femininity and masculinity in cosmetics consumption

The global cosmetics market is worth hundreds of billions of dollars per year. In the Asia-Pacific region alone it is expected to reach an annual US$126.8 billion by 2020 (PRNewswire 2015).

Cosmetics marketing targets women, and women are greater cosmetics consumers than men. According to a survey in the United States, women used an average of 12 personal care products per day containing 168 unique ingredients. Men used an average of six of these products per day containing 85 unique ingredients. More than one-quarter of all women and one out of every 100 men used at least 15 personal care products per day (EWG 2004).

Safety data are lacking for most chemicals in makeup, shampoo, deodorants, skin lotions, nail polish and other personal care products (WECF 2016). In the United States releases of such products onto the market are not heavily regulated (FDA 2015). Substances in personal care products may include lead, toxic metals, parabens, triclosan phthalates, mineral oils, nanomaterials and formaldehyde (Campaign for Safe Cosmetics 2016, WECF 2016, Bocca *et al*. 2014); even if individual substances have been tested for human health effects, the effects of synergetic exposure (the "chemical cocktail" effect) remain mostly untested (WECF 2016).

Many chemicals in cosmetics are known to be carcinogenic, mutagenic, neurotoxic or bioaccumulative, while others are suspected to be one or more of these (Steinemann *et al*. 2015, Colborn *et al*. 1996). The United States-based Environmental Working Group estimates that one out of every 24 women is exposed daily to personal care product ingredients that are known or probable reproductive and developmental toxins linked to impaired fertility or developmental harm to foetuses (EWG 2014). Many common chemicals in cosmetics, especially phthalates and parabens, have been linked in animal studies to male genital birth defects, reproductive disorders in women, oestrogenic effects, decreased sperm counts and altered pregnancy outcomes; there is no definitive evidence of the same effects in humans, but widespread exposures, primarily to phthalates, have been shown to occur through cosmetics use (Matsumoto *et al*. 2008, Barrett 2005). Phthalates are linked with early puberty onset in girls and boys and with breast cancer in women (Lynn *et al*. 2016 Scott *et al* 2015; WECF 2016; Mouritsen *et al*. 2013; Steingraber 2007). Parabens have been shown to have oestrogenic and endocrine-disrupting effects and have been detected in human breast tumor tissue, indicating absorption, although the route and causal associations have yet to be confirmed (Harvey and Darbre 2004, Colborn *et al*. 1996). A recent study revealed that nearly one-third of cosmetic products in Austria, Germany and Switzerland contain endocrine-disrupting substances, mostly parabens (FOE 2013). Skin-lightening products, most of which contain mercury, are in wide use in Africa and Asia and among racial minority populations in Europe and North America. An estimated 77% of women in Nigeria and 59% in Togo, regularly use skin lighteners, while in India 61% of the dermatological products market consists of skin lightening products (WHO 2011).

In addition to the health effects of exposures to chemicals in cosmetics, the production and disposal of these products cause widespread pollution and environmental damage. Releases of oestrogenic substances and microplastics, in particular, into aquatic and drinking water systems result in widespread environmental degradation and expand the circle of exposures to hazardous chemicals (Cassani and Gramatica 2015, Boxall *et al*. 2012, Colborn *et al*. 1996, American Rivers n.d.).

The highest growth rate in the global cosmetics industry is in emerging economies. In 2010 Brazil, China, India and Russia together accounted for 21% of the world's "beauty industry" while emerging markets accounted for over 80% of growth in global sales in cosmetics in 2011 (Lopaciuk and Loboda 2013). As these economies shift from early industrialization into late industrialization with a growing service sector, there is evidence that the explicit demand for "attractive" workers in the service sector is fueling this growth. Scholars of China suggest that increases in women's consumption choices have intensified their concern with physical appearance, as indicated by a growing interest in beauty pageants, plastic surgery and other forms of cosmetics (Xu and Feiner 2007). Some observers suggest that in China, among other countries in the midst of this economic shift, notions of femininity and beauty seem to be shifting to favor more 'commodified' Western attitudes (Nolan 2008).

Gender inequality and global production

Unsustainable consumption is interwoven with unsustainable production. Production of material goods takes place in a sex-segregated and gender-discriminatory labour context, a pattern that plays out at local as well as global scales, in developing as well as developed countries. Attracting transnational export-oriented production and industrialization investments has become a primary strategy for developing countries in order to improve their economies, reduce poverty and increase formal employment. Governments often describe this type of strategy as a pathway to improving women's economic well-being and empowerment. Evidence concerning the gender equity outcomes is mixed at best. Despite the proposition that increased trade and economic development will result in increased equality between the sexes, studies have shown that the gender inequality which resides in social norms and institutions persists even after many years of economic development; in fact, old forms of gender discrimination may survive economic liberalization while new ones emerge (Self and Grabowski 2009, Jomo 2001).

Evidence suggests that two types of gender inequality are inherent in this economic growth strategy in many countries. First, a rising economic tide does not necessarily lift all boats. Both women and men may benefit from increased economic opportunities, but because women are universally paid less than men and their labor is more contingent they typically gain less than do their male counterparts. A recent analysis of women and men working in foreign export manufacturing zones in China, for example, found that women received smaller wage gains compared to men (Braunstein and Brenner 2007). Secondly, pre-existing gender inequality is often used intentionally to attract foreign investment and economic growth and, in some cases, might be a prerequisite for it (Seguino 2000). Especially in middle-income emerging economies that depend on export-oriented production, gender inequality is both an outcome of and a stimulus to growth. Employers tap lower-wage women to work in industrial production to keep the costs of goods low for export. For investors the ability to pay women workers lower wages is seen as an investment enhancement and profit multiplier: gender wage differentials signal opportunities for profitable investment (Seguino 2000, Ertürk and Çaatay 1995). The "labour-cost advantage" of hiring women is a product of government and corporate policies on employment and wages that make women's labour cheap and simultaneously mobilize gender ideals and stereotypes that justify women's concentration in unskilled, low-paying, high-turnover jobs (Enloe 2014, Berik 2000).

As multinational companies scour the globe for ever-cheaper production sites, the fact that women's labour can usually be made cheaper than men's means women typically predominate on the bottom tier of most global production systems. The exploitation of poor, non-unionized and ultimately 'disposable' women in developing countries proliferates through the use of sweatshop suppliers (Bettany *et al*. 2010). The "global assembly line" is, at least in the early stages of global integration, typically a feminized one: in 2012 there were an estimated 4500 export-oriented garment factories in Bangladesh employing 3 million people, 70% of whom were women (Enloe 2014); as Mexico's large-scale export-production programme of maquilas got under way in the 1980s, women accounted for more than 75% of workers (Brown 2002); in 2015, women dominated Cambodia's garment sector, making up an estimated 90-92% of the industry's estimated 700,000 workers (HRW 2014). This feminization of global assembly production is typical but not universal: in India the majority of garment workers in industrial production are men.

The bottom tiers of global manufacturing production, which are often among the most feminized, are also among the most dangerous for workers. Garment workers, for example, suffer from musculoskeletal and respiratory problems, eye diseases and vision problems, skin diseases and stress as well as being at a high risk of accidents and injuries. Since most of these workers are from lower socio-economic classes, work-related impacts are compounded by poverty, lack of education, poor working conditions, excess working hours and poor diet (Saha *et al*. 2010). Catastrophic workplace accidents are not uncommon in emerging-economy industrial workplaces. Lax workplace oversight (often compounded by corruption, inadequate infrastructure and negligence) can result in large-scale disasters such as the Tazreen Fashions factory fire that killed more than 100 workers in Dhaka, Bangladesh, in 2012 and the collapse of an eight-story garment production centre in 2013, the Rana Plaza, also in Dhaka, that killed more than 1000 workers and injured even more. In 2015 the International Labour Organization reported that 80% of export-oriented ready-made garment factories in Bangladesh should have better fire and electrical safety

standards, despite a government finding that most of these factories were safe (Quadir 2015).

The social costs, particularly gender inequities, of garment production are paralleled by environmental damage which, in turn, exacerbates social impacts. Bangladesh's garment and textile industries have contributed heavily to what experts describe as a water pollution disaster, especially in the large industrial areas of Dhaka: many rice paddies are now inundated with toxic wastewater; fish stocks are dying; and rivers are filled with textile dyes due to routine dumping of wastewater from textile mills and their associated factories (Yardley 2013). In China, which produces an estimated 65% of the world's clothing, the textile and garment industry is one of the country's biggest water polluters, using more water than almost any other industry and polluting nearly all the water it uses (IPE 2012, China Water Risk 2011).

Links between social and environmental damage are not surprising since both are integral to the global industrialization strategy. Environmental and gender inequalities converge in this sector of the modern global economy: a key part of the strategy of global production is not only to seek (usually feminized) low-wage production sites, but also to locate production in countries with low or poorly enforced workplace and environmental protection capacities.

Producing plastics and toxic chemicals

Hazardous chemicals in the workplace are among the most direct dangers to workers and the environment. The burden of direct workplace exposure to toxic materials is unevenly distributed. In the context of gender-segregated work and economic relations women not only have different susceptibilities to chemicals than men, but in many cases women and men have different gender roles and are exposed in different ways to chemicals (WECF 2016). Biologically and socially related determinants therefore define what chemicals women and men are exposed to and the threats these chemicals pose.

For women, occupational exposures to chemicals used in the plastics industry may contribute to the development of breast cancer and reproductive problems since many of the primary chemicals in plastics production either act as mammary carcinogens or disrupt the normal functioning of the body's endocrine system, or both. Endocrine-disrupting chemicals such as phthalates, brominated flame retardants, and BPA are ubiquitous in plastics production environments (DeMatteo *et al*. 2012). Importantly, action at the endocrine level is such that significant adverse effects can be produced at concentrations thousands of times lower than the presumably safe levels established by traditional toxicology (DeMatteo *et al*. 2012). Other studies reinforce these findings, demonstrating, for example, that women who work in automotive plastics production and food canning industries have a five-fold increase in pre-menopausal breast cancer (Brophy *et al*. 2012).

Waste

High levels of consumption result in enormous quantities of waste. Many countries face waste management crises, especially in urban areas. In most developing countries a large share of muncipal solid waste is collected and recycled by waste pickers and other people in the informal economy. Although it can be extremely hazardous, this may be one of their few sources of income (Medina 2008). There are millions of waste pickers in the world (women, men and children). They are estimated to represent about 1% of the urban population, but little is known about the exact number since statistical data are difficult to collect. Women in Informal Employment: Globalizing and Organizing (WIEGO), an NGO, has developed a "Waste Pickers Around the World" database with information about waste picker organizations in Africa, Asia and Latin America (Fernández *et al*. 2014).

Gender-disaggregated data on waste-picking is scarce. An International Labour Organization study found that, among informal workers, a higher percentage of men than women were found to be waste pickers in five out of seven West African cities. In one city (Cotonou, Benin) all the waste pickers identified were men. In Lima, Peru, 0.8% of men and 0.3% of women who were informal workers were waste pickers. In two cities in Africa (Bamako, Mali and Ouagadougou, Burkina Faso) more women than men informal workers were waste pickers; this was also the case in urban India (0.2% women and 0.1% men) (ILO 2013).

One of the most hazardous kinds of waste in developing countries is e-waste (end-of-life electronic and electrical waste) (Pellow 2007). E-waste is complex and expensive to treat in an environmentally sound manner. There is a

general lack of legislation concerning it or enforcement of such legislation. Today most e-waste is discarded in the general waste stream. Of the e-waste in developed countries that is sent for recycling, 80% is shipped (often illegally) to developing countries (Lundgren 2012).

The manual sorting, stripping, burning and recycling of mountains of e-waste could be considered a symbol of the global consumption and production crisis. It also represents a health crisis for formal or informal e-waste workers and people living nearby. Much of the evidence on health effects is anecdotal and spotty, as there are few systematic and comparative long-term health studies of e-waste workers (Grant *et al*. 2013, Lundgren 2012). Health and environmental risks vary greatly, depending on the nature of the operations and who is involved. It is clear from several studies in China that rudimentary recycling techniques coupled with high amounts of e-waste processed result in adverse health and environmental impacts, including contaminated soil and surface water (Tsydenova and Bengtsson 2011, Frazzoli *et al*. 2010, Zhao *et al*. 2010, Wang *et al*. 2009). Recyclers' reported health problems include diseases and problems related to the skin, stomach, respiratory tract and other organs (Nordbrand 2009). Workers suffer high incidences of birth defects, infant mortality, tuberculosis, blood diseases, anomalies in the immune system, malfunctioning of the kidneys and respiratory system, lung cancer, underdevelopment of the brain in children, and damage to the nervous and blood systems (Prakash and Manhart 2010). Through air sampling in Taizhou, a giant e-waste dismantling complex employing over 60,000 people in Zhejiang, China, researchers linked uncontrolled handling and processing of e-waste to adverse human health effects including inflammatory responses, DNA damage and cardiovascular disease (IOP 2011). In Accra, Ghana, increased levels of polychlorinated biphenyls (PCBs) and polybrominated diphenyl ethers (PBDEs) in breast milk samples were linked to informal e-waste recycling activities (Asante *et al*. 2011).

Overall, of particular concern is the exposure of children and pregnant women to lead, mercury, cadmium and other heavy metals, as even relatively low exposure levels can cause serious and, in some cases, irreversible neurological damage (Lundgren 2012, WHO 2010). However, there is not even a reliable profile of workers in the global e-waste industry; anecdotal evidence indicates high involvement of women and children, but the nature of the e-waste varies considerably from place to place.

Transformational change – moving forward

Sustainable consumption and production decouples economic growth from environmental degradation (UNEP 2012a). To achieve a sustainable future, (gender-equitable) improvements to quality of life need to be made without increasing environmental degradation or compromising progress towards gender equality. This is a major challenge, but there are promising signs: governments are committed to achieve the Sustainable Development Goals (SDGs); at the Paris climate change talks they agreed on a long-term goal to keep the average global temperature increase well below 2°C compared with pre-industrial levels, and to aim to limit the increase to 1.5°C; and everywhere citizens are organizing to create sustainable change in local communities and in their personal lives.

Consistently and across national assessments, research findings point to gender differences – often significant ones – in social and economic development, consumption patterns, access to (and use of) knowledge, approaches to environmental issues, ecological footprints, environmental management, and use of, access to and control of resources (ILO 2015, UN Women 2013). These differences suggest women could be the more engaged demographic group for bringing sustainability forward:

- A European Union survey asked if people were willing to pay more for less polluting transportation: 43% of men and 39% of women said they were not prepared to do so; 48% of women and 42% of men were willing to pay up to 10% more (Eurobarometer 2007);

- A cross-ethnic survey of Asian and Caucasian Americans found that gender is relevant to environmental attitudes and behaviour: women expressed more concern about environmental problems than men because of their potential impacts on others, the biosphere and themselves (Burn et al. 2012);

- A meta-analysis of research on gender and environmental attitudes in 14 countries found

that women consistently reported stronger pro-environmental behaviour and attitudes (Zelezny *et al*. 2000);

- Studies in Germany have shown that women are more likely to be conscious of and act on sustainable consumption than men (Costa Pinto *et al*. 2014);

- A preliminary study in the United Arab Emirates recently found that women are more focused than men on purchasing and consuming products which are environmentally friendly and more aware of conserving energy and other natural resources (Kahn and Triverdi 2015).

Findings such as these point to the need to engage women as well as men in planning for a sustainable future and indicate that women are well-positioned to take a leading role (UNEP 2015b). The emerging focus on developing a "green economy" (UNEP 2011) provides an opportunity to address both environmental degradation and gender discrimination within economic frameworks. Without gender-informed guidance and policy intervention, however, a greener economy will do little to relieve gender inequalities and could exacerbate them to the detriment of overall sustainability (ILO 2015, UNRISD 2012, ENERGIA *et al*. 2011). As workers, women will be excluded from green economy growth due to gender-segregated employment patterns and discrimination. As consumers they are more likely than men to buy eco-friendly products but have limited purchasing power. As citizens, women are crucial to good governance in the green economy but have little influence since very few women have management positions in both the public and private sectors (UNIRSD 2012).

Estimates suggest that about 75% of green jobs will be related to renewable energy and green buildings (UNIRSD 2012). In 2012 the International Trade Union Confederation estimated that almost 50 million green jobs could be created worldwide in five years; however, most were expected to be in construction and manufacturing, sectors that employ few women and are characterized as "non-traditional" for women (ITUC 2012, 2009). Although occupations that have traditionally been female-dominated (e.g. secretaries, teachers, nurses and household help) may be "greened", they are often not regarded as a core component of job creation in the green economy agenda. To the extent that greening the economy is still framed by conventional notions of the economy, greening will not alleviate gender inequality.

The agriculture and forestry sectors are likely to be major beneficiaries of the transition to a low-carbon economy and the source of at least 2 million green jobs in, for example, organic agriculture, biofuels and forest conservation (UNIRSD 2012). Here, too, women are a small minority of the formal workforce and receive only a minute share of training, credit, and access to services.

Greening economies can offer new opportunities to promote gender equality. Integral to the greening of the economy is a shift from providing products ("lightbulbs") to providing services ("light") (UNEP 2015a). At that point of conceptual and material shift, community organizing and collective action (areas in which women have long been agents of change) become central to sustainability and gender equality.

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MARINE AND COASTAL COMMUNITIES AND ECOSYSTEMS

Key Messages

- Women and men have common but differentiated responsibilities in the fishing sector. Fishing is frequently portrayed as a male domain, but when the whole fishing cycle is taken into account, actually some 47% of the workforce is female.
- Fishing both reflects and defines gender boundaries; men are conventionally defined as "fishers", while women's activities in the sector are too often overlooked in official programmes, data collection and support.
- Environmental change and damage to marine systems have gendered impacts, and women and men experience climate disruptions differently. Climate change is especially threatening to coastal communities and fishing livelihoods. "Downstream" effects on fishing sector activities such as post-harvest work are often not taken into account.
- Health impacts are gender-differentiated. For example, many marine contaminants are particularly dangerous for foetal development. Chemical contaminants in ocean systems bioaccumulate, threatening human health and the health of marine organisms.
- As fisheries collapse globally and fish become scarce locally, many women have to turn to transactional sex to bridge the scarcity gap.
- Illegal, unreported and unregulated (IUU) fishing relies on trafficked, indentured and slave labour, mostly by men.
- Evidence suggests that fisheries management improves when women are actively involved.

2.5

◄ Photo credit: © UN Photo/Martine Perret

"What we take out": fish, fishing and livelihoods

Women, men and identity in fisheries

Some 35 million people in the world are fishers, with 90% classified as small-scale fishers. Millions of others take part in seasonal, occasional or informal fishing activities, although they may not be categorized as fishers in official statistics. When the tally of all these people is combined with those who supply inputs to fishing and post-harvest activities (and their household dependents), it is likely that more than 200 million people worldwide depend in some way on small-scale fisheries and aquaculture for their livelihoods (FAO 2016).

Fishing provides 3 billion people with over 20% of their animal protein. It is a critical protein source for millions of food-insecure people in developing countries in Africa, Asia and the Small Island Developing States (SIDS) (FAO 2016, FAO 2009). In addition to supporting human health, fishing contributes to the economic health of the global economy: when the total direct, indirect and induced economic effects arising from marine fish populations are accounted for, this sector's contribution to global economic output is estimated at about US$235 billion per year (UNEP 2011).

Open-ocean fishing is almost exclusively a male domain. Women predominate as fishers in coastal ecosystems, including mangroves, reefs, tidal flats and coastal estuaries, often gleaning and cultivating shellfish (Lambeth *et al*. 2014). This separation of activities is maintained through norms of femininity and masculinity: women's fishing work is often conceptualized as "not fishing", as if this work were an extension of their traditional role of (unpaid) household labour (SPC 2007). The association of fishing from boats, especially on open seas, with maleness is supported by cultural practices and taboos around the world with respect to women in boats (Lambeth *et al*. 2002, Williams *et al*. 2002). The sex segregation of fishing is not merely the result of gender boundaries: in fishing communities fishing defines these boundaries (Yodanis 2000).

Because male-identified capture fishing is considered "real" fishing, the entire fisheries sector is conventionally portrayed as a male enterprise (Willson 2014). Most official data focus on open-ocean fishing rather than the entire fishing cycle, which means women's contributions are largely hidden. Although women are significant actors in the "social system of fishing" (Nadel-Klein and Davis 1988), gender-disaggregated databases on fisheries-related work are very limited, making it difficult to introduce concepts relating to gender in relevant decision-making and policy platforms. Failure to fully account for participation in fishing activities by women and men also has serious implications for fisheries management.



Women selling fish on the Indonesian island of Flores
Photo credit: © Doug Walsh - www.twofargone.com

Women make up 47% of the total global fisheries workforce when all parts of the fishing cycle are counted (World Bank 2012) **(Table 2.5.1).** They play a variety of roles in the fishery value chain in both large-scale and small-scale fisheries, and in both developed and developing countries. Women are more heavily involved than men in post-production fishery activities such as processing and selling of fish and fish parts. They also support fishing efforts by making and repairing nets, building and repairing boats, maintaining equipment, and other ancillary jobs. They often derive income from small businesses that support men's direct fishing efforts. Moreover, women are frequently involved in the financial aspects of fishing as investors, managers or boat owners. While these are essential activities, women in fishing-dependent communities may miss out on the most available – and frequently most lucrative – source of income by not fishing themselves (Yodanis 2000).

Above all, women are responsible for household nutritional security. In this role they are purchasers and consumers of fish, as well as fish sellers or traders. While roles and responsibilities within the fishing sector vary from one location to another, women's responsibility to provide nutritional security for their

Table 2.5.1: Global profile of small-and large-scale fisheries

	Small-scale fisheries			Large-scale fisheries			Total
	Marine	Inland	Total	Marine	Inland	Total	
Number of fishers (millions)	14	18	32	2	1	3	35
Number of post-harvest jobs (millions)	38	38	76	7	0.5	8	84
Total workforce (millions)	52	56	108	9	2	11	119
Percentage of women	36%	54%	46%	64%	28%	60%	47%

Source: World Bank (2012)

households remains relatively constant globally (Harper *et al*. 2013).

Across the Pacific region, where fishing is critical to support livelihoods and economies, women collect fish primarily for food. Surplus fish are sold or traded to supplement household incomes. In some villages in Samoa women make up only 18% of fishers, but catch 23% of seafood by weight (Passfield *et al*. 2001) and provide an estimated 20% of the seafood consumed (Lambeth 2000). In Niue women traditionally catch fish in near-shore ecosystems and are responsible for harvesting marine products. Traditional taboos have restricted them from participating in every sector of fishing activity, especially fishing from boats; women, especially if menstruating, have been believed to bring bad luck if they touch fishing gear or cross over fishing lines. These taboos are slowly disappearing, and women in Niue increasingly fish from small boats with their husbands or friends (Tuara 2000). In South Tarawa, Kiribati, women harvest bivalves, collecting over 1400 tonnes per year from the largest fishery in the area (Lambeth *et al*. 2014). In Palau, as elsewhere, women's role as near-shore fishers is especially important during rough weather when men are unable to go out to sea to fish. Fijian women are the most active fishing group in the region, engaged in both subsistence and commercial fisheries. As a result of their activities in both types of fishing, Fijian women have significant knowledge of fisheries and their management (Lambeth *et al*. 2014).

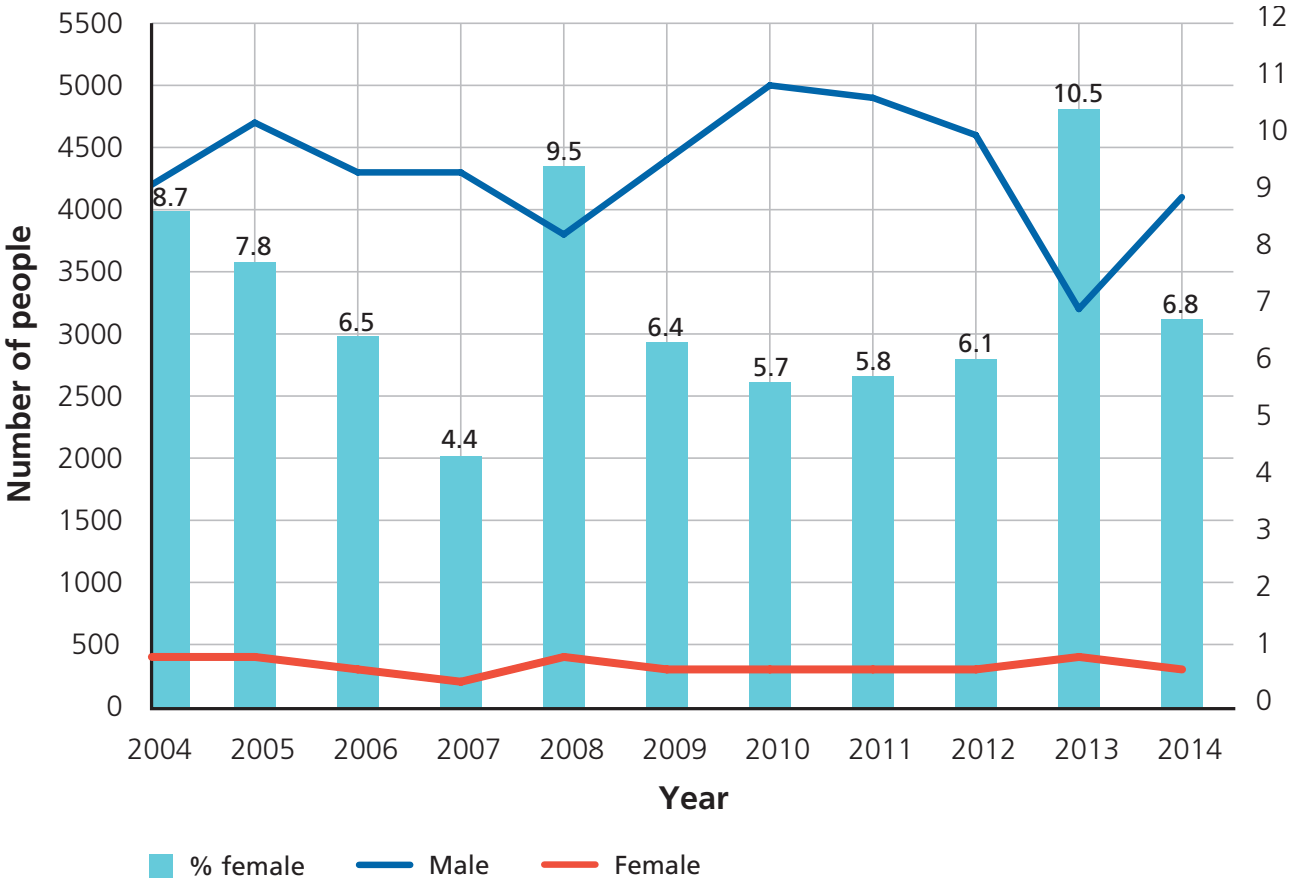
Among developed countries, Iceland has an unusually important fisheries sector which provides 40% of the country's export earnings, accounts for more than 12% of its gross domestic product (GDP) and employs nearly 5% of the workforce (Forbes 2015). In Iceland women account for about 7% of commercial boat-based fishers **(Figure 2.5.1),** unusually assuming all roles from skipper to deckhand (Willson 2014). Those in the commercial fishing sector serve on vessels of all sizes. In most other developed countries (e.g. Australia, Canada and Norway) when women are commercial fishers on boats, nearly of them work on small, family-owned vessels and they almost always work with their husbands (Willson 2014).

Illegal, unreported and unregulated fishing:

Illegal, unregulated and unreported (IUU) fishing is a serious global problem that results in illegal harvests of millions of tonnes of fish and billions of dollars in revenues being lost to legitimate fishers. It threatens the health of fish populations and marine and coastal ecosystems worldwide, as well as the livelihoods and food security of millions of inhabitants of coastal areas (Hall 2016, Pew Charitable Trusts 2016). An estimated 14-33% of the total global catch consists of IUU fishing, with a value of US$8-19 billion (Borit and Olsen 2012). The real figures are likely to be higher since IUU data, by definition, are scarce. Information on women's roles in IUU is even scarcer (Kleiber *et al*. 2014).

Fishing and aquaculture have become global industries employing a large number of migrant workers and others who are vulnerable to trafficking and forced labour (ILO 2013). IUU activities are responsible for severe labour and human rights abuses. When carried out on an industrial scale on the open seas, they rely almost exclusively on labour by men, many of whom have been pressed into indentured labour and held on ships as actual or de facto slaves, often for years without being allowed off the ship (Urbina 2015, ILO 2013). Pirate fishing operations in particular are characterized by some of the worst working conditions, and there are extensive reports of abuse (EJF 2010). Women and girls are subject to human trafficking and forced labour on board these vessels, primarily for sexual exploitation rather than as fishing labourers. Women are also reported to be victims of trafficking in the land-based fish processing sector (ILO 2013).

Figure 2.5.1: Number of people in Iceland employed full-time as commercial fishers, 2004-14: male, female and % female



Source: Willson (2014)

In many communities around the world traditional fishing may suddenly be redefined as "unlicensed" or "illegal" if fishing access rights are taken away by governments, often in favour of larger fishing operations or for conservation reserves. When fishing rights are transferred or eliminated in these ways, the indigenous and traditional fishing rights of both women and men can be easily overlooked or misunderstood (Coope SoliDar R.L/ICSF 2015, Madrigal-Cordero and Solis-Rivera 2012). "Ocean grabbing" has gender-differentiated effects (Bennet *et al*. 2015). Groups who are already marginalized, including women, are especially vulnerable to "grabbing"; moreover, women fishers and gleaners whose work is concentrated in foreshore and reef areas are often within sight of communities and open to surveillance and regulation for IUU "violations" in ways that other types of fishing is not (Bennet *et al*. 2015).

Post-harvest activities in the informal and formal sectors:

In addition to women's heavy presence in fish extractive processes, they are closely associated with post-production processing and selling of fish (World Bank 2012). They have primary responsibilities in many countries for performing jobs such as smoking, salting and drying, as well as selling fish and seafood products in local markets. The nature of activities required for post-production processing varies considerably among regions (Fitriana and Stacey 2012, Okorley and Kwarten 2000).

Women work in disproportionate numbers in seafood processing factories, preferentially hired due to the stereotype of women having "nimble fingers" (for cleaning and gutting fish) and because they are typically paid less than men (Hamilton *et al*. 2011). In Fiji, women make up 90% of cannery workers (Lambeth *et al*. 2002); in South Africa 62% of the seafood processing workforce is female (Jeebhay *et al*. 2004); in Cambodia, 80% of fish sauce factory workers are women (Dugan *et al*. 2010), while women make up over 90% of shrimp processors in India (Dhanya 2013).

Fish processing plants typically rely mostly on manual labour for the freezing, cutting, degutting and deboning activities that constitute processing. Workplace health and safety risks in fish processing include accidents involving machinery, excessive noise, low temperatures,

and exposure to a variety of diseases and hazardous chemicals. Fatal and non-fatal injuries are frequent. Musculoskeletal disorders of the neck and shoulders occur in 31-35% of processing workers; occupational asthma associated with fish processing is common, as are skin conditions, infections and frostbite (Jeebhay and Lopata 2012, Jeebhay *et al*. 2004).

Disproportionate employment of women in canning facilities has numerous economic and social ripple effects. Women who migrate to look for jobs in factories often leave behind household and childrearing duties, as well as sustenance activities such as gardening. Because wages in canning factories are typically low, many women experience a "well-being deficit" while they are employed there: what they are paid does not offset the costs of increased workload, poor working conditions resulting in declining health, transmission of sexually transmitted diseases, and increased alcohol and drug abuse (World Bank/FAO/IFAD 2009, Sullivan and Bidesi 2008).

Formal employment in the maritime industry:

The maritime industry is one of the world's largest industries, with employees working not only directly in shipping and fishing but also in law, marine administration and pollution mitigation, as well as in positions as ship owners, brokers, charters and harbour masters (Aggrey 2000). Despite this wide range of opportunities, women comprise only an estimated 2% of the world's maritime workforce; 94% of these women work in the cruise and ferry sectors. In the first major assessment of women in maritime positions in 2003, the Seafarers International Research Centre determined that women constituted 10% of the seafaring workforce in Scandinavian countries, 8% in the United Kingdom and 4% in Germany (Sulpice 2011).

Women are similarly absent from leadership in seafood companies. In 2015 only one of the world's top 100 seafood companies, the Japanese-owned Maruzen Chiyoda Suisan Co., was run by a woman (FAO 2015, Tallaksen 2014). In Norway, due to national legislation requiring a minimum of 40% women on the boards of publicly traded companies, the six Norwegian companies that are among the top 100 seafood companies globally have boards on which there are 39% women; however, that share falls to 21% on the companies' management teams, to which gender composition quotas do not apply (Bertrand *et al*. 2014).



Women work in disproportionate numbers in fish processing factories. Photo credit: © Sportsmens Cannery

Maritime colleges recognize the importance of training women. The World Maritime University in Malmö, Sweden, founded by the International Maritime Organization (IMO), seeks to ensure that women represent 30% of graduates (WMU 2014). The IMO's Women in Development Programme focuses on equipping women in the Caribbean with maritime industry skills as a way to address poverty (Grant and Vivette 2015). Despite such efforts, including a 25-year focus on gender integration by the IMO and the existence of trade associations such as the Women's International Shipping & Trading Association, women lag far behind in terms of their share of employment in the maritime industries (IMO 2016).

Offshore oil, mining and seabed extraction:

Extractive industries potentially provide development opportunities for communities, even when they operate offshore. However, for millions of people in the world the reality is that these industries rarely benefit most communities in any significant way and are often destructive, disrupting the social fabric, depleting natural resources that are necessary for survival, and increasing health burdens in already vulnerable households **(Box 2.5.1)**.

In Ghana offshore oil exploration is responsible for a steady decrease in the availability of fish for women to sell or process (Adusah-Karikari 2015). Women have reported that fishing is not allowed within a 500-metre radius of rigs, while fishermen are continually harassed

Box 2.5.1: Women's protests against seabed mining

Perhaps women's most prominent role in regard to seabed mining and other environmentally damaging extractive processes has been that of organized protest. Globally women have led efforts to prevent seabed mining. For example, the Vanuatu National Council of Women has insisted on the need to protect the seabed as an inherent foundation of wealth. At the 2012 UN Conference on Sustainable Development (Rio+20) women led a campaign to end experimental seabed mining (Hunter and Taylor 2013). In a remote island of Papua New Guinea a woman led efforts which succeeded in the gathering of 24,000 signatures to present to the government protesting experimental seabed mining (Jameson 2013).

by people on the rigs and patrols guarding the rigs often extort money from them (Campos-Serrano 2013). As fish become increasingly scarce, fishermen from local villages migrate to other villages where they catch fish and sell it to local women there, leaving their wives with no fish and no immediate source of alternative income (King 2010).

While extractive industries such as near-shore oil production create jobs, these jobs mostly go to men. In northeast Scotland between 2006 and 2013 there was a 19% increase in the number of women working on offshore rigs, yet only 3.7% of total workers were women (Saner 2013). Women who work on rigs are usually involved in catering and in health and safety (Saner 2013). When women obtain extraction industry related jobs in coastal areas, these jobs tend to be menial so that the women are part of the lower paid workforce (Adusah-Karikari 2015).

Women feel distinctive effects from extractive industries, particularly when the industry involves large numbers of transient non-local male labourers in small coastal communities (Scott *et al*. 2013). As these communities grow up around extractive industries, criminal networks are also likely to grow. For example, in Equatorial Guinea a dramatic increase in trafficking of women and children for domestic and sexual exploitation was associated with these industries (US Department of State 2011).

"What we put in": contaminants and pollutants

Oil spills: Assessments of damage from oil spills usually focus on destruction caused to fisheries and to the livelihoods of men in the fishing industry; downstream impacts such as loss of fish processing jobs and ancillary businesses (often women's domains) that depend on robust fisheries are seldom counted as "fishing" impacts and are seldom compensated if oil companies are compelled to pay for losses (Olujide 2006). In addition to fishery and livelihood issues, oil spills have highly gendered health implications. Following the Exxon Valdez oil spill in Alaska in 1989, women were particularly subject to high levels of depression and post-traumatic stress disorder, as were Native Americans of both sexes (Palinkas *et al*. 1993).

Plastics: Plastic materials are now considered the most persistent and problematic type of marine debris, with widespread effects on marine ecology. Between 4.8 and 12.7 million tonnes of plastic debris per year enters the ocean, of which approximately 83% originates in only 20 countries with China, Indonesia and the Philippines topping the list of marine plastic polluters (Jambeck *et al*. 2015). The impacts of plastic debris include entanglement of birds, turtles and marine mammals, as well as marine animals' ingestion of plastic fragments, resulting in blocking of the digestive system. The fact that plastics persist for very long periods and are largely insoluble has significant implications for human health (Roy *et al*. 2011).

Because of spatial differences in fishing by women and men, there may be significant gender differences in their experience, knowledge and impacts of marine plastics pollution. The build-up of plastic debris in coastal zones is severe and different in character from open-sea plastic pollution, with different impacts on women's near-shore fishing than on open-ocean fishing by men. Loss of economic activities, damage to well-being, and mental health aspects of the impacts of degraded environments are all gender-differentiated and likely to be more intense for women in near-shore fisheries than for men in fisheries located offshore. However, virtually no research or data exist on such differences.

Plastic debris in oceans fragments into increasingly smaller particles without chemically degrading (Engler 2012). These newly formed microplastic particles (or secondary microplastics) are easily ingested and

absorbed into the tissues of marine life, thus entering the food chain. In addition to forming through a process of fragmentation, microplastics enter the marine system directly through sewage discharges or factory waste streams as a primary pollutant in the form of microbeads. Recent studies estimate that 263 tonnes of microbeads per year are released to the environment in the United States alone, about half of which pollute marine systems (Gouin *et al*. 2011).

Microbeads were introduced in consumer goods to increase sales of personal care products. These products are among the most gender-manipulated consumer items, and the rapid proliferation of microbeads in them can only be understood as part of a gender-consumption nexus (UNEP and WECF in press). Women are socialized to be much heavier users of personal cosmetics than men (see also Section 2.4). As heavy consumers of products containing microbeads, they have an opportunity and a responsibility to challenge these products' use. The Plastic Soup Foundation, a women-led organization in the Netherlands, has taken a lead in organizing an international campaign against cosmetics-based maritime microbead pollution, Beat the Microbead, as has the 5 Gyres organization based in the United States (5 Gyres 2016, Plastic Soup Foundation 2016).

There are clear gender differences in exposures to plastics and their chemical components and by-products, whether through direct use of cosmetics that contain microbeads and plasticizers or through the marine food chain (UNEP and WECF in press, Barrett 2005).

In addition to the uptake of plastics and associated chemicals directly from marine plastics, leaching of plastic-production chemicals from landfills into marine systems results in significant uptake of chemicals such as Bisphenol A (BPA) into the marine food chain (Kang *et al*. 2006). Women and men have different vulnerabilities and suffer different health consequences from exposures to the oestrogen mimicry and endocrine disruption effects of plastics. In women they have been strongly associated with breast cancer and reproductive disorders (Rochman *et al*. 2013, Waring and Harris 2011, McLachlan *et al*. 2006). Fish and other marine wildlife that ingest microbeads also ingest chemicals attached to the microbeads during manufacturing or the "hydrophobic pollutants" such as polychlorinated



Microbeads in consumer products.
Photo credit: © Alicia Dominga

biphenyls (PCBs), DDT and polycyclic aromatic hydrocarbons (PAHs) that collect on the surface of microbeads in salt or fresh water (Office of New York State Attorney General 2014). Little research is yet available on the gender-differentiated effects of these chemicals, which are transferred up the food chain to humans along with the microbeads themselves.

Polychlorinated biphenyls (PCBs): PCBs are among the major bioaccumulating chemicals. They are found throughout the world's oceans, often at very high levels. PCBs are carried into marine systems by run-off from land-based industrial processes or through airborne deposits, and they persist for many years in sediment deposits and in the food chain. In humans exposure to (or ingestion of) PCBs can damage the immune system, liver, skin, reproductive system, gastrointestinal tract and thyroid gland (Secretariat of the Stockholm Convention 2008); thyroid effects show differential impacts on women, men, boys and girls (Persky *et al*. 2001). Women are often advised to reduce or temporarily eliminate fish consumption during pregnancy to avoid the transfer of ingested toxins to the foetus; in the case of PCBs this is ineffective in reducing both pre- and post-natal exposures, as the PCBs persist in the body for long periods and children are exposed to them through breastfeeding and weaning foods (Binnington *et al*. 2014). In Norway consumption of fish, fish liver and seagull eggs is the main dietary source of PCBs and dioxins in women and children (Caspersen *et al*. 2013). Although production of PCBs was largely banned in 2001 under the Stockholm Convention on Persistent Organic Pollutants, their use continues (Secretariat of the Stockholm Convention 2008).

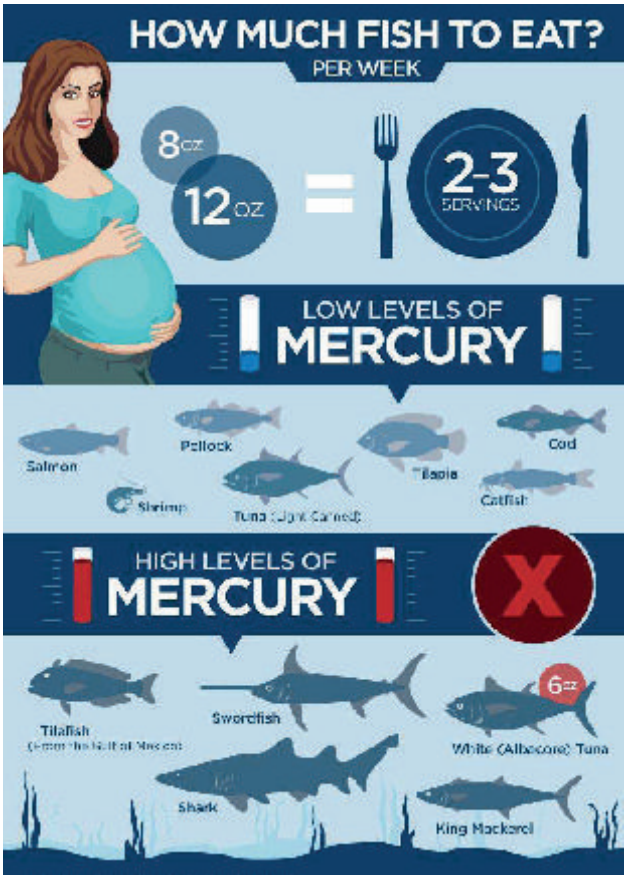
Methyl mercury: Methyl mercury is a heavy metal found in large quantities in marine systems. It originates primarily from land-based industrial emissions, coal burning and mining processes. For humans, consumption of fish and shellfish is the primary route of exposure. Once introduced into marine systems, in fish and shellfish it bioaccumulates, often at concentrations 1-10 million times higher than in ambient water (US EPA 2015, Lawrence and Mason 2001). In humans methyl mercury is a strong neurotoxin with severe health implications such as kidney and brain damage. Foetal exposure in utero is especially problematic, often resulting in neurodevelopmental problems in children (Axelrad *et al*. 2007, Weihe *et al*. 2002). Many governments and health authorities worldwide issue fish advisories to warn consumers, especially pregnant women, about the dangers of mercury exposure through fish consumption **(Figure 2.5.2).**

In the northern hemisphere, ocean currents tend to drive methyl mercury contamination northward towards the Arctic, where it becomes further concentrated in large marine mammals. Some of the highest human concentrations are found in indigenous children (especially those still breastfeeding) in the Canadian Artic and northern Greenland, in populations that depend heavily on fish and marine mammals for sustenance (El-Hayek 2007). Methyl mercury contamination is not limited to northern zones: high levels have been widely reported in coastal Peru, New Zeland and the Seychelles, among other countries (Dewailly and Knap 2006).

Sewage

Sewage entering the marine system through sewage treatment outputs, storm water run-off and direct dumping of raw sewage is a source of considerable ocean and coastal pollution globally (Islam *et al*. 2013b). Many of the world's cities do not treat (or only partially treat) sewage **(Table 2.5.2)**. The regional district of Victoria, Canada, for example, pumps 120-130 million litres per day of raw sewage into the nearby Strait of Juan de Fuca (Meissner 2014); Zanzibar (Tanzania), with a population of over 1 million, has no sewage treatment plant (IRIN News 2010); only 40% of sewage in Rio de Janeiro is treated, with the remainder flowing directly into marine systems (Hosek 2013); 80% of urban sewage discharged into the Mediterranean Sea (an estimated 650 million tonnes per year) is untreated (WWF n.d., UNEP n.d.); in Accra, Ghana, 1000 tonnes of sewage per day is dumped into the sea (Hinshaw 2012). As sea level rise continues and coastal populations grow, the impacts of sewage dumping on human health and the health of marine ecosystems will continue to escalate.

Figure 2.5.2: Public warning about seafood for women and children



Source: United States Food and Drug Administration. Reproduced in Chai (2014)

Lack of sewage treatment in many parts of the world is related to the high costs of infrastructure, which may be beyond the reach of most municipal or federal budgets in developing countries. However, it also reflects widespread cultural and political complacency about oceans' capacity to absorb vast quantities of human pollution.

Table 2.5.2: Percentage of sewage treated, by region

Region	Percent of Sewage Treated
North America	90
Europe	66
Asia	35
Latin America & Caribbean	14
Africa	<1

Source: World Resources Institute (n.d.)

Cruise ships are a significant source of global marine sewage pollution, as well as of oil, solid waste and hazardous waste (US EPA 2008). This industry is growing nearly twice as fast as any other travel sector, with about 20 million passengers per year (CLIA 2011). In their wake cruise ships leave about 3.8 billion litres of sewage in the world's oceans each year (FOE 2014).

Sewage contains many contaminants and inputs, including inorganic nutrients, pathogens, endocrine disruptors, sediments and heavy metals, and has a wide range of impacts on marine and coastal ecosystems (Wear and Thurber 2015). Nutrients from sewage run-off contribute to nutrient enrichment of coastal waters, resulting in the growth of algae that can displace slow-growing organisms such as corals. Nutrient enrichment increases the susceptibility of reef coral to bleaching. The large amounts of freshwater that often accompany sewage dilute saline water and can lead to changes in the biota of marine systems. Suspended solids and particulate matter can cause water to become more turbid, resulting in significant changes to the structure of ecosystems and the ability of animals to thrive. Endocrine disrupting compounds (EDCs), often flushed into oceans along with the sewage, are common pollutants in coastal marine systems and have profound impacts on wildlife, including slowing the growth of coral and producing intersex reproductive systems in many animals (whereby male testes develop eggs instead of sperm). EDCs are widely implicated as a cause of breast cancer in humans.

Coastal communities – change, insecurity and well-being: Coastal areas and islands occupy less than 5% of the Earth's surface but provide goods and services to over 2 billion people. Half the world's major cities are within 50 kilometres of a coast and more than one-quarter of the world population lives within 100 kilometres of one; coastal areas are three times more densely populated than those inland (Kay and Alder 2005). Intense population and extractive pressures result in degradation of fragile ecosystems such as estuaries, coral reefs and mangroves, critically important food producing habitats (Figure 2.5.2) which are also threatened by the effects of climate change. Coastal habitats are the basis of most of the world's fish production in both wild (or capture) fisheries and aquaculture. A significant share of the world's food comes from coastal zones.

Small-scale fishing communities tend to be marginalized in social, economic, political and often geographical terms and frequently lack representation at the national or regional levels (Ratner *et al*. 2014). Cross-cultural research on poverty and fishing communities reveals a number of gendered vulnerabilities: income and assets in fishing communities are unevenly distributed between women and men, and incomes are highly variable in relationship to people's roles in the community and over time; both female and male fishers are often excluded from other income-earning opportunities, social services and political representation; and these fishers are exposed to higher than average levels of risk because they are marginalized and have a limited ability to cope with shocks due to resources collapse, climate change or changing social dynamics (Allison *et al*. 2012). Women are marginalized in distinctive ways, within already marginalized communities, with inequalities stemming from differences in identity, roles, relationships within the marketplace, and household dynamics that affect asset accumulation, market opportunities, social capital and social norms (Thorpe *et al*. 2014, Béné and Merten 2008, Sen 2000).

Higher rates of risk and disease have serious implications for women and children living in fishing communities **(Box 2.5.2)**. Women frequently have fewer financial assets or other coping mechanisms with which to respond to injuries or other health threats such as decreased food availability or access to clean water. When fish are scarce, women often have little choice but to forgo nutrients (Mendoza 2009), take on additional jobs, and supplement food and fuel with other natural resources. More extreme coping mechanisms include loans from "loan sharks", often resulting in debt bondage or child marriage to settle debts (Hossain 2009, Mendoza 2009). When local fisheries collapse, as is happening in many parts of the world, there is increasing documentation of women undertaking transactional sex to compensate for lost income **(Box 2.5.3)** (Neis *et al*. 2013, Lwenya and Yongo 2012, Béné and Merten 2008).

In marine governance systems, the notion of "rights" has historically focused specifically on access to fishing rights (Allison *et al*. 2012). Little attention has been given to human rights in coastal zones, even in the face of growing human rights abuses there. However, since 2007 the Food and Agriculture Organization (FAO) has increasingly framed policy support and advice

to governments in terms of human rights. The *FAO Voluntary Guidelines for Securing Small-Scale Fisheries in the Context of Food Security and Poverty Eradication* states that "All parties should create conditions for men and women of small-scale fishing communities to fish and to carry out fisheries-related activities in an environment free from crime, violence, organized crime activities, piracy, theft, sexual abuse, corruption and abuse of authority. All parties should take steps to institute measures that aim to eliminate violence and to protect women exposed to such violence in small-scale fishing communities. States should ensure access to justice for victims of *inter alia* violence and abuse, including within the household or community" (FAO 2015).

Human rights violations in coastal communities range in scale and impact. Forced evictions are relatively common as coastal development and tourist development continues at a rapid rate. Conversion of common property and resources for private development or for conservation areas also occurs in coastal communities. In many countries, including China, Ecuador, Indonesia and Viet Nam, mangrove forests are being rapidly converted to commercial shrimp farms (Hamilton 2013). In Tanzania, conservation efforts that put coastal lands off limits have decreased the availability of small-scale fisheries, with implications for food security and income-generating activities (Benjaminsen and Bryceson 2012).

Child labour practices are especially egregious in fishing communities **(Box 2.5.4).** A review of fisheries in Bangladesh, El Salvador, Ghana and the Philippines showed that of all child labourers in those countries, 2-5% worked in fisheries with boys accounting for an estimated 90% of child labour in the sector; alarmingly, children constituted 9-12% of the total fisheries labour force (Allison *et al*. 2011). In Senegal, data suggest that around 29% of the total workforce in fisheries consists of children under the age of 15; children account for some 27% of crew members and 41% of those active in trade-related activities (ILO 2013, O'Riordan 2006). In a study in Pakistan, children represented 27% of workers employed in the fishing sector (Hai *et al*. 2010). In Thailand, an estimated 180,000 undocumented women from Myanmar worked in fishing and fish processing (EJF 2010).

Impacts of climate change:

Sea level rise, flooding, erosion and other impacts of climate change are already displacing millions of people globally (IPCC 2014). Sea level rise is particularly problematic for coastal communities. Not only does it result in loss of land, but also in contamination of near-shore water sources, increased erosion, and increased exposure to violent storms and wave surges. These impacts translate into lost livelihoods, property damage, forced migration and a variety of human rights violations.

Box 2.5.2: Gender, HIV/AIDS and fishing communities

People in fishing communities, many of whom are transient (Green 2015), are among the highest-risk groups for HIV infection in countries with high overall prevalence rates, averaging four to 14 times above national averages (MacPherson *et al*. 2012, Allison and Seeley 2004, Entz *et al*. 2000). These findings have been corroborated by epidemiological research in Uganda and Kenya (Opio *et al*. 2013, Asiki *et al*. 2011, Kwena *et al*. 2010), including a study in 2010 of Lake Victoria fishing communities in Uganda where HIV prevalence was three times higher than in the general population (Opio *et al*. 2013). Disproportionately high HIV rates have also been reported in fishing communities in South and Southeast Asia, Latin America and South America (Kissling *et al*. 2005).

In addition to overall rates exceeding the national average, women in fishing communities frequently have higher rates of infection than men. For example, in a study in Tanzania, women in the Pwani region were three times more likely than men to be HIV/AIDS-infected and those in the Tanga region were twice as likely to test positive (Torell *et al*. 2006). Both poverty and gender inequality can be correlated with the spread of HIV/AIDS in women. One of the key drivers of HIV in fishing communities is transactional sex (MacPherson *et al*. 2012). Unequal power and influence by women and girls in sexual relations means they are at special risk of infection. Women who are economically dependent on their husbands or other male fishers are less likely to be able to negotiate for safer sex; are more likely to exchange sex for money or favours; and are less likely to leave a relationship that they perceive as risky (Duwal *et al*. 2015).

Box 2.5.3: Bargaining power and sex in the context of declining fish catch

Gendered economies with highly skewed compensation frameworks (in which men have the capacity to earn much more money than women) affect the economic realities of gender relationships and the structure of intimate relationships within communities, including the development of sexual economies (Campbell 1997). Fishing economies have a highly gendered structure, with men often fishing while women process and sell the fish. However, the ways in which fish move from male fishing activities to women's processing and marketing vary considerably: in Sri Lanka many husbands and wives work as a team, with the man fishing and the wife selling; in Sierra Leone wives typically buy fish from their husbands according to a business-like arrangement; in coastal Kenyan communities fishermen give preferential access to women with whom they are in a sexual relationship.



Declining catches bring pressures on women to trade sex for fish.
Photo credit: © Habil Onyango - The Star

A study of fish workers in Zambia reported that 31% of fish traders had an institutionalized fish-for-sex relationship (Béné and Merten 2008). In some cases these sexual transactions may be voluntary, but fishermen are frequently in stronger positions than fish traders both socially and economically. In the absence of money and other resources, the female fish traders often lack the bargaining power to refuse a sexual relationship, either because of blackmail ("no sex, no fish") or because they cannot afford to turn down a favourable offer from a fisherman (Lwenya and Yongo 2012, Béné and Merten 2008). They also have unequal ability to negotiate safe sexual practices (Halperin and Epstein 2004). These fish-for-sex dynamics drive high HIV risk and prevalence rates.

The number of people forced to migrate from coastal regions is expected to increase dramatically due to climate change: 187 million could be displaced by 2100 (Nicholls *et al*. 2010). Low-lying coastal plains, deltas and small islands are especially susceptible to environmental migration (McLeman and Hunter 2010). Fishing communities may be affected by climate-induced migration caused by sea level rise, increasingly violent storms, and islands exposed to multiple climatic stresses and shocks (Islam *et al*. 2014). Gender and age play key roles regarding the ability to migrate, as well as influencing the outcomes of migration. Studies of coastal communities in Bangladesh have shown that older people and female heads of households are often less able to migrate because of cultural restrictions and limited income-earning opportunities both at home and in destination communities (Islam *et al*. 2014).

Sea level rise causes saline waters to intrude into and contaminate coastal freshwater, a particular problem for coastal communities. Saltwater intrusion will continue to move further inland, while the salinity of freshwater in coastal areas will increase with rising sea levels and increasing levels of evaporation in shallow water communities. Such contamination has far-reaching impacts in coastal communities. Many households in fishing communities already suffer from chronic water shortages or water with high levels of contamination, with direct and indirect effects on health. Rates of preeclampsia and gestational hypertension in pregnant women living in coastal areas have been shown to be higher than those for women living inland (Khan *et al*. 2011, Khan *et al*. 2008). Drinking water salinity **(Box 2.5.3)** is also a significant determinant of infant mortality in coastal areas, especially for infants born to women who drink highly saline water in the late stages of pregnancy (Dasgupta *et al*. 2016).

Changing climate conditions trigger not only human migration but also that of animals. Distribution patterns for fish, mammals and other species change in response to changing physical and biological components of ecosystems, such as water temperatures, food availability and water salinity. This has implications for the incomes, food security and migration patterns of human populations. Arctic communities are experiencing forced diet changes with shifts in the distribution patterns of marine mammals and fish, making access to traditional foods more difficult. In tropical zones the health of inshore fisheries, where

Box 2.5.4: Exploitation of child labour in fisheries

In the Philippines children (mostly boys) are swimmers and divers in muro-ami (a type of net) fishing for reef fish, which is extremely hazardous. They risk ear damage, injuries from falls, reef cuts, shark attacks, snakebites and drowning. The hours worked by child labourers in shrimp processing (head removing) depots in Bangladesh (mostly girls) tend to prevent them attending school. Processing plants are dangerous; cuts to hands and feet are common and can become badly infected, abscessed or swollen. Sexual abuse, including rape, is reportedly common. The fact that unmarried girls work in the plants can have negative effects on their reputations and marriage prospects even if they do not engage in sexual activity. On Lake Malawi young boys bail water from small fishing boats. These chimgubidi ("water pumps") work throughout the fishing trip, often all night, and are not allowed to fall asleep or be seasick or they receive only half pay; if they are seasick they have to drink lake water to "treat" the sickness. On Lake Chilwa, Malawi, young boys work as "bila boys" to guide and disentangle seine nets when they are pulled in. This dangerous job requires them to be in the water for prolonged periods and to dive to unsafe depths.



Photo credit: © ILO

Child labour is often coerced and always highly exploitative. Nevertheless, some boys seek early entry into fishing. A strong general connection between fishing and cultural perceptions of masculinity, as well as income that seems high to boys, encourages them to look for such jobs as early as they can. Since much fishing occurs at night, the boys make poor daytime pupils. Elevated high school dropout rates for boys are common in fishing communities (ILO 2002).

Source: FAO and ILO (2013)

women predominate, is especially dependent on the integrity of reef systems and seagrass ecosystems – highly threatened by climate change – to keep the fisheries intact. As these ecosystems are degraded by changes in water temperature, storm severity and changing acidity **(Table 2.5.3)**, coastal fisheries are at particular risk, directly threatening the food security of coastal communities, as well as threatening the economic opportunities and activities of both women and men (Huelsenbeck 2012, Pratchett *et al*. 2011).

Towards sustainability

The Small Island Developing States Network (SIDSnet), representing countries particularly threatened by climate change, has long been in the forefront of climate change activism and negotiation. Women in SIDS have been prominent in climate change activism and ocean protection efforts. Because of their vulnerability to sea level rise and the impacts of increased natural disasters, these countries were among the first to reject

Box 2.5.5: Saltwater intrusion and coerced marriages

Women and children most often have responsibilities for water collection. As saltwater intrusion contaminates water sources in coastal communities, they must walk further to find water. Women globally already suffer from time poverty, and additional work burdens have impacts on livelihoods and education opportunities (Ahmed 2013). In Zanzibar (Tanzania), where water contamination from saltwater intrusion is severe, water collection became increasingly time-consuming and burdensome in the early 2000s. A District Commissioner observed that as this task became more onerous, her office "had to intervene several times when they heard about women being married off so they could be used to fetch water for their new husbands" (Kabendera 2013). When fresh water returned to the community in 2012 with new long-distance piping, the number of unwanted and girl marriages reportedly fell (Kabendera 2013).

Table 2.5.3: Countries most vulnerable to food security threats from ocean acidification

Vulnerability Ranking to Ocean Acidification	Country	Ocean Region
1	Cook Islands	South Pacific Ocean
2	New Caledonia	Southwest Pacific Ocean
3	Turks and Caicos Islands	Caribbean
4	Comoros	Indian Ocean
5	Kiribati	Central Tropical Pacific Ocean
6	Aruba	Southern Caribbean
7	Faroe Islands	North Atlantic Ocean
8	Pakistan	Arabian Sea
9	Eritrea	Red Sea
10	Madagascar	Indian Ocean

Source: World Bank (2012)

the global consensus of attempting to keep average global warming below the 2°C target, pressing for a maximum increase of 1.5°C above pre-industrial levels. In 2015 a global aspiration – but not a commitment – to limit this increase to 1.5°C was included in the Paris Agreement (UNFCCC 2015).

The Aichi Targets of the Convention on Biological Diversity (CBD) recognize the severity of threats to marine systems. Target 14 also recognizes that the restoration and protection of ecosystems that provide essential services need to take into account "the needs of women, indigenous and local communities, and the poor and vulnerable" (CBD 2016). Overall, however, international policies and agreements relating to marine protection, the maritime environment and fisheries remain largely gender-insensitive.

From community to national levels, strategies and policies that define rights and responsibilities in the fisheries sector have to contend with endemic problems such as inequitable access to and control over resources, conflict within communities, unsustainable resource use, and weak participation of significant stakeholders such as the poor and women (Leisher 2016, Agarwal 2010). Women often use natural resources differently than men, yet they frequently have minimal influence on how local resources are managed. Evidence from South Asia, including a meta-analysis of community fisheries management, reveals that empowering more women in local fisheries decision-making leads to better resource governance and conservation and increases women's social capital (Leisher 2016, Sultana *et al*. 2002).

Community-based women's groups around the world are in the forefront in developing gender-sensitive policy agendas that protect marine livelihoods and ecosystems, while at the same time promoting gender equality. For example, the Shared Gender Agenda of the International Collective in Support of Fishworkers (2010) challenges existing models of development based on unsustainable extraction of natural resources and emphasizes the need to protect women's access to fish and to protect the integrity of their small-scale artisanal fishing activities. The network of Locally-Managed Marine Areas in the South Pacific, in which women are deeply involved, emphasizes building the resilience and sustainability of local resources under local management (LMMA 2016). Small-scale fisheries not only provide livelihoods, but also represent ways of life where women's traditional knowledge and cultural identity have a prominence rarely found elsewhere (Begosi 2010).

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FORESTS

Key Messages

- Traditionally, forests are important to many people's daily lives and livelihood activities. They provide timber (e.g. for construction and furniture materials) and many other products including food, medicinal plants, fodder, fuelwood and colours for dying, as well as invaluable ecosystem services. Women and men in forest-dependent communities have different roles and purposes in regard to these traditional forest uses.
- There is a well-documented gender gap in access to forest resources. Women often have less access to and control over forest land and resources than men (e.g. due to customary laws and social norms). The problem of unequal rights and access has been made worse by increasing forest over-exploitation for commercial purposes, including through land grabbing, logging and illegal wildlife trade.
- Land grabs and unsustainable mining projects have negative direct and indirect impacts on health and the environment, particularly with respect to poor and indigenous people (e.g. through lead and methyl-mercury contamination of soils and water resources, or direct contact with toxic and harmful materials at mining sites). Women and girls or men and boys experience these negative impacts differently.
- Illegal wildlife poaching and trade is a highly gendered conservation issue. Women and men tend to have different roles in the value chain, including hunting, processing, transporting, purchasing and consumption. Gender-specific studies and other information, or requirements regarding gender and the wildlife trade, are nevertheless very limited.
- There are potential win-win relationships between more inclusive community forestry institutions, and better forest conditions and distributional equity. Women can play effective roles in formal forest protection forces, including combating illegal wildlife poaching and logging. However, adding environmentally related tasks to women's productive and reproductive responsibilities without considering social structures and norms (and the economic pressures associated with these resources) may overburden them.

2.6

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Forest resources: supporting lives and livelihoods

Gender roles in forest utilization

Forest outputs supply the food, health, energy and shelter needs of billions of people. Very large numbers of people also benefit indirectly from forests' environmental goods and services (FAO 2014). For indigenous and other peoples who live within or near forests – and have historically been responsible for protecting and managing them – the resources essential to meet basic needs include food, fodder, timber, fuelwood, charcoal and medicinal plants (APF and UHCHR 2013, WWF 2012, Aguilar *et al*. 2011).

The total number of forest-dependent people in the world is difficult to ascertain, and the meaning of the term "forest-dependent" can vary considerably from one location to another (Chao 2012, Bryan and Arnold 1997, Fisher *et al*., FAO n.d.). How the resources on which these people depend for their survival are obtained and used, by women and men, is largely determined by local contexts and customs. While women's knowledge and needs frequently differ from those of men, similar patterns exist in different parts of the world. For example, timber extraction for household and community construction is often carried out mostly by men (especially in developing countries), but more complex gender roles are identifiable in the collection of non-timber forest products (NTFPs) **(Table 2.6.1)**. Poor management or even loss of forest ecosystems can have different impacts on women than on men (Djoudi *et al*. 2015, WWF 2012, Aguilar *et al*. 2011).

Women and men collect NTFPs for household consumption and for their commercial value. NTFPs for household consumption are extremely important to people who are very poor. Trading them can provide a "safety net" to help respond to environmental and economic shocks (Wunder *et al*. 2014, Marshall *et al*. 2006). Both women and men generally collect NTFPs for both household consumption and commercial value; however, as shown in **Figure 2.6.1** the pattern of their roles is not globally consistent. Where there are lower collection rates for women than for men, the reasons can include limited forest access, market information and transport (Azzez *et al*. 2014, Sunderland *et al*. 2014).

Table 2.6.1: Common non-timber forest products (NTFPs) and their uses

NTFTs	Uses
bamboo	furniture, construction
bamboo shoots	food
mushrooms	food, medicine
roots	food, medicine
honey	food
ornamental plants	decoration
seeds	medicine, food, domestication
leaves	fodder, medicine, dye
bark	medicine, spices, dye
nuts and fruits	food, medicine
sap	dye
rattan and other fibres	furniture, decoration
fuelwood and charcoal	energy (cooking, heating)

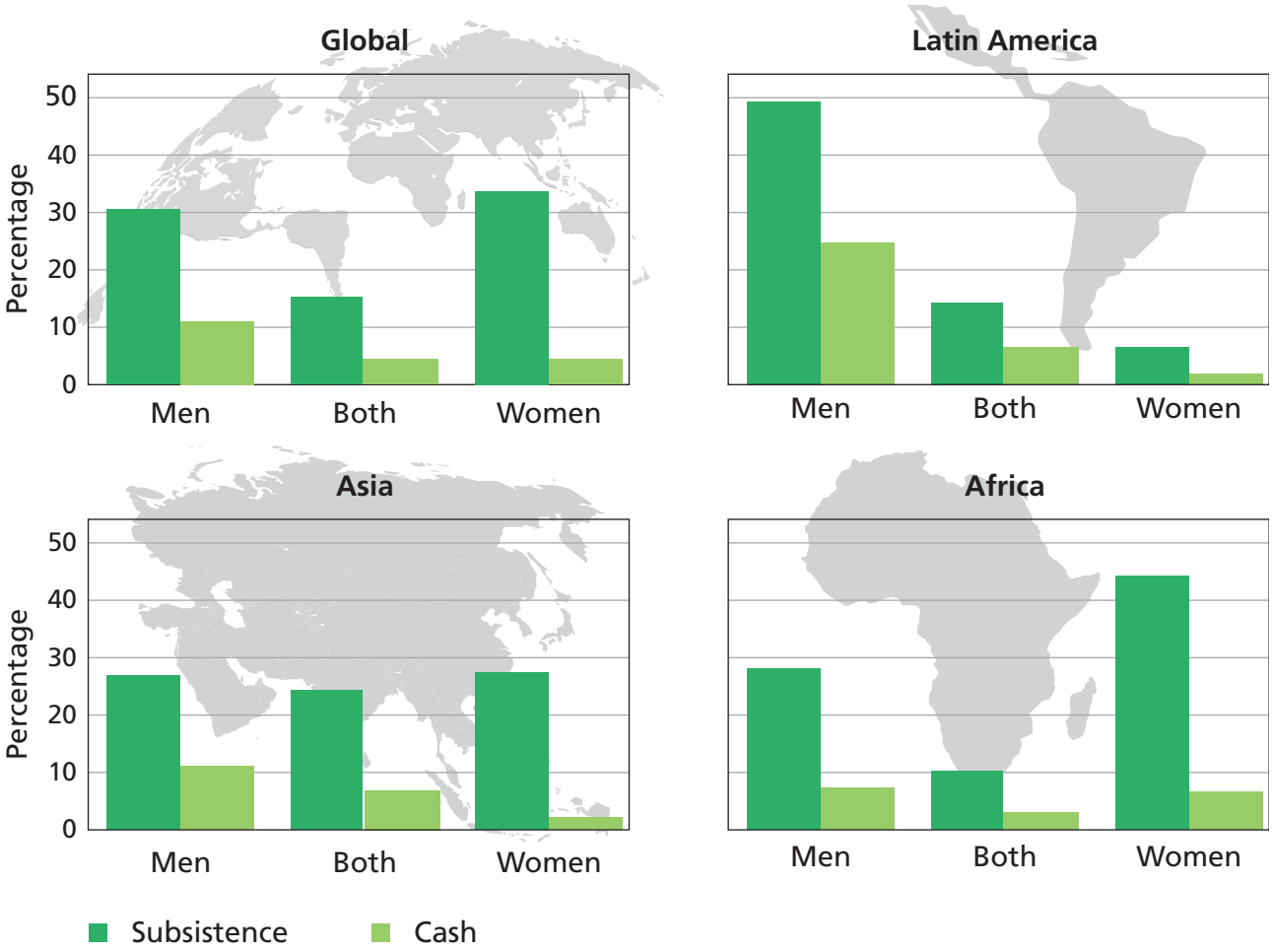
Source: Aguilar *et al*. (2011) and FAO (2011)

Scaling up commercialization of NTFPs and other forest resources can lead to overexploitation and resource depletion, putting additional pressures on both women and men in forest-dependent communities in terms of the use of their time and competition for land on which to produce these resources (Dancer and Tsikata 2015, Marshall *et al*. 2006).

Unequal access to forest resources

Restricted access to forest resources by people dependent on these resources (especially female-led households) can result in food insecurity, low resilience to disasters and environmental change, and lower incomes (so that these households fall into a poverty trap). In recent decades considerable efforts have been made by national government and international development programmes to support the poor, particularly women, in gaining greater economic and decision making empowerment, including access to and control over forest resources, often through promoting and implementing community-based forest management programmes and through forest user groups (FUGs) – groups of people living in the vicinity of forests who are entrusted to manage and conserve them, develop forest resources and utilize forest products. FUGs are actively involved in a range

Figure 2.6.1: Shares of unprocessed forest products collected by women, men and both at global and regional levels



Source: Sunderland *et al*. (2014)

of community forestry processes (Forestry Nepal 2016). Participating in them can help women increase their incomes and knowledge, but barriers include social structures and cultural norms, lack of intra-household negotiation power, and household responsibilities may keep them from taking full advantage of such opportunities (Sunderland *et al*. 2014, Sunderlin *et al*. 2007).

Although some successful experiences with increasing women's access to forest resources have been recorded, in many countries women, especially in poor and/or indigenous communities, continue to face challenges to gaining or maintaining access to (as well as the right to make decisions about) natural resources – sometimes through means such as state control or non-participatory conservation projects that may include fencing off nature reserves and other protected areas (Berger 2016, Knapman 2016, Odeny 2013, Juma 2010).

Degradation of forest resources: increasing scale and impacts

Wildlife poaching and trade

Illegal wildlife poaching and trade continue to increase internationally at an alarming rate (Wasser 2015, Wittemeyer *et al*. 2014, Niraj 2009). They can have severe negative impacts on wild populations, including biodiversity loss, disease and the introduction of invasive species (Bush *et al*. 2014). Both forest and non-forest species have become endangered (IUCN 2015, FAO 2014). As an indication of the scale of the problem, some 55,000 Indian Star tortoises (primarily found in scrub forests, grasslands, and some coastal scrublands of arid and semi-arid regions, and highly popular in some Asian countries as pets) were reportedly illegally traded from a single Indian trade hub in 2014 (D'Cruze *et al*. 2015, World Animal Protection 2015, TRAFFIC 2012) while approximately 25 million birds (mainly

songbirds) are captured illegally each year in the Mediterranean region for food, hunting and to keep as pets (Birdlife International 2015).

Obtaining reliable figures is problematic, but the total value of the international wildlife trade and environmental crime (including trade in illegal timber) is estimated to be as high as $US8-10 billion per year (Lawson and Vines 2014). Demand for ivory, especially in Asian countries such as China, Viet Nam and Thailand, is rising along with these countries' economic growth (OECD 2014). The Monitoring the Illegal Killing of Elephants (MIKE) programme of the Convention on International Trade in Endangered Species of Fauna and Flora (CITES) reports that in Africa in 2015, 1334 elephant carcasses were encountered at 40 monitoring sites. This was the same number of carcasses as in 2014, but at six fewer monitoring sites. Despite a slight decline and stabilization since 2011, estimated poaching rates overall remain higher than the normal growth rate of elephant populations (or above the sustainability threshold), which means it is likely the elephant population overall continued to decline in 2015 (CITES 2016).

Information on traders and consumers of wildlife products seldom takes account of gender. However, treating illegal wildlife poaching and trade in a gender-blind way may prevent understanding the issues fully and finding more effective solutions, as they are highly gendered activities (Torres-Cruz and McElwee 2012). People who take part in wildlife-related illegal activities can be characterized by gender as well as social class, income level and geographical location. In many countries, hunting wild animals is perceived as a "man's job" because of its danger and extended hunting periods, while women may hunt or collect some wild species (e.g. turtles and medicinal plants) or transport wildlife parts and products. Men's roles in the illegal wildlife trade as both producers (hunters) and consumers are clearer than those of women, even if the latter are involved at several stages of the supply chain (e.g. as transporters or as purchases for food and medicine processing) (Torres-Cruz and McElwee 2012, Anonymous 2010). There are different demands by women and men for types of food, ornaments, medicines, decorations, and spiritual and power symbols. For example, eating wild meats and

Box 2.6.1: Women's role in conservation of high mountain ecosystems in central Tien Shan, Kyrgyzstan

The Public Union Global and Local Information Partnership (GLIP) is a conservation initiative in Central Tien Shan, Kyrgyzstan, a complex high mountainous area with a unique ecosystem. A biological reserve, the Sary-Eertash State Reserve, was established in the Central Tien Shan in 1995. The Tien Shan is home to impressive biodiversity including five endangered mammal species (snow leopard, white clouded-bear, mountain sheep, Pallas' cat, stone marten) and many endangered bird species. This area is also home to two former-mining villages, Enylchek and Akshyyrak. In the absence of economic opportunities, a high proportion of the local population – mostly men -- was engaged in poaching.



Photo credit: © Balbakova

The GLIP and WWF, in focusing on conserving this high mountain biodiversity, sought to develop economic alternatives and to build capacity to provide alternatives to poaching. They engaged women throughout their programmes. Women were given training as rangers (including providing uniforms, binoculars, computers and cameras), and were supported with community-based micro-credit programmes so that they could start new businesses. With stable incomes and conservation training, women have become major advocates of conservation, including organizing efforts to discourage their husbands from engaging in or supporting poaching. The level of poaching has dropped significantly.

Source: Balbakova (2016)

consuming other wildlife products may be believed to increase men's sexual prowess, and it is common for some women to consume products derived from wildlife such as bear bile, mostly for health purposes; nevertheless, the majority of men have indicated leisure and entertainment as the main reasons for their interest in wildlife (Liu *et al*. 2016, Hance 2015).

Transnational criminal networks engaged in illegal wildlife trade may also traffic in drugs, arms, toxic waste, natural resources, counterfeit consumer goods and persons. Billions of dollars per year from these illegal activities flow through the global economy, distorting local economies, reducing legitimate business revenues, deteriorating social conditions and fuelling conflicts (OECD 2015, Lawson and Vines 2014). The wildlife trade and other types of environmental crime – whether driven by "greed" or "need" (Roe 2014) – have impacts on forest ecosystems and biodiversity and the welfare of forest-dependent communities.

In 2015 a South African ranger group consisting mostly of women, the Black Mamba Anti-Poaching Unit, was one of the winners of the top United Nations environmental prize. Since its inception in 2013 the 26-member unit has reduced snaring by 76%, removed more than 1000 snares, and put five poachers' camps and two bush meat kitchens out of action (UN News Centre, 2015).



Black Mamba team
Photo credit: © Black Mamba APU

Artisanal and small-scale mining

Mining on or near forest land can result in forest loss and fragmentation, soil degradation and loss, greenhouse gas emissions, biodiversity loss and water pollution, as well as increasing competition for land and water (OSISA 2015, Perch and Tandon 2015, Wickham *et al*. 2013). The social and economic impacts of (commonly land-based) extractive industry operations include displacement of local communities, including indigenous people, increased threats of food security and loss of livelihoods in forest-dependent communities. Many of

Box 2.6.2: Characteristics of artisanal and small-scale mining (ASM)

Artisanal and small-scale mining needs to be managed sustainably in order to make positive contributions to development without harming human health and the environment. The size and scope of ASM vary considerably across localities, countries and regions. These general characteristics have been identified:

- ranges from informal to formal, and can be disorganized or well organized;
- strongly linked to rural poverty and lack of better livelihood alternatives;
- involves mining of precious stones and metals (such as diamonds, rubies, gold and silver) as well as industrial minerals (such as stone aggregate, sand, clay, and salt) and some base metals (such as tin, tungsten or tantalum);
- livelihood activities can take place at all stages of the mining value chain;
- participation fluctuates with commodity prices;
- can include scavenging from and/or coexistence with large-scale mining concessions;
- sometimes seasonal, with mining alternated with farming, fishing and other livelihood activities;
- typically labour-intensive and low-technology;
- offers very low wages and insecure, unsafe and exploitative jobs (child labour, physical and sexual abuse of women, migration, HIV/AIDS and poor sanitation);
- often includes a series of intermediary buyers, who frequently operate illegally;
- often has negative repercussions for the local environment and rural livelihoods (un-rehabilitated excavations, effluent dumping, improperly stored waste, dust emissions, releases of chemicals such as cyanide and mercury, acid mine water, river siltation and deforestation);
- has been associated with conflict and war.

Source: World Bank and Gender Action Plan (2012)



Small-scale gold mining in Burkina Faso.
Photo credit: © Gilles Paire/ shutterstock.com

these negative impacts are similar to those resulting from other types of land-grabbing projects. However, extractive activities also create formal employment opportunities for community members and an influx of transient male workers (Marcoes *et al*. 2015, Margano *et al*. 2014). The benefits they receive from mining jobs are relatively small compared to the profits gained in the later stages of the supply chain (O'Faircheallaigh 2012). Implementing free, prior and informed consent (FPIC), both before an extractive industry project starts and during the project's lifecycle can be help to avoid conflict with communities and ensure that the project contributes to sustainable development (Buxton and Wilson 2013).

Many of the impacts described above fall unequally on women and men in local communities. For example, in Indonesia, which has the world's highest rate of deforestation (approximately 840,000 hectares of forest loss per year, primary forest loss of over 6.02 million hectares from 2000 to 2012), women often bear the brunt of development without enjoying the potential benefits.

Artisanal and small-scale mining (ASM) takes place in approximately 80 countries. It is widespread in developing countries in Africa, Asia, Oceania, and Central and South America (World Bank and Gender Action Plan 2012). Much of the forest loss in these countries caused by mining is due to large-scale mines, but small-scale mining also has detrimental impacts which often occur in tandem with those of large-scale mining (Rajaee *et al*. 2015). A variety of ASM techniques are used, and women and men share some of the same tasks, risks and opportunities. When ASM is carried out in an informed and responsible way, it can contribute to economic development, helping people out of poverty. However, it also has negative social, economic and environmental impacts (IIED 2016a, World Bank and Gender Action Plan 2012) **(Box 2.6.2)**.

There are approximately 100 million artisanal miners globally, an estimated 30% of whom are women (ranging from 10-25% in some Asian countries up to 25%-50% in parts of Africa) (AU and AMCC 2015). Working at ASM sites was once considered too dangerous for women, but the number of women in this sector has been increasing for a number of years **(Table 2.6.2)**. Women's participation typically decreases with increasing mechanization (Mhinda 2016, GIZ 2014, World Bank and Gender Action Plan 2012).

Of some 70,000-100,000 small-scale miners in Papua New Guinea (20% female and 80% male), most were categorized as belonging to low literacy to illiteracy levels (Javia and Siop 2010). These workers' roles range from labour-intensive mining tasks to processing of mine materials (including crushing, grinding, sieving,

Table 2.6.2: Number of women in small-scale mining in selected countries

Country	Number of Women	Proportion of Women
Africa		
Burkina Faso	45,000 - 85,000	5
Ghana	89,500	45
Malawi	4000	10
Mali	100,000	50
Mozambique	18,000	30
South Africa	500	5
Tanzania	137,500	25
Zambia	9,000	30
Zimbabwe	153,000	50
Asia		
India	33,500	7
Indonesia	10,900	10
Philippines	46,400	25
Papua New Guinea	12,000	20
Latin America		
Bolivia	15,500	22
Ecuador	6,200	10
Total	**596,000**	

Source: Hinton *et al*. (2003)

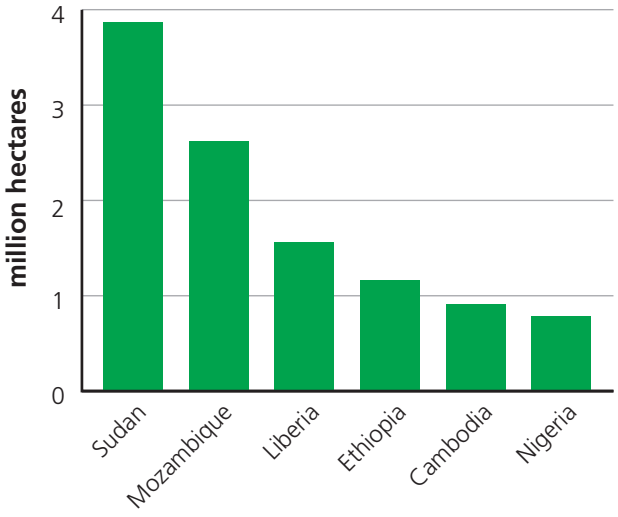
washing, and amalgamation with mercury in the case of gold extraction). As processing activities are often carried out in the home, women and their families are at risk of mercury poisoning and silicosis (Hinton *et al*. 2003). In many locations women's multiple roles include care-giving and participation in the sex trade. They may be subject to abusive situations and health risks such as HIV/AIDS. Women's contributions are often invisible because they perform unrecognized and undervalued care and domestic work. Despite heavy involvement of women in ASM, men control and own most of the family's assets, including land, the income from mining and farming, tools, homes, crops and the benefits yielded.

The dangerous conditions in which many miners work are not surprising, given the informal and often illegal nature of ASM. Women and men miners are endangered through handling and misuse of chemicals such as mercury and cyanide, accidents due to landslides or explosions, and lung diseases due to exposure to silica dust. Contamination by mercury used in gold recovery has significant impacts not only on women, men and children working at ASM sites, but on other people in the vicinity and those living in downstream areas (specifically young children and women who are pregnant and breastfeeding) (AU and AMCC 2015, Cordy *et al*. 2011, HRW 2010).

Land grabbing of forest land and resources

Demand for sometimes very large tracts of land on which to increase agriculture to meet food and energy needs (as well demand for land for urban and industrial expansion) continue to grow. In many countries, particularly across parts of Africa, Asia and Latin America, these demands are associated with "land grabbing" (IIED 2016b, Odusola 2014, Deininger and Byerlee 2011, ILC 2011) **(Figure 2.6.2).** Land grabbing is a global phenomenon that has had significant economic, environmental and social impacts during the last decade or so, frequently resulting in conflict between local communities and outsiders (Dhiaulhaq 2014, IIED 2016, Cotula and Vermeulen 2010, Cotula *et al*. 2009). Land grabs in forest areas are often followed by the introduction of chemically intensive, industrial-scale monoculture production (i.e. production of single crops or types of livestock). Crops such as oil palm, biofuel feedstock (e.g. sugarcane and jatropha) and animal feed are examples.

Figure 2.6.2: Large-scale land transfers, 2004-09



Source: World Bank (2009)

Land grabbing in forest areas but also in other types of ecologies such as savanna, pastureland, agricultural land, not only has impacts such as fragmentation (threatening forest biodiversity) and loss of agrobiodiversity. It can also have serious negative effects on people in forest-dependent communities (De Schutter 2009). These include further restricting their already limited access to forest resources and

Box 2.6.3: Poor working conditions on biofuel feedstock plantations

In the Valle del Cauca region of Colombia, known for its extensive sugar cane plantations, 92% of permanent crops are sugar cane monocultures. In this region there has been an increase in reported cases of sick children, deformities and abortion, which people believe are caused by chemicals used to fumigate the plantations that have filtered through to the streams they use, and/or by constant burning of sugar cane. Moreover, intensive water use for agrofuels production has deviated rivers or dried them out. The plantations give jobs only to men, as this is a labour-intensive occupation. There are concerns about their working conditions. The men do not receive any social benefits and their wages are very low. Many sugar cane cutters suffer from back pain and respiratory illnesses, increasing pressures within the household. They may have to stop working (and be taken care of by the women in the household) and some die as a result of these working conditions.

Source: Alvarez (2013)

marginalizing them from their traditional livelihoods; production of biofuel feedstocks instead of food; and indirect health impacts due to use of agrochemicals, as well as smoke and dust.

Production of biofuels can exacerbate gender inequality, contributing to the socio-economic marginalization of women and female-headed households and threatening families' health and food security (Alvarez 2013, Juma 2011, Ewing and Msangi 2009, FAO 2008) **(Box 2.6.3)**. The associated environmental and socio-economic risks can also lower the resilience of rural communities and individuals to exogenous shocks, for example reducing their ability to cope with the impacts of climate change (FAO 2008). On the other hand, it has been suggested that biofuels production schemes that include promotion of alternative energy sources for household uses could improve productivity and health, especially for women and children (Ewing and Msangi 2009). According to a World Bank study (Kammen 2011, Benfica, Thurlow and Arndt 2010), biofuels production could provide an opportunity for women in Mozambique to substantially increase their incomes, as they are currently predominantly involved in subsistence agriculture. Extra income generated through biofuels production is predicted to have positive knock-on effects (e.g. reducing household vulnerability and poverty levels), but this study emphasizes the need for female education. It is projected that increasing the number of years of schooling for unskilled female workers would increase overall gains in economic growth from biofuels and give women greater access to skill-intensive agricultural jobs in agriculture.

Biomass is being used in some parts of Europe and North America to produce heat and power. Although the trade in this energy source is mostly North-North (United States and Canada, EU to within the EU) and there is little South-North trade, there are concerns that it could be scaled up, with major impacts on forest-dependent communities. An example is the Suzano e Papel investment in Maranhão, Brazil, where the Cerrado forest was bulldozed and communities lost their land to eucalyptus plantations across 40,000 hectares, partly so that wood pellets could be produced for a power station in the United Kingdom. Neither a proposed pellet plant nor the power station that was intended to burn the pellets has so far been built (Goncalves de Souza and Overbeek 2013).

Large-scale intensification of livestock production requires large areas of land on which to produce animal feed crops like maize and soybean. Paraguay's Chaco forest, the last refuge of the uncontacted Ayoreo-Totobiegosode tribal peoples, has been devastated by the world's highest rate of deforestation. Satellite images show the astonishing extent of forest destruction in the Chaco between 1990 and 2013; the area claimed by the Ayoreo-Totobiegosode is one of the last remaining patches of forest left (Survival 2014, Hansen *et al*. 2013). The most important primary production sectors in Paraguay are livestock and soy production; most land is privately controlled (85.5% of the territory is in the hands of 2.6% of the population) (Lovera 2015).

Despite numerous studies on the social and health and environmental effects of monoculture plantations (Hahn *et al*. 2014, Mutter and Overbeek 2011), further research is needed on gendered impacts (FOEI 2009) **(Box 2.6.4).** Several years ago the World Rainforest Movement (WRM) documented the impacts of plantations on women worldwide, identifying factors such as their lack of participation

Box 2.6.4: Industrial tree plantations

Industrial tree plantations (ITPs) have different effects on women and men and can reinforce existing inequalities. In a study of Brazilian women in communities that once lived in forest areas, but had lost their lands and were surrounded by ITPs, one woman reported: "Indigenous women face more difficulties today, because in the past there was an abundance of everything. Indigenous women stayed home with their children and they grew a lot of different crops and devoted themselves to picking leaves, while their husbands were doing other things. There was an abundance of everything. Today, in addition to the fact that they don't have a lot of crops, there's a lot of unemployment" (Overbeek *et al*. 2012).

Women have also found that access to traditional medicines, which they were accustomed to look after and which were vital to rural communities, has been affected. "I am pregnant and ill," said one woman, "and the herbs are nowhere to be found. Before now, we used to go to the bush to get herbs to cure all sorts of ailments, but now we cannot gain access to them" (WRM 2009).

in forest management and decision-making; scarce opportunities for employment; low wages and difficult working conditions, including negative health impacts; land tenure issues and consequent evictions and displacement; and loss of traditional knowledge and livelihoods (WRM 2005).

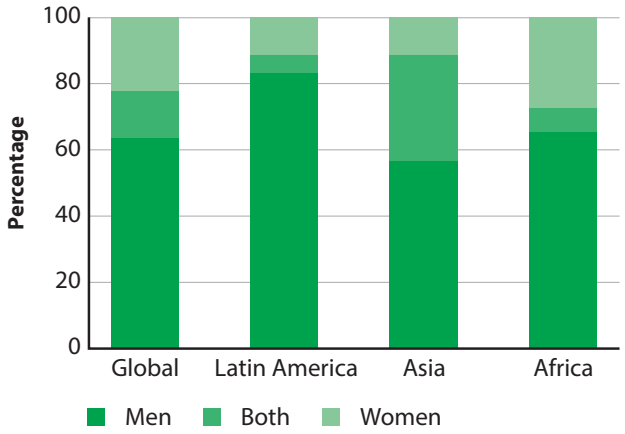
Reports by the Office of the UN High Commissioner for Human Rights (OHCHR) on forced evictions recognize that there are severe detrimental impacts on women, who tend to be disproportionately affected and bear the brunt of abuse (both physically and psychologically) during forced evictions. The OHCHR reiterates the discriminatory situation of women in terms of legal ownership of housing and land, including marital property, as well as inheritance (including customary laws and practices that fail to recognize their equal rights) (UN-Habitat and UNHCR 2014).

Equal rights and participation – a key to solving forest degradation issues

Community-based forest management supporting gender equality

In forest-dependent communities women play a key role in forest management but are often excluded from decision-making (Onta 2012, IIED 2012, OECD 2010) **(Box 2.6.5).** Nevertheless, gender equality is essential to achieve more sustainable forest management (UN Women 2014, Giri 2012, Mwangi *et al*. 2011). For example, excluding women from decision-making can lead to ineffective forest protection (e.g. through violation of rules requiring sustainable extraction of forest resources) and inefficient forest planning (Agarwal 2011). Drawing on data collected from over 8000 households across research sites in Africa, Asia and Latin America, researchers concluded that women's participation in forest user groups was far less than that of men and below their proportionate use of forests. Male participation in these groups exceeded that by women at all but two sites (Sunderland *et al*. 2014) **(Figure 2.6.3).**

Figure 2.6.3: Participation of women and men in forest user groups (FUGs)



Source: Sunderland *et al*. (2014)

Box 2.6.5: Reasons for women's lack of participation in local governance

According to a study by Agarwal (2001), the reasons women did not participate in local forest governance in South Asia, and conditions under which they are more likely to participate, could be summarized as follows:

- "rules of entry": criteria defining membership in order to join either the general body (GB) or the management board/executive committee (EC);
- social norms that define, for example, who should attend and speak at meetings, who should form the patrol, and how men and women should behave in public;
- social perceptions regarding women's ability to contribute to community forestry group (CFG) activities;
- entrenched territorial claims;
- personal endowments and attributes (e.g. educational levels, property status, marital status, age);
- household endowments and attributes that define where women fall in the structural hierarchies of class and caste.

Extending Agarwal's analysis to Africa and Latin America, Coleman and Mwangi (2013) used two global datasets from the International Forestry Research Institute (IFRI) to explore whether these reasons applied. The quantitative results mostly supported Agarwal's model. The authors pointed out that less exclusive institutions, higher household education levels, and lower economic inequality correlate positively with women's participation in community forestry.

Box 2.6.6: The impacts of male migration on gender equality

In Nepalese villages with different social structures and migration patterns, increased rates of male migration in one village created space in which women could participate actively in community forestry (Basnett 2013). This finding is echoed in a study of community forestry user groups in Ramechhap, Nepal, where wives left behind without adult men in the household took part in general assemblies more frequently and made their voices heard in decision-making (Giri and Darnhofer 2010). However, in a low-caste village studied by Basnett, male migration contributed to the creation of a "remittance class" which used community forestry as a platform to wage a caste-based struggle. Gender inequalities were further entrenched along with those of class and seniority. Women were able to participate only nominally in community forestry decision-making, and the rules established sidelined their interest in gaining secure access to fodder and fuelwood.

Community forestry initiatives (or devolution of forest management to the local level) are often seen as a means of obtaining both social and environmental co-benefits. Over one-tenth of the world's forests are estimated to be managed through community forestry arrangements (Maryudi and Krott 2012). Proponents of such arrangements emphasize that the ability to conserve forests depends critically on local people's involvement and active participation (Agrawal and Gibson 1999). Others point out that ensuring local communities have a right to participate in forest management will ensure they receive fair rewards and benefits (Dolisca *et al*. 2009). A wide range of studies across Africa and Asia demonstrate that community forestry offers opportunities for sustainable management of forests and enhanced livelihoods (CIFOR 2016, Benjamin 2010, Pandit and Bevilacqua 2010, Sunam and McCarthy 2010, Gobeze *et al*. 2009).



Through self-help groups, capacity building workshops, and programs that link farmers to inputs and markets, small-scale women farmers are empowered across India
Photo credit: © McKay Savage

Effective participation can be defined as attending meetings and speaking up during them, but it can also be defined by the share of women in office-bearing positions. Analyzing 135 executive committees of Indian and Nepali community forestry institutions, Agarwal (2010) found that a critical mass of around one-third women in executive committees correlated positively with meeting attendance and speaking up. Regardless of their numbers, though, the positions women occupied were usually supportive rather than office-bearing. Agarwal also found that executive committees with a higher proportion of landless women had a greater female voice. The author attributed this to less social pressure on poor women to comply with social norms and the greater stake of landless women in forest access. This underlines the importance of involving disadvantaged women in particular. However, a study on female participation in India's Forest Rights Act (FRA) – which legitimizes marginalized groups' access to ancestral forested lands, promotes collective management of forests, and provides tribal and other groups with the option of pursuing individual and community-owned land titles through establishing claims committees –found that while FRA rules ensured one-third female membership in most claims committees, meaningful participation by women was limited in cases where women-friendly issues were put forward. The author argues that this was due to the participation of "critical actors" rather than a critical mass. Increasing the number of women in such institutions, according to the author, increases the likelihood that critical actors will be present (Bhalla 2015).

The interface between gender, participation and community forestry has impacts on pre-existing gender relations and on relative participation by women and men in community forestry decision-making processes. These include changes in the intra-household decision-making process and in the allocation of land, labour and capital. One such change is migration and agrarian transformation. The short-term effect of male migration is an increased workload for women without greater

decision-making power. In the longer term, however, it can provide women with social space in which to assume leadership with respect to household decision-making. Male migration eventually presents new opportunities to change gendered divisions of labour, power, decision-making processes and market access (Djoudi and Brockhaus 2011) **(Box 2.6.6)**.

Increasing women's presence in community forestry institutions does not guarantee that gender equality will be favoured by the rules and outcomes. In many cases women merely "sit in on" meetings (Nightingale 2003). Even if there is a legal emphasis on including women in community forestry decision-making bodies, their actual participation can be determined by the goodwill of male committee members and forest bureaucrats (Basnett 2008, Mohanty 2004).

Agarwal (2010) found that women were more likely to promote gender inclusive rules and improve collective action when they made up 25-30% of the committee. This "critical mass" helped bolster the confidence of other women in the group and increased the likelihood of the women voicing their concerns and volunteering to hold offices. Agarwal recognized that measures to increase women's presence in decision-making bodies need to be complemented with investment in empowerment and leadership skills. It is critical to create a "web of strategic alliances" to secure women's bargaining power at the local level, and to ensure that government institutions are interactively and democratically engaged with women at this level.

Comparing women's participation in forest management and decision-making in 18 Reducing Emissions from Deforestation and Forest Degradation (REDD+) sites, in Brazil, Cameroon, Indonesia, the United Republic of Tanzania, and Viet Nam, (Larson *et al*. 2015) observed that women's involvement in decision-making was limited and that significantly fewer women than men had knowledge and information about REDD+. The authors question the usefulness of promoting women's participation alone as a way to ensure equitable programme outcomes. Instead they call for analyses of how gender gaps in information, knowledge and decision-making affect the distribution between women and men of future benefits and burdens. In an analysis of the Green Belt Movement in Kenya and Community Forestry Programs in Nepal, (Boyer-Rechlin 2010) highlighted the importance of taking account of pre-existing gender roles and cultural contexts, as well as investing in civic education and building women's skills.

Arora-Jonsson (2010) has suggested that promoting community forestry institutions worldwide may not always be the best way to challenge gender and social inequalities. Examining forestry organizations in India and Sweden, the author found that women "included"

Box 2.6.7: Valuing of forests' nutritional, cultural and social aspects by women

A study by Khadka and Verma (2012) on Bangladesh, Bhutan, India and Nepal demonstrates that biodiversity is conserved where women exercise some control over forest management. The study as a whole found discernible patterns of gender-differentiated knowledge and conservation interests. In Bhutan women are traditionally responsible for collecting and preparing wild yam tubers in the forests and customary agreements give them authority to protect the wild yam. On private land women have collectively implemented regulations on cutting the young yam vines, grazing in the forests, and cutting trees infested by yam vines. Violating these regulations results in fines. These conservation strategies have contributed significantly to the regeneration of wild yam vines in the forests.

In Bangladesh women play a critical role in seed production and storage, as well as the maintenance of genetic diversity. Knowledge and techniques (e.g. using marigolds as insecticides) are passed on from one generation to the next. As women are responsible for providing the family's nutrition, they grow a larger variety of species than men. In Nepal women tend to be more interested in conserving ecologically sensitive areas, regulating unsustainable harvesting, protecting plants with nutritional and economic value, and supporting poorer forest users. Men prefer forest management for commercial products.

Altogether, women throughout this study region were found to value nutritional, cultural and social aspects of the forests, while men prioritized the forests' commercial aspects (timber and high-value non-timber forest products). The differences can be attributed to the gendered division of labour, especially the multiple roles women play in the productive and reproductive spheres in the studied communities (Khadka and Verma 2012).

in the organizations were expected to abide by rules about which they had little say. The women therefore preferred to participate through their own groups, where they felt more confident. While men in the formal organizations acknowledged that collaboration with women was important, this collaboration was to be realized through women joining the village organizations which the men believed to be neutral. The inclusion of women was often welcomed, but men in the associations were less inclined to address gender inequalities that left women out of decision-making in the first place. Including women could be perceived as a way to maintain and legitimize the gender status quo rather than a sincere effort to enhance the inclusiveness of forest decision-making. Inclusiveness is not always best achieved by including the excluded in mainstream institutions. It can also be achieved by making sure these institutions are able to relate to other, existing forms of organizations that represent women's strategic and practical interests. Thus a gender analysis should aim at revealing how unequal practices are perpetuated in mainstream community forestry institutions, rather than assuming these institutions are always neutral and equal.

The benefits of gender-equal participation in forest management

Forest condition: Although research is limited, it suggests that women's participation contributes to positive conservation outcomes **(Box 2.6.7)**. Building on the International Forestry Resources and Institutions (IFRI) dataset, (Mwangi *et al*. 2011) analyzed the effects of different forest user group compositions on the likelihood these groups adopting behaviour enhancing forest resources in Bolivia, Kenya, Mexico and Uganda. They found that male-dominated and mixed groups performed better than female-dominated ones. However, they suggest these differences could be due to gender biases in access to technology, dual roles faced by women as productive labour as well as caregivers, and women's lack of sanctioning authority. Based on the results of the study, the authors strongly caution against "essentializing women as 'natural conservators'" (Mwangi *et al*. 2011).

Another study based on the IFRI database, which contains data on institutional effectiveness in forest commons in 14 countries in Latin America, East Africa and South-East Asia, suggests that women's greater involvement in forest executive committees has a significant positive effect on forest cover (measured as basal area) (Coleman and Mwangi in press). Drawing on the same dataset as (Mwangi *et al*. 2011), the positive correlation between women's involvement in executive committees (as opposed to forest user groups) underscores the importance of paying attention to the types of participation and institutional arrangements through which positive outcomes are likely to be achieved. According to Agarwal (2009), women at studied sites actively contributed to improved forest conservation outcomes through increased compliance with rules, which improved forest protection and led to significant decreases in illegal grazing and logging.

Although both women and men in forest-dependent communities possess traditional knowledge of the use of forest ecosystems, enhancing women's roles in the protection and of biodiversity and forest ecosystems is crucial, including through preservation of indigenous seeds and medicinal plants (Mulyoutami *et al*. 2013, Voeks 2007). As women in many regions are under-represented as landholders, providing opportunities for their greater involvement in land management might help in this regard. When women are in decision-making positions but not fully informed, however, they can make decisions with negative environmental impacts. Villamor *et al*. (2014) have pointed out that "complex gender, land-use and multifunctionality intersects may not be obvious". It is therefore important not to overestimate, romanticize or "essentialize" women's environmental knowledge, especially in relation to development projects.

Distributional equity: An increase in the number of women on executive committees can bring about improved distributional equity for women and other disadvantaged groups, as shown in a study on community forestry groups in India and Nepal (Agarwal 2015). Where there was a higher proportion of women than men on these committees, the women argued more successfully for increased fuelwood extraction and were better at reporting fuelwood shortages. As wood is the most important cooking fuel (mostly collected by women and girls), the author considers that its availability and equitable distribution are an important marker of gender equality in India and Nepal. Active participation by women in local forest governance institutions has a negative correlation with disruptive conflict (Coleman and Mwangi 2013). However, men are more likely to win positions when council seats are acquired competitively, demonstrating that in many cases power relationships still favour men in forest management. Analyses of two global datasets

revealed that greater numbers of women in decision-making positions did little to change perceptions of the fairness of rules and penalties. The authors caution against policy advice advocating *"carte blanche* participation without carefully understanding the type of women's participation that can make a difference" (Coleman and Mwangi 2013).

Gender equality and sustainable forest management – a win-win relationship?

While many study results confirm that there a positive relationship between more inclusive community forestry institutions and better forest conditions (and increased distributional equity) a simple "win-win" relationship between gender equality and the environment cannot be assumed. First, such a relationship does not always exist everywhere (UN Women 2014, Villamor *et al*. 2014, Mwangi *et al*. 2011). The assumption of a universal positive relationship between women's involvement in forest decision-making and improved forest conditions risks providing misguided policy recommendations (Arora-Jonsson 2011) as well as entrenching gender stereotypes and inequalities (UN Women 2014). Support to increasing women's involvement in decision-making for the improved efficiency of forest conservation programmes, for example, is often based on gendered roles in the collection, management and use of forest products and resources.

Programmes that support women's increased participation in order to achieve environmental targets risk "feminizing" the responsibility for sustainable forest management. By adding environmental tasks to women's existing productive and reproductive responsibilities, such programmes may overburden women (Arora-Jonsson 2011). Simplistic approaches to community-based forestry, by merely pushing for women's increased participation, also risk overlooking the local and non-local economic, cultural and socio-political processes that shape the ways women and men acquire and articulate environmental knowledge (Larson *et al*. 2015, Arora-Jonsson 2010, Agarwal 2001). Expecting women to save forests without assessing their resources and traditional role in family care might jeopardize both the social and environmental outcomes of community forestry programmes (Leach 2007).

Second, equating women's involvement in natural resource management with better environmental outcomes risks "instrumentalizing" gender equality. Should the right of women (and other marginalized groups) to partake in community forestry and the decisions that directly affect their lives be conditioned on the grounds that this would lead to improved forest condition or increased biodiversity? Likewise, interventions aimed at sustainability, such as community forestry, do not always translate into gender equality (UN Women 2014, Villamor *et al*. 2014, Mwangi *et al*. 2011, Arora-Jonsson 2010). While strong synergies exist between women's participation and the resilience of community institutions, distributional equity, forest cover and biodiversity, environmental sustainability and gender equality should also be seen as two interlinked albeit separate goals.

Thirdly, portraying women as socially and economically marginal, as well as pro-environment, risks reinforcing stereotypes of women as both vulnerable victims and sustainability saviours (UN Women 2014, Arora-Jonsson 2011). When these stereotypes are situated in a binary conceptualization of gender, they also risk more or less implicitly portraying all men (especially in developing countries) as oppressors and perpetrators of environmental crime. Furthermore, perceiving this relationship between *excluded women and excluding men* as the sole power struggle within community forestry risks overlooking differences and inequalities among – or affecting – women and men based on various other socio-economic factors such as ethnicity, class, age and religion. This underscores the importance of both understanding gender as a contextual and intersectional concept and viewing women (like men) as individual agents, constrained by structures of varying flexibility, whose identities, preferences and aspirations cannot be reduced to simplistic, general and often empirically unfounded stereotypes.

Biodiversity and forest management policy – towards a green economy and gender equality

Women, bio-prospecting and the Nagoya Protocol

To date, most international conventions and forest and biodiversity related policies recognize the importance of women's empowerment and of participation by indigenous and local communities in conservation. The Nagoya Protocol to the Convention on Biological

Box 2.6.8: Rooibos

Rooibos is a plant endemic to the South African Western and Eastern Cape Provinces. It has a long tradition of use in this region, including for tea and medicinal purposes such as alleviation of infantile colic, allergies, asthma and dermatological problems. Given its rich properties, Rooibos can be a substitute for milk. Women use it as a staple food for their children. Rooibos is drunk regularly in most households, and communities that grow it receive an income from its commercialization. Rooibos also has an important use in cosmetology, so it is a source of income for small women-led enterprises. To date, attempts to patent Rooibos have not been successful. Patenting it would have meant misappropriating genetic resources and associated traditional knowledge, and losing an important source of nutritious food and medicine for communities which have traditionally used it.

Source: Joubert *et al.* (2008) and NaturalJusticeVideos's channel (2012)

Diversity not only acknowledges women's role in decision-making and biodiversity conservation, but also emphasizes the traditional knowledge associated with genetic resources (CBD 2011).

Concerns about the search for and commercialization of new products based on biological resources (sometimes referred to as "bio-prospecting") urged such an international legally-binding agreement like the Nagoya Protocol to occur as many industrialized countries continued to exploit natural resources that constitute the basis for the livelihoods of people in developing countries at the detriment of communities who depend on them (Shiva 2007). Without such a protocol, patents would grant companies – and other actors – full rights to certain genetic resources without the free, prior and informed consent of communities who traditionally use them (Forest Peoples Programme 2016), meaning that these resources become private property. In the case of Rooibos and Honeybush in South Africa in 2010, a big multinational corporation had five pending patent applications **(Box 2.6.8)** (Amusen 2014, ICSTD 2010).

Gender and REDD+

Comparing women's participation in forest management and decision-making in 18 Reducing Emissions from Deforestation and Forest Degradation (REDD+) sites in five countries, Larson *et al*. (2015) observed that women's involvement in decision-making was limited and that significantly fewer women than men had knowledge and information about REDD+. In an analysis of the Green Belt Movement in Kenya and Community Forestry Programs in Nepal, Boyer-Rechlin (2010) highlighted the importance of taking account of pre-existing gender roles and cultural contexts, as well as investing in civic education and building women's skills.

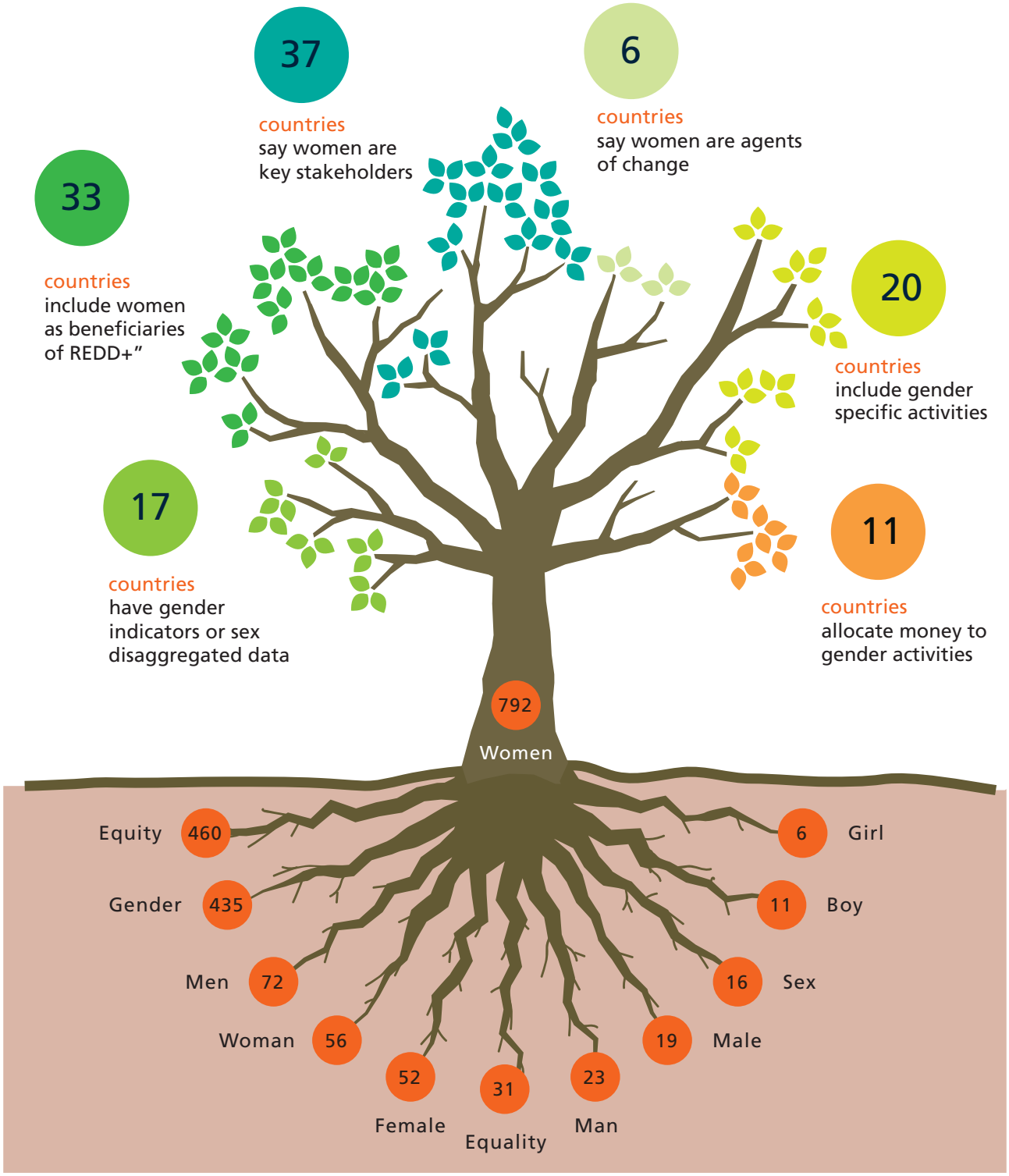
Among the many factors that influence successful implementation of a REDD+ scheme (e.g. baseline CO_2 emissions, records of forest carbon stock, condition of biodiversity, quality of governance), it is important that safeguards are in place to secure land rights and full participation by local communities in order to achieve "win-win" effects on both poverty alleviation and environmental protection (Mahanty 2013, Lawlor *et al*. 2013). The UN-REDD programme developed guidance to promote gender-sensitive processes in the preparation, implementation and monitoring of REDD+ projects and other action plans which focus on strengthening a bottom-up approach, including priority alignment to national needs and capacities (UN-REDD 2013). However, mainstreaming gender national policies, which is often interpreted as an increased number of women participating at local level, is not sufficient to realize the full potential of women and men as agents of change at community level. Several reports have suggested that gender should be carefully integrated in the design, monitoring and evaluation of REDD+ programmes, including gender-sensitive indicators and safeguard approaches. Systematic gender-responsive analysis should be carried out, including information on decision-making, gender perceptions and actual gender differences in interests, as well as needs for effective engagement of women and men in REDD+ implementation in local contexts (Larson *et al*. 2015, Gurung and Setyowati 2012).

From natural resource management to green economy approaches

Natural resource management (NRM) or sustainable livelihood projects often provide a good "neutral" entry point for tackling social norms and cultural issues related to the gender-environment nexus. There are numerous examples of NRM projects that are trying

to address these links in conflict-affected countries. At the same time, in non-conflict settings the approach to more inclusive food production, through agricultural livelihoods, has been found wanting in the context of equal distribution and inclusion. The focus on increased productivity has not proven equally beneficial to women and men. Women farmers and women do not have equal access to inputs, credit and technology, and these gaps can have effects across a number of development pillars including income poverty and nutrition (UNDP 2013). A recent survey of Southern Africa, in the context of gender and climate-smart agriculture, highlights concerns about equality of access over the next ten years, with a large

Figure 2.6.4: REDD+ and gender and REDD+ readiness preparation analysis



Source: IUCN (2015)

majority of respondents worrying about this more than other concerns (Perch and Byrd 2015). Post-harvest management initiatives in different countries also highlight the need for institutional frameworks and implementation approaches that consider not only gender equality but its localized nuances. Other research also calls for approaches which reinforce qualities such as resilience (Sibanda 2014).

The greening of artisanal and small-scale mining requires consideration of the three dimensions of sustainable development at the local level – social, economic, and environmental consequences – in tandem with sustainable livelihood strategies rooted in gender equality and women's empowerment. Environmental protection, decent work for women and men, and the recognition, reduction and redistribution of unpaid care work are also among necessary measures.

Box 2.6.9: Gender-equitable forest landscape restoration in a changing climate

The resurgent focus on landscapes as an organizing principle for analyzing ecosystems and their multiple interactions with the market and society (i.e. productive landscapes, landscape resilience) provides an opportunity to address gender and environment not only as a social and/or environmental issue, but also as a sustainable development one.

Forest landscape restoration (FLR) is an innovative approach to bringing natural function back to degraded land in a way that benefits nature and people. For example, in Uganda the International Union for Conservation of Nature (IUCN) is working to implement ecosystem-based adaptation to enhance climate resiliency, accompanied by other benefits including gender equality. From design and planning to implementation, the Community Learning Center at the base of Mount Elgon in southeastern Uganda has promoted a gender-inclusive approach and makes it possible for the community to realize environmental, economic and social benefits. Sanzara, a community of about 200 homes beside Mount Elgon, sits in a "rain shadow," meaning rain is scarce and many families suffer from water shortages almost all year long, resulting in low agricultural production which affects income, food and nutritional security. In Sanzara the FLR opportunity has actively promoted and included women and men in all aspects to ensure equitable outcomes, achieving great success in building the resilience of all community members with respect to climate change adaptation.

The Learning Center, established in 2012, initiated leasing of land so the community could develop a wider range of crops adapted to drier conditions. Intercropping and agroforestry have been promoted as a "culture of tree planting". Besides participating in agricultural activities at the Learning Center's communal garden, people attend technical training sessions to learn about climate change and different methods of managing land to enhance environmental integrity, sustainability and yield.

Community members, both women and men, have welcomed the opportunity to enhance their capacity in regard to agricultural techniques, and other ways to improve their livelihoods and food and water security. This initiative promotes women's voices and empowerment in the community. An unexpected outcome has been the convening of women who work at the Learning Center into their own group, which did not exist prior to the project. The women discuss community issues such as health and educational services, which they hope will be supported by the fund.

Source: IUCN

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MARCHE MONDIALE

IN A HIGHLY CONNECTED AND CHANGING WORLD: CROSS-CUTTING ISSUES

This report reviews a number of sectors, topics and issues in relation to the linkages between gender and environment. All of them share some common factors that influence the analysis, including disasters, climate change, conflicts and health. These have been identified as "cross-cutting issues" for the sections in Chapter 2. They have close connections to human and environmental vulnerability, and many of these connections have been discussed in the previous sections of this chapter. This section briefly examines the complex intersections between these issues, with a focus on gender and the environment – which is often seen as a cross-cutting issue itself.

2.7

◄ Photo credit: © John Englar

Introduction

The *Global Gender and Environment Outlook (GGEO)* looks at linkages between gender and the environment in regard to a number of sectors, topics and issues. It is by now conventional wisdom that everything environmental is connected. However, some of the areas discussed in the GGEO – disasters, climate change, conflict and health – are particularly "cross-cutting". This section briefly examines the complex inter-relations among these areas. At the same time, it should not be forgotten that gender and the environment itself is often seen as another cross-cutting issue.

Disasters

For many years disasters have been defined by a "hazards" approach in which physical parameters are prioritized over socio-political variables to help understand causation, response, mitigation and recovery. Disasters have often been represented as large-scale, rare and extreme environmental events. However, hazards exist – and disasters take place – in the context of everyday realities defined by natural resource management, poverty, and social inequalities of many kinds (Blaikie *et al*. 2014, Hewitt 2014, O'Keefe *et al*. 1976).



Bangkok flooding in 2011
Photo credit: © Ruchos/ shutterstock.com

The gender-differentiated evidence base in this field is growing, demonstrating the always-gendered nature of disasters at any point in the disaster cycle and whatever the hazard types (Bradshaw 2013, Enarson 2012, Fordham 2003). Neumayer and Plümper (2007) have argued convincingly through statistical analysis that the socially constructed, gender-specific vulnerabilities of females within everyday socio-economic patterns lead to higher female mortality rates in disasters. More females die in disasters (and at a younger age) than males, but this is tied closely to their socio-economic standing. Adverse impacts of disasters on females relative to males decrease as the socio-economic status of women rises (Neumayer and Plümper 2007). This is a powerful argument in favour of an intersectional gendered analysis rather than a simple biological sex-based investigation.

Specific disaster cases require an open approach. For example, during the 2004 Indian Ocean tsunami in which, according to Oxfam (2005), male survivors in Indonesia outnumbered female survivors by almost three to one, in the worst case 80% of deaths were female. The Oxfam evidence is supported by Rofi *et al*. (2006), who found that two-thirds of tsunami deaths in Aceh Province, Indonesia, were female. A high percentage of female fatalities is common but not universal. For example, during the 1995 Chicago heat wave in the United States elderly African-American men were most likely to die (Kleinenberg 2002); in other cases, especially in floods, young males appear to be particularly vulnerable through a greater propensity for risk-taking behavior (Jonkman and Kelman 2005).

Women may be disadvantaged in many other ways during environmental disasters. They are under-represented in both formal and informal decision-making roles pre- and post-disaster (Bradshaw 2013, Fordham 2003). Although women are more likely to believe warnings and have a greater propensity to act on them, gendered power relations mean men often make decisions (Tyler and Fairbrother 2013). Women experience higher rates of sexual and gender-based violence during disasters, a pattern found across social and class divides (Ajibade *et al*. 2013, Enarson 2012).

There is a small but growing evidence base focused on the lived experiences of gender and sexual minority groups during environmental disasters. In the Asia-Pacific region, for example, there are many recognized cross-gender groups such as the whakawahine in New Zealand, the fa'afafine in Samoa, the mahu of Hawaii and the bakla of the Philippines, to name but a few (Gaillard *et al*. 2015, Gaillard 2011, Pincha 2008). Research has identified the specific vulnerability and marginalization, as well as the capacities and





Different gender roles in response to natural disaster events: man repairing house during a typhoon in the Philippines and women taking part in reconstruction after an earthquake in Nepal. Photo credits from left to right: © www.buildchange.org, Rebecca Macapagal - CRBC

contributions, of the bakla during the 2009 cyclones in Quezon City (Gaillard *et al*. 2015, Gaillard 2011). They were given "dirty" jobs and fed last in their households, but also recognized more positively for their community disaster response activities. Despite this emerging understanding, consideration of gender, in both policy and practice, is generally couched in "heteronormative" terms as a binary sex variable: female or male. Rarely are categories of sexual orientation or alternative identities included, despite considerable advocacy for recognition (and protection) by lesbian, gay, bisexual, trans, and/or intersex (LGBTI) communities of interest and even cautioning statements by the UN Secretary-General Ban Ki-moon, who has described discrimination based on sexual orientation and gender identity as "one of the great, neglected human rights challenges of our time" (UN 2013).

Despite recognition throughout the UN system and some non-governmental organizations (NGOs) of the need to better address gender issues, a range of reports point to lack of real progress in the area of gender and disasters. For example, the *Global Assessment Report on Disaster Risk Reduction* is a biennial global assessment by the UN Office for Disaster Risk Reduction (UNISDR), as well as a comprehensive review and analysis of the impacts of natural hazards. The 2011 report stated that gender was not being adequately addressed in disaster risk reduction (UNISDR 2011). Gender still did not feature strongly in the UNISDR 2015 Global Assessment Report (UNISDR 2015a), where "gender" was mentioned only four times, and "women" six times in over 300 pages. Reports on disaster monitoring and preparedness continue to point to a lack of real progress on gender. This is perhaps not surprising when so little gender-disaggregated data are collected. Analysis of implementation of the 2009-2011 Hyogo Framework for Action (UNISDR 2011) indicated that 62 out of 70 countries did not collect disaster-related vulnerability and capacity information disaggregated by gender.

The choice and development of gender indicators, necessary before collection of gender-disaggregated data can begin, are both a technical exercise and a political project (Moser 2007). In a disaster context, technical and political barriers have combined to defeat calls for gender-disaggregated data as just one necessary step towards measuring any indicators of gender difference. However, the recent Sendai Framework for Disaster Risk Reduction 2015-2030 (UNISDR 2015b) makes some acknowledgement of the need to take into account the gender dimensions of disaster risk reduction (DRR), calling for "a gender, age, disability and cultural perspective in all policies and practices; and the promotion of women and youth leadership."

Climate change

Climate change impacts, policies and other related factors are similarly gender-differentiated but less well documented, partly due to uncertainty about attributing any single event to climate change but also because this category has been dominated (longer than the disaster category) by a physical sciences approach in which social scientific approaches have struggled to achieve acceptance. Nevertheless, climate change adaptation and disaster risk reduction are clearly interlinked, as evidenced by the fact that 91%

of recorded major disasters caused by natural hazards between 1994 and 2013 were climate and weather events (IUCN 2015, UNISDR n.d.).

Climate change, understood as an identifiable change in the state of the climate (from whatever cause) that lasts for an extended period (IPCC 2012), provides a backdrop of uncertainty for all the topics addressed in the GGEO report. The projected increase in extreme weather and climate events unsettles the (admittedly often tenuous) statistical likelihood of repeated events such as floods or storms and makes planning, mitigation or adaptation a challenge for individuals, communities and countries. Climate change can also be regarded as a threat multiplier that "may intensify existing social, economic, political and environmental problems that communities are facing already; exacerbate grievances; overwhelm coping and adaptive capacities; and at times spur forced or proactive migration" (Bob *et al*. 2014).

Projected climatic changes will lead to changes in the frequency, intensity, spatial extent, duration and extremes of weather and climate events (IPCC 2012) which will almost certainly have direct impacts on people's security, livelihoods and health through increased frequency or extremes of heat waves, flooding and droughts; rising sea levels; and, indirectly, health impacts such as the expansion (spatially and temporally) of infectious diseases or disruption of the food supply. All these impacts are also associated with mental health impacts such as stress, anxiety and depression (IPCC 2012, Climate and Development Knowledge Network 2012).

Migration is one adaptation strategy to deal with extremes of environmental change. All evidence on migration shows that it is highly gendered, whether it is caused by environmental change or poor governance and whether it is voluntary, compelled or involuntary (Fröhlich and Gioli 2015, O'Hagan 2015, Detraz and Windsor 2014, Wodon *et al* 2014). Women and men migrate in almost equal numbers overall, but their triggers for migration and subsequent experiences are different and contingent. People already in a vulnerable position are likely to be hardest hit by disasters and compelled migration, and to be at higher risk overall of climate-generated violence and conflict of various kinds. Gendered analysis affects how compelled migrations are conceptualized: it "shifts the perspective away from a state security focus (with its potential for militarization) towards a human (in)security focus which humanizes" the migration phenomenon and is more inclusive of humanitarian concerns (Detraz and Windsor 2014).

The Lancet's 2015 Commission on Health and Climate Change argued that climate change threatens to undermine the last half-century of gains in development and global health while, on the other hand, tackling climate change effectively could present the greatest global health opportunity of the 21st century (Watts *et al*. 2015). For example, reducing air pollution and respiratory diseases would be a health co-benefit of reducing emissions from fossil fuel burning. Other adaptation options could provide multiple benefits. Suitably gender-responsive early warning systems of various kinds can give necessary alerts to trigger pre-emptive rather than reactive responses. Enhancing food security can bring many benefits, not least to women and girls who tend to eat least and last in many parts of the world. Investing in public health infrastructure, education interventions, and processes to reduce infectious disease incidence, among many other examples, can improve the everyday situation of millions across the world. Green urban design can offset heat wave impacts and provide extra benefits for obesity reduction or reduced mental stress (see Watts *et al*. 2015 for many more suggestions). In this way climate change typifies crisis, which always encompasses both risks and opportunities. The worst impacts of climate change (especially on marginalized groups) that have been predicted are not inevitable. They are contingent upon how the global "community" of UN Member States and local communities approach mitigation and adaptation challenges.

Conflicts

Conflicts and militarism are closely linked to all gender and environment domains within a complex web. The assumption and imposition of different gendered roles and responsibilities that prevail in peacetime continue during conflicts, often in more extreme forms (Enloe 2014). The international actors who often lead post-conflict reconstruction typically frame men and women in strict and stereotypical gender roles that further reinforce inequalities in post-conflict situations (Puechguirbal 2012, UN Women 2012, Cohn 2008, Cohn *et al* 2004). Women are often sidelined in peace talks and negotiations because of a strict

division of labour that (re)assigns traditional roles and responsibilities to women and men during the reconstruction process (UN Women 2012).

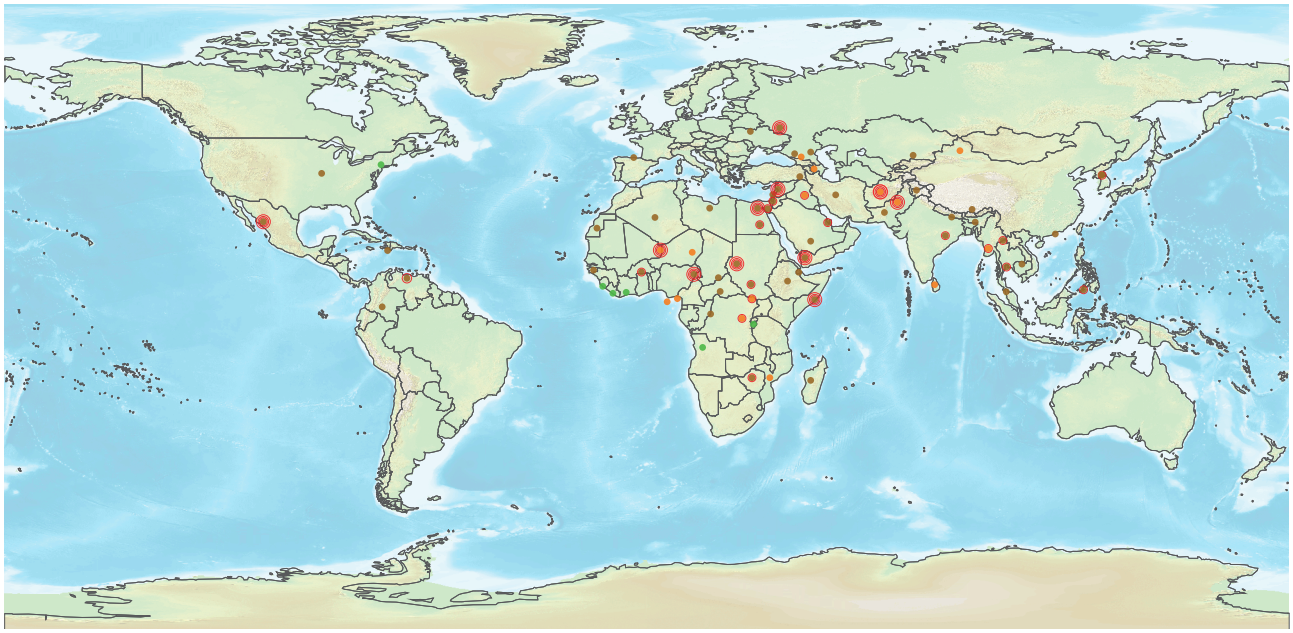
Conventional views of war and conflict often assume the major impacts fall on male combatants. However, a broader view of conflict as a process that unfolds over a longer time than simply a period of acute armed fighting reveals that in many ways women are more adversely affected than men (Enloe 2016, Plumper and Neumayer 2006, Garfield and Neuget 2000). Mirroring findings for disasters more generally, it is at locations where women face daily discrimination in peacetime that they are most severely affected in times of conflict (Enloe 2016, Plumper and Neumayer 2006). Factors contributing to adverse life outcomes for women during conflicts include:

- exposure to dangers arising from the difficulties of securing water, food and fuel, over and above normal family care;
- poor health outcomes as a result of damage to (collateral) health infrastructure and disruption of health services;
- increased risk of infectious and sexually transmitted diseases due to conflict-generated displacement and sexual violence;
- economic impacts arising from rising prices, which make it more difficult to meet basic needs;
- targeted violence against women and girls through trafficking, sexual slavery and systematic rape used as a weapon of war.

In the past decade, considerable scholarship has emerged concerning relationships between violent conflicts and natural resources (UNEP, UN Women, PBSO and UNDP 2013, Koubi *et al*. 2014, Mildner *et al*. 2011). UNEP estimates that at least 40% of all intrastate conflicts in the last 60 years have had a direct link to natural resources, and natural resource exploitation has fuelled and financed at least 18 conflicts since 1990 (UNEP 2009). Inequalities and grievances related to natural resource rights, access and control are significant contributing factors with respect to many of the world's most protracted conflicts, including those in the Middle East and the eastern Democratic Republic of the Congo. Moreover, many fragile states are now tackling additional shocks and stresses associated with climate change – including increasing resource scarcity and food insecurity – which risk aggravating existing tensions or generating new conflicts.

Natural resources underpin livelihoods for the vast majority of people worldwide. They are often fundamental to economic recovery and development

Figure 2.7.1: The world conflict map: active armed conflicts in March 2016



Red circles around dots indicate a conflict's severity; green dots indicate post-conflict zones.
Source: ConflictMap.org – http://www.conflictmap.org/.

in conflict-affected settings. Intentional exclusion of certain communities or groups of people (often, women as a category) from equitable access to natural resources is a central feature of the structural inequalities and discrimination that can ultimately destabilize societies. This is most evident in regard to land tenure, but extends to access and usage rights for renewable resources such as water, as well as equitable distribution of benefits from extractive resources including minerals, metals, timber and oil. Addressing issues of inequality related to natural resource access, participation and decision-making is a critical condition for lasting peace and development. Focusing on gender is an important part of understanding these dynamics, as women and men use and enjoy the benefits of natural resources according to roles and responsibilities determined by their gender as well as their socio-economic status.

Violent conflicts present distinct challenges for women and men (UN Women 2013, UNEP, UN Women, PBSO and UNDP 2013). The capacity to cope with the impacts of such crises, including physical and food insecurity, displacement, loss of livelihood assets and social exclusion, is strongly influenced by gendered roles. As the primary providers of water, food and energy at the household and community levels, women in rural settings, for example, tend to be disproportionately affected by the impacts of conflict on the availability and quality of natural resources such as land, water and agricultural crops. Conflict also disrupts social and cultural systems for management of natural resources (land in particular). Women's access to resources often depends upon the social structures of their communities. In turn, the well-being of whole communities frequently depends on women's ability to access resources.

Conflict often leads both women and men to adopt coping strategies that challenge traditional gender norms. To meet the needs of their households and compensate for the loss of revenue usually provided by male family members, women may be required to assume new roles either by taking up alternative income-generating activities or by moving into traditionally male-dominated sectors. In the aftermath of conflict, capitalizing on these shifting roles can contribute to breaking down existing barriers to women's empowerment and participation, which are key to post-conflict recovery. Indeed, women's roles in natural resource management may provide significant opportunities to enhance their participation in decision-making at all levels and to engage in economic recovery.

However, patriarchal and discriminatory social norms tend to reassert themselves in post-conflict periods, often reversing gender equity progress that may have been achieved (Fröhlich and Gioli 2015). One example is female ex-combatants or women associated with armed groups, who are often perceived as poorly suited to assume culturally accepted female roles in the aftermath of conflict, and who tend to face significant challenges when they return to their communities or to civilian life. When disarmament, demobilization and reintegration programmes fail to ensure that their interventions are gender-responsive, female ex-combatants can be denied the support services afforded male ex-combatants, such as access to land or disbursements of cash with which land can be purchased, resulting in further marginalization (Cohn 2008).

Men's livelihoods and notions of masculinity are also affected by conflict. They may have more difficulty maintaining traditional livelihoods (e.g. livestock herding or day labouring) due to insecurity, and can face intense pressure for recruitment into armed groups. With few employment opportunities overall in conflict zones, as well as reduced access to important natural resources including land, social understandings of masculinity are often challenged or threatened during conflicts (Enloe 2016, MenEngage-UNFPA, n.d.). Such destabilizations often lead to heightened violence towards women (and other men) as men try to reassert their control in everyday domains (Strachan and Haider 2015, Specht 2013). Such violence often continues well into the post-conflict period (UN Women 2013); in Côte d'Ivoire, Liberia and Sierra Leone, for example, documented levels of domestic violence against women have skyrocketed in the past decade of post-conflict recovery (UNEP, UN Women, PBSO and UNDP 2013).

Despite increasing recognition of women's multi-faceted roles in situations of conflict, including through such prominent agreements as UN Security Council Resolution (UNSCR) 1325 on Women, Peace and Security (Box 2.7.2), the international community's dominant focus on women as victims of conflict – particularly as victims of sexual and gender-based violence – limits their ability to fully engage in all aspects (political, economic and social) of post-conflict recovery (Cohn *et al* 2004). Peacebuilding interventions





Acknowledging the significance of UNSCR 1325 in different parts of the world. Photo credits left to right: © Femmes Africa Solidarité, MIFTAH

often fail to address the specific challenges faced by women in regard to their access and use of natural resources and therefore do not capitalize on related opportunities.

The gap between policy commitments and financial commitments to gender is especially pronounced in the area of peace and security. A decade and a half after adoption of the landmark UNSCR 1325 in 2000, which represents a significant turning point in that it makes concrete at the policy level that gender needs to be taken into account in addressing conflict resolution and peacebuilding stronger political support at the international level has led to some improvements in financial commitments (Fröhlich and Gioli 2015). However, the amounts of aid targeting gender equality in the peace and security sector remain low at an average of only US$500 million per year since 2002. In 2012-13 only 2% of aid to peace and security in fragile states targeted gender equality as a principal objective (OECD DAC Network, 2015).

Health

Women and men have different roles and responsibilities that shape their interactions with, risks from, and control over their environment. Their biological and physiological differentiation creates gender-differentiated risks for reproductive health in particular. For example, pregnant women are especially susceptible to malaria-carrying mosquitoes; this puts them at particular risk in the context of the global temperature rises expected as a result of climate change, which are also expected to lead to shifts in water-borne and vector-borne diseases (WHO 2012).

Environmental degradation is associated with myriad physical heath problems, many of them gender-differentiated. Although less studied, poor mental health is consistently associated with environmental degradation across a range of settings, typically manifested in elevated rates of depression and suicide (Fearnley *et al*. 2014, Speldewinde *et al*. 2011).

Box 2.7.1: UN Security Council Resolution 1325: Women, Peace and Security

UN Security Council Resolution 1325 on Women, Peace and Security was adopted in October 2000, the first time the UN directly addressed the subject of women in armed conflict despite gender mainstreaming being official UN policy since 1997. It provides a useful example of how gender and environmental responsiveness engages with the cultural, socio-political and technical domains of policy change. Resolution 1325 shifts the rhetoric away from women's vulnerability to recognizing their contributions to peacebuilding and conflict prevention; it formally recognizes women's rights to participate in decision-making at all levels and calls for a commitment to a gender perspective and gender mainstreaming in conflict, peacebuilding and post-conflict domains.

Source: Cohn (2008)

Although limited, available evidence suggests that women in degraded environments are more likely than men to report that they are struggling with stress and depression (Speldewinde *et al*. 2011).

The prevalence and nature of environmental health risks to women and men vary according to local traditions of gendered divisions of labour. In many contexts women might be more at risk from indoor pollutants, or pollutants related to traditional female employment patterns such as the export flower industry, or hazards associated with supplying resources for the household (water, food, forest products); men might be more at risk in regard to occupations such as working in mines or as open-ocean fishers (WHO 2016, Levine *et al*. 2001). This simplified picture does not take account of women's and men's socio-economic status, land tenure/land rights and many other factors. The complex webs of the social determinants of health relative to those that are biologically determined tend to be underexplored. A recent example of these complex webs is provided by the spread of the Zika virus, which has emerged as a major international public health risk **(Box 2.7.2).**



Box 2.7.2: The Zika virus - a convergence of unsustainable development, gender politics and ecological disruption

Global attention to the emergence of the Zika virus (ZIKV) as a public health threat in the Americas in 2015, and the initial policy responses to it in the first half of 2016, bring into sharp focus the importance of gender-informed environmental policies – as well as the ineffectiveness of developing environmental policies in a "gender vacuum". Initial policy responses framed the problem primarily through a biological lens without incorporating a gender perspective, exemplifying the pervasive gap between social and environmental policy.

The ecology: ZIKV is a *Flavivirus* transmitted to humans by bites from arthropods, particularly the Aedes mosquito. Other Flaviviruses include dengue fever and yellow fever. The precise combination of factors that brought ZIKV to the Americas is not yet known. Like many insect-borne emerging diseases, it is the consequence of complex interactions between ecological disruption, climate change and human behaviour (CDC 2016).

Confusing gender analysis with sex analysis: In humans ZIKV can cause several neurological impairments, including Guillain-Barré syndrome. ZIKV appears to be able to cross the placental barrier, which means a foetus may be susceptible to the virus if infected mosquitos bite a pregnant woman. ZIKV infection can cause microcephaly and related neurological deficits in newborns. As the arrival of ZIKV in the Americas became evident, and given concerns about the threats to foetuses, public health attention by Latin American health authorities turned quickly to women. One of the first responses by government authorities in several countries in the region, including Colombia, Ecuador, El Salvador, Honduras and Jamaica, was simply to advise women to "not to get pregnant" for various periods between six months and two years (until the health threats of ZIKV to developing foetuses was further understood). Such policy approaches confuse sex analysis with gender analysis, positioning women primarily as biological vessels. As policy nostrums, these suggestions represent a striking disregard for the realities under which women become pregnant, the extent to which they may not control their own reproductive lives, or the extent to which they have sexual autonomy. Globally about 42% of all pregnancies are unintended; in Latin America and the Caribbean this figure is 56% (Sedgh *et al*. 2014). It is evident that women are not fully or solely responsible for determining whether or not they 'get pregnant.'

A policy focus that makes men's role in creating pregnancies invisible is guaranteed to fail. Further, health authorities' advice to "avoid pregnancy" cruelly disregard the reality that many of the same governments restrict abortion rights and distribution of contraceptives, further denying women the power to manage their own reproductive lives *(Lancet Global Health 2016).*

In terms of vulnerability to ZIKV, social inequality intersects with gender dynamics: people living in the poorest urban communities, lacking municipal services and with uncontrolled waste and standing water, are at particularly high risk of mosquito exposure (Diniz 2016). Women who live in substandard housing are more likely to become ZIKV infected in the first place, and then to be the least likely to be able to protect themselves (or a foetus they are carrying) from the health effects. For poor women who have the most limited access to basic reproductive services and less capacity to evade restrictive abortion laws that strip them of a choice when faced with the dire consequences of the virus on their health and that of their children, the health guidelines merely represent heightened state scrutiny and judgement, with no real assistance *(Lancet Global Health 2016)*. This is a familiar pattern -- shifting responsibility for managing environmental crises onto women, and blaming women's fertility for social and ecological crisis (Hartmann 1995).

Precaution and pesticides: As early as 1962, Rachel Carson in *Silent Spring* described the high environmental costs of indiscriminate use of pesticides. Yet decades later, health authorities across Latin America responded to the ZIKV threat by immediately resorting to aggressive campaigns of saturation spraying of pesticides in interior spaces, along roadways, around waterways and throughout urban neighbourhoods. While there is vigorous debate in the public health field on the benefits and drawbacks of insecticide use (and evidence of strong disease-control benefits from targeted uses of specific pesticides), ecological harm and problems with insecticide resistance are inevitable by-products of wide-scale pesticide campaigns. Ironically, widespread pesticide use represents a considerable and specific threat to children (Watts 2013). Environmental precautionary principles suggest that in the face of uncertainty, actions – particularly those taken in haste – need to be weighed against possible (irrevocable) harm. However, in this case the initial policy responses showed little of the restraint and considered judgment that the past 50 years of gender and environmental analysis have demonstrated to be essential.

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OUTLOOK FOR A SUSTAINABLE AND JUST FUTURE – FROM BUSINESS-AS-USUAL TOWARDS TRANSFORMATIONAL CHANGE



"Human beings are at the centre of concerns for sustainable development. They are entitled to a healthy and productive life in harmony with nature."
Principles 1 and 20, Rio Declaration on Environment and Development

3

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Key Messages

- Gender-and-environment approaches are essential for sustainable, equitable and just management of natural resources and ecosystems.
- Business-as-usual approaches are proving disastrous for people and the planet alike. For a sustainable, equitable and just future it is essential to adopt gender-and-environment approaches.
- Until recently, gender and the environment were treated in separate silos.
- While the gender-and-environment nexus is increasingly acknowledged in international agreements and national policy documents, implementation and follow-through have so far been weak or absent.
- Gender equality cannot be measured by women's and men's "presence" alone. Presence does not necessarily mean participation nor does it imply influence: the nature of people's participation is what makes their presence meaningful or not.
- A transformative agenda recognizes gender equality as a driver of social change, leading to more people-smart environmental policies.

It is not "development" if it is not inclusive, equitable and sustainable

More than 20 years have passed since the 1995 Fourth World Conference on Women in Beijing laid out an expansive vision and body of commitments for achieving gender equality, women's empowerment and sustainable development (UN 1995). In the 2030 Agenda for Sustainable Development, adopted by the United Nations General Assembly in 2015, governments reaffirmed the Beijing Platform for Action as a foundation for sustainable development and made a commitment to integrate gender perspectives in sustainable development policies and programmes (UN 2015a).

The 2030 Agenda expresses universal, indivisible and rights-based ambitions to "leave no one behind". It places women's rights at the centre of transformative change, and above all at the centre of the pursuit of sustainable development in its three dimensions – economic, social and environmental (UN 2015c). Responding to the challenges of an increasingly "globalized" world, the goals and targets of the 2030 Agenda are applicable in developed and developing countries. Gender equality considerations are reflected in an integrated way throughout the Sustainable Development Goals (SDGs) **(Figure 3.1)** and are identified as critical to their achievement.

The 2030 Agenda holds out the promise of shifting current trends and dynamics away from business-as-usual in regard to gender and the environment. However, even in a document as visionary as the 2030 Agenda, explicit links between gender and the environment are weak: in the environmentally specific SDG goals women are mentioned in only one target ("13.b, Promote mechanisms for raising capacity for effective climate change-related planning and management in least developed countries and small island developing States, including focusing on women, youth and local and marginalized communities"); in the targets under Goal 5 ("Achieve gender equality and empower all women and girls"), environment is not mentioned at all.

Gender-and-environment policies: While the gender-and-environment nexus is increasingly acknowledged in international agreements and national policy documents, implementation and follow-through need to be strengthened. The extent and gravity of environmental crises globally require a decisive move away from business-as-usual approaches.

Global drivers and trends – including, importantly, gender norms -- establish the overarching context of life on the planet. The forces that create environmental unsustainability are often also responsible for gender (and other social) inequality. Environmental decisions and decision-makers are gendered. This is true at macro as well as micro levels, including in regard to individual decision-making. Systems of political power and economic systems are shaped by cultural norms in which gender presumptions are embedded. While greater gender equality will not magically solve all environmental problems (and environmental sustainability would not automatically ensure greater gender equity), there are strong ideological synergies between forces of equity – or inequity – in both realms.

Figure 3.1: The 17 Sustainable Development Goals



Source: UN 2015b

The relationships are complex, however, and should not be oversimplified; they are influenced by gendered knowledge, power and decision-making practices that are context-specific, and careful contextual analysis is essential for sound gender-sensitive environmental policy-making (Bhattarai *et al*. 2015, Dankelman 2001, Enarson 2000, Rocheleau et. al.1996, Douma 1994, Agarwal 1992).

The Future We Want: The outcome document of the Rio+20 meetings in 2012, *The Future We Want* (UN 2012), defines a framework for action anchored in rights, responsibilities, accountability and opportunities. Although this document is not as gender-sensitive as the 2030 Agenda, it can serve as a departure point for conceptualizing, analyzing and resolving current development challenges in ways that give a central place to both gender equality and environmental quality. Through a gender lens, the 'future we want' could be shaped through:

- bridging the divide between the social and environmental, which starts by bringing gender analysis into environmental policies and practices;
- exposing and rejecting sectoral "silos": promoting solutions that are multi-focused and prioritizing actions likely to have positive effects on gender equality, the environment and sustainable development;
- ensuring that policies that address environmental sustainability, gender equality and sustainable development will "leave no one behind" – a critical SDG goal;
- addressing structural (including gender-based) violence in current patterns of environmental degradation;
- recognizing that broad issues of gender identity extend beyond the simple binary of "women and men" to include multiple forms of femininity and masculinity and femininity, as well as other genders;
- moving beyond a focus on numbers (or quantities) signifying representation, to methods of measuring representation that give equal attention to both quality and quantity;
- recognizing that the Rio Principles on Environment and Development (UN 1992), particularly the principles of Common but Differentiated Responsibilities and prior (and informed) consent, apply to both environmental relations and gender relations.

Embracing these principles will require a thorough understanding of what environmental sustainability entails, of social and political realities, and of interactions between them. It will also require willingness to critically examine conventional environmental – and

"Human beings are at the centre of concerns for sustainable development. They are entitled to a healthy and productive life in harmony with nature."

"Women have a vital role in environmental management and development. Their full participation is therefore essential to achieve sustainable development."

- Principles 1 and 20, Rio Declaration on Environment and Development (United Nations Conference on Environment and Development, 1992)

social – structures and analyses and to move beyond business-as-usual approaches in cultural as well as environmental realms.

Signs of progress in moving beyond business-as-usual towards the future we want

There are indications that a more sustainable and just future may be within reach. Considerable progress has been made in the areas of gender equality and of environmental sustainability – separately, and in regard to the gender-and-environent nexus – in recent decades.

Recognition that a healthy environment is a right: Acceptance that a healthy environment is a right has been an important step in the right direction. The first formal international policy recognition of the right to a healthy environment was in the 1972 Stockholm Declaration, which emerged from the pioneering global United Nations Conference on the Human Environment:

> Man [sic] has the fundamental right to freedom, equality and adequate conditions of life, in an environment of a quality that permits a life of dignity and well-being, and he [sic] bears a solemn responsibility to protect and improve the environment for present and future generations (Principle 1, 1972 Stockholm Declaration).

Since 1972 environmental concerns have increasingly been integrated in international and national policies and governance mechanisms, including the SDGs, the Millennium Development Goals (MDGs), and international bodies associated with agreements on climate change, biodiversity, protection of the ozone layer and international trade in hazardous waste, among dozens of others (UN 2015c).

Making human rights real and tangible (that is, not just theoretical rights that exist "on paper") is one of the most significant moral challenges of the 21st century (Fredman and Goldblatt 2015, Kjaerum 2013). Nation states have a recognized responsibility to protect their citizens and the environment (OHCHR 2016a, OHCHR 2016b, UNEP 2015). In more than 100 countries various notions of environmental rights have been given constitutional recognition (Boyd 2012). However, the extent to which a constitutional principle translates into an entitlement that gives citizens the power to hold their or other governments accountable for preventing pollution, claim damages due to environmental destruction, or ensure equitable access to natural resources of good quality is still hotly contested (Daly 2012).

The principle that citizens have legally enforceable rights to a healthy environment is slowly gaining currency. In many countries indigenous peoples **(Box 3.1)** are at the forefront of rights-based environmental activism, rooted in a long-standing understanding of the environmental embeddedness of their cultures and economies.

Recent litigation by environmental activists demonstrates that the right to a clean environment is beginning to be considered legally defensible. Recent cases have met with some success in both developed and developing countries **(Box 3.2)**. No clear gender considerations have emerged in these cases, although in general they invoke the need to consider equal access to justice across social groups as well as the applicability of laws to all citizens.

Recognition that gender equality works for all: In many respects environmental rights movements draw on women's rights movements and have expanded in parallel with them. It is becoming increasingly clear that inclusiveness enhances effectiveness in all spheres of society, from the micro to the macro. Moreover, there is strong evidence that reducing gender gaps accelerates progress towards other development goals including environmental goals (UNDP 2014a).

Box 3.1: Environmental violence against indigenous women

Indigenous women from the International Indian Treaty Council, Indigenous Women's Environmental and Reproductive Health Initiative and the Alaska Community Action on Toxics have invoked human rights principles that should be implemented with respect to their exposure to environmental contamination. In 2012 this coalition submitted an extensive report to an expert group of the UN Permanent Forum on Indigenous Issues on Combating Violence Against Indigenous Women and Girls at UN headquarters in New York. They described the disproportionate and often devastating impacts of environmental contamination on indigenous women as "environmental violence" for which States and corporations should be held accountable. The UN Committee on the Elimination of Racial Discrimination (UN CERD) has recognized the obligation of States to implement, promote and monitor the enjoyment of their rights; to implement effective solutions, remedies and mechanisms in conjunction with indigenous peoples; and to monitor the human rights impacts of the corporations which they license.

Source: USHRnetwork (2012)

Evidence from the Social Institutions and Gender Index (SIGI) of the Organisation for Economic Co-operation and Development (OECD) reveals that lower levels of discrimination against women are linked to better outcomes in families, including in educational attainment, child health and food security (OECD 2014a). Where women have a more equal status in the family, children are more likely to complete primary school; and where they have greater control over their own bodies, child health outcomes also improve. Countries with the greatest restrictions on women's physical integrity (e.g. where there are high levels of violence against women, and where women lack the power to make choices about their sexual and reproductive lives) have an average infant mortality rate more than three times that in countries with low levels of such restrictions (OECD 2014a). Men who live in more gender-equal societies have a better quality of life than those in less gender-equal ones (Holter 2014).

Repeated analyses have demonstrated a strong positive correlation between higher GDP and greater gender equality (World Economic Forum 2015, OECD 2014a). At business and corporate levels, too, numerous studies have found that companies with the most diverse leadership have higher financial returns, more transparency and more stable governance (World Economic Forum 2015, Queensland Government 2009, McKinsey & Company 2008). Gender equality in formal governance systems brings about positive environmental outcomes: evidence suggests that countries with higher parliamentary representation of women are more likely to ratify environmental agreements and to set aside protected land areas (UNDP 2014a).

Incorporation of gender into environmental policies: Since the UN Conference on Environment and Development (UNCED) in 1992 in Rio de Janeiro gender aspects have received more attention in several international environmental policies. As a consequence of assiduous advocacy, analytical and political work by women's groups, gender now appears to have obtained a firm purchase in several platforms, such as the UN Convention on Biological Diversity (CBD), the UN Convention to Combat Desertification (UNCCD) and the UN Framework Convention on Climate Change (UNFCCC) **(Box 3.3)**.

In the recent history of climate change Conference of the Parties (COP) meetings, several delegations from different regional groupings have played crucial roles in advocating gender approaches. For example, an informal gender working group of delegates has gathered since COP20 in Lima, Peru, and within the EU a Gender Expert Team has been active. Before and during COP21 in 2015 three specific groups of Parties – the Independent Association of Latin America and the Caribbean (AILAC), the Environmental Integrity Group, and the African Group – alongside a dozen individual countries indicated their support for including gender considerations in the objectives and operative part of the Paris Agreement (not just in the Preamble).

In many UN environment and sustainable development negotiations the Women's Major Group (since 1992) and the Women and Gender Constituency of the UNFCCC (since 2009) have played important roles in bringing gender analysis to the forefront, along with the voices, needs and visions of women.

Many national-level climate action plans promote the integration of gender aspects in national climate change policies. Cambodia's **(Box 3.4)**, for example, has a particularly well-developed gender component.

Box 3.2: Climate change-related lawsuits in the North and South

In the Netherlands in 2015, a court ordered the government to reduce its greenhouse gas (GHG) emissions by at least 25% within five years in response to a case brought by more than 800 individuals. "Before this judgement, the only legal obligations on states were those they agreed among themselves in international treaties," said Dennis van Berkel, legal counsel for Urgenda, the group that brought the suit, in an interview. "This is the first a time a court has determined that states have an independent legal obligation towards their citizens…" The country's Environment Minister later said the government would contest the decision but would begin to comply in the meantime (Neslen 2015, Lin 2015, Darby 2015).

Environmental Justice Australia is canvassing support for a lawsuit similar to that in the Netherlands (Darby 2015). In Belgium a similar case (expected to be decided in 2016) was filed by around 10,000 people (Neslen 2015).

In 2015 a farmer in Peru began proceedings to bring a legal challenge against one of Europe's largest CO_2 emitters, the German energy firm RWE. He lives in the floodpath of a glacial lake that is on the verge of breaking through its banks as the climate warms. This suit advances the idea of global environmental accountability for climate changes that are manifested locally (Collyns 2015).

In the Philippines, Greenpeace and the Philippine Rural Reconstruction Movement filed a petition in September 2015 on behalf of typhoon survivors, calling for the devastation caused by extreme weather-related disasters to be properly recognized. In April 2016, lawyers for the petitioners met with the Commission on Human Rights of the Philippines to identify expert witnesses for a hearing into the liability of 50 of the world's largest fossil fuel companies for violating the human rights of Filipinos as a result of catastrophic climate change (Howard 2016, Darby 2015, Greenpeace 2015).

In the state of Washington in the United States eight young people (aged 11 to 15) won a case in 2015 to force the state to consider science-based emissions regulations. This was the first victory for the campaign group Our Children's Trust, which (with other organizations) is bringing similar actions across the country challenging the federal and state governments by seeking damages from climate change-related harms or citing a violation of the public trust doctrine, according to which the government owns resources in trust for public use. If their actions are successful, the federal government could be required to create an inventory of CO_2 emissions and "an enforceable national remedial plan to phase out fossil fuel emissions and draw down excess atmospheric CO_2 so as to stabilize the climate system and protect the vital resources on which Plaintiffs now and will depend" (O'Berger 2016).

Innovative financing: In the 2030 Agenda for Sustainable Development, UN Member States agreed to work towards a significant increase in investments to reduce the gender gap (UN 2015a). In addition, in 2015 Member States and entities of the UN system and civil society launched the Addis Ababa Action Plan on Transformative Financing for Gender Equality and Women's Empowerment, which calls for accelerating implementation of the financial commitments in the 1995 Beijing Declaration and Platform for Action and for meeting new commitments in the context of the 2030 Agenda (UN Women 2015a).

Sufficient support and financing to increase gender equality across sectors helps reduce other inequalities and discriminatory norms, with broad social, economic and environmental effects. For example, greater gender equality in education and employment can stimulate sustainable growth and help reduce poverty. Relative increases in women's employment may leverage bargaining power within households, contributing to greater control by women of their time and income as well as increased investments in children's well-being (OECD 2013). Economic policies that promote full employment for all, decent work and social protection (including the right to organize in the workplace) contribute to gender equality in livelihoods. These policies should also facilitate better access to productive resources such as land and credit. In addition, they should reduce the disproportionate burden of unpaid care and domestic work on women and girls and enable its redistribution within the household and between households and the State. An enabling (macro)economic environment that generates decent jobs and sustainable livelihoods is central to financing gender equality and women's empowerment (UN Women 2015).

Box 3.3: Gender in the COP-21 2015 climate agreements

Gender and social aspects were integrated in the Paris Agreement and the related COP21 Decision, although in limited ways. The Preamble to the Agreement mentions the importance of gender awareness and of equitable access to sustainable development. Some of the operational texts on adaptation and capacity-building make explicit reference to gender. For example, Article 7.5 declares that "Parties acknowledge that adaptation action should follow a country-driven, gender-responsive, 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 knowledge, knowledge of indigenous peoples and local knowledge systems, with a view to integrating adaptation into relevant socioeconomic and environmental policies and actions, where appropriate."

With respect to capacity-building, Article 11.2 states that "Capacity-building should be country-driven, based on and responsive to national needs, and foster country ownership of Parties, in particular, for developing country Parties, including at the national, subnational and local levels. Capacity-building should be guided by lessons learned, including those from capacity-building activities under the Convention, and should be an effective, iterative process that is participatory, cross-cutting and gender-responsive."

Although these are important achievements, the Women and Gender Constituency (WGC) has criticized the outcomes of COP21. The fact that there is an agreement, and that it mentions the desirability of meeting a +1.5°C target, is welcomed, but lack of a real paradigm shift from business-as-usual (with strong dependency on, for example, market-based mechanisms) is regretted. Concerning the integration of gender issues, WGC states that these are mainly integrated into the "software" of proposed climate action (adaptation and capacity-building) and are absent from the Agreement's "hardware" (mitigation, technology and financing).

Source: Women and Gender Constituency (2015b)

Gender-responsive budgeting (GRB) is planning, programming and budgeting that contributes to the advancement of gender equality and the fulfilment of women's rights. It entails identifying and reflecting needed interventions to address gender gaps in sectoral and local government policies, plans and budgets. GRB initiatives also seek to create enabling policy frameworks, build capacity, and strengthen monitoring mechanisms to support accountability to women (UN Women 2012). GRB has been well developed over several years and across several national systems, including, prominently, in Rwanda **(Box 3.5).**

There is currently an urgent need to integrate gender budgeting in national and global accounts that, among other features, take into account the care economy and informal labour, which keep communities and ecosystems intact (Ghosh 2015, Boris and Parrenas 2010, Folbre, 2006).

Innovative means of financing such as social impact bonds (SIBs) have interesting potential to enhance gender equality, women's empowerment and sustainable development. In the case of SIBs, where a number of actors share risk, private financiers invest

Box 3.4: Cambodia: gender in climate policies and actions

One of the guiding principles of the Cambodia Climate Change Strategic Plan (2014-23) includes reducing gender vulnerability. The Plan has a special section on gender and climate change and, under strategic objectives, several strategies are identified that prioritize women's needs and the integration of gender into climate responsive planning. The development of a Gender and Climate Change Strategic Plan in 2013 and, based on that, a Gender and Climate Change Action Plan (2014-18) demonstrates that there is ample vision and commitment at least within the Ministry of Women's Affairs (MoWa) and the Ministry of Environment (MoE), and that support from the UN Development Programme (UNDP) and non-governmental organizations (NGOs) in this area has been effective. The success of all these efforts will depend on their enforcement and implementation. There is still potential for improvement, particularly at sub-national and local levels, which will require building expertise, awareness and commitment.

Source: Ministry of Women's Affairs, Cambodia (2014)

Box 3.5: Rwanda: linking gender and environment in national policies and budgets

In Rwanda, poverty, gender, environment and climate change issues were successfully integrated in the national economic development and poverty reduction strategy. To ensure implementation, the Ministry of Finance and Economic Planning – supported by Rwanda's Environment Management Authority (REMA) and the UNDP-UNEP Poverty and Environment Initiative (PEI) – included an annex on environment and climate change budgeting in the annual budget call circular. It also adopted a national programme for gender-responsive budgeting, supported by the Ministry of Gender and Family Promotion, UN Women and UNDP. These efforts, along with support provided to REMA and women's civil society groups to track adherence to budget guidelines and advocate for increased allocations, contributed to a 26.3% jump in Rwanda's agricultural budget from 2009 to 2011 and an increase in the country's average expenditure on environment and climate change from 0.4% of annual gross domestic product (GDP) in 2005-08 to 2.8% in 2008-12.

The Rwandan government also established a national environment and climate change fund in 2012 with support from UNDP-UNEP PEI; the fund was later operationalized by the United Kingdom's Department for International Development (DFID). One project-funding criterion is impact on gender and youth. FONERWA's output indicators include the number of people with improved access to clean energy (disaggregated by gender) and the percentage of projects demonstrating transparent community participation, and gender equality and equity, in the design and implementation phases. Projects currently include water-harvesting structures, which have the potential to reduce women's workloads.

Source: UN Women and UNDP-UNEP PEI (2015)

capital in public projects focusing on measurable social outcomes for individuals at risk (Bireg LLC 2013). Several Latin American countries are experimenting with SIBs, for example in the Mexican state of Jalisco where the aim is to move single mothers out of poverty (Levey and Bloomgarden 2015).

Recognizing the role of civil society actors: NGOs played crucial roles in the early development of gender-and-environment analysis, policy and practice (Box 3.6). They continue to push forward progressive, gender-centered environmental agendas. The Women's Major Group (WMG) was created at the Earth Summit in Rio de Janeiro in 1992, at which governments recognized women as one of nine groups in society important for the achievement of sustainable development. Since 1992 the WMG has been recognized by the UN in its sustainable development processes and, since 1996, in the processes of UNEP. WMG's role is to ensure effective public participation by women's non-governmental groups in UN policy processes related to sustainable development, post-2015 and environmental matters (Women's Major Group n.d.).

The Women and Gender Constituency (WGC) is one of nine UNFCCC observer stakeholder groups. Established in 2009 and granted full constituency status in 2011, it consists of 15 women's and environmental civil society organizations which work to ensure that women's voices are heard and that their rights are embedded in all processes and results of the UNFCCC for a sustainable and just future (so that gender equality and women's human rights are central to the ongoing discussions). The group is now able to make official interventions on the floor on behalf of women and gender equality (Raczek *et al*. 2010). It works to advocate for and promote women's full and effective participation at all levels of decision-making. At COP21 it presented recognition awards for "Gender Just Climate Solutions", including Gender Just Technical and Non-technical Solutions, as well as Transformational Climate Solutions (Women and Gender Constituency 2015a).

Recognizing the potential of social media and technology: The communications connecting people around the world make it almost impossible for crises and significant social and environmental events to go unnoticed. Social media use by activists is increasingly creating borderless communities of concerned people. An ever-increasing number of social movements and activists use social media to maintain constituent engagement and raise consciousness. Postings on YouTube and Facebook have become essential ways to create awareness of environmental and social problems and abuses (Van Dijk 2013).

Nevertheless, there is a considerable gender gap in access to digital technology and social media. In many parts of the world, use of mobile devices and computers is limited for women and girls – in some

Box 3.6: Community Practitioners Platform: multi-stakeholder collaboration and sustainability

Led by the Community Resilience Campaign of the Huairou Commission, the Community Practitioners Platform operates at a global level as a formal mechanism for engagement by local communities and indigenous communities in the UN International Strategy for Disaster Risk Reduction (UNISDR) negotiations and policy-making spheres. It also functions as a mechanism at the regional, national and local levels. The Platform ensures that policies and programmes effectively reflect community priorities and directly represent their voices. This mechanism aims to tackle the issue of ineffective representation of women and local communities as public advocates by focusing on their values, actions and proven successful strategies to affirm their agency and, in particular, women's empowerment as a priority in long-term sustainable development. In Honduras, for example, the national agency for disaster management has signed an agreement with Afro-indigenous women's organizations through which it will provide technical training to refine community access to, and understanding of, risk information. Three hundred community volunteers will be trained on emergency preparedness, providing a concrete example of an institutional partnership for technical and financial assistance with a view to grassroots resilience priorities.

Source: The Huairou Commission (2015)

cases intentionally so by local legislation that prohibits them using these technologies (Al Jazeera 2016).

Revaluing traditional knowledge: The value of indigenous knowledge systems and practices is slowly receiving more recognition in international environmental fora, including in the wording of the COP21 Paris climate change agreement (Meyer 2016). The traditional knowledge of indigenous peoples is of paramount importance for environmental conservation and sustainable development (Chanza and DeWit 2016, UNIASG 2014). Just as feminist scholars have shown the gendered specificity of western science and associated models of knowledge, indigenous knowledge is also gender-differentiated, and knowledge held by women and men may be complementary, but is usually different (Harding 2006, Dankelman 2001).

Recognizing the value of citizen science: Citizen science, as described in the World Economic Forum's Global Risks Report 2016, "is increasingly seen as a tool that could enable a more participatory democracy by empowering individuals and communities to analyse, understand and ultimately take ownership of the issues that affect them, enabling them to propose concrete and actionable solutions to decision-makers" (World Economic Forum 2016). Such "factivism" (Bono 2013) or evidence-based activism can create new ways to engage grassroots women's organizations and keep authorities and private sectors accountable. It can also contribute significantly to transparency and inclusiveness.

An example of citizen science is the Open Seventeen Challenge, which operates in conjunction with the SDGs. Activists may use open source data to verify progress towards the SDGs at local, regional or global levels. Such tracking can be carried out with the help of crowdsourcing, which accelerates the analysis of large amounts of data such as images or documents through collective efforts on the Internet. The Open Seventeen Challenge (a joint initiative of the research organizations Citizen Cyberlab and GovLab, The ONE Campaign, and the open-source company SciFabric) aims to transform grassroots activism on the Internet into new open knowledge that can help achieve implementation of the SDGs.

Moving beyond the gender binary in order to "leave no one behind": Gender identities do not start or stop with "women" and "men." Many individuals and recognized subcultures live outside this binary. Understanding environmental impacts and agency, and the relationships of cultures to the environment, will be incomplete if only gender binaries are recognized. In environmental analysis, categories of sexual orientation or alternative identities are rarely included despite considerable advocacy by LGBT communities of interest and statements by UN Secretary-General Ban Ki-moon, who has described discrimination based on sexual orientation and gender identity as "one of the great, neglected human rights challenges of our time" (UN 2013).

Moving beyond the gender binary is not only or primarily manifested at the level of the individual. In the Asia-Pacific region, for example, there are recognized gender non-binary groups such as the whakawahine in New Zealand, the fa'afafine in Samoa, the mahu

in Hawaii, the waria in Indonesia, the bakla of the Philippines (Gaillard *et al*. 2015), the Aravanis (also known as Hijras or Jogappa) in India (Pincha 2008), to name only a few. These groups have distinctive positions in regard to environmental sustainability, change and outlooks. [See also references to groups in: Australia (Dominey-Howes *et al*. 2014), Haiti (Laguerre 2011), Japan (Ozawa 2012), Nepal (Knight and Sollom 2012) and the United States (D'ooge 2008, Wisner 2001).]

Large-scale structural forces holding back transformational change

To make the transformational changes needed to move towards gender-equitable environmental sustainability, it is necessary to challenge the overarching systems that produce currently prevailing unsustainable environmental and gender inequality – and that slow progress. Large-scale structural forces, many of which have existed for decades (and some for centuries), hinder transformative change. They include:

Conventional framing of "the environment": Most environmental assessments conceptualize "the environment" within a physical, biosystem framework. Political ecology frameworks that treat it as socially constructed and perceived are still marginalized in much mainstream environmental work (Beuchler and Hanson 2015, Forsyth 2004, Rocheleau 1996). Climate change, for example, is conventionally addressed primarily as a scientific problem requiring technological and scientific solutions; at policy levels it is seldom discussed as a problem of ideologies and economies of domination, exploitation and colonialism – all of which represent credible approaches to understanding its drivers and impacts (Gaard 2015). The physical-sciences-first approach sidelines social and gender analysis (Castree *et al* 2014).

Pervasive gender inequality: One of the most powerful contexts of the current state of social and environmental relations is gender inequality. It is pervasive and universal, and is sustained by visible and invisible practices in public and private domains. Gender equality, similarly, exists on multiple planes simultaneously and progress across those planes is uneven.

The pace of change in reducing the gender gap has slowed in the last three years (WEF 2015). The Global Gender Gap Index, a composite index compiled by the World Economic Forum (WEF) based on economic participation and opportunity, educational attainment, health and survival, and political empowerment, indicates that no country has yet achieved full gender equality. The highest ranked countries (Iceland, Norway, Finland, Sweden and Ireland) have closed over 80% of their gender gaps; the lowest ranked country (Yemen) has closed a little less than half of its gender gaps. Based on the current global rate at which countries' gender gaps are being closed, it is estimated that reaching parity in the economic area will take a century or more (WEF 2015).

Gender inequalities are intersectional and magnified by other social positions (Association for Women's Rights in Development 2004, Crenshaw 1989). Multiple and multiplying layers of inequality are experienced by women who are indigenous; or members of sexual, racial or other minorities; or the elderly and the poor. As pervasive as gender differences and inequalities are, they are often hidden. Sometimes, as in the case of outbreaks of large-scale gender-based violence, individuals and institutions acting in what they see to be their vested interests, often in collusion with powerful institutional actors such as governments, actively hide the scale, scope and nature of the problem. Examples of the cooperation of multiple parties in suppressing evidence of widespread sexual abuse have recently come to light in regards to mining operations in Guatemala, and with UN peacekeeping efforts, but these are merely two of many (Deschamps *et al* 2015,

> "The planet has boundaries. We are living as though it doesn't. Some states have historical responsibilities for the damage they've done during the industrial era; other states have small ecological footprints and yet suffer most from climate change, global warming, ocean acidification and environmental damage. And everyone has to urgently change consumption and production systems, now! No mines, no geo-engineering, no commodification of nature, no more."
>
> Diverse Voices and Action for Equality, Fiji (2015)

"Industry and global institutions must appreciate that ensuring economic justice, equity and ecological integrity are of greater value than profits at any cost."

- Wangari Maathai, Nobel lecture, 10 December 2004, Oslo, Norway (2004)

Mendez, 2015). Such denials are typically nested within and supported by the political and economic contexts that are the overarching contexts of everyday life.

Gender disproportion in formal political domains: It is in the formal political arena that policies are developed and choices are made that directly shape citizens' livelihoods and well-being, including social and environmental relationships. At the nation state level power relations and social disparities become visible through formal politics and policy-making, including women's presence or absence in these systems. As of 1 May 2016, women held 50% or more of elected legislative seats in only two countries in the world, Bolivia and Rwanda, while the world average was around 23% (Inter-Parliamentary Union 2016) **(Table 3.1)**.

Table 3.1: Women's representation in governments as of 1 May 2016

REGIONAL AVERAGES			
	Single House or Lower House	**Upper House or Senate**	**Both Houses combined**
Nordic countries	41.1%	-	-
Americas	27.5%	25.0%	27.4%
Europe - OSCE member countries (including Nordic countries)	27.5%	24.7%	25.5%
Europe - OSCE member countries (excluding Nordic countries)	24.3%	24.7%	24.4%
Sub-Saharan Africa	23.1%	21.9%	22.9%
Arab States	19.3%	15.1%	18.9%
Asia	18.4%	12.1%	17.5%
Pacific	13.5%	36.0%	16%

Source:Inter-Parliamentary Union (2016)

Increasing women's representation in formal political systems is not an automatic panacea for social justice, gender equity or environmental justice. Nevertheless, the diminished presence of women in formal political institutions is emblematic of the extent to which the brain trust of half the world's population is excluded from contributing to formal decision-making. Women's unequal representation at all levels of society limits the capacity to apply humanity's full capacity, resources and innovation to meeting environmental challenges (including global climate change).

Public corruption is one of the forces that works against opening up political systems to diverse and new participants (Freedom House 2012, Johnston 2005). Throughout most of the world, in non-fragile as well as fragile states, corruption plays a major role in keeping entrenched elites – mostly male, in most places – in power. At the same time, public corruption blocks environmental accountability and sustainability, actively driving environmental destruction, (including through the wildlife trade), land grabs, and irresponsible natural resource extraction (UNEP 2013, UNODC 2013).

Complex and often conflicting relationships between the state and the individual are at the heart of the gender-and-environment nexus in regard to development. They can be defined on the one hand by the individual's right to development as well as to certain public goods and, on the other, by the responsibility of the state to ensure a minimum quantity and quality of services such as human security, economic security and environmental security. Making people's rights tangible and or bankable is often a neglected part of efforts to address equality (Sandler and Pezullo 2007).

Perverse economic systems: Scholarship by feminist ecologists and economists reveals the extent to which ecological and social systems are trapped in a vicious spiral of unsustainable economic priorities, enabled by unrealistic economic assumptions, and supported by inadequate analytical tools that are bringing about

environmental devastation while simultaneously undermining gender equality (Klein 2014, Sassen 2014, Barry 2012, Gibson-Graham 2006, Elson 1998). Environmental and gender security will both be elusive as long as economic systems based on the unsustainable assumption that production and consumption can and should continuously grow have primacy (Victor and Jackson 2015, Nelson 2009, Perkins 2007). A core insight of scholarship in this field is that classic economic models are framed by priorities that are stereotyped as male and reflect masculinist assumptions about how to measure economic activity **(Box 3.7)** (Gibson-Graham 2006, Elson 1998, Waring 1998).

GDP-based national accounting systems provide distorted views of gender, environmental and economic well-being (see also Section 2.7), while marginalizing both gender equality and environmental protection. At the same time, feminist economists point out that while "alternative" environmental economics as a field challenges the orthodoxy of GDP-based growth, it does so mostly while sticking close to the same tools and models used conventionally (which are centred on mathematical representations, notions of "rational agents" and sharing models of cost-benefit analyses). Moreover, ecological economics, like orthodox economic approaches, ignores the gender bias in such approaches (Nelson 2009, Ferber and Nelson 2003). Many feminist ecological economists suggest that more holistic, humanistic and care-based approaches to human relationships to the environment need to replace econometrics in order to bring both gender and environmental equity to the foreground in thinking about how to define a healthy economy (Nelson 2009).

Time poverty and unpaid labour, care and domestic work: In the past two decades feminist theorists and ecological economists have engaged with the conundrum of how to make a democratic and equity-enhancing transition to an economy based on less material throughput (Perkins 2007, Eichler 1999, Elson 1998). One important element in this effort is to demand a more realistic accounting of what labour – and materials – it takes to keep economies running and communities and families functioning. A great deal of unpaid labour and "caring" work is at the heart of both productive and reproductive systems (Ghosh 2015, Boris and Parrenas 2010, Folbre 2006, Folbre 2003).

Unpaid labour – the largest share of which is performed by women – is uniformly ignored in mainstream economic accounts (Nelson 2015, Folbre 2006). Community activism, caring work that is not goods-based, and ecological restoration activities are the real forces that sustain economic and environmental well-being, yet none of these has a secure place in mainstream economic processes and measurements. Without the unpaid (and currently uncounted) time that women and men put into sustaining themselves, their communities and local ecosystems, there would be even greater unsustainability. The care economy goes beyond "unpaid work" to encompass social reproduction work, looking after children, the elderly, and the disabled, and the home-based services that keep families and individuals alive and in good shape (Ghosh 2015, Boris and Parrenas 2010, Folbre, 2006). While both women and men perform care economy functions, women carry out the largest share. Without the care economy, the formal economy would not function well.

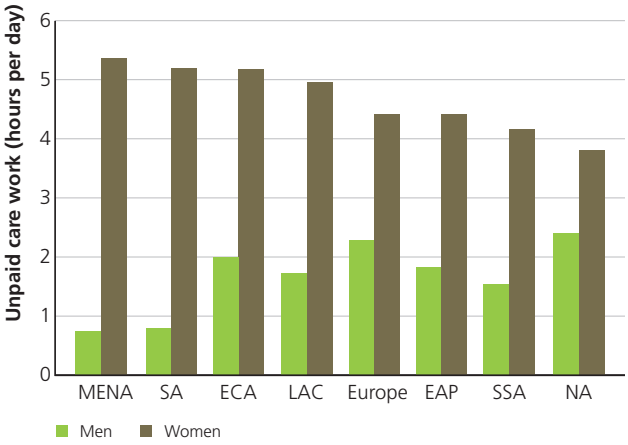
Even given regional variations, women universally spend far more time performing unpaid work than men

Box 3.7: Counting out women and nature: reframing economics

"Women and nature share similar treatment in neoclassical economics. They are, variously, invisible; pushed into the background; treated as a 'resource' for the satisfaction of male or human needs; considered to be part of a realm that 'takes care of itself'; thought of as self-regenerating (or reproductive, as opposed to productive); conceived of as passive; and/or considered to be subject to male or human authority. One would search in vain in the most paradigmatic models of economics for any inkling of where the materials used in production came from, or where the detritus from the production process goes. Similarly, one would search in vain in most descriptions of human agents for a discussion of where economic agents come from, or where they go when they are broken or used up. The bearing and raising of children, and the care of the aged and sick – traditionally women's responsibilities – are, like nature, too unimportant to mention. The treatment of both women and nature as passive, exploitable resources is not, however, just coincidental, or incidental to neoclassical analysis."

Source: Nelson (2009)

Figure 3.2: Time spent per day on unpaid care work, by gender and region.



Source: OECD (2014b)

(Figure 3.2). Unpaid work is a major obstacle to gender equality, influencing gender gaps in all subsequent stages of employment (OECD 2014b, Seguino 2013, Waring 1989). Time spent performing unpaid work represents less time possible for paid work; the more unpaid work women carry out, the less likely they are to obtain paid full-time employment, contributing to the overall result that they earn less than men (OECD 2014b).

Armed conflicts: Militarized conflicts are among the most globally significant drivers of both gender inequality and environmental destruction (Enloe 2016, Hynes 2014, Cohn *et al* 2005, UNEP 2005). Globally armed conflict destroys environments, kills and maims many thousands of people, disrupts communities, enhances male privilege and power, and distorts budgets and diverts public finance from social and environmental priorities. The locus of war has moved from battlefields to urban and rural population centres, causing massive migration and creating crises of contaminated water, poor sanitation, inadequate health care, malnourishment, overcrowding and sexual predation in refugee camps (Hynes 2014, Garfield and Neugut 2000).

UNEP has outlined some of the combined effects of conflict situations on women and environments (UNEP/UN Women/PBSO/UNDP 2013): women in conflict-affected settings (or even in highly militarized peacetime settings) routinely experience physical insecurity from armed men, including sexual violence, while carrying out daily tasks linked to the collection and use of natural resources; coupled with gender discrimination, conflict-related changes to natural resource access, use and control can significantly increase women's vulnerability and undermine their recovery; land grabs by armed combatants dislocate both women and men, but women have less secure claims with which to resist takeovers or to reclaim land and resources in the post-conflict period; and failure to recognize the specific natural resource-related challenges and opportunities for women in conflict-affected settings can perpetuate discrimination and exacerbate inequality in the peace-building period.

Recognizing gender – and beyond

Transformation towards the future we want should benefit all people. Inclusiveness enhances effectiveness in all spheres of society. Striking the right balance between living well and living within the Earth's environmental limits will require structural changes in institutions, practices, technologies, policies, lifestyles and thinking. This includes recognizing the importance of gender as both a social and environmental category and a force. It will also require moving beyond gender binaries: gender identities do not start or stop with "women" and "men." Many individuals and recognized subcultures live outside this binary. Understanding environmental impacts and agency, and the relationships of cultures to the environment, needs to start with recognition of the importance and the complexities of the gender-and-environment nexus and then move further.

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AN AGENDA FOR TRANSFORMATIONAL CHANGE



Gender equality cannot be measured by women's or men's presence alone. Participation is not influence; the nature of participation is what makes it meaningful. In the photo: Maria Neida (Brazil) supports the World Bank's "Think Equal" campaign for gender equality.

4

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Gender equality and sustainable development – connecting the dots

As documented in earlier chapters, gender equality and sustainable development are thoroughly enmeshed. In every assessed environmental dimension – food and energy, or forest and water – it is demonstrably the case that environmental degradation is associated with gender inequalities and in turn also aggravates these inequalities. On the other hand, reducing the gender gap can enable progress towards more sustainable development and environmental solutions.

The primary arguments for enhancing gender equality in environmental policies and actions include:

- Gender equality is a human right with clear benefits for women, but also for men (Fredman and Goldblatt 2015). Most men may not experience the negative effects of gender discrimination at first hand. But they do benefit from a more just society. In particular, men benefit from gender equality in terms of improved health and well-being (Holter 2014).

- Using a "gender lens" to examine environmental policies can make these policies more effective. This approach goes beyond the human rights framework, as it actually promotes gender equality. Nevertheless, use of the gender lens can help achieve progress towards more sustainable development and environmental protection.

- Sustainable development will not advance, nor will environmental protection policies and actions be as effective as they need to be, if gender equality is not protected and enhanced. Gender equality is a multiplier of sustainability. For example, it strengthens efforts to address poverty and food security. Gender-responsive approaches to problems related to energy, water, sanitation, land and other natural resources are key to protecting human health and the environment.

- If a gender lens is not used, environmental policies may aggravate existing gender inequalities. There are many examples of the introduction of new technologies in the energy and agricultural sectors having unintended inequality-intensifying consequences.

- With the use of an explicit gender lens, environmental policies can contribute to increased gender equality.

- In the absence of a gender lens it is impossible to develop comprehensive assessments of the nature and scale of the most pressing environmental problems.

The world's policy-makers and governments are aware of synergies between gender equality and sustainable development. The outcome document of the 2012 UN Conference on Sustainable Development (Rio+20) acknowledges some of these synergies. In the 2030 Agenda for Sustainable Development, adopted at the UN Sustainable Development Summit in September 2015, countries have made an overarching commitment to realize gender equality (UN 2015). While it is intended that both gender equality and protection of the environment be thoroughly integrated in the 2030 Agenda, only one of the specifically environmental goals actually mentions gender (in fact, "women, youth and local and marginalized communities") (Target 13.b, climate change) and none of the gender-focused goals includes specifically environmental concerns. The continued treatment of these issues in separate "silos" – even to a certain extent in the Sustainable Development Goals (SDGs) – underscores the magnitude of the transformation that is still needed in order to respond adequately to environmental crises.

Countries have the primary responsibility for implementing the 2030 Agenda, together with "all stakeholders". At the national level, implementation of the SDGs is intended to build on existing or emergent legal and policy frameworks. This means countries should either have in place or develop commitments and policy mechanisms to further gender equality and environmental sustainability. In reality, considerable work remains to be done to set the stage for implementing the 2030 Agenda in countries. While the laws of most countries include gender equality provisions, discriminatory legal barriers to women's empowerment and human rights persist; while most countries have environmental protection mechanisms, enforcement is often weak or non-existent. Almost no countries have policy frameworks or mechanisms in place that would enable a synergistic view (l*et al*one implementation) of gender and environmental goals.

Key conclusions

The scarcity of gender-disaggregated data

Environment-related gender-disaggregated data are crucial for gender-and-environment analysis. In all the domains covered by the GGEO, however, gender-disaggregated data are scarce or entirely absent; where available, they are typically fragmented and incomplete, making regional or cross-national comparisons impossible. In some domains, such as the water sector, progress in collecting gender-disaggregated data at the global scale has been reversed. In the absence of gender-disaggregated information, including data, indicators and other information, environmental analyses will be inadequate and partial while establishing realistic baselines, monitoring progress and assessing outcomes will be impossible.

The gender and environment dimension of sustainable development

Unsustainable development activities not only have negative impacts on the environment (including terrestrial and marine ecosystems), but they also create unequal pressures and health consequences for women and men, girls and boys, and vulnerable groups to which they may belong in both developing and developed countries.

Gender boundaries are reflected and defined in economic and productive sectors including energy, fisheries, forestry and livestock production. Activities whose purpose is to end environmentally destructive practices need to be supported by widespread changes in notions about appropriate gender roles.

Narrowing gender gaps in agriculture, water and sanitation, education, research and other areas would increase society's productivity and reduce poverty and hunger appreciably **(Figure 4.1)**.

Consumption patterns are highly gender-differentiated. Reducing the environmental impact of the over-consumption of commodities including cars, cosmetics, meat and plastic products will require shifts in gender-based societal norms that determine the types of consumption and behaviours that are considered acceptable, appropriate or desirable for women and men.

Basic questions about gender and environment cannot be adequately addressed using conventional units of analysis such as "the household" or "the family". Women and men experience "the household" differently and have different authority, resources and control relationships within it.

Women and men play different roles in maintaining livelihoods and well-being at the household and community levels. Understanding their roles as potential agents of change at these levels can indicate pathways to equal opportunities and equal participation in decision-making, which in turn will help ensure more efficient and sustainable natural resources management as well as waste reduction.

Equitable gender and environment policies for the future we want

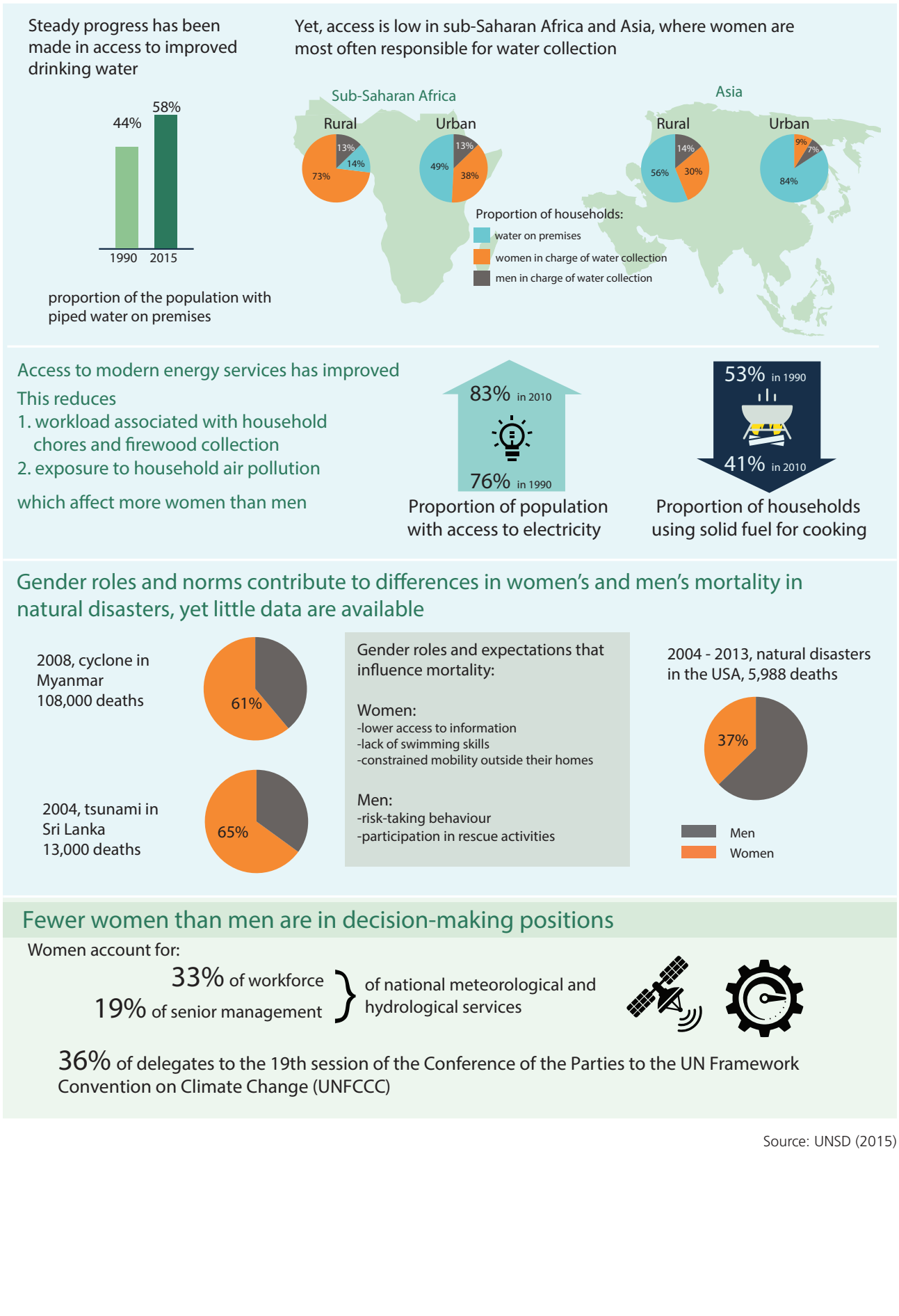
Until recently, the importance of the gender-and-environment nexus was scarcely recognized. Today there is growing acknowledgement, including in the Sustainable Development Goals (SDGs), that gender and environment are interlinked.

While the importance of the gender-and-environment nexus is increasingly accepted in, for example, international agreements and national policy documents, implementation and follow-through are still largely absent.

A more transformative agenda would call for gender equality as a driver of change, leading to more people-smart environmental policies.

Existing environmental and gender commitments by governments need to be followed up and effectively implemented. Governments have made commitments to gender equality in a number of multilateral environmental agreements and policies, notably the 2030 Agenda and the UN Framework Convention on Climate Change (UNFCCC). To implement those commitments, ensuring gender equality must be understood as more than just counting the number of women participating in a meeting. Real progress is needed at the country level, starting with the integration of gender into national action plans, monitoring and reporting systems, prioritization of the collection and analysis of gender-disaggregated data, and gender budgeting.

Figure 4.1: The environment affects women and men differently due to gender inequality



Source: UNSD (2015)

Adequate funding and resources will contribute to improvement and progress in developing and implementing gender-sensitive environmental policies. The amount of aid focused on gender equality in fragile states and economies has grown rapidly, but is concentrated in health and education. There is significant under-investment in gender equality in the economic and productive sectors, including agriculture, where women play a major role. This situation could be improved through creating and enabling gender-sensitive financing mechanisms under multilateral environmental agreements and mechanisms such as the UNFCCC, the Convention to Combat Desertification (UNCCD), the United Nations collaborative initiative on Reducing Emissions from Deforestation and forest Degradation in developing countries (REDD+), the Basel, Stockholm and Rotterdam Conventions, the Convention on Biological Diversity, Climate Investment Funds (CIFs), the Global Environment Facility (GEF) and the Global Climate Fund (GCF).

Gender-sensitive environmental assessments are needed at national and international levels. Environmental assessment tools (e.g. environmental impact assessments and strategic environmental assessments) and safeguard measures, which may be required as a prerequisite for development plans and activities, need to take gender aspects into account. This could be done through making gender impact assessments (GIAs) mandatory in public and private environmental reviews and permitting, licensing and planning activities. Conducting national-level "state of gender and the environment" assessments would help establish a baseline context against which future changes and progress might be measured. International support to carry out these activities would need to be provided to developing countries.

Gender-disaggregated information is essential. Strengthening the focus on developing, collecting and analysing gender-disaggregated data, indicators and other information (including at the intra-household level) would support more effective environmental decision-making. This would include efforts to "lift the roof off the household" in data collection, revealing intra-household gender relations, assets and roles in resource utilization and decision-making. It is necessary to move beyond gender binaries and use a wider lens in regard to social-environmental relations. The value of qualitative information, which is especially valuable in capturing intra-household dynamics, should be recognized and brought into official data streams to support in-depth understanding of the complexity of social dynamics, especially where quantitative data are missing or too costly to obtain. It is also important to promote and support the development of gender-disaggregated environment-related indicators with respect to the implementation of the Sustainable Development Goals (SDGs) at national and subnational levels.

It is essential to promote and support women's voices, leadership and organization. The science, technology, engineering and math (STEM) disciplines are particularly important in environmental management and in promoting gender equality along the environmental and science expertise pipeline, but they are highly gender unbalanced. Gender equality also needs to be addressed in the agricultural extension, forestry, water management and technical advisory fields, as well as in wildlife management, parks conservation and management, and training to carry out environmental and strategic impact assessments.

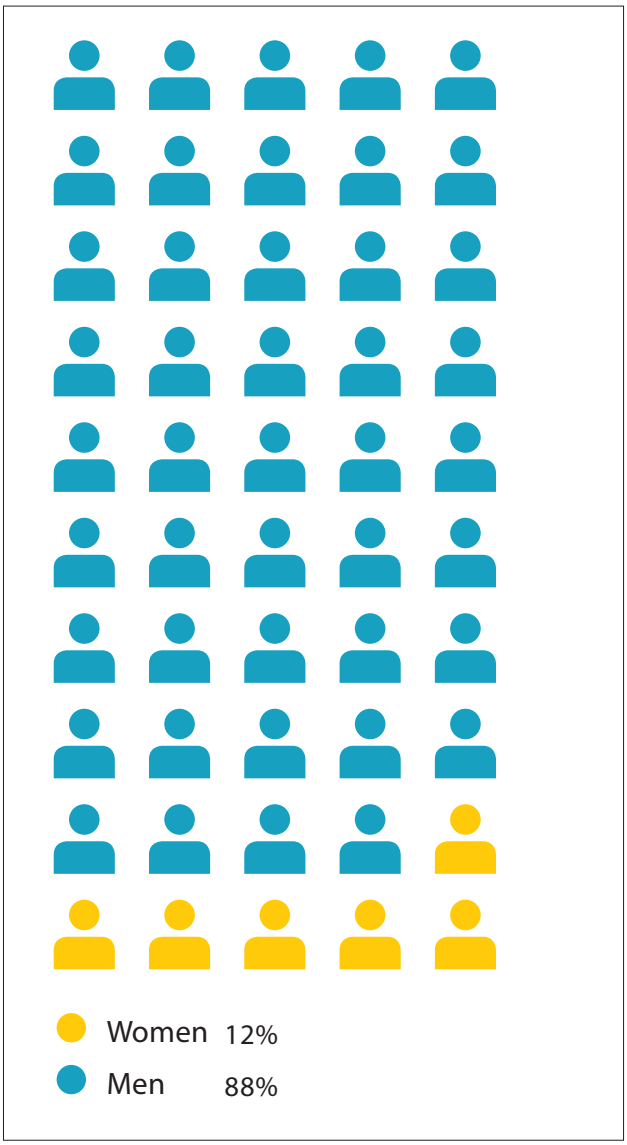
In addition, diverse voices need to be brought into formal environmental governance systems, and strong goals should be established for achieving gender equality in governance at the local through the national and multilateral levels. Integrating environmental issues into existing national gender policies, as well as providing capacity building for existing and emergent civil society organizations (including women's, indigenous and youth groups) on environmental sustainability and sustainable development would reinforce gender-and-environment links, as well as meaningful participation in environmental decision-making and programme implementation **(Figure 4.2)**.

It is important to bring men and boys, as well as women and girls, into the gender-and-environment conversation. Everyone benefits from sustainable environmental development. Gender equality benefits men, boys, and people who gender-identify as male; some of these people, as well as women, girls and people who gender-identify as female, warrant special attention as they strive to overcome a past and present of discrimination. Creating a safe, healthy and equitable future that leaves no one behind is the responsibility of all, and can be of benefit to all.

Enabling conditions for large-scale transformations with respect to the environment and gender need to be created. Large-scale socio-economic structures and policies have both positive and negative effects on the environment and on gender equality. Leveraging positive effects while minimizing negative ones is challenging, but can provide opportunities to create enabling environments in which social equality, inclusiveness and well-being are combined with environmental sustainability. It is essential to develop policies that prioritize social well-being over individual and short-term economic gains.

Issues of unpaid work and time poverty need to be addressed. Both women and men perform "care economy" functions. Women's share of such work is usually larger and is often unrecognized, encompassing not only child rearing and home care but also invisible production activities. Recognizing the contributions of people who take care of families and communities, as well as those who perform subsistence agricultural and other work, would make it possible to account more fully for the value of this work; to address time poverty issues; to increase capacities to redistribute paid and unpaid work within households, among households, and between households and governments; and thus to consider the care economy and unpaid work in initiatives aimed at achieving sustainable development and gender justice.

Figure 4.2: Heads of national environmental sector ministries in UN Member States (women and men) in 2015



Source: IUCN (2015)

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Annex 1: Gender-Environment Datasets with Broadest Country Coverage

The data team for GGEO undertook a global analysis of available data at the intersection of gender and environment. The result is a compilation of 17 indicators that provide the broadest coverage of countries. While these indicators represent a limited portion of the data and information needed to offer a comprehensive picture of gender aspects of environmental issues, compiling these indicators into one resource supports UNEP's environmental assessment processes and provides a baseline that also aligns with the SDGs.

The availability of data is important because of a simple tenet – what's not counted doesn't count. Limited information is available about the differences between women's and men's needs, resource uses, and responsibilities across all of the subsectors under sustainable development, environment, and conservation. Women's roles in particular are often invisible in sectors such as biodiversity due to lack of comprehensive sex-disaggregated data and information.

The primary criterion used to select the 17 indicators was the availability of data that are separated by women and men on environment and sustainable development issues. In addition, the analysis focused on data that: provide coverage for the largest number of countries; datasets where country-level information is made available online; data that are relatively recent (post 2010); and data from major multilateral institutions (to ensure integrity of the research). Additional data and information, including country-level studies and qualitative information, were collected for use in the *Global Gender and Environment Outlook* report.

The 17 indicators are grouped into 5 categories:

Under the **Agricultural work and food security** category, data are available from Food and Agriculture Organisation (FAO) on the female share of a country's economically active population in agriculture, and on the agricultural share of economically active women. Also under this category, sex-disaggregated data on agricultural employees are available from International Labour Organisation (ILO), and data from World Health Organisation (WHO) are available on the prevalence of anaemia among pregnant women, often used to measure food security.

Under the **Access to land and non-land assets** category, data are available from the Gender, Institutions, and Development Database (GID-DB) of the Organisation for Economic Co-operation and Development (OECD) on secure access to land, land title owned by women, and secure access to non-land assets. Also under this category, data are available from FAO on female agricultural holders and women's legal property and inheritance rights.

Under the **Water and sanitation category**, data is available from the Joint Monitoring Programme (JMP) for Water Supply and Sanitation of WHO and UNICEF on access to improved drinking water and sanitation in female and male headed households and water collection roles. Also under this category, sex-disaggregated data is available from UNICEF's Multiple Indicator Cluster Surveys (MICS) on time spent on water collection, and sex-disaggregated data are available from The World's Women produced by the United Nations Department of Economic and Social Affairs on water collection and time burdens, deaths associated with unsafe water, sanitation and hygiene issues, and water-related extreme climate events.

Under the **Health impacts of indoor and outdoor air pollution category**, sex-disaggregated data are available on the burden of disease from household air pollution (HAP) and burden of disease from ambient air pollution (AAP) from World Health Organisation (WHO).

Under the **Female participation in environmental institutions and education category**, sex-disaggregated data are available from the Global Forest Resource Assessment of the Food and Agricultural Organisation (FAO) on the percentage of female staff in public forest institutions by region, and on the percentage of female graduates in forest-related education. Also under this category are data on female graduates in science, agriculture, engineering, manufacturing, and construction from United Nations Educational Scientific and Cultural Organisation (UNESCO).

The following chart outlines the 17 indicators, and their relation to targets under the Sustainable Development Goals.

Agricultural work and food security		Related SDG Targets
1. **Female share of economically active in agriculture** FAOSTAT http://faostat3.fao.org	The share of the economically active population in agriculture who are women. This FAOSTAT dataset active until 2011. The SOFA 2010-2011 includes this data.	**Goal 1. End poverty in all its forms everywhere** 1.4 By 2030, ensure that all men and women, in particular the poor and the vulnerable, have equal rights to economic resources, as well as access to basic services, ownership and control over land and other forms of property, inheritance, natural resources, appropriate new technology and financial services, including microfinance **Goal 2. End hunger, achieve food security and improved nutrition and promote sustainable agriculture** 2.2 By 2030, end all forms of malnutrition, including achieving, by 2025, the internationally agreed targets on stunting and wasting in children under 5 years of age, and address the nutritional needs of adolescent girls, pregnant and lactating women and older persons 2.3 By 2030, double the agricultural productivity and incomes of small-scale food producers, in particular women, indigenous peoples, family farmers, pastoralists and fishers, including through secure and equal access to land, other productive resources and inputs, knowledge, financial services, markets and opportunities for value addition and non-farm employment
2. **Agricultural share of economically active women** http://www.fao.org/docrep/013/i2050e/i2050e.pdf	The share of the economically active female population who are engaged in or seeking work in agriculture, hunting, fishing or forestry. The State of Food and Agriculture 2010-2011 includes this data.	
3. **Sex-disaggregated agricultural employees** ILO dataset http://data.worldbank.org/indicator/SL.AGR.EMPL.FE.ZS	Employees are people who work for a public or private employer and receive remuneration in wages, salary, commission, tips, piece rates, or pay in kind. Agriculture corresponds to division 1 (ISIC revision 2) or tabulation categories A and B (ISIC revision 3) and includes hunting, forestry, and fishing.	
4. **Prevalence of anemia among pregnant women** WHO http://data.worldbank.org/indicator/SH.PRG.ANEM	Prevalence of anemia among pregnant women is the percentage of pregnant women whose hemoglobin level is less than 110 grams per liter at sea level.	
Access to land and non-land assets		
5. **Secure Access to Land** OECD Gender, Institutions, and Development Database (GID-DB) 2014 http://stats.oecd.org/Index.aspx?DatasetCode=GID2	Whether women and men have equal and secure access to land use, control and ownership. Here is the ranking system: • 0: The law guarantees the same rights to own, use and control land to both women and men. • 0.5: The law guarantees the same rights to own, use and control land to women and men, but there are some customary, traditional or religious practices that discriminate against women. • 1: The law does not guarantee the same rights to own, use and control land to women and men, or women have no legal rights to own, use and control land.	
6. **Land Title Owned by Women** OECD Gender, Institutions, and Development Database (GID-DB) 2014 http://stats.oecd.org/Index.aspx?DatasetCode=GID2	Percentage of agricultural holdings headed by women	

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7. **Female Agricultural Holders** The State of Food and Agriculture 2010-2011 (2012) FAO, p. 118 – 126 http://www.fao.org/docrep/013/i2050e/i2050e.pdf	74 countries have the most recent data. "An agricultural holding is an economic unit of agricultural production under single management comprising all livestock kept and all land used wholly or partly for agricultural production purposes, without regard to title, legal form, or size. Single management may be exercised by an individual or household, jointly by two or more individuals or households, by a clan or tribe, or by a juridical person such as a corporation, cooperative or government agency. The holding's land may consist of one or more parcels, located in one or more separate areas or in one or more territorial or administrative divisions, providing the parcels share the same production means, such as labour, farm buildings, machinery or draught animals."	**Goal 5. Achieve gender equality and empower all women and girls** 5.a Undertake reforms to give women equal rights to economic resources, as well as access to ownership and control over land and other forms of property, financial services, inheritance and natural resources, in accordance with national laws **Goal 8. Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all** 8.5 By 2030, achieve full and productive employment and decent work for all women and men, including for young people and persons with disabilities, and equal pay for work of equal value 8.8 Protect labour rights and promote safe and secure working environments for all workers, including migrant workers, in particular women migrants, and those in precarious employment
8. **Secure Access to Non-Land Assets** OECD Gender, Institutions, and Development Database (GID-DB) 2014 http://stats.oecd.org/Index.aspx?DatasetCode=GID2	Whether women and men have equal and secure access to non-land assets use, control and ownership. Here is the ranking system: • 0: The law guarantees the same rights to own and administer property other than land to both women and men. • 0.5: The law guarantees the same rights to own and administer property other than land to both women and men, but there are some customary, traditional or religious practices that discriminate against women. • 1: The law does not guarantee the same rights to own and administer property other than land to women and men, or women have no legal rights to own and administer property other than land.	
9. **Women's legal property and inheritance rights; institutional, financial, and social support or barriers for women's land tenure** FAO Gender and Lands Rights Database http://www.fao.org/gender-landrights-database/data-map/statistics/en/	Sex-disaggregated statistics on gender and land rights in 101 countries (see data tables below the maps). Largely qualitative country reports on land tenure for a subset of countries.	

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Water and sanitation		
10. **Access to improved drinking water and sanitation in female and male headed households; Water collection roles** WHO/UNICEF Joint Monitoring Programme (JMP) for Water Supply and Sanitation	• Progress on Sanitation and Drinking-Water: 2014 Update includes graphic on sanitation and water in Mongolia, Nigeria, and Niger (see below) • In 2012 update, data drawn from MICS and DHS surveys (2006-2009) in 25 sub-Saharan African countries show that women perform 62% of water collection in the region (see graphic below) The MICS4 (2009-2010) and MICS5 (2012-2014) instruments both include a question about time spent on water collection (question WS4: "How long does it take to go there, get water, and come back?"), and asks about the sex and age of the main person collecting water.	**Goal 6. Ensure availability and sustainable management of water and sanitation for all** 6.2 By 2030, achieve access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations
11. **Time spent on water collection** **Multiple Indicator Cluster Surveys (MICS) UNICEF** http://www.unicef.org/statistics/index_24302.html	The MICS4 (2009-2010) and MICS5 (2012-2014) instruments both include a question about time spent on water collection (question WS4: "How long does it take to go there, get water, and come back?"), and asks about the sex and age of the main person collecting water.	
12. **Water collection and time burdens; Deaths associated with unsafe water, sanitation and hygiene issues; Water-related extreme climate events** The World's Women 2010: Trends and Statistics UN DESA 2010 http://unstats.un.org/unsd/demographic/products/Worldswomen/WW_full%20report_color.pdf	Chapter 7 on Environment provides global gender-disaggregated data on: water collection and associated time burdens; deaths associated with unsafe water, sanitation and hygiene issues; deaths associated with water-related extreme climate events (flooding, tsunamis, etc.). Data is drawn primarily from DHS and MICS, 2006 World Bank data, and national statistics offices, and is computed by the UNSD. The data show that water collection, as well as deaths related to unsafe water or lack of sanitation services, continue to disproportionately affect women. The gendered effects of climate extremes vary by location. In some cases, climate extremes disproportionately affected men; in other locations, women were more affected. *The 2015 version of this publication will come out later this year, so UNEP Live may want to wait for that new data.*	

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Health impacts of indoor and outdoor air pollution		
13. **Burden of disease from household air pollution (HAP)** WHO 2012 http://www.who.int/phe/health_topics/outdoorair/databases/HAP_BoD_results_March2014.pdf?ua=1	Includes household deaths attributable by HAP by age and sex (see below for representation of percent of total HAP burden for women, men, and children). Although women experience higher personal exposure levels than men and therefore higher relative risk to develop adverse health outcomes due to their greater involvement in daily cooking activities, the absolute burden is larger in men due to larger underlying disease rates in men.	**Goal 3. Ensure healthy lives and promote well-being for all at all ages** 3.9 By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination (although this goal does not mention gender specifically, WHO data shows that mortality rates for indoor air pollution are highest for women and children)
14. **Burden of disease from ambient air pollution (AAP)** WHO 2012 http://www.who.int/phe/health_topics/outdoorair/databases/AAP_BoD_results_March2014.pdf?ua=1	Includes household deaths attributable by AAP by age and sex.	
Female participation in environmental institutions and education		
15. **Percentage of female staff in public forest institutions by region** Global Forest Resource Assessment (FRA) http://www.fao.org/docrep/013/i1757e/i1757e.pdf 2008	Based on reports from 66 countries, while the staff of public forest institutions decreased globally between 2000 and 2008 by 9.1 percent, or 1.2 percent annually, the proportion of female staff diminished only slightly, from 23.5 percent to 22.1 percent. This percentage varied from less than 18% in Africa and Europe to over 30% in North and Central America. The global decrease is mostly a result of reductions in the Eastern and Southern Africa and the East Asia subregions, as all other regions experienced an increase or no change in the proportion of female staff. Data is from 2000, 2005, and 2008. 68 countries reporting in 2010. Requested updated female data from FRA2015 (to be published October 2015).	**Goal 5. Achieve gender equality and empower all women and girls** 5.5 Ensure women's full and effective participation and equal opportunities for leadership at all levels of decision-making in political, economic and public life Goal 8. Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all 8.5 By 2030, achieve full and productive employment and decent work for all women and men, including for young people and persons with disabilities, and equal pay for work of equal value 8.8 Protect labour rights and promote safe and secure working environments for all workers, including migrant workers, in particular women migrants, and those in precarious employment

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16. **Percentage of female graduates in forest-related education** Global Forest Resource Assessment (FRA) http://www.fao.org/docrep/013/i1757e/i1757e.pdf 2008	2008 data includes a) Graduation of female students in forest related education, including MSc., Bsc., Technician certificate/diploma; and b) Female professionals working in publicly funded forest research centres, by Phd, Msc, or Bsc. Based on data from 68 countries, the proportion of women studying forest sciences at university increased from 30% in 2000 to 34% in 2008. Female students made up about 31% of total master's students, 36% of bachelor's students and 16% of technicians. However, some significant forest countries did not provide gender disaggregated information. Asia, North and Central America and Oceania had the highest proportions of female students in 2008, while Europe and Africa had the lowest	**Goal 4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all** 4.3 By 2030, ensure equal access for all women and men to affordable and quality technical, vocational and tertiary education, including university 4.5 By 2030, eliminate gender disparities in education and ensure equal access to all levels of education and vocational training for the vulnerable, including persons with disabilities, indigenous peoples and children in vulnerable situations 4.a Build and upgrade education facilities that are child, disability and gender sensitive and provide safe, non-violent, inclusive and effective learning environments for all
17. **Female Graduates in Science; Agriculture; and Engineering, Manufacturing, and Construction** UNESCO, 2001 - 2012 Data: http://data.uis.unesco.org www.uis.unesco.org/Library/Documents/GED_2010_EN.pdf	• Percentage of female students enrolled in (or graduated from) tertiary education in Science • Percentage of female students enrolled in (or graduated from) tertiary education in Agriculture • Percentage of female students enrolled in (or graduated from) tertiary education in Engineering, Manufacturing, Construction	

Glossary

Acute exposure: Once-in-a-lifetime or rare exposure to a hazardous substance (see also chronic exposure).

Agricultural inputs: Products and resources used in agricultural production. In addition to land, labour and capital, they may include seeds, fertilizers, pesticides, irrigation, farm machinery and knowledge.

Agrobiodiversity (contraction of "agricultural biodiversity"): The result of natural selection processes and the careful selection and inventive developments of farmers, herders and fishers over millennia. Agrobiodiversity is a vital sub-set of biodiversity (FAO).

Agroecology: Integrative study of the entire food system, including its ecological, economic and social dimensions. Agroecological management practices are often based on local, traditional or indigenous knowledge.

Aquaculture: Farming of aquatic organisms including aquatic plants. The term farming "implies some type of intervention in the rearing process to enhance production, such as regular stocking, feeding, and protection from predators. It also implies individual or corporate ownership of the stock being cultivated" (FAO) (see capture fisheries).

Biodiversity (contraction of "biological diversity"): The variety of life on Earth, including diversity at the genetic level, among species and among ecosystems and habitats. It includes diversity in abundance, distribution and behaviour. Biodiversity also incorporates human cultural diversity, which can both be affected by the same drivers as biodiversity, and itself has impacts on the diversity of genes, other species and ecosystems (UNEP GEO 5).

Biofuel: Fuel produced from dry organic matter or combustible plant oils, such as alcohol from fermented sugar or maize, and oils derived from oil palm, rapeseed or soybean.

Biofuel feedstock: Starting materials used to make biofuels. Examples are maize, sugarcane, soybeans and oil palm.

Biogas: Gas, rich in methane, which is produced by the fermentation of animal dung, human sewage or crop residues in an airtight container (UNEP GEO 5).

Bio-prospecting: The systematic search for (and development of) new sources of chemical compounds, genes, micro-organisms and other valuable products from nature. Bio-prospecting means looking for ways to commercialize biodiversity (WHO).

Capture fisheries: Harvesting of aquatic resources and production takes place in the wild (capture fisheries) or in controlled environments (aquaculture). Capture fisheries and aquaculture can be marine or freshwater. They use a wide range of technologies, from artisanal to highly industrial. "For both capture fisheries and aquaculture … technical advances have generally led to more efficient and economical fishing operations, reduction of the physical labour required per unit of output and improved access to resources" (FAO).

Care work (unpaid): Refers to the unpaid services provided within a household or community that sustain the health, wellbeing and smooth functioning of its members, including personal (and medical) care of persons, housework, and voluntary community work. Women perform most of the world's unpaid care work.

Chronic exposure: Repeated and continuous exposure to a hazardous substance over an extended period (see also acute exposure).

Commercial fertilizers: In agriculture, fertilizers are substances that provide nutrients that are vital for plant growth. Commercial fertilizers (also called "inorganic" or "synthetic") are chemical mixtures manufactured by the fertilizer industry.

Customary law: Refers to laws, practices and customs of indigenous peoples and local communities, which are accepted and respected by community members.

Disaster risk reduction: The conceptual framework of elements intended to minimize vulnerability to disasters throughout a society, to avoid (prevention) or limit (mitigation and preparedness) the adverse impacts of hazards, within the broad context of sustainable development (UNEP GEO 5).

Drivers: The overarching socio-economic forces that exert pressures on the state of the environment (UNEP GEO 5).

Endocrine disruptor: An external substance that interferes (through mimicking, blocking, inhibiting or

stimulating) with functions of the hormonal system and consequently causes adverse health effects in an intact organism, or its progeny or (sub) populations (UNEP GEO 5). Endocrine disrupters are particularly implicated as a cause of breast cancer in women.

Environmental assessment: The process of undertaking an objective evaluation and analysis of information designed to support environmental decision-making. Environmental impact assessment (EIA) and strategic environmental assessment (SEA) are two types.

European Union (EU): The 27 EU Member States (the EU-27) consist of the EU-15 (Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, Sweden and the United Kingdom) and the EU-N12 countries which joined the EU in 2004 (the Czech Republic, Cyprus, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia and Slovenia) and 2007 (Bulgaria and Romania).

Food security: Food security, as defined by the United Nations' Committee on World Food Security, is the condition in which all people, at all times, have physical, social and economic access to sufficient safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life. Over the coming decades, a changing climate, growing global population, rising food prices, and environmental stressors will have significant yet highly uncertain impacts on food security (International Food Policy Research Institute).

Food sovereignty: The right of peoples to healthy and culturally appropriate food produced through ecologically sound and sustainable methods, and their right to define their own food and agriculture systems (Nyéléni Declaration, 2007). Its key components include the right to food, valuing farmers and farmworkers, local production and control, and environmental sustainability.

Forest management: The processes of planning and implementing practices for the stewardship and use of forests and other wooded land aimed at achieving specific environmental, economic, social and/or cultural objectives (UNEP GEO 5).

Forest plantations: Forest stands established by planting and/or seeding in the process of afforestation or reforestation. They are either of introduced species (all planted stands), or intensively managed stands of indigenous species, which m*eet al*l the following criteria: contain one or two species, are of similar age and regularly spaced (UNEP GEO 5).

Forest user groups (FUGs): Groups of people living in the vicinity of forests who are entrusted to manage and conserve them, develop forest resources and utilize forest products. FUGs are actively involved in a range of community forestry processes.

Fossil fuels: Coal, natural gas and petroleum products (such as oil) formed from the decayed bodies of animals and plants that died millions of years ago.

Free prior and informed consent (FPIC): The principle (recognized by a number of international bodies, conventions and international human rights law and increasingly in laws of State) that communities have the right to give or withhold their consent to proposed projects that may affect lands they customarily own, occupy or otherwise use.

Gender: Refers to the roles, behaviors, activities, and attributes that a given society at a given time considers appropriate for men and women. In addition to the social attributes and opportunities associated with being male and female and the relationships between women and men and girls and boys, gender also refers to the relations between women and those between men. These attributes, opportunities and relationships are socially constructed and are learned through socialization processes (UN Women).

Gender-disaggregated information: Information collected and presented separately according to people's gender. It typically includes the state of being masculine or feminine based on social or cultural identities, constructs and differences.

Gender equality: Refers to the equal rights, responsibilities and opportunities of women and men and girls and boys. Equality does not mean that women and men will become the same but that women's and men's rights, responsibilities and opportunities will not depend on whether they are born male or female. Gender equality implies that the interests, needs and priorities of both women and men are taken into

consideration, recognizing the diversity of different groups of women and men. Gender equality is not a women's issue but should concern and fully engage men as well as women. Equality between women and men is seen both as a human rights issue and as a precondition for, and indicator of, sustainable people-centered development (UN Women).

Gender gap: Disparities between the condition or position of women and men in society, measured in various ways. For example, the "gender pay gap" refers to differences in average earnings. The World Economic Forum's Gender Gap Index seeks to measure relative gaps between women and men across four key areas: health, education, economy and politics.

Gendered: Reflecting or involving gender differences or, in some cases, stereotypical gender roles.

Genetically modified (GM): Derived from organisms whose genetic material (DNA) has been modified in a way that does not occur naturally, such as through the introduction of a gene from a different organism.

Globalization: Increasing integration of economies and societies around the world, particularly through trade and financial flows, and the associated transfer of culture, ideas and technology.

Heteronormative: Heteronormativity is an expression used to describe or identify a social norm relating to standardized heterosexual behavior, whereby this standard is considered to be the only socially valid form of behavior and anyone who does not follow this social and cultural posture is placed at a disadvantage in relation to the rest of society. This concept is the basis of discriminatory and prejudiced arguments against LGBT, principally those relating to the formation of families and public expression (UN Women).

Household air pollution (HAP): Around 3 billion people cook and heat their homes using solid fuels (i.e. wood, charcoal, coal, dung, crop wastes) on open fires or traditional stoves. Such inefficient cooking and heating practices produce high levels of household (indoor) air pollution that includes a range of health damaging pollutants such as fine particles and carbon monoxide (WHO).

Hydro-social cycle: Unlike the hydrologic cycle (which focuses on the physical production and circulation of water), the hydro-social cycle reflects water's social nature. The hydro-social cycle describes the socio-natural processes by which water and society make and remake each other (Linton and Budds). The concept directs attention to how water is produced and the social power and equity relations in how it is used and distributed.

Improved drinking water source: One that, by the nature of its construction, adequately protects water from outside contamination, particularly from faecal matter.

Improved sanitation: Sanitation facilities that hygienically separate human excreta from human contact.

Intensive agriculture: Intensive (also "industrial-scale" or "factory") agriculture refers to practices that produce high output per unit area, usually through intensive use of, for example, manure, agrochemicals and mechanization. "Factory" farming often refers to livestock production on this scale, often under cruel conditions.

Intersectionality: The understanding that social roles and identities overlap and have intertwined effects. The identity of any individual reflects and is shaped by a range of social and cultural categories such as race, class, gender, sexual orientation, and religion (among others). Oppressions within society are enacted through these multiple and linked identities.

Land grabbing: Large-scale land grabbing is defined as "acquisitions or concessions that are one or more of the following: (i) in violation of human rights, particularly the equal rights of women; (ii) not based on free, prior and informed consent of affected land-users; (iii) not based on a thorough assessment, or in disregard of social, economic and environmental impacts including the way those impacts are gendered; (iv) not based on transparent contracts that specify clear and binding commitments about activities, employment and benefits sharing; and (v) not based on effective democratic planning, independent oversight and meaningful participation" (Tirana Declaration, 2011).

Integrated Water Resources Management (IWRM): A process promoting co-ordinated development and management of water, land and related to maximize

the economic and social welfare that could result in an equitable manner without compromising the sustainability of vital ecosystems.

Masculinist: The promotion of attitudes and values that are assumed to be typical of men and masculinity. This often also incudes advocacy for the needs, values, and positions that are taken to be typical of men and masculinity.

Masculinity: A gender perspective allows us to see that there is pressure on men and boys to perform and conform to specific roles. Thus, the term masculinity refers to the social meaning of manhood, which is constructed and defined socially, historically and politically, rather than being biologically driven. There are many socially constructed definitions for being a man and these can change over time and from place to place. The term relates to perceived notions and ideals about how men should or are expected to behave in a given setting. Masculinities are not just about men; women perform and produce the meaning and practices of the masculine as well.

Microfinance: Economic development approach intended to benefit low-income women and men. It refers to provision of funds (often in very small amounts) and financial services to low-income clients, including the self-employed, who would otherwise have little hope of obtaining these services.

Micronutrient deficiency: Lack or shortage of micronutrients (vitamins or minerals) that are essential in small amounts for proper growth and metabolism. People are often said to suffer from "hidden hunger" when they consume sufficient calories but suffer from micronutrient deficiency. While this form of hunger may not be visibly apparent in individuals, it increases morbidity and mortality and has negative impacts on other aspects of health, cognitive development and economic development.

Microbeads: A type of microplastics manufactured for specific purposes including use in personal care products. Besides consumer uses, they have industrial, scientific and medical applications. Microbeads in "down the drain" products are released and accumulate in the aquatic environment after wastewater treatment (since they are too small to be filtered out).

Microplastics: Plastic particles up to 5 millimetres (mm) in diameter, a size range readily ingested by many organisms. In recent decades concentrations of microplastics have greatly increased in oceans and inland waters.

Organic farming: There are many explanations and definitions for organic agriculture but all converge to state that it is a system that relies on ecosystem management rather than external agricultural inputs. It is a system that begins to consider potential environmental and social impacts by eliminating the use of synthetic inputs, such as synthetic fertilizers and pesticides, veterinary drugs, genetically modified seeds and breeds, preservatives, additives and irradiation. These are replaced with site-specific management practices that maintain and increase long-term soil fertility and prevent pest and diseases (FAO).

Poaching: Illegal hunting, killing or capturing of wild animals. It may also refer to illegal harvesting of wild plant species.

REDD/REDD+: Reducing Emissions from Deforestation and Forest Degradation in Developing Countries. REDD+ involves enhancing existing forests and increasing forest cover. In order to meet these objectives, policies need to address enhancement of carbon stocks by providing funding and investments in these areas (UNEP GEO 5).

Renewable energy source: An energy source that does not rely on finite stocks of fuels. The most widely known renewable source is hydropower; other renewable sources are biomass, solar, tidal, wave and wind (UNEP GEO 5).

Safe drinking-water: Drinking-water that is considered safe because it meets certain microbiological and chemical standards provided by the World Health Organization (WHO) Drinking-water Quality Guidelines.

Subsistence: Having what is required in order to remain alive.

Sustainable agriculture and livestock production: Management of agricultural and livestock resources to satisfy human needs while maintaining or enhancing environmental quality and conserving natural resources for future generations (UNEP GEO 5).

Sustainable consumption and production (SCP): Use of services and products that respond to basic needs and bring a better quality of life while minimizing the use of natural resources and toxic materials, as well as emissions of waste and pollutants, over the life cycle of the service or product so as not to jeopardize the needs of future generations.

Sustainable forest management (SFM): Stewardship and use of forests and forest lands in a way (and at a rate) that maintains their biodiversity, productivity, regeneration capacity, vitality and potential to fulfill, now and in the future, relevant ecological, economic and social functions at local, national and global levels, and that does not damage other ecosystems.

Time poverty: Like income, time is a basic currency that allows people to pursue activities that increase their well-being, so much so that time might be considered the "currency of life" (Krueger *et al*. 2009). Time is a scarce resource, and a prerequisite for wellbeing. Time poverty refers to a scarcity of time such that the necessary capacity for productive and leisure activities cannot be met.

Undernourishment: An indicator of inadequate dietary energy intake. Someone who is undernourished is unable to acquire enough food to meet the daily minimum dietary energy requirements, over a period of one year. The Food and Agriculture Organization (FAO) defines "hunger" as being synonymous with chronic undernourishment.

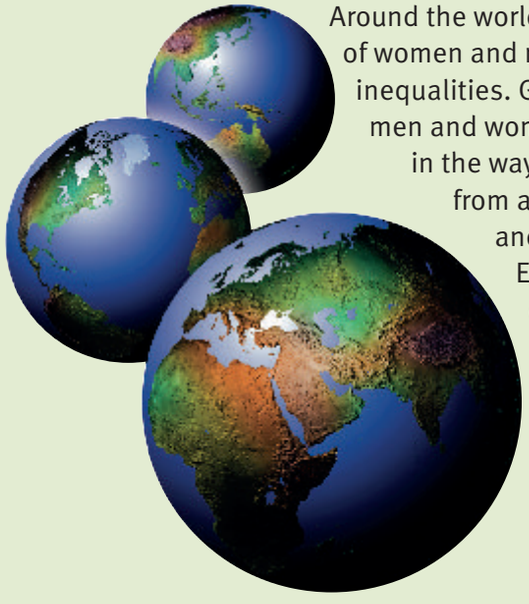
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Around the world, environmental conditions impact the lives of women and men in different ways as a result of existing inequalities. Gender roles often create differences in the ways men and women act in relation to the environment, and in the ways men and women are enabled or prevented from acting as agents of environmental change. UNEP and partners developed the Global Gender and Environment Outlook (GGEO), following the request of the Network of Women Ministers and Leaders for the Environment (NWMLE). The report aims to support governments in understanding the potential roles of men and women as agents of change and subsequently support development and implementation of gender-sensitive environmental policies.