Good Engineering Practices

Gender Mainstreaming in Water and Wastewater Climate Change Adaptation Projects:

A Case Study for the Caribbean

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Abstract

Climate change and its impacts are not gender-neutral. Infrastructure projects developed to mitigate and or adapt to climate change impacts, will have different degrees of gender dimensions, based on the social and economic contexts within which populations are embedded.

Incorporating gender differences in climate projects is smart economics, and as such the Green Climate Fund (GCF) is the first international fund to mandate the integration of a "gender-sensitive approach" throughout project life cycles. Projects that systematically address, rather than reinforce gender inequalities that increase the vulnerability of specifics groups to climate change will provide greatest benefits and be most effective. As of July 2015 the Caribbean Community Climate Change Center was accredited as a regional implementing entity by the Board of the GCF, and now provides Caribbean nations access to over US \$10 billion in funding, thus representing the newest and largest climate finance mechanism in the world.

With the exception of renewable energy projects, limited literature exists on creation of genderresponsive infrastructure projects. Particularly for the Small Island Developing States of the Caribbean, literature and tools for categorization of the gender dimension of water and wastewater infrastructure projects to determine the scope, and type of gender mainstreaming activities are absent.

This work presents practical guidelines, and approaches to mainstream and operationalize gender throughout the life cycle of water and wastewater infrastructure projects using the Green Climate Fund framework for a Food Energy Water nexus project.

The project presented reimagines the portfolio of a sustainable utility of the future, and aims to demonstrate how incorporating renewable energy, reducing non-revenue water losses (and thus embedded energy), and reusing resources found in wastewater in agriculture can lead to the mitigation of greenhouse gas emissions, and support climate change adaptation for small island nations throughout the world.

Key words: gender mainstreaming, climate finance, water and wastewater infrastructure projects, sustainable utilities

Introduction

Throughout the course of history, water influences the development and evolution of cultures. The time spent collecting water dictates the rhythm and beat of community life in many places. Women and children spend 125 million hours each day collecting water, which is on average more time spent on any other domestic water related activity (Water.org 2016). In July 2010 access to water and sanitation was officially designated as a basic human right by the United Nations, and currently 763 million persons on earth for whom access to improved potable water and health services are beyond their reach (UN 2016).

Evolution in water technology and infrastructure has been geared to increase reliability of access to water of quality, quantity, and of frequency required for intended purposes. The role of water and wastewater technology in shaping the human-water relation contributes to themes of kinship, family and class structure, religious ceremonies and rituals, and gender relations.

The expansion and maintenance of water infrastructure has not kept pace with population growth (Zimmerman 2009, ASCE 2013). In urban cities where more than half of the world's population resides, challenges such as water pollution, limited sewer infrastructure, reduction in access to potable water and water-borne diseases are intensified (Wagner 2013). Climate change further exacerbates these challenges and introduces new vulnerabilities to global food, energy and water security, in part due to a higher frequency and severity of droughts (Misra 2014).

Utilities must now address climate change impacts, in addition to their traditional scope of financial viability, infrastructure stability, customer satisfaction, operational resiliency, employee and leadership development, community sustainability, operational optimization, water resource adequacy, product quality, and stakeholder understanding and support (Water and Waste Digest 2016).

Gender, a socially constructed concept, refers to the roles assigned and opportunities ascribed to men and women, within a specific cultural context, and at a particular point in time on the basis of their sex (Hannan 2001, Dunn 2012). Climate change and its associated impacts on water resources are not gender neutral (Dunn 2012, Schalatek 2013). The differences in men and women's power in decision making, access to resources and extent of participation in economic activities will determine the way people are impacted by, and their ability to respond to climate change.

In the Caribbean, small populations and limited funding for water and wastewater infrastructure projects incentivizes utilities to re-envision/diversify their portfolio to include climate resilient projects. These projects must balance the competing demands of effective utility management, and communicate goals with internal and external stakeholders (such as boards and governments, ratepayers, media and the public) to obtain buy-in/encourage stewardship of the sector. This paper provides a rationale and context for inclusion of gender perspectives in the development of water and

wastewater sector infrastructure projects for Caribbean Small Island Developing States. It then presents step-by-step guidelines to conduct a gender analysis, and approaches to mainstream and operationalize gender throughout the life cycle of water and wastewater infrastructure projects using the Green Climate Fund framework.

Gender and International Financing

To access funding from international development donors like the World Bank and Inter American Development Bank, criteria for ready to finance climate projects have traditionally included the following:

- 1. Project Concept Note and Pre-Feasibility Study,
- 2. Environmental Impact Assessment (EIA), or Environmental and Social Impact Assessment (ESIA), and
- 3. Stakeholder Analysis

The United Nations Framework Convention on Climate Change (UNFCC) through its financial mechanism the Green Climate Fund (GCF), is the first international fund to add a **Gender Analysis** as a compulsory component to this checklist. For the GCF, proposals must include a "**gender-sensitive approach**" from the onset and throughout the project cycle irrespective of funding scale. This requires data that are not routinely collected in many countries. If countries are unable to provide baseline gender data, their proposals must include plans for system strengthening to enable applicants to conduct a proper gender analysis early in their program (Schalatek 2013). Integration of gender-based perspectives in climate adaptation projects is smart economics.

Gender mainstreaming is the process of assessing the implications of the experiences, knowledge and concerns of women and men on any planned action in a development agenda (Charlesworth 2005, ILO 2016). This can include recommending changes to legislation, policies, project goals and actions in all areas, and at all levels. To operationalize a gender-sensitive approach in the projects it funds, the GCF has cataloged good practice experiences from other development finance actors like the World Bank to develop assessment guidelines for the gender mainstreaming potential of climate adaptation projects (Schalatek 2013).

As of July 2015, the Caribbean Community Climate Change Center was accredited as a regional implementing entity by the Board of the GCF, and now provides Caribbean nations access to over US \$10 billion in funding. This represents the newest and largest climate finance mechanism in the world and for the Caribbean.

With the exception of renewable energy projects, limited literature exists on creation of gender-responsive infrastructure projects. The *"Resource Guide – Mainstreaming Gender in Water Management"*, and *"Guide on Gender Mainstreaming – Energy and Climate Change Projects,"* published by the United Nations Development Program (UNDP) and United Nations Industrial Development Organization (UNIDO) respectively, provide the most comprehensive case study list of gender mainstreaming in climate

change projects (Khosla 2006, UNIDO 2014). Notably missing from these publications are case studies from Small Island Developing States (SIDS), and particularly Caribbean nations. Literature and tools for categorization of the gender dimension of water and wastewater infrastructure projects to determine the scope, and type of gender mainstreaming activities required are unpublished or absent.

Sustainable Climate Resilient & Adaptive Water Infrastructure Projects

Government subsidies mask the true cost of water production and delivery to the customer. Many Caribbean islands currently experience non-revenue water (NRW) losses of at least 30%, representing a vital resource and economic loss to the utility and country (Gessel 2015, Audain 2015). With a projected drier and warmer climate, reduced rainfall will lead to decreased ground water recharge, and increased water demands from a growing population (Pulwarty et al. 2010). Coupled with a projected sea level rise of one (1) meter by the end of the century, this will result in saltwater intrusion of groundwater resources, potential impairment of groundwater quality, the destruction of mangroves and coral reefs (UNEP, 2010), and a 14-30% reduction in coral calcification rates (Kleypas et al. 1999).

Diverse terrain and scattered-low population densities make pumping water uphill, and over large distances cost and energy prohibitive, thus limiting island-wide water connection and sewer coverage in many SIDS. The limited reuse of wastewater for potable or non-potable functions constitute another loss of resources to the utility in the form of water, nutrients and energy, and a lost opportunity to mitigate greenhouse gas emissions.

Design and planning for expansion and upgrade of water infrastructure should be holistic to anticipate impacts on ecosystem and community dynamics, as well as built for redundancy. This will ensure that proposed interventions complement and do not replace existing reliable sources. A sustainable water utility of the future must build local capacity and develop regional and international partnerships to pursue projects that recoup water, energy, nutrient and monetary losses, and that demonstrate climate change adaptation for small island nations throughout the world.

Using the Green Climate Fund framework for incorporating a gender-sensitive approach to climate responsive development projects, this paper presents guidelines for a stepby-step Gender Analysis of an envisioned Caribbean Food-Energy-Water (FEW) nexus infrastructure project. Recommendations for targeted interventions at potential gender bottlenecks during project design, implementation, monitoring and evaluation are also provided.

Case Study

This paper uses a case study of a utility that manages both water and wastewater, with both being centralized systems. The proposed Food-Energy-Water water sector infrastructure project has overall goals to:

- 1. Reduce the greenhouse emission intensity and the energy bill of water provision by integrating photovoltaic renewable energy production at the water supply facilities.
- 2. Reduce the greenhouse emission intensity of water provision by designing and implementing sustainable Water Loss Reduction (WLR) initiatives.
- 3. Reduce the greenhouse emission intensity of water provision and make local use of embedded resources found in wastewater by demonstrating the use of reclaimed wastewater in agriculture, to safely and efficiently recover valuable resources from wastewater effluents and sludge.
- 4. Develop a transdisciplinary education, training, and entrepreneurship network for climate resilient water-energy-nutrient efficient resource recovery utilities in the Caribbean that lead to mitigation of greenhouse gas emissions and improved adaptation to climate change.



Figure 1. Project goals of a Food-Energy-Water nexus climate change resiliency and adaptation project in the Caribbean Water Sector

Gender Analysis Step-By-Step

Gender equality is defined as the creation of equal rights, power and opportunities for women and men by allowing them to contribute on an even footing economically, politically, socially and culturally (UNFCC 2015, UNIDO 2014). It entails that society values the roles played by men and women equally. **Gender equity** leads to equality and is the process by which men and women are treated fairly. This often includes proactively compensating for disparity in historical and social disadvantages that otherwise reinforce the inequitable basis on which and women and men operate.

The ultimate goal of gender mainstreaming is to transform unequal social and institutional structures into equal and just structures for both men and women (Dunn

2012). This is achieved by pursuing actions that lead to gender equality and gender equity. **G**ender analysis is a useful tool to identify points of intervention in the project cycle at which existing or potential disparities can be compensated for/reduced or eliminated.

Figure 2 sketches the 4 main steps of a Gender Analysis – i) Screening, ii) Data Collection, iii) Gender Impact Assessment and iv) Gender Mainstreaming/Targeted Interventions.



Figure 2. Overview of the Gender Analysis Steps

Step 1. Screening

This is a rough audit of the scope of project activities for gender integration and categorisation of gender dimensions. At this stage project developers can anticipate the expected contribution of project activities to gender equality, and catergorise the integration of gender goals as: targeted, significant, limited and minimal. Table 1 presents minimum gender project outcomes for each gender catergorisation.

Project managers can also anticipate the gender dimensions of their projects by assessing the applicability of the categories introduced below to project outcomes. Some examples of gender-specific aspects of traditional gender dimensions are detailed in Table 2.

Categorization of	Suggested Minimum Gender Project Requirements		
Gender Objectives			
Targeted	Ensure project objective and key results address one or more clearly defined gender issue, and formulate gender-responsive targets, indicators and a baseline to monitor and evaluate gender equality results.		
Significant	Ensure at least 50 per cent of the project outputs have activities promoting gender equality and/or the empowerment of women		
Limited	Ensure at least 20 per cent of the project outputs have clearly identified activities promoting gender equality and/or the empowerment of women, including gender-responsive indicators and a corresponding budget or at least one indicator in each project output refers to gender in some way.		
Minimal	Include a description of why the project is not expected to noticeably contribute to gender equality and/or women's empowerment. For example, the project does not have direct contact with communities or the project does not directly aspect or determine the use of resources, goods, or services accessed by women and men		

Table 1. Gender Categorisation Tool for Projects – (adapted from UNIDO 2014)

Table 2. Gender dimensions that can potentially impact water sector project design or outcomes (Adapted from Roehnr 2016)

Dimension	Examples of Gender-Specific Aspects			
Political	Key words: participation, power Power and participation of the sexes in decision-making impacts project design due to the gendered difference in perceptions and attitudes towards climate-			
	related problems.			
Legal	Key words: Land rights			
	Expansion of water and sewer infrastructure can encounter issues of land rights if private property interests with intended construction course. The presence of a national/sectoral gender policy can also guide project operations.			
Socio-economic	Key words: access to resources, income, education, division of labour, property ownership			
	Existing division of labour in technical fields can reinforce gender disparities if technology implementation requires specific skills.			
Socio-cultural	Key words: Religion, cultural patterns, norms			
	Interruptions in water supply can increase time requirements for domestic activities necessitating clear communication policies for household planning. Cultural or religious festivals that utilise water should be considered/accounted for in creation of educational & communication material.			
Socio-	Key words: Gender identity, gender roles, attitudes, risk perception			
psychological	Gender identities and societal expectations of being a man or woman can translate into different water consumption patterns which are guided by different value systems e.g. fairness and ethics vs. cost-performance			
Physical,	Key words: Physical differences between the sexes			
biological	Health impacts due to water quality can impact men and women differently for biological reasons influencing their choices of appropriate water treatment and use options.			

After identifying the gender dimensions of the project, key stakeholders must be consulted with for the data collection. Key stakeholders can be divided into two (2) broad categories:

- I. Institutional/internal which includes upper management of project partners, utility middle management and human resources personnel,
- II. External which includes networks of women's groups, utility customers especially those who will be directly affected by project activities, institutions providing small grants for water sector projects, and elected-area officials.

Step 2. Data Collection/Research

The data collected for the gender analysis provides the evidence for the gender dimensions identified in the screening process. Quantitative sex disaggregated data provides statistical measures of the gender differentials and inequalities. Conversely, qualitative data that is much harder to find in the gender and water infrastructure field provides explanations for the disparities observed (Rohenr 2016). Data disaggregated by sex can be obtained from secondary and primary sources. The data describes general measures such as participation in decision making, income and asset distribution, education levels, labour division and time use, perceptions on management and distribution of benefits arising out of the use of the resources by the utility, and access to, use of and threats to the use of energy, water and nutrient resources. Data collection provides a simultaneous picture of what information is available, and the gaps that should be filled by statistics and further research. Table 3 summaries goals, sources and mixed-method approaches to information collection for the gender impact assessment.

Goal of Data Collected	Source of Information/ Stakeholder Consulted	Method of Data Collection	Type of Information Obtained		
Analysis of integration of gender perspectives in legislation	National policies, strategies and action plans	Document review, interviews	Legal status of women in the country of intervention, gender norms and values		
Analysis of institutional structures and capacities for gender mainstreaming	Institutional Partners	Document reviews, interviews and focus groups	Gendered division of labour and time use, differentials in education		
Identification of socio- cultural, economic, political and health gender issues	Internal and External	Surveys, focus groups and social media	Water sources, connection penetration, collection, storage, storage maintenance, transportation, sewer coverage		
Context of access, use, and threats to energy, water and nutrients	Internal and External	Document review, interviews	Local energy mix, fertilizer source and use, water reuse practices		

Table 3. Sample data to be collected for a water sector infrastructure project gender analysis

Step 3. Gender Impact Assessment

Project goals can change or reinforce gender inequalities. The questions that guide the gender analysis serve to identify how the conditions and opportunities of women and men are affected. A gender analysis of a FEW nexus infrastructure project should answer the five (5) general questions: i) What is the context?, ii) Who does what?, iii) Who has what?, iv) Who decides?, and v) Who benefits?

The first four (4) questions describe the cultural context of the site of proposed project, as well as the perceptions and realities of stakeholders as they interact with infrastructure and services provided by the water and/or wastewater utility. The last question identifies direct and indirect benefits of the proposed project, and is usually where the location of recommendations for points of gender interventions. Collectively this information can help with project redesign or identify areas for further research during project implementation.

The gender impact assessment should answer the following generic questions (adapted from UNIDO 2014 and Roehnr 2016):

- 1. Is there a gender balance among project stakeholders?
- 2. Do the voices of key stakeholders include individuals or groups with gender perspectives (e.g. ministries of social affairs)?
- 3. What gender impacts will the planned activities have?
- 4. Which groups of individuals are directly and indirectly affected?
- 5. Do project activities take into account gendered needs and patterns of behavior?
- 6. Do project activities take into account gendered risk perception?
- 7. Do project activities influence the availability of time, and mobility of women and men?
- 8. Do project activities impact gender division of labour?
- 9. What are the risks of not mainstreaming gender in the project?
- 10. Which project activities require specific action to be more gender-responsive?
- 11. How will the project affect relations between women and men?

Step 4. Gender Mainstreaming the Project Cycle

Gender mainstreaming the project cycle entails setting gender outcomes, outputs and indicators to track the project's progress in changing conditions of men and women in terms of power, agency and access to resources. Activities that can achieve integration of the gender findings in each project phase are listed below.

 Project Formulation - communication and education plan responds to needs, and social media presence, to increase reserves/compensate for areas lacking water connections and save energy for pumping. At the household level this might consider RWH harvesting, communal water spaces, and shared entrepreneurial benefit from reuse projects.

- a. Create a gender-responsive budget that allocates resources for a gender focal point to coordinate integration of gender analysis findings, and reflect commitments to gender objectives.
- b. Balance stakeholder views by involving more of the underrepresented gender, and raise awareness of the disparity to the stakeholders.
- c. Set gender outcomes, outputs and indicators that will measure and track reduction in potential gender disparities identified.
- d. Set communication guidelines such as timing, and appropriate media that target the way women and men prefer to be reached.

II. Project Implementation

- a. Ensure the capacities and skills of women and men are considered and utilized.
- b. Ensure equal voice among women and men in the decision-making process.
- c. Propose interventions to counter gender-differentiated patterns of division of labour and wage gaps such as access to training, and promotion considerations.

III. Project Monitoring and Evaluation

a. Review of gender indicators to determine whether they lend themselves to produce sex-disaggregated data

Conclusion

In one location the existence of perceptions of water as a gift from god, natural resource, human right, common and public good, private property, and cash commodity are all possible based on the experiences and vantage point of the stakeholder. The diversity of descriptions of water available reflect the coexistence of different cultural value systems, and institutional evaluation systems employed in decision making. Further, women and men exhibit distinct differences in their perceptions of risk and priorities for water management, resulting in different needs and capacities to cope with climate change impacts on water resources. Data cataloging the gender dimensions of climate adaptive water infrastructure projects is limited, but vital to development of gender responsive projects that maximize limited resource allocation in national water development agendas. A gender analysis of water and wastewater infrastructure projects is timely as it provides an opportunity for the social dimensions of water to be leveraged in small island developing states, and targeted project activities can encourage community stewardship of limited water, energy and nutrient resources.

As Caribbean nations begin to access the Green Climate Fund, they will all have to complete gender analyses of their projects. USAID, the Caribbean Development Bank, and other funding agencies are also implementing gender policies, making it even more widespread that project's will have to address gender issues in order to receive funding.

If done right, the future of water and wastewater infrastructure in the Caribbean should reflect a gender sensitive utility that recognizes and supports the importance of gender in defining a sustainable utility.

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