

# Why Women Are More Vulnerable to Climate Change?

Golam Kibria Ph.D; December 2012

## Key points

Women in least developed countries (LDCs) and developing countries in Africa and Asia are responsible for food production (agriculture, livestock and fisheries), collection of water and bio-fuel (wood) and management of natural resources and taking care of children and elderly. Women farmer accounts for 45-80% percent of all food production in poor countries. Climate change is projected to cause severe impact on rural women via crop failure, shortages of bio-fuel and clean water, natural disasters, and diseases etc. The environmental degradation due to climate change will force women to move further to obtain natural resources such as clean water and fuel-wood. Flooding will increase deaths, injuries, and exposure to infectious diseases and toxic contaminants to women. Women as water collectors would face increasing exposure to malaria as global warming would amplify mosquitoes. Various Research conducted reveals that women in poor countries are fourteen times more likely to die than men during a disaster. For example, in the 1991 cyclone in Bangladesh about 71 percent of who died was women. Women's greater vulnerability to disasters can be linked to the fact that women in LDCs and developing countries are less mobile (women are generally homebound, in some cases need permission of the husband to move out), some cannot swim, and most of them lacking an access to information regarding disasters. Currently, women are underrepresented in decision-making with respect to plans and actions to mitigate, and adapt to, climate change. There is a need for well representation and engagement of women from a gender perspective in development and implementation of climate change related development projects. Climate change is a global problem which offers the humanity an opportunity to unite and work together for sustainable development and peace keeping, addressing gender inequalities and enhancing human security.

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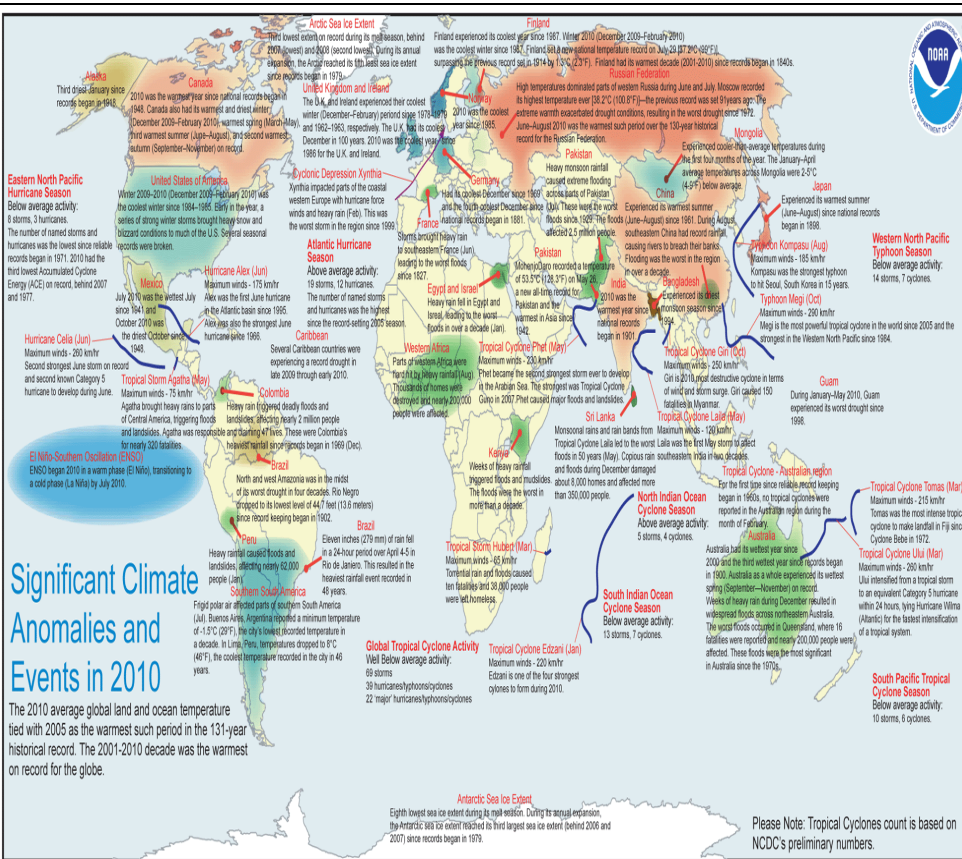
## 1. Introduction

[References 1,2,3,4,5,6,7,8]

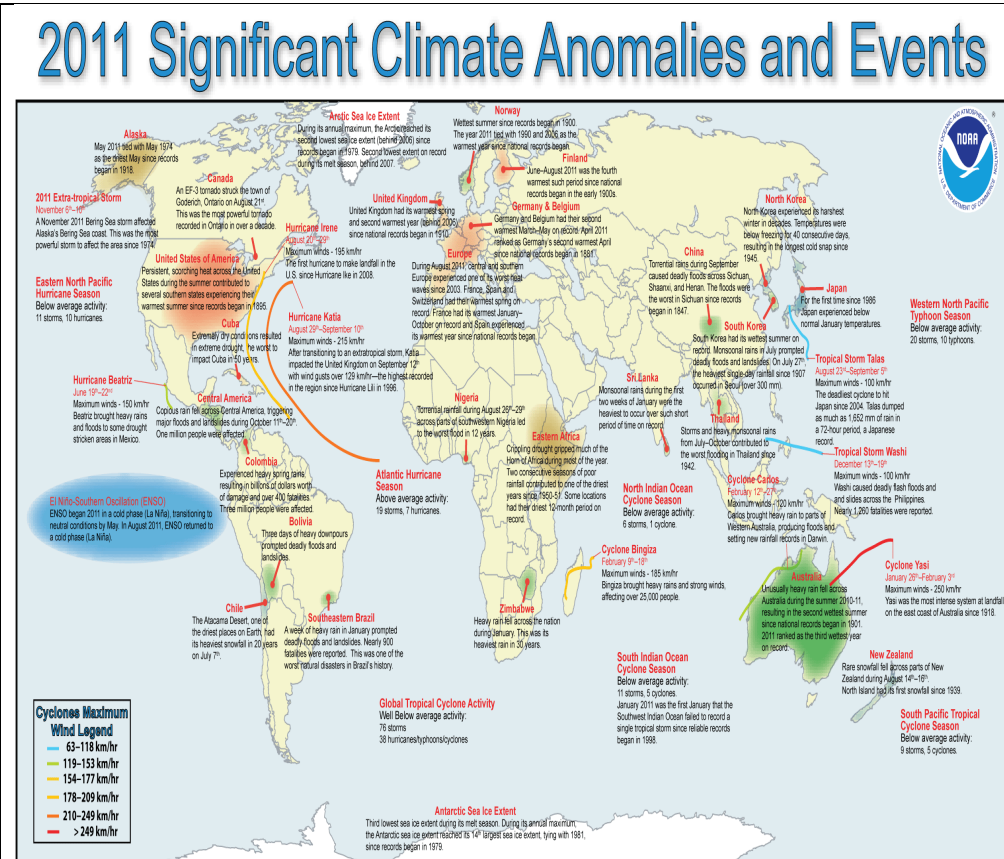
Climate change will cause a rise of temperature, carbon dioxide, sea levels, and ocean acidification. It will increase the frequency and intensity of extreme weather events [1,2]. Climate anomalies and events data compiled by National Oceanographic and Atmospheric Administration (NOAA, USA), reveals that several countries are experiencing extreme climate events such as droughts, heat waves, heavy rainfalls, floods and cyclones (see Figures 1.1 and 1.2 on page 2). Droughts, heat waves, floods, cyclones can cause negative impact on food security (e.g. food availability, food accessibility, food utilization and food system stability), water security (e.g. water supply, water quality), and health security (e.g. diseases) in both developed and developing countries (see section 3). Though climate change will impact all countries, however, its impact will be differently distributed among different regions, generations, age classes, income groups, race, caste, ethnicity, occupations and genders (sex). In particular, the women in poor and least developed countries (Figure 2) will be disproportionality affected compared to men [see section 3] and as a consequence of climate change existing gender inequalities will magnify [3].



**Figure 2:** Womens in poor countries are responsible for collection of fire-wood (extreme left image), water (middle image) and agricultural food production (extreme right images). Women in general constitute more than 60 percent of the agricultural labour force in developing countries but will be severely affected due to climate change compared to men; image sources: [4,5,6]



**Figure 1.1:** Climate anomalies and events in the world during 2010 [Australia- wettest year since 2000, floods in northeastern Australia and worst floods in Queensland, tropical cyclone ‘Ulu’ (250 km/hr); Bangladesh- experienced driest monsoon season since 1994; Canada- warmest year since records began in 1948; China- experienced warmest summer since 1961; India- warmest year since records began in 1901; Japan- experienced warmest summer since records began in 1898; Kenya- weeks of heavy rainfall triggered floods and mudslides; Myanmar- cyclone ‘Giri’ (250 km/h) caused 150 fatalities; Pakistan- heavy monsoon rainfall caused extreme floods (20% of the country), affecting 20 million people and claiming 2000 lives; Russia- Moscow recorded highest temperature ever and worst drought; Sri Lanka- worst floods in 50 years; Western Africa- heavy rainfall, 200,000 people affected; USA- coldest winter since 1984-85] [7]



**Figure 1.2:** Climate anomalies and events in the world during 2011; (Australia- 2<sup>nd</sup> wettest year since national records began in 1901; China- deadly floods; Eastern Africa- drought in much of the Horn of Africa and one of driest year since 1950-51; Europe- experienced worst heat waves since 2003; Finland- July–August was the fourth warmest since records began in 1990s; South Korea- wettest summer on record; UK- warmest spring since national records began in 1910; USA- warmest summer since records began in 1895; Zimbabwe- heaviest rainfall in 30 years [8].

## 2. Women's role

[9,10,11]

Women in poor and least developed countries are responsible for agriculture (e.g. sowing, weeding, fertilizing and harvesting the staple crops such as rice, wheat and maize), rearing of livestock and farming of fish and prawn, collection of water and bio-fuel (fuel-wood) and managing natural resources (Figure 2). They are caregivers of children, sick and elderly, the home and assets. In particular, women's in poor countries are exclusively responsible for growing vegetables in home gardens (Figure 2), for example home gardens accounted for half the farm's total production in Nigeria and in the case of Indonesia it accounts for more than 20 percent of household income and 40 percent of domestic food supplies [9]. Women in general constitute more than 60 percent of the agricultural labour force in developing countries [10], for example in Benin, Congo, and Zimbabwe women carried out more than 60 percent of agricultural work (Figure 3) [9]. In Bangladesh, Bhutan, Cambodia, China, India, Myanmar, Nepal, Pakistan and Vietnam high percentages of women are also employed in the agricultural sector, with estimates ranging between 60 and 98 percent [11]. Apart from their important roles in household food security, they are also managers of natural resources and biodiversity, although they have restricted access to land, labour, capital and technology and information etc. [9,10,11].

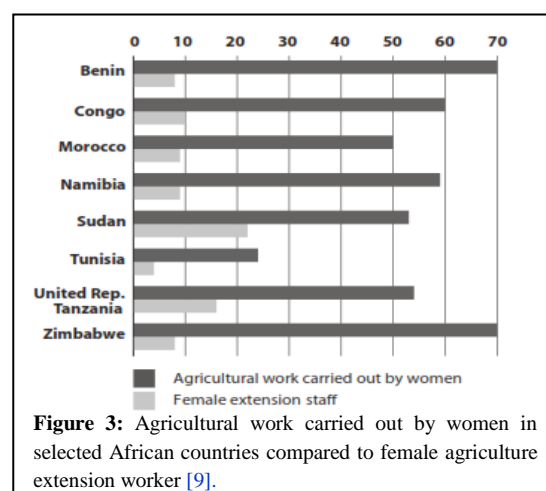


Figure 3: Agricultural work carried out by women in selected African countries compared to female agriculture extension worker [9].

## 3. Climate change impacts on women

[12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29]

Climate change would severely impact rural women's in LDCs and developing countries via crop failure, shortages of bio-fuel, clean water, natural disasters, and diseases (Figure 4). It is widely acknowledged that women will be affected most than men because they depend on natural resources and the environment for all of their activities and the basic needs of their families.

### 3.1: Food security [2,19,20,21,22]

Climate change (e.g. higher temperature, lower rainfall, proliferation of pests and diseases, sea level rise, ocean acidification) is projected to reduce crop yields and food production in the in low altitudes, semi-arid and tropical areas and rain fed dependent agriculture in Asia and Africa, of which the sub-Saharan Africa and South Asia is projected to be most affected [20,21]. Furthermore disasters like floods and cyclones would cause loss of crops (e.g. rice, wheat, maize, nuts, chillies, and lentils), trees, seeds, livestock (e.g. cows, goats, and buffaloes), poultry (e.g. chicken, ducks), animal fodder, fisheries and aquaculture. Sea level rise can cause loss of agricultural land due to flooding of lands and intrusion of seawater, as a result agriculture in low-lying coastal area or adjacent to deltas may be affected [22]. Women farmers who accounts for 45-80% per cent of all food production (agriculture, livestock and fisheries) in developing countries will further be affected since traditional food sources will become more unpredictable and scarce due to climate change. Women may loss income as well as harvests. Related increases in food prices make food more inaccessible to poor people, in particular to women and girls whose health has been found to decline more than male health in times of food shortages. The above discussion thus highlights that climate change may bring in severe economic hardships of poor women who depends on agricultural food production or work as labourer in food producing industries.

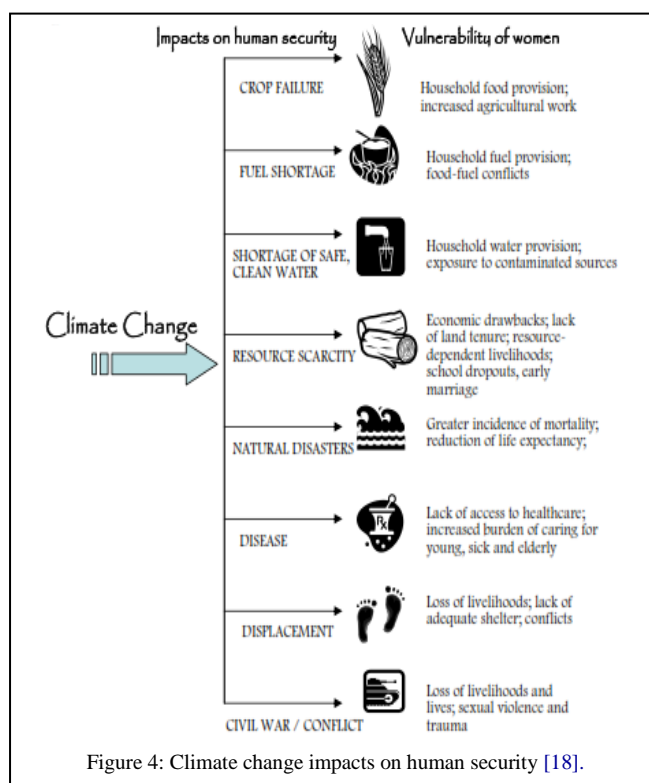


Figure 4: Climate change impacts on human security [18].

### 3.2: Water security, energy security

[18]

Droughts, water contamination, sea level rise and increasing demand for irrigation may exacerbate existing shortages of water. In the rural areas of Africa and Asia, women are highly dependent on biomass, such as wood, agricultural crops, wastes and forest resources for their energy and livelihoods. However, in the face of climate change, the ability of women to obtain these indispensable resources is reduced. In addition, the environmental degradation due to climate change will force women to move further to obtain natural resources (clean water, fuel-wood). For example, women in Nepal were able to collect fuel-wood in 2 hours during 1970 but their collection time has now increased to an entire day and involved walking



through rough terrain. Similarly women in Bangladesh need to travel long distances (sometimes up to 10 km) due to salinization of drinking water sources which requires sometimes travelling up to ten kilometres on foot every day in search of water. The extra travel will increase the likelihood of exposure of women to harmful chemicals and biological toxins and diseases. Water logging due to heavy rain and floods may cause differential health impacts in women than men in developing countries (Asia) since the situation will force to drink unhygienic water as tube wells are frequently contaminated where women are forced to stay close to the community.

### 3.3: Health security

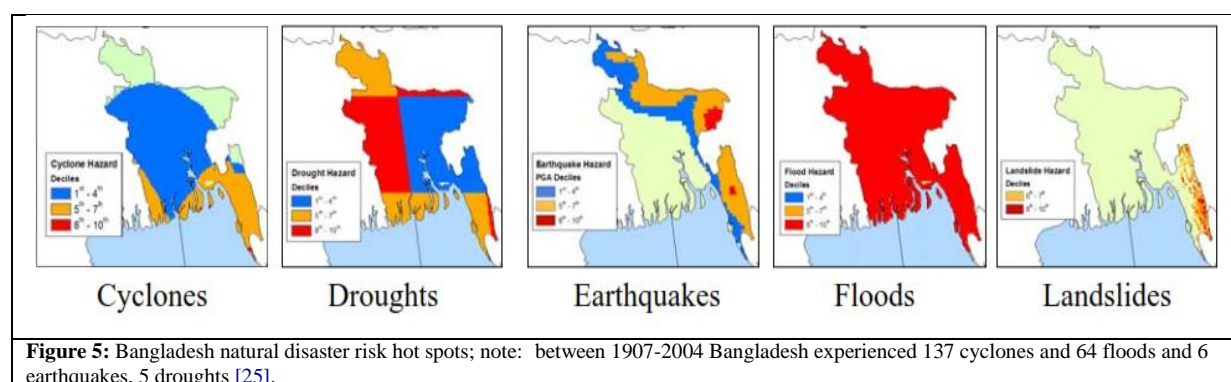
[2,22,23]

Climate change (rise of temperature) may cause increased spread of vector and water borne diseases, heat stress (heat cramps, heat exhaustion, and heat strokes) and respiratory illness to both women and men. Flooding due to climate change can increase deaths, injuries, and increase incidence of infectious diseases and exposure to toxic contaminants to women. Due to shortage of water, contaminated water can be used which increases the risk of diarrhoeal diseases to women and children. High rain fall and higher humidity may influence mosquito breeding. Women as water collectors would face increasing exposure to malaria (as global warming would amplify mosquitoes), which is endemic in many parts of Africa and Asia and parts of Central and South America. Further rising temperature may increase the transmission of malaria to pregnant women since they are twice as appealing as non-pregnant women. The rise of temperature may increase the risk of food poisoning by bacteria such as *Salmonella* spp., since multiplication of *Salmonella* spp., may be favoured at higher temperatures. Similarly seafood contamination by freshwater and marine algal toxins may be enhanced at higher temperatures affecting both women and men [2]. Increased salinity exposure of coastal populations in Bangladesh for example (due to sea level rise) through drinking, cooking and bathing caused hypertension, miscarriage among pregnant women, skin disease, acute respiratory disease, acute respiratory infections and diarrheal diseases [22]. Sea level rise can increase the risk of cholera in many countries including Bangladesh since cholera bacterium, *Vibrio cholerae* survive longer in salinity range from 2.5 ppt to 30 ppt and need sodium ion (Na<sup>+</sup>) for growth [22]. Pregnant women, lactating mothers and differently disabled women suffered the most after a disaster (cyclone), as they found it difficult to move before and after the cyclone hit.

### 3.4: Natural disasters

[17,24,25,26,37]

A recent climate change vulnerability index (CCVI-2011) ranked sixteen Asian and African countries of 'extreme risk' to climate changes [see 17]. These sixteen countries are also vulnerable to natural disasters, of which Bangladesh (CCVI rank 1) is of high risk of cyclones and floods (Figure 5, Table 1). Cyclones and floods caused significant women and men mortality between 1918 and 2009 in Bangladesh (see Table 1). Globally more women deaths were recorded during disasters, for example, various research conducted found that women are fourteen times more likely to die than men during a disaster [24,37]. In the 1991 cyclone in Bangladesh about 71 percent of who died was women (138,882 death, ratio of male: female death rate was 1:14) [24,26,37]. Similarly, during the extreme heat wave in Europe (2003) significantly more elderly women died than men; in 2004 Tsunami (Aceh, Indonesia), more than 75 percent of those who died were women [24]. Women's greater vulnerability to disasters can be linked to the fact that women in poor developing countries are less mobile (women are generally homebound, more often confined to the house, in some cases need permission of the husband to move out), some cannot swim, and most are illiterate (women make up two-thirds of the world's illiterate population) and they have less/ lack of access to information regarding disasters and have less decision-making power.



**Table 1:** Disasters (cyclones and floods) in Bangladesh and numbers of people affected and mortality [26, 27]. NA=not available

Date	Event	Numbers affected	Deaths	Comments
2009	Cyclone	3,900,000	190	Area affected: Satkhira, Khulna, Bagerhat, Barisal, Patuakhli, Bhola, Barguna, Pirojpur, and Patukhali districts Storm surge: 10 ft; wind speed: 120 km/hr
2007	Cyclone (Sidr)	8,900,000	3363	Area affected: Khulna, Barisal coast near Baleshar River Storm surge: 15 ft; wind speed: 223 km/hr
2004	Flood	3,900,000	700	
2002	Cyclone	-	3	Area affected: Sundarban Raimongal river

				Storm surge: 5-7 ft; wind speed: 65-85 km/hr
1998	Flood	15,000,000	1000	
1997	Cyclone	-	155	Area affected: Sitakundu Storm surge: 15 ft; wind speed: 232 km/hr
1997	Cyclone	-	78	Area affected: Sitakundu Storm surge: 10-15 ft; wind speed: 150 km/hr
1995	Flood	12,656,000	NA	
1994	Cyclone	-	188	Area affected: Cox's Bazar, Teknaf Storm surge: 5-6 ft; wind speed: 278 km/hr
1993	Flood	11,469,500	NA	
1991	Cyclone	15,438,800	138,882	Area affected: Chittagong ; Storm surge: 12-22 ft; wind speed: 225 km/hr
1988	Flood	73,000,000	2379	
1988	Cyclone	-	6133	Area affected: Khulna Storm surge: 2-14.5 ft; wind speed: 160 km/hr
1987	Flood	73,000,000	1657	
1985	Cyclone	-	4264	Area affected: Chittagong Storm surge: 15 ft; wind speed: 154 km/hr
1984	Flood	30,000,000	553	
1983	Drought	20,000,000	NA	
1974	Famine	-	2000-3000	
1974	Flood	38,000,000	28,700	
1970	Cyclone	3,648,000	500,000	Area affected: Chittagong, Bhola Storm surge: 10-33 ft; wind speed: 224 km/hr
1968	Flood	15,889,600	126	
1965	Cyclone	-	17,279	Area affected: Chittagong and Barisal Coast Storm surge: 12 ft; wind speed: 160 km/hr
1965	Cyclone	-	36,000	
1963	Cyclone	-	11,520	Area affected: Chittagong, Cox's Bazar Storm surge: 8-12 ft; wind speed: 209 km/hr
1961	Cyclone	-	11,468	Area affected: Chittagong Storm surge: 8-10 ft; wind speed: 164 km/hr
1943	Famine	-	1,900,00	
1942	Cyclone	-	61,000	
1918	Epidemic	-	339,000	

### 3.5: Livelihoods

[28,29]

Climate change will increase the frequency and intensity of extreme events such as floods and cyclones which will impact on the livelihoods of poor women across the globe via destruction of housing and homestead; crop loss (blown or washed away), livestock death (cows and goats) and inundation of fish farms. Due to damages to infrastructure and communications during floods and cyclones women cannot access the market to buy or sell food such as milk, eggs, vegetables or other products. Therefore women will be forced to trade within the village or accept lower prices offered by male buyers from other areas. Climate change will increase risks to poor women who are unable to build strong houses that can withstand against high winds, heavy rains (due to lack of capital). As a consequence of climate change (droughts) male out migration may happen due to shortage of resources thus allowing increased work load on women. This will likely cause more women left behind imposing additional agriculture and household duties [28,29].

## 4. Gender equality and adaptive strategies and policies for women

[12,24,30,31,32,33,34,35]

Seventy per cent of the 1.3 billion people who live in extreme poverty worldwide are women and girls. Though women in LDCs and developing countries produce most food but they own only one per cent of the world's resources [31,32]. As mentioned in section 2 that women in poor countries are usually responsible for household work, food production and collection of natural resources (water and firewood) therefore women can play a significant role to reduce their families' carbon footprint and environmental impact. However, women are not part of decision making bodies as are the men in their societies in developing nations. The statistics indicate that there are very few countries in which there are an equal number of male and female policymakers and in many countries women still play a very insignificant role in government's policy making process. There is a need of equal representation of both women and men in decision-making with respect to plans and actions to mitigate, and adapt to, climate changes. Community-based environmental education is required in order to encourage equitable involvement of women and men in climate change adaptation activities and policy development since it is expected that when there is greater gender equality there is a possibility of lower impacts on the environment [30]. The UN women advocates for gender equality and empowerment as integral to mitigating and adapting to climate change and achieving sustainable, environmentally sound development [33].

It is generally hypothesized that in societies where there is greater gender equality there will be relatively lower impacts on the environment. Therefore it is essential to incorporate both women and men into the decision-making framework on climate change mitigation and adaptation initiatives. For example, a recent study carried out found that CO<sub>2</sub> emissions per capita are lower in nations where women have higher political status [12]. Therefore empowerment of women (inclusion in decision making bodies) is an important ingredient in building climate resilience [35]. The following examples highlight the significance of women in climate solution [24]:

- women are considered more sensitive to risk, more prepared for behavioural change and more likely to support drastic policies and measures on climate change
- women globally live in a more sustainable way than men, leave a smaller ecological footprint and cause less climate change
- Swedish research found that women tend to worry more about the environment
- women tending to be more environmentally conscious than their male counterpart

A number of adaptive strategies and policies can be undertaken to reduce impacts from climate change on women (see Table 2).

**Table 2:** Adaptive strategies and policies for women to minimise impacts from climate change [2,12,17,18,22,34,35].

Security aspect	Climate change impacts	Gender aspects	Adaptive strategies for women and opportunities (policy)
Food security	<ul style="list-style-type: none"> <li>-Agricultural production changes (low yields in low latitudes, semi-arid and tropical areas (Africa, Asia))</li> <li>-Fishery stocks decrease (abundance and distribution changes)</li> <li>-Flooding (inundation of crop fields)</li> <li>-Food contamination (terrestrial and seafood) by bacteria <i>Salmonella</i> spp, <i>Vibrio</i> spp. Mycotoxins and algal toxins)</li> </ul>	<ul style="list-style-type: none"> <li>-More time and energy needed for food production</li> <li>-Increased work-burden</li> <li>-Calories/micronutrients deficiencies</li> </ul>	<ul style="list-style-type: none"> <li>-Adapting agricultural practices: switching to other crops; drought and salt tolerant crops; shifting cropping seasons; climate smart agriculture; integrated agriculture-aquaculture (fish) farming; culture of fish tolerant to higher temperature, salinity and low quality water</li> <li>-Involved women and men in conservation and biodiversity</li> <li>-Saving food</li> <li>-Land right for women</li> <li>-Better nutrition supplements for needy families</li> <li>-Capacity building (skills, knowledge, competencies) of women on agriculture and fisheries extension</li> </ul>
Water security	<ul style="list-style-type: none"> <li>-Lack of water (water shortages due to droughts)</li> <li>-Pollution and sanitation of water (chemical and biological pollution due to extreme weather events-floods, cyclones, sea level rise)</li> <li>-Flooding (contamination of water resources)</li> </ul>	<ul style="list-style-type: none"> <li>-More time and energy needed for water provision</li> <li>-Increased work-burden</li> <li>-Health problems since women and girls have to walk long distances to fetch water</li> </ul>	<ul style="list-style-type: none"> <li>-Promote water saving practices</li> <li>-Rainwater harvesting</li> <li>-Reuse and recycling of water (where feasible)</li> <li>-Purchasing water from water vendor</li> <li>-Empower women and facilitate equal participation in management of water resources</li> <li>-Safeguarding affordable drinking water</li> <li>-Capacity building of women on water management and water quality monitoring</li> </ul>
Energy security	<ul style="list-style-type: none"> <li>-Lack of biomass fuel-wood (drought, low rainfall, sea level rise cause biodiversity loss)</li> </ul>	<ul style="list-style-type: none"> <li>-More time and energy needed for fuel collection</li> <li>-Increased work-burden</li> <li>-Inferior energy sources: indoor pollution</li> </ul>	<ul style="list-style-type: none"> <li>-Switching to other energy sources</li> <li>-Use of energy saving devices</li> <li>-Provision of fuel sources</li> <li>-Provision of (and training in) energy saving devices</li> <li>-Ecological regeneration</li> <li>-Capacity building of women on natural resource management (afforestation, reforestation, biodiversity conservation)</li> </ul>
Health security	<ul style="list-style-type: none"> <li>-Increased infectious diseases (due to contamination of water, food)</li> </ul>	<ul style="list-style-type: none"> <li>-Women take care of the sick, and disabled</li> <li>-Women often lack of, or have less access to health services</li> <li>-Loss of medicinal plants and biodiversity</li> </ul>	<ul style="list-style-type: none"> <li>-Medicinal plants and application of other preventive or alternative methods</li> <li>-Access to health facilities and services for women</li> <li>-Increase in caring tasks</li> <li>-Capacity building of women on emerging health issues relevant to climate change</li> </ul>
Disasters	<ul style="list-style-type: none"> <li>-Mortality through different extreme events (floods, cyclones)</li> <li>-Housing infrastructure and services destroyed</li> <li>-Male out migration to seek jobs elsewhere leaving women</li> </ul>	<ul style="list-style-type: none"> <li>-More women than men die or injured (not learning how to swim; cultural constraints on female mobility)</li> <li>-Limited land right for women</li> </ul>	<ul style="list-style-type: none"> <li>-Provision for safe shelter for both women and men</li> <li>-Improving homes and houses</li> <li>-Disaster preparedness (training on gender sensitive disaster risk reduction)</li> <li>-Gender sensitive early warning systems</li> <li>-Gender-specific (women's participation on equal basis in policy and programme cycles)</li> </ul>

## 5. Conclusion

[12,36],

The impacts of climate change could be severe for women living in third world countries since with climate change there would be increasing scarcity of water, reductions in crop yields and forest biomass, and increased risks to human health with children, women and the elderly in a household becoming the most vulnerable. Women's specific knowledge of maintaining biodiversity, through the conservation and domestication of wild edible plant seeds and food crop breeding, is a key to adapting to climate change more effectively [12]. Currently women are underrepresented in decision-making with respect to plans and actions to mitigate, and adapt to, climate change. There is a need for well representation and engagement of both women and men from a gender perspective in development and implementation of climate change related development projects, in particular the role of women is undervalued in many societies in particular in developing countries. Climate

change is a global problem which offers the humanity an opportunity to unite and work together for sustainable development and peace keeping, addressing gender inequalities and enhancing human security [18].

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