

Improving and diversifying water access to mitigate the disproportionate impacts of climate change on women in northern Ghana

Cynthia Caul, MID'16

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EXECUTIVE SUMMARY

With increasingly erratic and violent rainfalls and diminishing ground and river water levels, climate change is predicted to contribute to significant water, land, and fuel scarcity in Ghana. These impacts are currently disproportionately felt in the nation's northern regions, which are already more vulnerable to poverty, food insecurity, and malnutrition. Furthermore, the impacts of climate change disproportionately affect women in these regions, as women are primarily responsible for water collection, firewood collection, and food production. These disproportionate impacts have significant implications for the nation. These include decreases in food production and national GDP, increases in the time and energy required to perform reproductive labor, and decreases in untaxed household revenues and self-sufficiency.

Given the cross-sectoral nature of these implications, effective mitigation and adaptation strategies must be multi-faceted. Addressing this complexity, the recommendations extended here focus specifically on issues of water access. This focus is justified given the magnitude of the problem and the significant role water access holds in women's lives. Two water access interventions are examined: Community Water Supply and Sanitation Project (CWSSP) in Sri Lanka and the Small Towns Water and Sanitation Project (STWSP) in Ghana. Both projects aimed to increase citizens' access to water in rural and peri-urban settings through the construction of borehole, well, and pipe-borne water sources using a participatory development approach. The inclusion of rainwater harvesting infrastructure, however, is unique in the Sri Lankan case. Water supply diversification is important given the negative impact climate change is having on groundwater reserves—the primary water source for boreholes, wells and pipe-borne systems. Recommendations are also provided and include promoting rainwater harvesting, considering centralization of water management, and ensuring the inclusion of women in project design and implementation. As women are the primary beneficiaries of increased water access, their inclusion is particularly vital to the sustainability of water infrastructure.

CONTEXT AND BACKGROUND

Climate change in Ghana's northern regions

Ghana has been experiencing higher temperatures and more erratic rainfall due to climate change. The impacts have been particularly detrimental for the nation's poorest households largely found in its northern, rural and peri-urban regions (see Figure 1). Households in these

regions have been experiencing unprecedented flooding. In 2007 alone, this flooding is estimated to have resulted in the loss of 144,000 MTs of food and 70,500 hectares of land. The Ministry of Food and Agriculture approximates that 50,000 Ghanaians in the northern regions were at risk for food insecurity and malnutrition up to fifteen months after peak flooding (Armah, 2010). This is particularly significant, as the northern regions are already more vulnerable to food insecurity and malnutrition, corresponding with higher poverty rates (see Figure 2). Poverty rates in the three northern regions are 2-3 times higher than the rest of the country.

Households in northern Ghana have also reported seasonal rains arriving progressively later each year and with less consistency. When the rains do arrive, they are far heavier and are often accompanied with destructive windstorms. Once beginning in April, the rainy season now begins as late as July in some areas (Yeboah et. al., 2010). The delay in rains corresponds with seasonal depletion of groundwater reservoirs and an overall decline in groundwater levels (Lutz et. al., 2015). By 2050, annual river flows and groundwater supply are estimated to drop by 30- 40% (Yeboah et. al., 2010). This is particularly significant for northern, rural and peri-urban communities, as ground and river water are the primary water sources in these areas.

The impact of climate change on women

Climate-change induced warming and flooding are projected to contribute to increasing land, water, and fuel scarcity in Ghana. These phenomena particularly affect women, because they are generally responsible for water and firewood collection, as well as food production (WEDO, 2008).

Fuel

Firewood and charcoal comprise 59% of Ghana’s total energy consumption, and over half of this consumption occurs at the household level (WEDO, 2008). Increasingly unpredictable rains have led to an increase in the amount of time dedicated to firewood collection, as women must travel further to find dry wood. Furthermore, erratic rainfall has led many women to store firewood inside of their rooms to protect it from getting wet. Such practices pose additional sanitation risks and in some cases have left women susceptible to scorpions stings and snakes bites (Gyampoh & Asante, 2011).

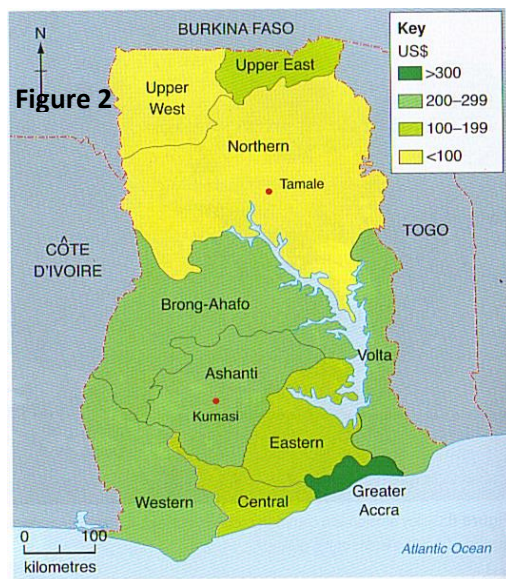
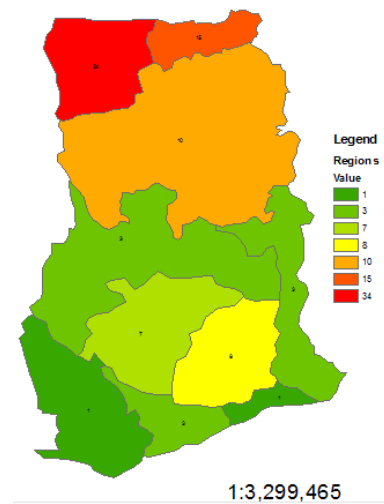


Figure 2

Figure 1
% of people that are food insecured



Source: Ghana Ministry of Food and Agriculture

Land

Land is becoming increasingly scarce throughout Ghana due to de-forestation-induced erosion and increased

commercial farming fueled by foreign and national biofuel investors (USAID, 2013). The increases in temperatures and flooding due to climate change will put further pressure on these already diminishing arable lands. Increased land scarcity negatively affects women, as their ability to secure lands is already institutionally limited. Land is distributed via state ordinance, but in most cases, within customary law systems. Under customary law in Ghana women are only able to gain use-rights for land through their husbands or fathers. Their ability to own land themselves is limited. Consequently, only 10% of women own land registered in their own name (USAID, 2013). 75% of women farmers, who comprise 52% of all farmers in Ghana, do not own the land that they farm (Actionaid, 2014).

Water

Currently, 70% of women in small (defined as 500-5000 residents), rural communities and 50% of northern households do not have access to potable water (WEDO, 2008). This circumstance was exacerbated by the privatization of water distribution in 2000 in compliance with World Bank policy frameworks. Peri-urban households that formerly had scheduled access to water from a central spout in their home, were subsequently only able to access water from rivers, wells, and boreholes in some cases upwards of three miles away (WEDO, 2008). As of 2002, only 40% of household pipes in urban and peri-urban locations were functioning. Due to a lack of progress, in 2011, the government decided to transition water management back to the public sector (TNI, 2014).

The larger development implications

Formal Sector

Women's agricultural production accounts for 80% of the nation's food, which contributes to 48% of the nation's GDP. Women, therefore, account for roughly half of the nation's largest GDP contributor. The potential negative impacts of climate change on women's agricultural outputs, consequently, has significant implications for the nation's overall productivity.

Decreases in food production can and have already led to increases in food prices. The effects of continued climate change are predicted to more than double the price of staple crops in coming years. By 2050, the prices of rice and maize are projected to increase by 121% and 153% respectively (as compared to 60% each without climate change impacts) (Yeboah et. al., 2010). Increases in food prices directly correlate with decreases in expendable income (Gyampoh & Asante, 2011). Women are, again, disproportionately affected by such reduced expenditures, as they comprise over 70% of retail traders in Ghana (Amu, 2005).

Informal sector

Women in Ghana often engage in supplemental, un-taxed income-generating activities. Specifically in the northern regions, women tend to supplement their incomes by selling shea butter, pito (a fermented, millet beverage), firewood and charcoal. These sources of income that were once utilized as coping strategies or safety nets are becoming increasingly central to household solvency. Increased reliance further exacerbates the climate-change induced scarcity,

however, making these activities increasingly less profitable for women (Gyampoh & Asante, 2011).

Female-headed households

One third of households in Ghana are currently headed by women. This percentage has been consistently increasing in recent years (Amu, 2005). Consequently, women's individual solvency is becoming increasingly linked to household solvency. Female-headed households are statistically more vulnerable to food insecurity. 90% of female-headed households in Ghana are currently classified as food insecure, as compared to 65% for their male counterparts (Actionaid, 2014). If the impacts of climate change on women go unmitigated, the vulnerability of this growing number of households will be further exacerbated.

The significance of water

Given the multi-dimensional nature of climate change's impacts on women and the larger implications for the nation, mitigation and adaptation strategies must be multi-faceted. This paper focuses on water interventions specifically. The specific focus on water access is justified due to the urgency and magnitude of water scarcity in Ghana and significant role it plays in women's daily lives. Increased water scarcity has been reported as women's chief concern in regards to climate change. This is largely due to the increasing demand it places on their time and energy and the associated risks for household health (WEDO, 2008).

Women currently walk upwards of three miles to collect water each day, including women from many peri-urban households with existing but non-functioning water pipes (WEDO, 2008). Water scarcity will be further exacerbated for the foreseeable future with the estimated decline of river flows by 30-40% (by 2050). Increases in temperature and decreases in overall rainfall are expected to diminish groundwater recharge by up to 22% in the next five years. This is a particularly grave circumstance for rural and peri-urban locations that depend almost exclusively on ground and river sources for daily water consumption (WEDO, 2008). Currently, boreholes and wells are seasonally running dry for one to three months in some areas due to increasing delays in the seasonal onset of rains (Lutz et. al., 2015).

Water scarcity not only has implications for women's time, but also household health. Diarrheal diseases attributed to poor water access are the third leading cause of death among children under five in Ghana. They account for 12% of childhood deaths in general, disproportionately occurring within the three northern regions (IPA, 2015). Climate change will thus most likely further exacerbate existing water scarcity that has already disproportionately affected Ghana's northern region and women.

Relevant Stakeholders

Given the centrality of water access to women's lives, they are the most important stakeholders. Ensuring their inclusion in project design and implementation is vital for water service sustainability. Identifying and collaborating with existing women's groups generally organized

around trades (e.g. pito production, shea butter production, or tailoring) at the community or regional level may be an effective targeting strategy.

Water management in Ghana is decentralized and, as such, primarily the responsibility of district assemblies and water and sanitation boards, as well as local communities. Therefore, additional primary stakeholders include these district representatives, community assembly men and women, and community-level governing bodies (i.e. elders, chiefs and queen mothers). Other relevant stakeholders include Ghana's sole water company Ghana Water Company, Ltd., as well as the Community Water and Sanitation Agency and its Water Resources Commission and Regional Coordinating Councils. These governing bodies are organized within the Ministry of Water Resources, Works & Housing.

COMPARATIVE INTERVENTIONS

The two projects selected for a comparative examination based on project design, implementation and efficiency are the Community Water Supply and Sanitation Project (CWSSP) in Sri Lanka and the Small Towns Water and Sanitation Project (STWSP) in Ghana. Both projects were carried out by their respective national governments in collaboration with the World Bank. The objective in both cases was to increase water access among the targeted communities in rural and peri-urban locations between 2003 and 2011 (World Bank, 2011).

Targeting

CWSSP in Sri Lanka targeted rural residents in Sri Lanka's Central, North West and North East Provincial Councils. The project originally targeted 1.1 million individuals in the Central and Northwest and 130,000 in the North East. These targets, however, were later revised to 719,700 and 73,783 respectively after a portion of project funds were re-allocated to the Tsunami Emergency Reconstruction Project in 2004. Communities interested in benefiting from the project were to form community-based organizations (CBO) to take on the responsibility of operation, maintenance, and a negotiated share of the construction costs ("CWSSP", 2011).

Ghana's project targeted 73 peri-urban or small towns (minimum population of 2,500) in six regions: Ashanti, Brong-Ahafo, Upper East, Upper West, Central, and Western. The specific towns were selected by District Assemblies based on poverty, existing water and sanitation facilities, and district-development plans. Similar to the case of CWSSP, interested communities were to self-organize Water Boards (WB), submit an application to their District Assembly, and agree to contribute 5% of the total cost. After the initial construction was complete, these Water Boards became responsible for the future operation and maintenance of the new water source ("STWSP", 2011). As such, both interventions entailed a degree of self-selection.

Interventions

Sri Lanka's CWSSP utilized a variety of interventions to increase household water access, including the construction of pipe-borne water schemes, boreholes, wells and rainwater harvesting tanks ("CWSSP", 2011). Ghana's STWSP focused exclusively on community and

household pipe-borne water sources (“STWSP”, 2011). This focus can largely be attributed to the fact that the peri-urban beneficiary communities or their neighboring urban centers already had pipe-borne water infrastructure in place. Many of these pipe-borne schemes had been non-functioning since the privatization of the Ghana Water Company, Ltd. in 2000 (WEDO, 2008).

Both projects were also involved in the construction of community and household latrines, as well as capacity building for CBOs, WBs, and local governing institutions. In Sri Lanka’s case, the project was also significantly enhanced by the activities of a local NGO called Lanka Rainwater Harvest Forum (LRWHF). This organization adopted the task of educating local communities about the benefits and potential of rain water harvesting specifically. LRWHF’s activities facilitated self-organization among local communities to benefit from CWSSP’s interventions (Ariyananda, 2010).

Implementation

Both projects implemented a participatory development approach with cost sharing schemes to foster local ownership over water sources. As such, interested communities were to self-organize and express their interest in project interventions to District Assemblies or Project Provincial Councils. STWSP communities were required to form Water Boards and submit applications to District Assemblies. District Assemblies and Water and Sanitation Teams were subsequently responsible for selecting beneficiary communities and drafting project proposals and procurement plans (“STWSP”, 2011). Similarly, in Sri Lanka, self-organized CBOs were to express their interest to Project Provincial Councils and negotiate a plan for constructing and funding new water sources. CBOs were also responsible for volunteering time and labor to the construction of these sources (“CWSSP”, 2011).

Neither project maintained a specific gender requirement. However, gender-balanced CBOs and WBs were encouraged, and the gender composition of these groups was monitored. Sri Lanka’s CBOs reported that women comprised 40% of executive positions within CBOs (“CWSSP”, 2011). All WBs in Ghana were identified as gender-balanced. “Gender-balanced” was defined by the STWS project as boards for which women comprised at least 1/3 of its members (“STWSP”, 2011).

The chief difference in implementation between these two projects was in the design of cost-sharing schemes. STWSP implemented a fixed cost sharing scheme. District assemblies and community WBs were each responsible for 5% of construction costs. After construction was completed, WBs became responsible for the future costs of operation and maintenance (“STWSP”, 2011). In the case of CWSSP, however, cost-sharing schemes were negotiated on a case by case basis. A revolving fund was established to mitigate initial capital costs at the community level. CBOs contributed over 30% of construction costs on average, in addition to the time and labor volunteered for water source construction. Project funds could not be used for the construction of meters, household connection, or electricity installation. These expenses had to be fully funded at the community level. As was the case with WBs in Ghana, Sri Lankan CBOs were responsible for all future costs of operation and maintenance after the initial construction of water sources (“CWSSP”, 2011).

Institutional Set-up

Sri Lanka’s CWSSP project goals were in line with the national decentralization agenda initiated in 2001. The National RWSS Policy of 2001 sought to transfer the responsibility of water and sanitation service management from national to local government (“CWSP”, 2011). While CBOs were self-organized at the community level, Project Provincial Councils were organized within The Rural Water Supply & Sanitation Division of the Ministry of Water Supply & Drainage. These councils were responsible for the administrative, technical and financial responsibilities. They were required to implement the project in accordance with project manuals (Project Agreement, 2003).

Ghana’s STWSP project objectives were also in line with a national water and sanitation policy instituted in 1988 to decentralize management of these services. The Ghana project consisted of three parts: community subprojects, sector support, and project management. Community subprojects coordinated by self-organized WBs created new water systems, as well as rehabilitated existing ones. Sectoral support was provided by District Assemblies and District Water and Sanitation Teams (DWST). DWSTs were organized within the Water Directorate of the Ministry of Water Resources, Works and Housing (MWRWH). The Community Water and Sanitation Agency (CWSA) was responsible for the third and final component—overarching project management and the allocation of project funds. In addition to water source construction, project funds were used to support district-level institutions with practical training, capacity building, and equipment (e.g. computers and motorcycles) (“STWSP”, 2011).

Efficiency Assessment

In general, CWSSP reached a little over half of its targeted beneficiaries (see Figure 3). CWSSP provided water access to 384,102 individuals through the construction of 1,054 pipe borne water schemes, 5,194 rainwater harvesting tanks, 1,965 private wells, 770 common wells, 36 tube wells, and 116 hand-pumping wells. The project also constructed 45,660 latrines, benefiting 189,

Figure 3

A summary of progress at closure, against the key outcome indicators is given below:

#	Indicator	Target	Achievement	Percentage
I.1	Number of people in project areas with access to Improved Water Sources	719,700	384,100	53
I.2	Number of new piped household water connections that are resulting from the project intervention	162,300	92,000	57
I.3	Number and types of beneficiaries and their level of satisfaction with completed systems	80%	88%	
I.4	Improved community water points constructed or rehabilitated under the project.	1121	922	82
Intermediate				
i.1	Number of water supply subprojects completed and operational	812	709	87
i.2	Number of latrines constructed and operational	54,500	45,660	83

Source: World Bank

the community level. The North eastern province is characterized with higher poverty rates, as compared to the other two targeted regions due to recent conflict within the region. More

946 individuals. Eighty percent of these water schemes were considered financially self-sustainable at the project’s close. Overall, 88% of the project’s beneficiaries reported being satisfied with the services provided at the project’s completion.

Water source construction was disproportionately centered in the Central and North western provinces. The North eastern province saw less success due to financial limitations at

prevalent poverty made it difficult for communities within this province to contribute financially

Figure 4

Annex 2. Outputs by Component

Project outputs	Output indicator	Status at project completion	Level of achievement
Component 1 :Community Sub-project			
Increased access to water supply in small towns in six regions	Provide 550,000 people with water supply facilities	561,754 people in 73 small towns provided with water supply systems	102.1%
Increased access to sanitation services in small towns in six regions.	Provide 50,000 people with sanitation facilities	50,424 people provided with sanitation facilities by means of 4,202 household latrines and 288 institutional latrines	100.8%
Component 2: Sector Support			
Participating small towns effectively using their improved water and sanitation systems and managing them in a sustainable manner.	No. of Water Boards fully trained through project and functioning	73 Water Boards formed, trained and functioning	100%

Source: World Bank

The final project report suggested that cost sharing arrangements informed by affordability assessments should be designed in future projects. (“CWSSP”, 2011).

Ghana’s STWSP saw greater success in impacting its targeted beneficiaries. All of the project’s objectives were achieved and, in some cases, surpassed (see Figure 4). The project aimed to provide 550,000 individuals in targeted areas access to water and effectively provided access to 561, 754. The project surpassed its sanitation objectives, as well. 50, 424 community and household latrines were constructed, surpassing the project’s goal of 50,000. At the conclusion of the project, all new water sources were reported as self-sustaining. These sources were being managed by the 73 Water Boards created throughout the duration of the project. These boards are currently responsible for collecting fees to cover the costs of operation and maintenance (“STWSP”, 2011).

Despite STWSP’s successes, water scarcity remains a significant problem within and outside of STWSP’s targeted populations. As mentioned previously, water scarcity is of particular concern for Ghanaian women in northern, rural and peri-urban communities. Seventy percent of Ghanaian women lack access to potable water and 50% of households in the three northern regions. The privatization of the national water company has done little to rehabilitate the nonfunctioning 40% of pipe-borne water systems. In 2011, the government of Ghana moved the company back into the public sector due to its repeated failure to achieve targets. Since this shift, no headway has been made in rehabilitating these systems (TNI, 2014). The problem of household water access will be further exacerbated by climate change in coming years (WEDO, 2008).

RECOMMENDATIONS

1. Promoting rainwater harvesting

Since STWSP’s completion, the World Bank and Government of Ghana began another collaborative project targeting Ghana’s rural communities found predominantly in the northern regions. This project, however, focuses primarily on borehole construction. Given the current

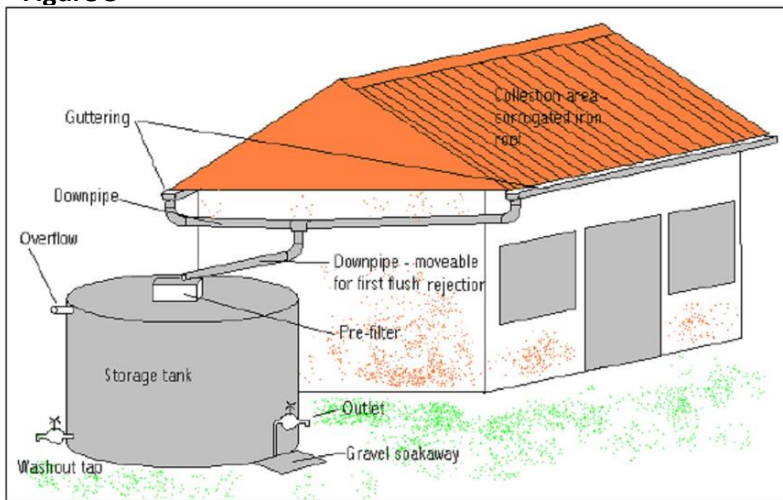
to water source construction. The cost-sharing structure also discouraged household connections, as these costs were not supported by project funds. For this same reason, many communities opted for diesel generators over installing electricity to power water sources. However, as diesel generators tend to involve higher maintenance costs, water sources powered in this way are at greater risk of becoming defunct.

decline in groundwater levels in Ghana, it is important to consider alternative water sources that will not increasingly tax this diminishing resource (Lutz et. al., 2015). Rainwater harvesting is one such alternative that was effectively introduced in Sri Lanka's CWSS project. It has significant potential in the Ghanaian context to decrease women's labor demands and increase household water access.

Among CWSSP beneficiaries, rainwater harvesting increased household water access by 15 lpcd (liters per capita per day). Consequently, the time necessary for water collection decreased by 30% (Ariyananda, 2015). Beneficiary households in Sri Lanka also reported having more time to dedicate to other activities (both social and income-generating), as well as enough water to irrigate small household gardens. Rainwater harvesting in Sri Lanka led to increased conservation of pipe-borne water sources and groundwater. It reduced the cost of household water bills and contributed to decreases in flooding in some communities (Ariyananda, 2015).

An important consideration with rainwater harvesting implementation in Ghana, however, is ensuring the initial capital costs do not deter uptake. As is evidenced in both the CWSSP and STWSP cases, the most vulnerable or impoverished populations were often unable to access

Figure 5



Source: David Allen Barnes

mitigate these costs. For example, households collectively contribute enough to finance the installation of one household catchment scheme each month until all household schemes are installed (Barnes, 2009). This strategy worked successfully for many CBOs in CWSSP's beneficiary communities.

As suggested in CWSSP's final report, however, affordability assessments should be performed to understand the price households are able to pay and the project funds necessary to subsidize the difference ("CWSSP", 2011). Collaboration with existing NGOs working on rainwater harvesting in Ghana would be helpful in completing community-level assessments and implementation. CWSSP's partnership with Lanka Rainwater Harvest Forum could be used as a model. Such NGOs already operating in Ghana's north include World Vision, the Presbyterian Church and New Energy, as well as the social enterprise Pure Home Water (Barnes, 2009).

project benefits due to prohibitive costs. Installing rain-water catchment systems tend to be more capital intense for households than other water structures. A single household is responsible for the cost of the storage tank, corrugated roof, and gutters, as well as associated transportation costs (see Figure 5). Revolving funds, by which community members contribute on a specified basis (e.g. weekly or monthly) towards installation, could be used to

2. Including women in project design and implementation

As water-focused interventions stand to benefit Ghanaian women most, women should be included more deliberately and to a larger extent in project design and implementation. This is particularly true when participatory development approaches are adopted, as was the case in Ghana and Sri Lanka. The incentive for utilizing such approaches is that they foster ownership among beneficiaries, and subsequently, sustainability. While both projects reported an inclusion of women at the community level, participation in both cases still remained below 50%. No female representation was recorded within higher levels of project management. This is not representative of the gender composition of either county. Furthermore, as water collection is chiefly the occupation of women in Ghana, they represent an even larger portion of the beneficiary community. As such, when adopting the participatory development methodology, including women in project infrastructure stands to contribute to overall uptake and sustainability.

As climate change impacts are making increasing demands on women's time, they may be unable to partake in project activities. They may have less time to self-organize or self-target to receive project benefits. As such, special attention must be given to target them specifically, particularly in spaces where they may already be meeting or allocating their time. For example, organized women's groups, which already exist at the community and regional levels in northern Ghana. These groups are generally organized by trade and meet on a regularly-scheduled basis. Meeting women in these spaces to discuss project objectives will ensure their inclusion without further taxing their time.

3. Considering centralization

These two cases also give reason to further examine the efficacy of decentralization agendas with regard to water service management in Ghana. In both cases, decentralization did little to protect already vulnerable populations. The nations' poorest and most vulnerable populations continued to lack water access. In Ghana, roughly half of piped infrastructure remains non-functional despite increased decentralization and roughly a decade of privatized water management (TNI, 2014).

Ghana currently finds itself at a cross-roads. As the national government traverses the path of restoring water services to public management, the efficacy of decentralization should also be examined. While Ghana has seen increases overall in water access in the past fifteen years since decentralization, relatively little progress has been made in pipe-borne infrastructure. This is due to the associated prohibitive costs and lack of infrastructure in place to manage operation and maintenance of services. Consequently, half of the most impoverished citizens in the northern, rural areas still have no access to potable water. In peri-urban locations, access to boreholes and wells have increased but do little to alleviate time-intensive water collection (WEDO, 2008). As the government strategizes a way forward at this juncture, centralizing water service management should not be left off the table, particularly for infrastructural weak and impoverished communities.

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