

# Chapter 4

## Gender and Climate Change

## 4.1 Introduction

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This section of the report deals with the relationship between climate change and gender in Commonwealth countries. The relationship is not simply a one-way relationship, with climate change impacting on different sexes in different ways or, more specifically, having a greater negative impact on women and girls than men and boys. The association between gender and climate change also encompasses the impact that women have had to date in shaping climate change policies at the subnational, national and international levels.

Notwithstanding this, the evidence indicates that women and children are 14 times more likely to die or be injured than men in a disaster, an effect that decreases as social inequalities between men and women decrease. In addition to high fatalities, loss of homes and livelihoods, women and girls also experience secondary impacts, including sexual and gender-based violence (SGBV) and trauma, loss or reduction of economic opportunities, and increased workloads. For example, increased rates of SGBV, including rape, were reported in Solomon Islands after the Gizo tsunami in 2007.

Recurrent and expensive climate-related disaster relief, recovery and reconstruction drain resources that could otherwise be used for development, including promoting gender equality. Further, disasters such as hurricanes or cyclones damage critical infrastructure, such as schools and hospitals. In response to the impacts of disasters and their damage, girls are more likely than boys to be pulled out of school to help with domestic chores after a disaster, making the achievement of universal primary education more difficult. Damaged infrastructure also limits access to health resources for pregnant women, increasing the risk of maternal death (UN Women Fiji 2014).

In terms of planning and disaster response, in many cases women lead both preventive and adaptive practices on the ground. There is evidence indicating that climate change, climate variability and extreme environmental events and natural disasters result in women, due to their social roles (Carvajal-Escobar et al. 2008), facilitating their communities' work in reducing disaster risks and in developing effective climate change adaptation strategies.

Women often have a strong body of knowledge and expertise that can be used in climate change mitigation, disaster reduction and adaptation strategies.

Furthermore, women's responsibilities in households and communities, as stewards of natural and household resources, positions them well to contribute to livelihood strategies adapted to changing environmental realities (Women Watch 2018). Their extensive knowledge and expertise should also be used in climate change mitigation, disaster reduction and adaptation strategies. And at the national level, evidence suggests that countries with higher proportions of women in political leadership perform much better on climate change mitigation than governments with fewer women, possibly due to women being more concerned than men about the impact of climate change in such countries (Women's Environmental Network and National Federation of Women's Institutes 2007).

A critical issue in how well countries cope with climate change is adaptive financing and how we overcome the existing gap between wealthier and poorer countries in adapting to climate change. Estimates of adaptation costs vary greatly, depending on the methodology used, analytical principles applied and assumptions made.

These choices involve complex and often subjective issues and, as such, produce very different views on the costs of adaptation and the resources it requires. As a result, there are no widely agreed methods for calculating costs, and therefore no agreed single estimate of the costs of adaptation. However, a review of the literature on the costs of adaptation in developing countries indicates they are likely to be underestimates. In light of limited financing and uncertainties about future impacts, developing countries require greater emphasis on early adaptation actions, 'low-regrets' options and the populations – including subgroups such as women and girls – these options will affect. Such options need to build in flexibility for longer-term decisions and formulate early planning for likely major future risks (UNEP 2016).

This section of the report will examine the gendered impact of climate change, referring to some adaptation issues and

their implications for women and girls, before examining the five Commonwealth regions' recent exposure to disasters and member countries' vulnerability to sea-level rise, together with countries' results to date in implementing climate change mitigation policies. In doing so, it will cover a number of SDGs ranging from women's role in agriculture (SDGs 2 and 5) and the sustainable use of ocean resources (SDGs 5, 14 and 16), to the safety and resilience of cities and other population centres (SDG 11) and the sustainable but productive use of forests (SDG 15) through development partnerships. The focus on reducing fossil fuel consumption and carbon

emissions through adoption of renewable energy (SDG 7) is covered in the analysis of comparative data looking at Commonwealth countries' performances on these goals.

However, a lack of data prevents analyses of other important dimensions of the nexus between climate change and gender, such as climate change displacement and the adaptive finance gap between richer and poorer countries. Nevertheless, the examination of data on sea-level rise and the populations that are potentially at risk will shed light on the importance of adaptive resourcing for vulnerable population centres.

## 4.2 Africa

### 4.2.1 The gendered impact of climate change

Agriculture is a highly climate-sensitive sector, supporting the livelihoods of 70 per cent of Africans, contributing to about 30 per cent of the continent's gross domestic product (GDP) and about 50 per cent of its total export value. It employs 65 per cent of the continent's labour force. And while women own less than 1 per cent of the land in sub-Saharan Africa (Wikigender 2018), they contribute 70 per cent of the continent's food production. Women also account for nearly half of all farm labour, and 80 to 90 per cent of food processing, storage and transport, as well as hoeing and weeding activities (Kimani 2012).

It is clear then that women will be first and most affected by climate change events and will be tasked with making up the shortfall in food and fuel. The proportion of women affected by climate-related crop changes is predicted to range from 48 per cent in Burkina Faso to 73 per cent in the Congo (UN Women 2018).

Africa has 9.3 per cent of all fishers and fish farmers in the world, employing an estimated ten million Africans who rely on small-scale fisheries as their primary livelihood. An additional 90 million Africans depend on fishing as part of a diversified livelihood strategy. And while there is limited 'gender'-specific data, it is well known that women play a significant role in fisheries, particularly in landing, processing and selling fish across the continent.

In West Africa, as much as 80 per cent of seafood is marketed by women. However, the sector is characterised

by low-paid, low-skilled, seasonal jobs, making women more vulnerable and less resilient to the loss of livelihoods.

In contrast, as with many other sectors, men dominate so-called 'expert' and decision-making positions in fisheries governance and the sector as a whole. While Section 1 of this report noted that women's movement into political leadership positions across the continent was steadily progressing, this was not consistent across all countries. Nor is it so evident at the subnational level or in the private sector. As with the Women, Peace and Security theme, women need to be promoted into more senior decision-making roles concerning climate change planning and response, including adaptation. The only country recognising this to date is Finland, which is committing to 'establish the connection between gender, climate change, natural resources and peacebuilding' (Government of Finland 2018).

The following sections begin with a review of Africa's most recent (2017) experience of disaster events, compared with that of other regions, before exploring indicators reflecting the vulnerability to sea-level rise of Commonwealth countries in Africa. These are: 1) 2010 national populations below particular sea levels from different global warming amounts; and 2) populations living in areas where the elevation is below 5 meters in terms of the percentage of total population and that are therefore at immediate risk of sea-level rises.

The section then deals with Commonwealth countries performances on: 1) greenhouse gas emissions; and 2) changes in their emission percentages since 1990. It then reviews countries'

fossil fuel consumption, the proportion of their energy use provided by renewable energy, and prospects for the future in renewable energy uptake.

### 4.2.2 Vulnerability to disaster events and sea-level rise

Figure 47 (Annex One) shows that in 2017, Africa experienced 9 per cent of the world's disastrous events, behind Asia (42%), the Caribbean and Americas (23%) and Europe (14%), and ahead of South America (7%) and the Australia and Oceania (i.e., the Pacific) region (5%). These events are increasingly being caused by climate- or weather-related disasters, a phenomenon dramatically illustrated in Figure 48, Annex One, which shows a rapid increase since the late 1970s in the frequency of disasters across the world.

Since 2008, an average of 22.5 million people, the majority of whom are women and children, have been displaced by climate- or weather-related disasters. Climate change, on top of increasing exposure and vulnerability, is expected to exacerbate this trend further, as the intensity and frequency of extreme weather hazards increases in the coming decades (UN Human Rights Council 2017).

One dimension of vulnerability to future climate disasters, is rising sea levels and its implications for population displacement across Commonwealth countries. Table 27 (Annex Two) shows the percentages of Commonwealth countries' populations most vulnerable to sea-level rises. In Nigeria (2.67%), Mozambique (5.25%) and Ghana (2.62%), substantial proportions of the countries' populations live in the most vulnerable areas. When these percentages are converted to

numbers of people affected under different sea-level rise scenarios, the results can be overwhelming.

Table 28 (Annex Two) presents four global temperature increases, ranging from a 1oC global warming scenario to a 4oC global warming scenario. The Commonwealth countries in Africa that are most likely to be affected are Nigeria, Mozambique and Ghana. In a 2oC global warming scenario, the median estimate would be 3.7 million Nigerians directly affected, followed by approximately 971,000 Mozambicans and 439,000 Ghanaians.

However, in a worst-case scenario of a 4oC rise in global temperatures, the affected populations could rise to between 7.8 and 9.4 million Nigerians, between 1.86 and 2.1 Mozambicans, and between 904,000 and 1.16 million Ghanaians (1).

#### 4.2.3 Fossil fuel consumption, greenhouse gas emissions and uptake of renewables

This section deals with four indicators reflecting countries' results in addressing climate change mitigation commitments. The indicators are: 1) their records on fossil fuel consumption and 2) greenhouse gas emissions; 3) the percentage change of greenhouse gas emissions from 1990; in addition to 4) the proportion of renewables in their energy consumption mix.

Consistent with both world and sub-Saharan Africa trends, all Commonwealth countries in Africa show increases in greenhouse gas emissions from their 1990s' levels. However, some of these increases are negligible and from a very low base, while others are much higher (2). Several points emerge

from an analysis of Tables 29 to 32, located in Annex Two. These are:

- The size of greenhouse gas emissions varies considerably across Commonwealth countries in Africa, ranging from the smallest economy – Seychelles – producing 910 kilo tonnes of carbon dioxide (CO<sub>2</sub>) equivalent, to South Africa's 420,483 kilo tonnes of CO<sub>2</sub> equivalent (3).
- Some economies, most notably those of Cameroon, Ghana, Mozambique and Tanzania, almost doubled their fossil fuel energy consumption as a percentage of their total energy consumption in the four years between 2000 and 2014 (see Table 29, Annex Two).
- Mozambique (829%), Botswana (514%), Ghana (265%) and The Gambia (197%) showed very large increases in their greenhouse emission changes from their 1990 baselines, while Cameroon (3.5%), Sierra Leone (22.7%) and Kenya (39.4%) showed the smallest increases.
- To put this in the broader African context, while no Commonwealth country in Africa has decreased its greenhouse gas emissions since 1990, several other African countries have done so. These are Angola (-18%), Benin (-28.9%), Cote d'Ivoire (-78%), Congo (DRC) (-41.7%) and the Congo Republic (-43.8%).

#### 4.2.4 The future uptake of renewables

Table 32, Annex Two, provides details on Commonwealth countries' uptake of renewable energy power in their overall energy consumption. From this table, several points worth noting are:

- In 12 of the 17 Commonwealth countries in Africa, renewable energy consumption as a percentage of total energy consumption was reducing

rather than increasing. This is more or less consistent with trends in sub-Saharan Africa, where the uptake of renewables is negligible in comparison to fossil fuel consumption. However, this trend contrasts with the global average, trending as a very small increase in the use of renewables.

- Three Commonwealth countries in Africa appear to be resisting this trend by slowly transitioning to renewables as an energy source. Indeed, in two of these cases, renewables comprise their main energy source. These are Malawi, where renewables have increased between 2010 and 2015 from 79.5 to 83.6 per cent, and in Zambia, with renewables increasing from 83 per cent in 1990 to 88 per cent in 2015.
- In South Africa, renewables increased from 16.6 per cent in 1990 to 17.2 per cent in 2015. It appears that both Malawi and Zambia may have some transitioning lessons that other countries can learn from.

Finally, when examining Africa's potential to further develop its renewable energy sources, a 2015 report by International Renewable Energy Agency (IRENA 2015) suggests that the continent could meet nearly a quarter of its energy needs through the use of indigenous, clean, renewable energy by 2030.

IRENA's analysis provides a roadmap for Africa's energy transition. The report presents a country-by-country assessment of supply, demand, renewable energy potential, and technology prospects. For Africa, it identifies options amounting to nearly 10 'exajoules' – the equivalent of more than 341 million tonnes of coal – for sustainable development through renewable energy, around half of which would come through

biomass-based heat applications. These will progressively displace unsustainable and unhealthy traditional biomass combustion.

The report notes that renewable energy capacity additions could increase the share of modern renewable energy technologies in the power sector to 50 per cent by 2030, reducing carbon dioxide emissions by more than 310 megatonnes. It notes that in the presence of record-low electricity prices from solar and wind energy, developing such projects has become more cost-effective than previously and recommends actions to accelerate the continent's renewable energy uptake. In summary, these include adopting enabling policies, a regulatory framework to catalyse investment, measures to attract investors, and promoting off-grid renewable solutions to increase energy access and reduce poverty. The report identifies four key modern renewable energy technologies with highest deployment potentials for Africa: modern biomass for cooking; hydropower; wind; and solar power (IRENA 2015).

## 4.3 Asia

### 4.3.1 The gendered impact of climate change

Climate change is having and will continue to have a devastating impact on communities across Asia, and the rapidly increasing frequency of such events is depicted in Annex One's Figure 47. Flooding, drought and crop failure are a strong 'push factor' for migration, co-existing with strong 'pull factors' including urbanisation, development, seasonal labour and access to health and other services. The region is prone to heatwaves, cyclones,

rising sea levels, ocean acidification, heavy rainfall, floods and landslides. As noted in the preceding section, such events will continue to expose the region's most vulnerable population groups – women and girls belonging to poorer communities – to livelihoods, displacement and security threats.

In South Asia, because men have historically migrated more often than women, the impacts of climate-induced migration on women is not fully understood. What *is* known is that displacement will leave millions of female-headed households across the region exposed to loss of livelihoods, creating an additional burden for women.

It will lead to a gradual feminisation of agriculture (Asian Development Bank 2013) in a region where women currently constitute more than 60 per cent of the workforce. In some communities in Bangladesh, women face social pressure not to leave the house, and this makes earning a livelihood very difficult if their husbands have migrated (Commonwealth Secretariat 2017).

Regional co-operation is lacking over the management of floods and droughts affecting rivers flowing through two or more countries such as the Ganges, Brahmaputra and Indus rivers in South Asia. Agriculture in Asia is dominated by smallholder cultivators. South Asia has a patrilineal system, where land is passed down the male line of inheritance. In Southeast Asia, patrilineal and matrilineal inheritance systems exist; however, despite the almost equal land ownership rights in countries across the Southeast Asia subregion, in practice women do not actually own much land (*ibid*).

Asia has 85 per cent of all fishers and fish farmers in the world, with China alone constituting one third of the world's total. Women's contribution

to aquaculture in Asia is markedly different between countries, with women comprising 33 per cent of the rural aquaculture labour force in China, 42 per cent in Indonesia and 80 per cent in Vietnam. In Bangladesh, the only Commonwealth country producing FAO data, only 5 per cent of the aquaculture workforce are women, although millions of women who fish for a livelihood are not recognised by these data.

Sea-level rises are highly likely to affect aquaculture infrastructure, and globalisation has had a profound influence on the fishing industry in Asia. This has led to whole fish from Europe and North America being sent to Asia for processing and packaging, particularly to India, China and Vietnam. Consequently, those engaged in aquaculture are far less likely to have control over their employment and livelihoods, because decisions over its future are made from Europe and North America.

### 4.3.2 Vulnerability to disaster events and sea-level rise

Figure 47 (Annex One) shows that in 2017, Asia experienced by far the largest proportion of disasters across the globe, with 42 per cent of the world's disastrous events, well above the Caribbean and the Americas (23%) and Europe (14%). Figure 48, Annex One illustrates the sharp increase in disasters within Asia between 1975 and 2000, and the consistently high numbers of disasters between 2000 and 2017. As mentioned in the preceding section, the trend of increasing numbers of weather-related disasters will continue and, with it, an increasing number of people, particularly women and girls, adversely affected by climate displacement.

Across the Asia region, Commonwealth countries' populations most vulnerable to sea-level rises are detailed in Table 27

(Annex Two). In Singapore (10.3%), Bangladesh (8.9%), and Malaysia (5.1%), large proportions of national populations are living in highly vulnerable zones located at 5 metres elevation above sea level or less. In India, although the corresponding figure is lower (2.7%), this translates to millions of people, as Table 28 (Annex Two) reveals.

In Table 28, four global temperature rise scenarios are presented, ranging from a 1oC global warming scenario to a 4oC global warming scenario. Asia's Commonwealth countries most affected in these scenarios are India, Bangladesh, Malaysia, Sri Lanka and Pakistan. If global temperatures rise by 2oC, an estimated 19.8 million Indians would likely be displaced and approximately 12.5 million Bangladeshis would be directly affected.

Malaysia (1.7 million displaced), Pakistan (509,000 displaced) and Sri Lanka (534,000 displaced) would be less affected in scale, although not in terms of the severity of the crises confronting substantial numbers of people and their communities.

However, should global temperatures rise by an average of 4oC, the affected numbers would increase dramatically to between 55 and 73.5 million Indians, between 48 and 63.87 million Bangladeshis, and between 6.8 and 8.8 million Malaysians. In the same scenario, between 2.3 and 3.5 million Pakistanis and 2.4 to 3.7 million Sri Lankans would be directly affected.

#### 4.3.3 Fossil fuel consumption, greenhouse gas emissions and uptake of renewables

This section outlines Commonwealth countries' results in addressing climate change mitigation commitments using four measures. These measures are: 1) their records on fossil fuel consumption

and 2) greenhouse gas emissions; 3) the percentage change of greenhouse gas emissions from 1990; in addition to 4) the proportion of renewables in their energy consumption totals. From these analyses, several notable points emerge. These include the following:

- With the exceptions of Pakistan and Sri Lanka, all Commonwealth countries in Asia obtain more than 70 per cent of their energy needs from fossil fuels. Brunei Darussalam derives 100 per cent of its energy from fossil fuels, which comprise natural gas and oil.
- All Asian countries, with the exception of Singapore, increased their fossil fuel reliance between 1990 and 2014, consistent with the South Asian average. However, Singapore's fossil fuel reliance reduced from 99.4 per cent in 1990 to 97.4 per cent in 2014.
- India's greenhouse gas emissions more than doubled between 1990 and 2012 – from 1.39 million kilotons equivalent to 3.002 million kilotons equivalent. All other Asian Commonwealth countries have followed similar continuous increases, with the exception of Brunei Darussalam, which has substantially decreased its greenhouse gas emissions between 1990 and 2012.
- These trends are also reflected in greenhouse gas emission change from 1990, expressed in percentage terms. India's increase has been the region's largest at 116.4 per cent compared to its 1990 greenhouse gas emission levels, while Brunei Darussalam has decreased its emissions by 19.3 per cent, admittedly from a very small base.
- All Commonwealth countries in Asia have reduced rather than increased their renewable energy consumption as a percentage of total energy consumed, except Singapore, which showed a slight increase. However,

renewables comprise a very low proportion of Singapore's energy consumption (i.e., 0.7%). In contrast, Sri Lanka relies on renewables for 52.9 per cent of its energy consumption. India's renewables reliance stands at 36 per cent, which, for such a large economy, is a substantial proportion.

Tables 29 to 32, Annex Two provide more detail on the above analysis.

#### 4.3.4 The future uptake of renewables

According to a recent IRENA analysis (IRENA 2018), energy demand in the region is expected to grow by 4 per cent annually, leading to a likely energy demand increase by the region of 50 per cent between 2014 and 2050. As urbanisation increases, manufacturing and other energy-intensive industries will increase, requiring a doubling of power generation. This will make the adoption of renewables a pressing priority for the region. According to the report, while a target of 23 per cent of energy from renewables has been adopted by the Association of Southeast Asian Nations (ASEAN), if existing policies, including those under consideration, are implemented without further initiatives, renewables will likely comprise just under 17 per cent of the region's energy supply. To meet the ASEAN target, a dramatic increase in renewables investment is required, as noted in Box 4.1.

## 4.4 The Caribbean and Americas

#### 4.4.1 The gendered impact of climate change

Small island developing states (SIDS) such as those found in the Caribbean and Americas region are some of the most vulnerable countries in the world

**BOX 4.1****RENEWABLES INVESTMENT REQUIRED TO MEET ASEAN TARGETS**

*A US\$290 billion investment in renewables is required to reach the ASEAN target, including \$7.5 billion in solar photovoltaic (PV) and \$6.3 billion in hydropower per year, together with a \$7 billion in annual investment in the building and industry sectors, focused largely on bioenergy and solar thermal. In doing so, IRENA identifies four priority areas:*

- 1 Increasing power system flexibility while using renewables to provide modern energy access for all by expanding transmission and distribution grids and interconnection capacity between countries and power systems. Member states also need to develop flexibility measures, such as flexible thermal capacity, energy storage, demand response and the coupling of the power and end-use sectors.
- 2 Expanding efforts for renewable energy uptake for the power sector, as well as the heating, cooking and transport sectors. It is important to develop renewable technologies in end-use sectors, such as heating, cooking and transport, as they comprise two-thirds of the capacity needed to meet ASEAN's renewable energy goal.
- 3 Creating a bioenergy market that is sustainable, affordable and reliable. On the supply side, the use of sustainable residues and waste feedstocks has to be maximised, bearing in mind the seasonality of supply. To ensure environmental, social and economic sustainability on both the supply and the demand sides, innovative suggestions and technologies must be delivered.
- 4 Increasing the availability of up-to-date renewable energy data and enabling the sharing of best practices. In light of the rapid changes in the renewables landscape in the region, accurate and timely data and its sharing are important, as this will facilitate the transfer of information and technical know-how between regional members with different levels of technical expertise in the renewables sector.

to climate change. In this region, climate change is an issue of survival to its people and the long-term existence of its countries. Sea levels will continue to rise, and populations will inevitably be displaced, while the increase in the frequency of catastrophic category five hurricanes is already two-fold.

The Caribbean and Americas has also a limited capacity to generate clean energy and has a strong dependence on tourism. It has a strong reliance on food imports, increasing the region's vulnerability to weather crises while posing considerable challenges to find pathways to longer-term sustainable development. Women and girls living in low-elevation areas will be subjected to the uncertainties and security risks of displacement and disrupted livelihoods, while the privatisation of water taking place in the region has had greatest impact

on female-headed households and the poor, due to the increased cost of water (Commonwealth Secretariat 2017).

Within the Caribbean, information on gender in fisheries is limited and scattered. Only four of the region's Commonwealth countries have fisheries policies or plans that include gender. In Canada, women accounted for 47 per cent of the workforce in 2006 (Government of Canada 2006) and in the fishing industry, this was 34 per cent. For the self-employed falling into the 'fish harvesters' category, the proportion of women employed was 20 per cent. Rising sea surface temperatures, ocean acidification and rising sea levels will affect thousands of fish species, making waters more hospitable to invasive species and shifting the lifecycle timing of certain other fish species. This, in turn, will disrupt the

ecosystem supporting subsistence fishing. It will also adversely affect commercial and recreational fisheries and tourism, leading to livelihood risks for those employed in these sectors.

Substantial numbers of women employed in the region's agriculture sector will also be affected by the impacts of climate change on crop and livestock viability. Changes in the frequency and severity of droughts and floods will pose challenges for farmers and threaten food safety, with decreasing crop yields from inundation and salinisation becoming more pronounced. Livestock may be at risk, both directly from heat stress and indirectly from reduced quality of its food supply.

The proportions and numbers of women engaged in the region's agriculture sector are difficult to assess due to data



limitations, but agricultural landholders vary from 14.7 per cent in Trinidad and Tobago to 27.9 per cent in Saint Kitts and Nevis and 29.7 per cent in Saint Lucia, suggesting that figures for female farm labourers will be even higher. For Canada, the distribution of female agricultural holders is 27.4 per cent. These data indicate that women will have a substantial role to play in how farming communities adapt to climate change. A review of National Action Plans (NAPs) indicates that, with the exception of Canada's NAP, gender analysis does not feature as part of planning, implementation and monitoring processes. This highlights a recurring theme emerging in this report concerning the lack of women's engagement in planning for countries' requirements to adapt to climate change and its social, economic and political impacts.

#### 4.4.2 Vulnerability to disaster events and sea-level rise

In 2017, the region experienced the second highest proportion of disasters with 23 per cent (see Figure 47, Annex One).

As with the Africa and Asia regions, these events began increasing sharply after 1980, peaking during the first decade of the new millennium. The most severe category five hurricanes have been an increasing part of this development. Hurricane Irma, which passed through Barbuda and neighbouring Antigua in September 2017, was the most powerful Atlantic Ocean hurricane in recorded history, leaving a trail of storm damage. In Barbuda, over 90 per cent of buildings and vehicles were destroyed, leaving the island 'barely inhabitable' (Keneally 2017). The Island's total population of 1,800 people required evacuation.

Populations most vulnerable to storm surges and sea-level rises in the Caribbean and Americas are detailed in Table 27 (Annex Two). Throughout the region, four countries have very large proportions of their populations living in areas where elevation is below 5 meters.

These are Guyana, with 27.9 per cent of its population located in this zone, followed by Belize (20.5%), the Bahamas (20.3%) and Antigua and Barbuda – as discussed above – with 11.8% of its population highly exposed. In fact, the Caribbean small states register the highest percentage of any region globally of population living in this most vulnerable elevation zone (11.6%).

The consequences of this geographical vulnerability are presented in Table 28, Annex Two, outlining temperature rise scenarios ranging from 1oC to 4oC. Those Caribbean and Americas countries most affected by these rises and the population numbers in question will be Canada, with 737,000 people at risk of displacement in a 2oC global temperature rise scenario, followed by Guyana with 543,000 people likely to be displaced and Jamaica with 291,000 people facing likely displacement.

In the much worse scenario of a 4oC average global temperature rise, these figures increase, and in some cases considerably. In Canada's case, a 4oC temperature rise would mean between 1.08 million and 1.34 million people displaced, in Guyana's case a likely displacement of between 566,000 and 572,000 people, and in Jamaica's case, between 518,000 and 588,000 people vulnerable to displacement. The exposure of populations to climate displacement in other Caribbean countries is detailed in Table 28.

#### 4.4.3 Fossil fuel consumption, greenhouse gas emissions and uptake of renewables

The extent to which Commonwealth countries in the Caribbean and Americas have been able to reduce their reliance on fossil fuels and, in turn, their greenhouse gas emissions is covered here, together with their uptake of renewable energy sources. From the available data, the most salient points emerging are:

- Data on countries' fossil fuel consumption as a percentage of their overall energy consumption was limited to three countries (Canada, Jamaica and Trinidad and Tobago) and the small island states' average. The regional averages for small island states indicate an increasing use of fossil fuels from 1990 to 2014, from 78.3 per cent of their energy consumption totals to 96.9 per cent. Of the three countries providing data, Trinidad and Tobago shows an increasing reliance on fossil fuels, comprising 98.9 per cent of its energy consumption in 1990 and rising to 99.9 per cent in 2014.
- Two countries appear to be stabilising or decreasing rather than increasing their reliance on fossil fuels. These are Canada, decreasing from 76.1 per cent of fossil fuels reliance in 2000 to 73.6 per cent in 2015, and Jamaica, decreasing from 84.6 per cent in 2000 to 81 per cent in 2014. Notwithstanding these results, fossil fuels remain, unsurprisingly, the dominant source of energy for these economies.
- All but one of the countries in the region are producing net increases in greenhouse gas emissions, and some of these have been quite dramatic, as in the cases of Jamaica, Saint Lucia, Trinidad and

Tobago, Saint Vincent and the Grenadines, and the Caribbean's small island states' average.

- Guyana provides a stark contrast to the region's increasing fossil fuel reliance, decreasing its greenhouse gas emissions dramatically between 1990 and 2012. This has been achieved through its partnership with the Norwegian government, launching a Low Carbon Development Strategy (LCDS) in 2009 to protect its substantial forest resources through the prevention of deforestation and transitioning towards a low-deforestation, low-carbon, climate-resilient economy. The strategy works to maintain Guyana's forests while generating payments for the services the forests provide.
- The above results are confirmed by Table 31's data on percentage changes in greenhouse gas emissions from 1990. While some Caribbean states have very high increases in greenhouse gas emissions, headed by Grenada with a 360 per cent increase from its 1990 level, Guyana has a 63.3 per cent decrease in emissions from its 1990 level.
- Concerning the percentage of renewables in countries' energy consumption profiles, Guyana's decrease in greenhouse gas emissions has not been associated with any increase in renewables as an energy source. In fact, the Guyana's renewables consumption as a percentage of its energy profile has decreased from 42 per cent in 1990 to 25 per cent in 2015. All other Caribbean countries have a similar decrease in the percentage of renewables in their energy consumption profiles, with the exceptions of Jamaica and The Bahamas.
- Jamaica's renewables consumption has increase from 7.6 per cent in 1990 to 16.8 per cent in 2015. Although

much more than Belize's negligible increase – from 34.6 per cent to 35 per cent – renewables in Belize comprise over one third of its energy consumption, the highest in the region.

Tables 29 to 32, Annex Two, provide more detail on the above analysis.

#### 4.4.4 The future uptake of renewables

Renewables in the Caribbean, as with other regions, have struggled to attract the required investment to achieve widespread adoption. The edited excerpt presented in Box 4.2 below (*The Guardian* 2015) summarises some of the advances made on the one hand, and on the other, the challenges confronting the region in adopting renewables on a larger scale.

## 4.5 Europe

### 4.5.1 The gendered impact of climate change

Women linked to the land through agriculture, food security, biodiversity and water resources in Europe are particularly vulnerable to climate change because they face social, economic and political barriers limiting their involvement in decision-making processes within these areas. Furthermore, women in rural areas have less mobility and are therefore less likely to become agents for change, while being more likely to be affected by climate change (Commonwealth Secretariat 2017).

In the fishing industry, decisions at the highest levels are dominated by men. While women are employed, often in large proportions, throughout every stage of the fishing industry process, from fishing haul to refinement, their contribution is not recognised and their presence in decision-making bodies goes under-represented, making them

effectively invisible. They are therefore not given access to the same benefits as men are, such as new technologies (Torp 2016). Within Europe, women are vessel owners, operators and merchants, but these women are a small minority, with industry research suggesting that women in the industry are looked down upon as an extension of 'domestic space', facing barriers in gaining recognition and status within the industry. A characteristic feature of employment in the fishing industry is the prevalence of occasional and part-time labour due to the nature of the industry's enterprises as often being family businesses (Commonwealth Secretariat 2017).

Data on women's landownership for Commonwealth countries in Europe are not available. However, policy-makers are aware that women located in rural areas often lack access to affordable childcare, and lack economic opportunities, networks and access to skills development training; such training is considered essential in assisting their communities to keep abreast of climate change in the agriculture and fisheries sectors.

In 2017, Europe incurred 14 per cent of the world's disastrous events (see Figure 47, Annex One) and, as reported in previous sections, a steep rise in these events from around 1980.

The pattern of extreme weather events associated with climate change varies greatly across Europe, with larger numbers in the United Kingdom and West-Central Europe and lower numbers in Scandinavia and Northern Europe. In Southern Europe, heat waves, droughts and wildfires have become the most numerous events, whereas in Western and Central Europe floods and storms predominate. Weather events have also been responsible

**BOX 4.2****RENEWABLES IN THE CARIBBEAN**

*The Caribbean appears to be the ideal location for renewable energy development. Petroleum resources are scarce and renewable resources such as solar, wind and geothermal are plentiful. Energy prices are high as there is no opportunity for economy of scale benefits that large land masses enjoy. Added to that, climate change impacts pose a major threat to the region's small-island economies that are largely dependent on tourism and agriculture.*

*So, what has been the barrier to using renewables? Many people have pointed to the cost factor. Small economies mean that in most cases countries require high upfront capital. Also, these factors have led some international investors and developers to be cautious about entering the Caribbean market.*

*However, indigenous grassroots knowledge paired with the experience and access to capital of larger local and international companies would be a winning combination.*

*The advantage of building on local interest and indigenous talent can be seen in Jamaica. The late Raymond Wright was trained as a petroleum geologist and was head of the Petroleum Corporation of Jamaica (PCJ) in the 1970s. His interest in wind energy was piqued while searching for areas with suitable geological characteristics for petroleum development. It soon became evident that Jamaica had a significant wind resource. Over time Wright shifted the focus of his energy development to renewables and PCJ took on a leading role in the establishment of the Wigton Wind Farm, which now generates about 0.1 per cent of Jamaica's energy.*

*Jamaica is keen to build on Wright's legacy. Expansion of the wind farm is under way and Jamaica plans to increase renewable energy use further, with a goal to reach 20 per cent by 2030, as part of its policy. There are plans for 20 MW (Mega Watt) of PV solar to be installed to complement the wind farm. In addition, Jamaica is offering benefits for any company or individual selling electricity to the grid from a renewable source.*

*In Barbados, there is a story of another pioneer, the late Professor Oliver Headley. An organic chemist by training, he became a leading international voice for solar energy development. He got into developing renewable energy in the 1960s after a PhD student colleague challenged him to put the sun that was beating down on them daily to productive use. His pioneering efforts helped propel Barbados to be a leader in solar water heater use in the western hemisphere.*

*There are three solar water heater companies in Barbados, which can be written off against income tax. This policy has been in place since 1974. The story goes that the then prime minister installed a solar water heater on his house and was so impressed with the results that he put the economic incentives in place.*

*Barbados is keen to expand the success of solar water heaters to solar photovoltaic with the introduction of the 'renewable energy rider'. This allows people installing solar photovoltaics to sell their power back to the grid at 1.6 times the usual charge. As a result of this incentive, there are now more than 300 house-top PV systems in the island, and that is expanding.*

*A few other Caribbean countries have seen success with renewable energy... It is encouraging to see developments such as these. But the efforts of individual champions cannot be successful without policies, legislation and economic incentives, which governments are slowly but surely putting in place. Having these policies on the books without recognising and supporting local businesses or providing an environment through which champions can come to the fore is likely to impede the progress of this spectacularly beautiful but vulnerable region in developing a flourishing green economy.*

*Source: The Guardian 2015*

for considerable loss of life in Europe, estimated at around 140,000 lives lost since 1980. The largest impacts on life have come from heat waves such as those in Central Europe in 2003. The economic loss has been considerable,

with an estimated loss of €415 billion since 1980 (2010 values). Storms and floods have been the most costly hazards, amounting to a combined total of almost €300 billion (Norwegian Meteorological Institute 2013).

Climate model simulations also suggest more frequent droughts throughout Europe, although flash and urban floods triggered by intense local rainfall events are also likely to be more frequent. Other likely

consequences of climate change include decreased annual river flow in Southern Europe and increased water stress in regions that are already vulnerable to reductions in water resources.

Studies suggest higher precipitation intensity for Northern Europe and increased dry-spell lengths for Southern Europe. High-intensity and extreme rainfall are expected to become more frequent within the next 70 years. More extreme events will occur with greater frequency, but will vary considerably from subregion to subregion across Europe (ibid).

#### 4.5.2 Vulnerability to disaster events and sea-level rise

Table 27, Annex Two, provides data on populations (%) living in areas across Commonwealth countries in Europe that are most vulnerable to sea-level rise. Cyprus has the largest proportion of people at risk of displacement in Europe's three Commonwealth countries, with 5.64 per cent of its population at risk.

This is slightly ahead of the UK (5.31%), although when these proportions are converted to population figures, many more Britons will be displaced in each of the three scenarios provided in Table 28 (Annex Two).

This table details temperature rise scenarios ranging from 1oC to 4oC and, specifically, the size of populations likely to be affected. Of the three European Commonwealth countries, the UK will have large numbers of people facing likely displacement, ranging from around 3.85 million people in a 2oC temperature rise scenario to between 5.9 and 7.3 million people in a 4oC temperature rise scenario. In Cyprus, the impact appears to be much less sizeable but by no means insignificant, ranging from 19,000

people facing likely displacement in a 2oC global temperature rise scenario, to between 51,000 and 72,000 in a 4oC global temperature rise outcome.

In Malta, the corresponding affected populations would be 10,000 (2oC temperature rise) to between 22,000 and 28,000 in a worst-case scenario of a 4oC temperature rise.

#### 4.5.3 Fossil fuel consumption, greenhouse gas emissions and uptake of renewables

The performances of Commonwealth countries in Europe in terms of results to date in reducing their reliance on fossil fuels and, in turn, limiting their greenhouse gas emissions are covered in this section, together with the adoption of renewable energy sources. The results to date are as follows:

- When considering data on countries' fossil fuel consumption as a percentage of their overall energy consumption, Commonwealth countries in Europe together constitute the only Commonwealth region where fossil fuel consumption is decreasing. In fact, all three countries show decreases. These range from a 10 per cent decrease in the UK (90.7% to 80.7%) between 1990 and 2015, a 6.7 per cent decrease in Cyprus from 1990 to 2014, and a 2.2 per cent decrease in Malta, from 100 per cent in 1990 to 97.8 per cent in 2014.
- However, only the UK reduced its greenhouse gas emissions during the 1990 to 2012 period by a noticeable level. From 1990, the UK has reduced its greenhouse emissions by 24.6 per cent, while Cyprus, despite decreasing its fossil fuel reliance, still managed to increase its greenhouse gas emissions by 44.8 per cent between 1990 and 2102. No data are available for Malta on this measure.

- Consistent with the region's reductions in fossil fuel consumption, each of its three countries registered increases in renewable energy consumption. These increases were from 0.5 per cent to 9.9 per cent renewable energy consumption in Cyprus, 0.7 per cent to 8.7 per cent in the UK, and from 0 per cent to 5.4 per cent in Malta.

#### 4.5.4 The future uptake of renewables

The slow progress to date in transitioning to renewables in Europe may be a function of men's domination of the power industry. The article in Box 4.3 (*The Guardian* 2018) below explores this issue.

## 4.6 The Pacific

#### 4.6.1 The gendered impact of climate change

In the Pacific, women have limited access and control of the land, marine, water and energy resources required for their meaningful engagement in planning sustainable consumption and production.

In some Pacific island countries such as Papua New Guinea (PNG), changes in rainfall patterns, droughts, floods, rising sea-levels and salinisation will make it harder for communities to make a living out of agriculture.

Climate change and its associated disasters are likely to make life even harder for women, who are responsible for the production of the majority of food for subsistence. In fact, Pacific women's role in food production, whether through subsistence farming to feed their families or growing cash crops for income, is an indispensable part

**BOX 4.3****GENDER AND THE TRANSITION TO RENEWABLES**

*'Lack of women in energy, holding back fight against climate change': Gender imbalance at energy firms and industry events is slowing transition to greener power, claims expert.*

*The lack of women in energy companies is holding back the sector's efforts to tackle climate change, a leading industry watcher has warned. Catherine Mitchell, a professor of energy policy at the University of Exeter, said poor gender diversity meant the industry was less open to new ideas, in particular the move to a lower-carbon energy system.*

*'I absolutely do think that the fact that the industry is so dominated by men and particularly older white men it is slowing down the energy transition', said Mitchell, who has worked on energy issues for more than 30 years and advises the government, regulators and businesses. She admitted it was not a given that women are more progressive on energy issues than men, but noted that the 'conventional' parts of the sector – fossil fuel power generation and energy networks – are more male-dominated than greener, innovative companies.*

*'The fact we are not moving is not good for Britain, is not good for the environment', she said of attitudes slowing the transition to renewable and decentralised energy. Juliet Davenport, the chief executive of the energy supplier Good Energy, said the argument was credible. 'The energy sector is lagging sorely behind other industries in terms of diversity, meanwhile sustainable [green] businesses are very balanced. So the idea that lack of diversity is contributing to the issue of transition to renewables is very plausible', she said.*

*Nearly two-thirds of the leading 89 energy companies in the UK have no women on their boards and industry events with men-only panels, or just one woman, are common. One female energy expert said she had been disinvited from a panel of chief executives at an annual event after a company deputised a female executive.*

*'It became a panel of CEOs, with a woman, and so they did not "need" another woman', she said.*

*Sometimes it is a case of being the only woman in the room. One senior female executive said she was the sole woman at a meeting hosted by an influential male government adviser in London.*

*Sexual harassment is not unknown either: one female leader, who did not want to be named, said she was groped by the head of a trade body at an awards event several years ago.*

*Occasionally, the lack of gender diversity breaks out in public. During a recent questioning of energy chiefs by MPs on the impact of a price cap, the Conservative MP, Antoinette Sandbach, said: 'I am quite struck by the panel. We have four men here'. Sandbach went on to scold the retail chief executive of SSE, Stephen Forbes, for the company's 19.4 per cent gender pay gap, a figure he attempted to defend.*

*Some in the industry are making an effort to address the problem, such as the big six lobby group Energy UK, which has banned men-only panels at its events. 'The energy sector is undergoing a huge period of transition, which brings with it a huge opportunity to increase gender balance', said the group's external affairs director, Abbie Sampson.*

*Source: The Guardian 2018*

of food production and consumption practices. Given the unique knowledge and skills held by women, development planning for the region needs to acknowledge and effectively utilise women's contributions in order to adapt to climate change impacts.

Despite the critical role that women play in food production (see Box 4.4), they often face barriers to accessing agricultural land, training, credit and services. The agricultural production that women and girls perform also tends to be considered part of women's household responsibilities. Climate

change impacts, combined with these challenges, will make it even more difficult for them to make a living from agriculture. Women may also struggle more than men in finding alternative livelihoods, entering the formal employment sector or migrating, due to cultural barriers and lack of economic opportunities and education. Meanwhile, the stresses associated with climate change and its impact, including climate-driven relocation and disastrous climate-influenced events can increase violence against women, particularly in insecure environments resulting from population displacement.

Reduced food security threatens social and economic development and will prevent some countries from achieving sustainable development. In fact, many Pacific island countries are already struggling with food security: countries that were known to produce plentiful food quantities that, a short time ago, more than covered the needs of their populations. The impacts on agriculture of climate change are likely to worsen this trend, as women have responsibility for many of the key roles in the agriculture sector. Their priorities, needs and concerns should be heard and reflected in planning, budgeting

**BOX 4.4****INNOVATIVE RESPONSES TO CLIMATE CHANGE**

In Fiji's Totoya Island, coastal flooding and erosion from climate change, in addition to unsustainable land management, have reduced the land available to grow crops, leading to lower yields. The Totoyan women have existing knowledge on production of local nutritious food, and traditional food preservation methods. This knowledge is now being used to grow resilient crops in vegetable gardens, and to make flour, both of which will help to reduce reliance on imported products.

and decision-making in climate change adaptation (UN Women no date).

**4.6.2 Vulnerability to disaster events and sea-level rise**

Every island in the Pacific will be threatened by rising sea levels, as island populations tend to cluster around coastal zones and ports. Most populations are highly dependent on shipping and goods made in distant locations.

As sea levels continue to rise, coastal erosion will increase. Port facilities will experience new currents and extreme water levels, making navigation challenging. Extreme high tides, which are already occurring, will lead to flooding in unexpected ways, such as water rising up through storm drains onto streets, and waves flowing across beaches into buildings and roads. Coastal wetlands, where important staples such as taro are grown, are now experiencing saltwater intrusion.

Saltwater is contaminating shallow aquifers and threatening freshwater availability. As temperatures rise, climate models are projecting that the Pacific will experience more frequent, strong El Niño events, bringing enormous changes for all Pacific islands. These include changes in rainfall, in wind

directions, in droughts, in waves and erosion processes, in water temperature and therefore in fish stocks.

Globally, data show a shift to increased rain intensity. With more extreme precipitation, it is possible that less water will soak into the ground to recharge aquifers and more of it will remain on the surface as runoff. This will deplete freshwater reserves and increase flooding. In some areas, this trend is compounded by extended drought periods. And El Niño phases exacerbate these impacts. The typical variability of storms and droughts rises in magnitude when El Niño effects occur.

In Yap and Palau, during the 2015–16 El Niño, the drought was so severe that communities were required to adopt 'two-hour water days', i.e., water restrictions when people could collect water for one hour in the morning and one hour in the evening. All reservoirs were nearly at zero, the rivers were drying up and freshwater was in desperately short supply.

In the Pacific's atoll communities, relying on thin freshwater aquifers, saltwater intrusion occurs into aquifers both by wave overwash and saltwater rising up from below. In 2007 and 2008, there was a state of

emergency in the Federated States of Micronesia, when a king tide and a high-wave event superimposed across the islands, causing around 80 communities to suddenly lose their food and freshwater because of saltwater intrusions. While concerns are expressed about sea-level rise, freshwater capacity is already being challenged (Schiffman 2017).

When data examining regional populations' vulnerability to sea-level rise are assessed, some island states will have substantial proportions of their populations subjected to displacement pressures. Typically, around 80 per cent of displaced populations comprise women and children (Thomas and Thomas 2004).

As Table 27 (Annex One) shows, three Pacific island states have very high proportions of their populations at risk of sea-level rise due to their low-elevation locations. These are Tuvalu, with 47.5 per cent of its population confronting likely displacement, Kiribati, with 20.6 per cent of its population vulnerable to displacement, and Nauru, with 7.6 per cent of its residents in exposed locations. However, when the size of affected populations is assessed, Australia has the largest of the region's populations at risk with 668,000 in a 2°C global temperature rise scenario, followed by New Zealand with 185,000 likely displaced people and Fiji, with approximately 108,000 vulnerable people.

In worst-case 4°C global temperature rise scenario, these populations increase significantly to between 1.88 and 2.46 million Australians, between 552,000 and 712,000 New Zealanders, and between 224,000 and 266,000 Fijians.

### 4.6.3 Fossil fuel consumption, greenhouse gas emissions and uptake of renewables

The results of Pacific Commonwealth countries' endeavours to reduce their reliance on fossil fuels and, in turn, limit their greenhouse gas emissions are reviewed here, together with their adoption of renewable energy sources. Data on Pacific island states and their fossil fuel emissions are unavailable, aside from a regional average that includes East Asian states. Notwithstanding this, when reviewing the fossil fuel consumption of Australia and New Zealand, a divergence is evident in their respective consumption patterns.

Australia's fossil fuel consumption between 1990 and 2015 has been static, while New Zealand's has decreased from 66.7 per cent in 1990 to 59.9 per cent in 2015. Conversely, New Zealand has shown a minor increase in its uptake of renewables, moving from 30 per cent of renewables as a proportion of its total 1990 consumption to 30.8 per cent in 2015. Australia's increase has been similarly negligible and from a much lower base, moving from 8 per cent in 1990 to 9.2 per cent in 2015.

When the performances of the Pacific island states on adopting renewables is reviewed, a very mixed set of results emerges. Fiji, Kiribati and Papua New Guinea have registered decreases in renewable energy consumption between 1990 and 2015, and Fiji and PNG have recorded very substantial decreases. However, the reverse is true in Vanuatu, Solomon Islands and Tonga. In Vanuatu's case, the island state has increased its renewables consumption from 24.2 per cent to 36.1 per cent in the 1990 to 2015 period.

Lastly, and seemingly at odds with their decreasing deployment of renewables, PNG and the Solomon Islands have shown substantial decreases in greenhouse gas emissions from their 1990 baselines. PNG's decrease is the region's most impressive, reducing fossil fuel emissions by 62.4 per cent between 1990 and 2015, while Solomon Island's result is a 22.7 per cent reduction. Fiji's result was a 3 per cent reduction. In contrast, Vanuatu's emissions were similar to its 1990 level, while New Zealand, Samoa, Tonga and Tuvalu recorded small gains. Australia has recorded the largest greenhouse gas increases in the region since 1990, recording a 57.9 per cent increase in emissions between 1990 and 2015.

### 4.6.4 The future uptake of renewables

The challenges faced in Asia referred to in Box 4.1, together with those faced in the Caribbean and Americas concerning the requirement for high-level capital investment to facilitate the transition to renewables, are shared in the Pacific region as well. IRENA describes this in a series of reports identifying the steps required throughout the region, specific to each small island state, in making a successful transition to renewables. An excerpt of IRENA's report (IRENA 2013) on hybrid power systems in the region is presented in Box 4.5.

## 4.7 Section summary and conclusions: gender and climate change

This section of the report covered the nexus between climate change

and gender, and particularly the likely impact of climate change on women throughout the five Commonwealth regions. It began each regional analysis by referring to the gendered impact of climate change on women in the fisheries and agriculture sectors, before examining Commonwealth countries' recent and historical exposures to disaster events linked to climate change. It then presented data on Commonwealth countries' vulnerability to one measurable component of climate change, i.e., sea-level rise. Countries' performances on a number of energy-related measures were then presented, including their consumption of fossil fuels as a percentage of their overall energy consumption and, conversely, their uptake of renewable energy in their energy profiles. Countries' greenhouse gas emissions were also reviewed from 1990 to 2015. The likely future uptake of renewables will depend on the availability of investment capital in all regions, and the policy frameworks that countries adopt to encourage this.

### The gendered impact of climate change

A number of conclusions have emerged from the analyses conducted. Concerning the gendered impact of climate change, women and children have been displaced by a dramatically increasing number of disasters, many linked to climate change. This is particularly so in Asia, the Caribbean and the Pacific, where populations' livelihoods and security have and will continue to be threatened by storms, hurricanes, droughts and rising sea levels. Countries' National Action Plans, formulated to deal with such crises, do not, with the exception of Canada's, focus on women and security

**BOX 4.5****HYBRID POWER SYSTEMS IN THE PACIFIC**

*The variable nature of photovoltaic and wind power generation and the dependence on diesel generators throughout the region mean that high levels of renewable energy utilisation will require complex hybrid power systems. As such, island renewable energy planners need to adopt a comprehensive energy systems planning approach, deploying high-penetration renewable energy systems together with existing fossils that, over time, will be phased out.*

*A significant build-up of renewable energy generation in the Pacific is inhibited by the region's limited financing, primarily composed of public funding from various development partners. The creation of island groups with similar renewable energy resources presents a potential opportunity to create the economies of scale required to bring down costs and provide the needed access to private financing. Working with the National Renewable Energy Laboratory (NREL), IRENA is providing Pacific islands with information on island groupings and other options to increase access to private renewable energy project financing.*

*Furthermore, the United Arab Emirates has offered a commitment from the Abu Dhabi Fund for Development (ADFD) of up to USD 350 million to support financing of renewable energy projects in developing countries endorsed by IRENA. The IRENA/ADFD project facility is currently evaluating projects from various countries, including countries in the Pacific islands region, for the first round of funding from the fund.*

*Finally, it needs to be noted that although the focus of this report is on near-term deployment of renewable energy power generation, this sector represents on average only 25 per cent of Pacific island oil imports. Achieving reduced dependence on fuel imports will require regional renewable energy planners to address the more challenging issue of widespread renewable energy use in the transport sector. Electric vehicles are the best technology currently available for renewable energy-based transport, but require deployment of large renewable energy power generation to offset fuel consumption.*

*Source: IRENA 2013*

issues. Nor do they place women with men at the centre of decision-making about climate change prevention, adaptation and crisis management.

**Likely population displacement**

The largest Commonwealth populations likely to face climate-induced displacement are India, Bangladesh, Nigeria, Malaysia, the UK, Sri Lanka and Pakistan, although many small island states will confront threats to their entire existence, as such large proportions of their populations will face displacement. Tuvalu is a case in point, where 47.5 per cent of its population live in areas below 5 metres elevation above sea level. In 2017, Hurricane Irma required Saint Maarten and Antigua and Barbuda's whole populations

to evacuate and has left the islands uninhabitable. It is highly likely that in the Pacific, whole island populations will also face evacuation because freshwater aquifers will be overrun with salt water before the inundation of population centres takes place.

**Fossil fuel consumption and greenhouse gas emissions trends**

When fossil fuel consumption trends are examined, only a handful of Commonwealth countries have shown decreases since 1990 and can therefore be considered models from which policy-makers from other countries could consider borrowing lessons.

These countries, in order of their fossil fuel percentage reductions, are the UK, with a 10 per cent reduction,

New Zealand, yielding a 7.3 per cent reduction, Zambia, showing a 6.9 per cent reduction (although only 1990 to 2000 figures are available), and Cyprus, with a 6.7 per cent fossil fuel reduction.

Concerning greenhouse gas emissions, many Commonwealth countries have shown substantial increases in emissions since 1990, while others are less dramatic. However, six countries show decreases in greenhouse gas emissions, and five of these have shown *substantial* decreases, again justifying their status as policy and practice models. These are Guyana, registering a 63.3 per cent decrease, Papua New Guinea, producing a 62.4 per cent decrease, the UK, with a 24.6 per cent decrease, and Solomon Islands, with a 22.2 per cent decrease. Fiji has recorded a 3 per



cent decrease, adding to the numbers of island states showing leadership in producing effective outcomes on this measure. To place this in context, the global average is a 40 per cent increase in post-1990 greenhouse gas emissions.

#### **Renewable energy uptake**

Lastly, in most cases, the key to the above results is natural resource

protection and sustainable utilisation, as in the case of Guyana, and an uptake of renewable energy sources to replace fossil fuels. On this measure, those Commonwealth countries leading the adoption of renewables are Vanuatu, with an 11.9 per cent increase between 1990 and 2015, Cyprus, with a 9.4 per cent increase, Jamaica, recording a 9.2 per cent

increase, the UK (8%), Rwanda (6.6%) Malta (5.4%) and Solomon Islands (4.3%). Rwanda's status as a land-locked country indicates that non-island states can also productively implement policies recognising that climate change is a priority for all and not just for countries at risk of imminent sea-level rise.

## Endnotes

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1 The figures referred to throughout this section on populations

affected by sea level rise are those between the median and 83rd percentile markers rather than the 17th and 83rd percentile markers found in Table 28.

2 Unfortunately, per capita figures are not available.

3 This is a figure provided in 2000. No data have been provided since 2000 from South Africa.

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