1. Introduction

The urban areas of the world are expected to absorb all the population growth over the next four decades, and most of this growth will be concentrated in the cities and towns of the less developed regions\(^1\). It is expected that the number of urban dwellers will increase by nearly 3 billion by 2050. Providing safe and secure water for these fast growing urban populations, therefore, is one of the greatest challenges for the present and the future. The challenge is magnified in megacities where the population density is high, and there is an ever-growing volume and expanse of unstructured housing and tenements, and infrastructure is stressed to the maximum.

Although widely assumed that cities provide better water and sanitation services than those found in rural areas, access depends upon many factors such as location of the home, economic situation of family members, social segregation/integration within the community, whether or not the home can be connected to the pipeline, and the extent of supply coverage in the city. Geographical and social equity in distribution of services cannot be taken for granted and is dependent on complex factors. As such, pro-poor services or equality-oriented services are not generally a normal practice in megacities. Financial constraints on the part of the utilities are usually cited as a reason for unequal or inadequate distribution of services; however, a general lack of accountability of the service providers to the people is sometimes found to be the main ‘missing ingredient’\(^2\). Accountability necessitates the meaningful involvement of users in the planning, delivery and monitoring of water services. This increases the chances of delivering reliable, sustainable and affordable water services to more urban inhabitants\(^3\). Success depends on good governance and the engagement of men and women as equal partners and agents for change\(^4\).

Strategies for public participation in policy planning and decision-making with regard to water supply services, climate adaptation and also in improving responses to water related disasters are designed for the entire population of the vulnerable area, and use existing social structures for decision-making and communicating information. These existing structures do not necessarily represent the community, and do not as a rule provide space for women to participate and make their voices heard. Men and women have differential access to water, and gender-specific vulnerabilities that are determined by their socio-economic, political and spatial contexts. An understanding of these vulnerabilities would provide a context for analysis of the different needs and

\(^1\) http://www.unwater.org/topics/water-and-urbanization/en/

\(^2\) Yael Velleman, Social accountability Tools and mechanisms for improved urban water services, WaterAid, June 2010, p. 3.

\(^3\) Ibid.

capacities of men and women and the kinds of interventions that would be needed to improve their water security and help them to adapt to the impact of climate change. It would also provide guidelines for their participation in climate mitigation. Responses would then be more effective, focusing on the different needs, constraints and strengths of different groups of men and women in the local community.

The purpose of this chapter is to draw attention to the gender dimensions of urban water and climate adaptation and to suggest measures for integrating gender concerns in climate adaptation plans for megacities.

2. Understanding gender

Gender refers to the social and cultural differences between men and women, to their responsibilities, tasks, knowledge and foremost to the relations between men and women. Gender does not simply refer to women or men, but to the way their qualities, behaviours, and identities are determined through the process of socialisation. Gender is generally associated with unequal power and access to choices and resources. The different positions of women and men are influenced by historical, religious, economic and cultural realities. These relations and responsibilities can and do change over time.\(^5\)

The following points help to ‘unbundle’ the concept of gender:

- Sex indicates the physical differences between men and women based on their reproductive roles.
- Gender refers to the roles of men and women in society and their relationships with each other, which are socially and culturally constructed and determined.
- Through the process of socialisation, each society and culture inculcates in men and women different behaviours, personality traits, attitudes, values and also the power relations between men and women. Therefore behaviour that is acceptable in one culture, society, or country may not be acceptable in another.
- As a result it is generally accepted that men and women can or cannot do certain things. For example, it may be ok for men to use public transport and travel by themselves, but it may not be appropriate for women to use public transport or travel alone without a male escort. These restrictions on mobility reduce the options for women in many areas such as employment and opportunities to earn better incomes, obtain higher education, access financial resources, and improve their livelihood security.
- Gender differentials cut across race, ethnicity, class, age, health and disability. Social categories are inter-connected and are further divided by gender. The urban poor, for instance cannot be referred to as one group. The level and extent of poverty may be further determined by ethnicity, race, age, sex, and

\(^5\) Cap-Net and Gender and Water Alliance, Why Gender Matters in IWRM.
gender roles. There are more poor women than there are poor men in urban conglomerates.

✓ Gender inequalities occur because of the unequal power relations between men and women, which have been perpetuated and reinforced over generations. The male view has gained precedence over the female view, consequently few women are able to participate in decision-making at different levels, and even at the household level.

✓ Gender roles and relationships are not static. They change over time and in different contexts. For example, voting rights for women, women in political leadership, women as CEOs and women wearing trousers, were not acceptable in many cultures in the past but change has taken place over the years. Although there is still a long way to go, women now are able to assert themselves and take on leadership roles. Similarly, men’s roles are also undergoing a change, making their active participation in domestic duties more acceptable than it was in the past.

Social constructs have made resources such as land, water, credit and capital, mobility, and information more accessible to men. All over the world, women are more likely to be given the primary responsibility for family care, including the provision of food and water, and caring for the children, elderly and sick family members. When there is insufficient access to water services, food, energy and mobility, these tasks can be extremely challenging and time-consuming. Time is therefore a scarce resource for many women. Care giving tasks are not valued economically and are not recognized as contributions to the economy. These inequalities persist even in countries with a high degree of gender equality and a high share of women in the formal labour market.

Gender mainstreaming is a strategy for making women’s as well as men’s concerns and experiences an integral dimension of the design, implementation, monitoring and evaluation of policies and programmes in all political, economic and societal spheres so that women and men benefit equally and inequality is not perpetuated. The ultimate goal is to achieve gender equality.  

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6 Ibid.
3. Gender dimensions of water, food and livelihood security in megacities

People need water every day for drinking, for sanitation, and for social, religious and economic purposes. In rural areas people access water from the environment. In urban areas most people are dependent on the water supplied by utilities, either directly to their home or through a public standpipe. Every society has norms of behaviour for men and women and expectations of the roles they should play in the household and the community. In most societies, whether in developed or in developing countries, the primary responsibility for accessing and using water at the household level rests with the women. Cooking, cleaning, laundry, hygiene and sanitation, for which water is needed, are tasks primarily performed by women. Hygiene and cleanliness are particularly important for women because of their reproductive functions.

When poor households or communities living in slums or informal settlements do not have access to piped water networks, they tend to meet their water needs through a combination of different sources and means. They (most likely women and girls) either collect water freely from public or private protected or unprotected sources and/or purchase water from formal or informal vendors, depending upon the quantity and quality of water available. On one hand, resource-poor families may not have sufficient financial resources to obtain water connections for their homes, but on the other, they end up spending much more money on purchasing water, often of poor quality, from water vendors. Health risks are associated with the consumption of poor quality water, further exacerbating the situation.

Lack of access to water, or inadequate water supply has different social, economic and health implications for men and women. Economic resources are required to be able to obtain sufficient water on a daily basis to meet personal needs and those of the family. When time and resources need to be spent in accessing the water required for the daily needs, the consequence could be a loss of income, particularly for women, from inability to go to work, thus perpetuating a cycle of economic crisis. This is particularly true of female-headed households. Water scarcity also affects the schooling of children, particularly girls, when time spent in education has to be spent on collecting water. Investing in the infrastructure needed to provide adequate water and sanitation facilities can sharply reduce health costs and loss of labour as a result of illness. It can also release women for productive activities by reducing the burden of collecting water for cooking, laundry and other household uses.

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8 Ibid.
As the world's cities grow, the role of urban farmers becomes increasingly important. The percentage of urban families engaged in agriculture varies from 10% in some large cities in North America to as many as 80% in some smaller Siberian and Asian cities. The informal activities of city farmers require increasing financial and technical support.

A large number of women farmers are engaged in urban and peri-urban agriculture, contributing significantly to urban food security. City farming has a long tradition in both Asia and Europe. There are some 200 million urban farmers in the world, supplying food to 700 million people, about 12% of the world population, and it is estimated that urban farming provides direct earnings for at least 100 million people.

City farming or urban agriculture is an important livelihood and source of income for many, especially women, who because of a lack of education and/or inability to find adequate employment are unable to provide food security for their families. Urban and peri-urban farmers largely grow food for home consumption, and for many women, it is a part-time occupation and source of cash income from sale of excess production. Commodities such as fruit, vegetables, pork and poultry provide some 10-40% of the nutritional needs of urban families in developing countries, thus making a major contribution to urban food security.

According to FAO, urban agriculture provides a number of major benefits, including income for producers; employment for under- or unemployed residents; environmental improvements such as reduced run-off; avoided costs of wastewater treatment and solid waste disposal; import substitution; and reduction of urban squalor. Wastewater is a reliable source of irrigation even in times of scarcity and contains nutrients required for plant growth. The use of wastewater for agriculture is a form of nutrient and water recycling. However, there are many health implications of using untreated wastewater for food production and wastewater irrigation needs to be regulated.

Since urban and peri-urban agriculture is often not recognized by local authorities as ‘legitimate’ farming, men and women farmers face a constant threat of losing access to the land and water resources that they are using for food production. It is important to recognize that both freshwater and wastewater resources are being used for urban agriculture, and urban plans should make provisions for sustaining this important

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10 Ibid.
11 Ibid.
12 Ibid.
economic activity as it contributes to the food security of the city. Land tenures for women farmers are very important as women own very few productive resources, and have much less access to land and water for economic purposes. Local authorities need to monitor the use of wastewater for irrigation by making it safe for food production both for the farmers and consumers. Extension services for women and men farmers should be put in place, by providing training, seeds and other technical support for making urban farming a sustainable business.

4. Gender and climate adaptation in megacities

The adaptive capacity of individuals and households depends upon the extent of their water, food and livelihood security. A reliable income and employment, access to financial resources, access to water, food and sanitation, quality of infrastructure, access to energy, and social support within their communities are factors that improve adaptive capacity. The most adversely affected in times of climate distress are those men and women who work in the informal sector such as daily wage labour, and lack social and financial support systems. In this context, poor women and female-headed households have the least adaptive capacity. Women’s work burden increases when there are food and water shortages due to climate events, and their care-giving roles become more demanding when climate impacts on health and psychosocial well-being. It is important to be aware that the role of women as family or professional carers during disaster is often invisible, while men’s actions in rescue operations and emergency services tends to be more visible and recognised within the community.

Climate events and disasters not only disrupt physical infrastructure but the structure of the society as well. Lives change and so do the ‘normal’ ways of doing things. While on one hand social and gender disparities are magnified by impacts of climate change, natural disasters often offer women the opportunity to challenge gendered status in society. Not only do women take up traditionally male tasks outside their domestic spheres, but often do so against the wishes of the men in the community, thus challenging their perceived roles in society. Women are most effective at mobilizing the community to respond to disasters, and as a result of their response efforts, women develop new leadership and management skills. It is only in times of extreme stress such as droughts and natural disasters, that men are seen playing a major role in accessing water for domestic use, which is usually the woman’s responsibility.

13 Guidebook on Gender and Urban Climate Policy, June 2015.
14 Ibid.
15 Ibid.
17 Ibid.
Five good reasons why cities should pursue a gender-sensitive approach to urban climate policy

Climate change poses huge challenges to cities but also represents an opportunity to work towards more healthy, livable, sustainable, equitable and inclusive cities for the following reasons:

First, both women and men have the right to be involved in decision-making regarding climate policy, whether at city or neighborhood levels. The equal participation of women and men enhances the legitimacy of urban climate policy and builds a sense of ownership.

Second, climate policy is not only about technologies, it is also about people. People are subject to the impacts of climate change and their consumption and mobility is the underlying cause of greenhouse gas emissions. Hence, people are both the problem and the solution. This means that climate policy will only be effective if people, their gender roles and traditional tasks in society are taken into account. This makes urban climate policies and measures more acceptable, viable and efficient.

Third, policies should respond to the needs and capacities of all citizens, women and men, and include poor and marginalized groups. Otherwise, a vast array of human resources, innovative potential and traditional and practical knowledge is left untapped.

Fourth, a gender approach makes climate policy fairer and more equitable, taking into account that in most cases those who emit the least greenhouse gases are the most vulnerable and vice versa. If the gender dimensions of climate change are not addressed, the impacts of climate change will likely exacerbate existing inequalities and might have adverse impacts.

Fifth, the full integration of social and gender issues into climate policy maximize the effect of available resources for everyone: women and men, girls and boys.

5. Integration of gender concerns in climate adaptation

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18 Cited from Gender and Urban Climate Policy: Gender sensitive policies make a difference published by Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH in collaboration with United Nations Human Settlements Programme (UN-Habitat) and GenderCC-Women for Climate Justice, June 2015, page 7.

19 There are several examples cited in this section from the other chapters on megacities, of inclusive policy and participatory processes. Although these examples do not specifically discuss gender integration they demonstrate that participatory processes can be implemented successfully. These examples also indicate the opportunities for gender integration in policy and decision-making.
While an enabling environment can be created with a top-down policy in order to facilitate gender integration in climate change adaptation, this would not be enough to address the concerns, without a simultaneous bottom-up approach in terms of raising awareness in local governments, and mobilizing local communities.

In Lagos\textsuperscript{20}, The Role of Civil Society Organizations (which includes Women, youth groups) is well articulated in section 4.2.6 of the \textit{National Water Supply and Sanitation Policy (2000)}, which stipulates that NGOs shall make use of their presence and acceptability in the community to complement government efforts in promoting sanitation programmes, especially health and hygiene education. In particular, the NGOs shall be involved but not limited to the following:

1. Advocacy and mobilization
2. Health, hygiene education and sanitation promotion in the community
3. Development of community sanitation programme
4. Training & capacity building of the community
5. Developing communication materials that are easily understood and accepted by the community
6. Sourcing and providing necessary finance for projects
7. Bridging existing gaps between government and communities
8. Working with lead government agencies to ensure generation and consolidation of relevant data

Climate adaptation measures require building resilience, not only of infrastructure and services but also of individuals, households and communities. The first step in this direction would be to conduct a gendered assessment of the needs, capacities and vulnerabilities of men and women in different social, cultural, ethnic and geographically located groups in the megacity. This would help in planning appropriate interventions for each group of people and increase their effectiveness.

Generally characterized by poor housing conditions, inadequate access to safe water and sanitation, overcrowding and insecure tenure, men and women in slums and unstructured tenements feel the impacts of climate related events more strongly than in other parts of the cities or towns. More because slums and unstructured tenements are usually found in low-lying areas or in parts of the city or town where property is far less valuable, and consequently attract far less investment in infrastructure. These areas are as a result more vulnerable to the effects of extreme weather such as flooding

and drought.

In Buenos Aires, the most significant floods take place in the low basins of rivers and streams and have impact on the poorest homes since they are moved towards lower environmental quality lands because of the real estate market which sets a higher price to non-flooding lands, which grows in densification, and the lack of public rules which cannot dissuade, or the public control cannot avoid people’s settlement and household building on flooding or low environmental quality lands. Despite increasing criticizing of these space and social segregation processes, the unequal access to the city has not been duly set forth in the different governments’ agenda. Another great challenge related to climate change effects is drinking water and sanitation service supply: to extend the provision towards vulnerable areas where there is no supply at present; to guarantee service quality, quantity and continuity; preserve quality and quantity of water collection sources as well as the rest of the facilities which form part of the system.21

- Involve men and women from different localities and social groups in regulating and monitoring water services, in order to build accountability to the people and ensure that water services are resilient to climate adaptation.

Civil society organizations in Manila have been active at two levels. One, in keeping a close watch on the performance and returns on investments of the two concessionaires and, two, in promoting community-led water supply schemes for the large, underserved population of informal settlers. The campaign against rate increases (involving the Freedom from Debt Coalition, among others), for example, was a useful means of keeping public attention focused on the terms of the concession agreement. Advocacy was further built by networks such as Bantay Tubig and the Citizens’ Network for Adequate, Potable and Affordable Water. At the very least, this resulted in the concessionaires formally recognizing the need to deal with civil society views and by reorganizing their corporate structures to include arrangements for engaging with NGOs.

Many local communities have organized small-scale water providers which collaborate with the concessionaires to supply water to unserved areas. In these cases, people’s organizations (POs) have been set up as the interface to mobilize the communities, metering the consumption of water, ensuring bills are paid on time, and operational issues (such as leaks and theft) are addressed. The POs play a useful role in helping the concessionaires meet their obligations to serve the urban poor. A useful by-product of this arrangement is that earnings from POs are often ploughed back into local communities and used for social projects such as paving footpaths, street lighting, and securing formal ownership of the land on which the community is located.22

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Encourage men and women to participate in decision-making by providing mechanisms for interaction with policymakers and service providers. It is also important to create awareness in the local officials about the need and importance of socially inclusive decision-making and provide a mechanism for meaningful dialogue between policymakers, implementers, stakeholders and citizens. Capacity would need to be developed at different levels of governance, to assess and understand the gendered differences, while at the same time men and women in the community would need to receive training to participate in the conservation and adaptation programs.

In Mexico City, the National Water Law (LAN) and its complementary regulations set out the rules applicable to concessionaires of national waters; further, it mandates that the user sectors and the general public should be actively involved in water management, so that they assist in its administration and do not consider official regulations as an authoritarian imposition that results in greater resistance to its compliance. To promote this social participation, the so-called River Basin Councils and Groundwater Technical Committees (COTAS) have been formed, which represent the sectors involved in the use and management of water users, government levels, private sector, academia, involved in planning, decision-making, assessment and monitoring of water policy.

These subsidiary bodies are formed according to guidelines set by the CONAGUA and have legal personality; they receive an allowance from the CONAGUA, which can be supplemented with one of similar amount by the respective state government. Although they are not entitled to exercise authority, they assist in the collection of basic data for the study of water sources, participate in the formulation of management plans and regulations, assist in the supervision of its observance, and are a link between users and the CONAGUA23.

Provide incentives for men and women to participate actively and contribute to water conservation programs.

Los Angeles organizes a wide variety of events and has many on-going public outreach programs to inform, involve, and educate the City’s residents and customers about water issues. The City’s tremendous success in water conservation is a great example of the positive impact outreach programs such as ‘Save the Drop’ and ‘Cash in your Lawn’ can have on water conservation and on public water scarcity awareness. A recent example of a program with great public participation is the turf removal rebate program, which incentivizes removing thirsty grass and replacing it with California-friendly or drought-tolerant variety. Through a number of outreach programs and incentives, the City’s customers have made changes to their water use and have drastically reduced the

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average per capita water demand by 35% since 1990 from 173 to 113 gpcd (655 to 428 l/p/d). The City of LA, once known for its abundant water use, now has one of the lowest per capita water use of all large cities in the United States\textsuperscript{24}.

✓ It is important to inform the people about proposed changes in policy such as pricing, or in service provision and to engage them in a dialogue before decisions are taken. It is important to listen to their views and take them into consideration. Without the support of the people, policy reforms will not be successful.

In Paris, the pricing of water has been the subject of debate for several years. There are two main reasons for this: the burden placed by the water bill on households, especially the most disadvantaged, and the sustainability of the financing of water utilities. Today, there is an insufficient understanding of the bill that is actually paid by the user, and this information is essential to the debate on the public water and sanitation service\textsuperscript{25}.

In London, partly driven by the regulator and the move to retail competition but also due to the need to explain complicated issues to customers and engage their support, it has become more important than ever to engage with all types of customers. Research into customer attitudes is being carried out both by the water companies and the organisation which carries out collaborative research on behalf of the water industry: UK Water Industry Research (UKWIR) In particular a report recently produced by UKWIR: Post PR 14 Customer Engagement, Communication and Education\textsuperscript{26} was commissioned to enable the industry to take stock, collectively, and evaluate companies’ programmes of customer engagement encompassing pure research, wider consultation approaches and customer communication via education programmes and campaigns. The report includes 6 principles of good practice and guidance from companies in developing and undertaking customer engagement in the future as well as for CCGs in reviewing these activities.

Other work has been done to understand how better to explain the need for metering to customers who for so long have regarded the access to unlimited treated water as an absolute right. Some sensitive subjects have been dealt with such as what should or should not be thrown into toilets or poured down the drain as the reduction of unsuitable debris being thrown into the sewers could reduce the incidence of blockages and extend the life of sewers. The comparison of non-intrusive repair methods with intrusive repair methods has ensured that new approaches do not just provide short-term benefits\textsuperscript{27}.

\textsuperscript{26} Post PR 14 Customer Engagement, Communication and Education UKWIR, London 2015.
\textsuperscript{27} Cited from Jo Parker, 2015. Water in London and the Response to Climate Change.
✓ Special care needs to be taken in order to ensure that early warning systems, knowledge and information reach both men and women in the community. In communities where the mobility of women is restricted due to cultural norms, women may not be able to access early warning systems, or shelters in situations of extreme weather events, and to take advantage of post-disaster services. Research suggests that women and girls may be more vulnerable to some natural disasters as a result of less access to information and life skills development, and culturally constrained mobility of women outside of their homes. Shelters are often not suited to accommodate women in terms of their hygienic and safety requirements, and special arrangements would need to be made for them.

Beijing will issue a **Beijing Emergency Response Plan on Flooding** before the flooding season every year. The Plan puts the life and safety first as its purpose. It pursues the principles of preventing flood by laws, government leadership, jurisdictional administration, professionalism and social mobilization. The accountability system is adopted according to the Plan. Publicity and outreach programs on flood prevention and risk reduction have been conducted via media with an aim to deliver the relevant knowledge at schools, workplaces, communities and families, and ultimately increase the public awareness of disaster prevention and risk-avoiding and self-help capacities²⁸.

✓ Technical and financial assistance and support needs to be provided, especially for the poor, in order to prepare for extreme weather events that can cause flooding and damage houses and property.

Chicago’s **RainReady** program provides outreach, guidance with financing, and training course and workshops to enable homeowners and communities alike to reduce impacts from local flooding. These impacts include basement flooding and/or sewer backups. Working with homeowners, CNT’s **RainReady** program provides property assessment, construction oversight, and guidance with financing. Services include an examination of living space such as foundations and basements for damage. Sewers are inspected for breaks or blockages that contribute to basement flooding. Yards, gutters, and downspouts are studied to determine if re-grading or downspout disconnection or relocation might alleviate a local problem. Opportunities are explored for implementing site-specific green infrastructure such as rain gardens and rain barrels. In sum, a customized solution is developed by both the homeowner and the **RainReady** experts²⁹.

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²⁹ Cited from Timothy T. Loftus and Mary Ann Dickinson, 2015. Chicago, Illinois, United States: City by the Lake and Centerpiece of America’s Third Largest Metropolitan Region.
6. Conclusion

Climate change impacts are experienced in varying degrees by men and women in different social and cultural groups, depending upon their financial, social and physical vulnerabilities. Adaptive capacity is determined by the individual’s or household’s resilience in terms of their water, food and livelihood security. Mainstreaming gender concerns in policy, planning and implementation of climate change adaptation needs to begin with a gender analysis of sex-disaggregated information related to the needs, capacities and vulnerabilities of different social and cultural groups of men and women residing in the megacities. Mechanisms for dialogue need to be put in place, and special efforts need to be made to engage with women and facilitate their participation in policy, planning and decision-making processes.