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Uganda, Water
Scarcity

Warka Towers and the Magic of Maji

Introduction

Maji is a Swahili word that strongly resembles the English word “magic”. Although magic and *maji* share many traits including elusivity and rarity, they differ in their status of necessity. In Uganda, more than half the population lacks access to safe *maji* (“Women And Water - A Woman's Crisis”), and this is a critical issue. *Maji* is the resource that unlocks life through its pivotal role in health, industry, and, perhaps most importantly, food. Without it, life cannot exist, and with restrained amounts of it, life is painful; Ugandans feel this pain today as many struggle to survive on dirty and limited *maji*. This is where the falsity of the cognate relationship between magic and *maji* is exposed; while magic is the trivial fun of tall tales and tricks, *maji* has the much more serious definition of water.

The water issue in Uganda is nothing that can be fixed with the mere wave of a magic wand.
With

51% of Ugandans unable to acquire potable water (“Women And Water - A Woman's Crisis”), the
issue

at hand is nearly incomprehensible, especially considering how water is needed for everything
from

growing food to sanitation. However, by analyzing the characteristics of Uganda and the people who live
there, examining the nuances of the water crisis, inspecting the failures of past and present efforts to
help,

and evaluating new technologies being used elsewhere, the solution to Uganda’s water crisis can
be

implemented; it may already be found. A new technology is on the rise, and it is called the Warka Tower.

Behind the veil of unconventionality, this device is providing clean water through the condensation of
water vapor, and consequently changing lives for the better.

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Uganda

Geography and Climate

Uganda is a land-locked nation of west Africa, bordered by the Democratic Republic of
the

Congo, Kenya, South Sudan, and Tanzania (“Discover the Climate and Geography of
Uganda”).

Although Uganda has an arrangement of lakes and rivers, the vast majority are swampy, sluggish,
and

seasonal, thus unfit to serve as proper water sources (Lyons). Located on the equator, Uganda has a

primarily tropical climate, with an average annual temperature of 78°F. Transitioning from day to night,

temperatures drop within the range of 14-18°F (“Climate and Average Weather in Uganda”), contributing

to the condensation of water vapor. With a rainy season in both spring and autumn, Uganda receives 40-60 inches of rain annually, but precipitation is frequent throughout the year, although less plentiful

during the two dry seasons (“Discover the Climate and Geography of Uganda”).

Population and Economics

Independent since 1962 and governed by a presidential republic (Sawe), Uganda is home to

nearly 45 million people today. The population has only been growing since the mid-20th century, a trend

that places increasing pressure on natural resources including the water supply (“Uganda Population

LIVE”). Only 17% of the population occupies the country’s urban areas, meaning the remaining 83%

live rurally, away from the benefits of city water (“Uganda - Rural Population % of Total Population”).

Many of these rurally residing Ugandans focus on subsistence farming but cultivate coffee, tea, and

tobacco, the major agricultural exports of Uganda, when given the chance (“Agriculture &

Agribusiness”). Because of this economic as well as sustenance dependence on agriculture, water is relied

on to grow crops not only for food but to financially support

families.

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Life As An Ugandan

Family Life

In Uganda, the average family is composed of 5 people, and many families live in the typical rural dwelling of mud or brick walled, grass or corrugated iron-roofed huts. 80% of Ugandans live in villages (United Nations), and those born in a village tend to stay in that village for their entire lives; both cultural traditions and financial constraints keep many Ugandans in their birthplace, even if that means facing dangers such as unsuitable water for the duration of their lives (“Ugandan Families Stick Together,

They Don't Fly Far from the Nest”).

Die t

The typical Ugandan diet varies between the regions of Uganda. The *matooke* plantain is a staple of the south, eaten often and in many forms including stews and curries. In northern Uganda, diets consist heavily of millet, sorghum, and other grains along with local vegetables. Pastoral communities rely strongly on animal products like blood and meat. Fish, when and where available, is eaten throughout the country (Ingham). To summarize, Ugandan diets consist mostly of fruits, vegetables, and grains, supplemented by animal products when

available.

The emphasis on plant-derived food is an indication of the minimal presence of water in Uganda;

growing plants takes significantly less water than growing animals (Staff), and thus the minimal amount of animal-derived cuisine reveals the lack of water in Uganda. Most Ugandans survive on what they grow themselves (Ingham), an arrangement that exacerbates the effects of the water crisis; if a particular area receives less water due to drought or a river running dry, then that area will most likely suffer from famine in addition to lack of water.

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Careers and Education

Career acquisition in Uganda is highly dependent on education and the level to which it is

achieved. The annual salary of an average Ugandan is the equivalent of \$18,160 (“Uganda: 2019/20

Average Salary Survey”); 1.8% of Ugandans are unemployed (“Unemployment, Total % of Total Labor

Force Modeled ILO Estimate”), but 73% of Ugandans work in agriculture, and many others are employed

in service occupations like transportation (Ssebutinde). The way a Ugandan makes a living is determined by the Ugandan education system; test scores of the seventh grade determine whether a student enters

technical training, teacher training, or another secondary school.

However, a student must first make it to the seventh grade, and the odds are stacked against many

who wish to do so. Although 90% of Ugandan children attend primary school, 25% are forced to drop their education in secondary school due to shortages in facilities and supplies (“10 Important Facts to Know About Education in Uganda”). Additionally, many children are kept from fulfilling their education or from attending school at all because of the expense of losing a family worker. When children are at school, they are not at home helping with family businesses, farms, or households, and in many cases, the time and labor of children are needed to keep the family afloat. Sending children to school is an expense many families cannot pay for very long, and so many Ugandans are kept from pursuing careers that require a higher level of education, such as doctor or engineer (“Children of Uganda”). With easily accessible potable water, more children would be able to fulfill their education; availability of potable water would improve the health of crops, decreasing the time needed to care for families and farms, and decrease the amount of time needed to fetch water. Time saved from these tasks can then be spent going to school and developing an education. Access to clean water would also decrease disease and illness, enabling more children to attend school.

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Crises and Deficiencies

Currently, there are not nearly as many Ugandans who have passed through the education system

as is needed, and this contributes to poor healthcare, weak infrastructure, lack of electricity, and more

issues in Uganda; with minimal doctors, engineers and electricians, it is nearly impossible to correct these

matters. Healthcare is a tremendous issue; on top of the weak infrastructure and mountainous terrain that

hinder timely medical help, there are too few medical officials, only one doctor for every 8,300

Ugandans. Illness is abundant thanks to the unsanitary living conditions and sustenance problems caused

by lack of safe water, and currently, the healthcare system is largely unable to effectively attend to many

sick individuals (“The State of Healthcare in Uganda”). Electricity is nearly as rare as timely medical assistance (“Uganda - Rural Population % of Total Population”); only 19% of Ugandans have access to

electricity (“The State of Healthcare in Uganda”). These problems cannot be solved without a greater abundance of doctors, engineers, and the like, and without accessible clean water, many individuals lack

the resources and time to receive the education needed to assume these careers.

Uganda’s Water Crisis

*Where and
Why*

Lack of potable water is the root of the education problem and many more issues, and many

factors contribute to this insufficiency of clean water. One such factor is the country’s rapid increase in

population and economic growth which is stretching Uganda's supply of clean water more tightly than ever before. US News reported Uganda as the number one country with the worst accessibility, availability, and quality of drinking water ("10 Countries With the Worst Drinking Water"), and it is easy to see why. 40% of Ugandans must travel more than 30 minutes to access water, and only 49% have access to water that is safe to drink ("10 Countries With the Worst Drinking Water"). Ugandans who live

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in urban areas have better access to potable water; many new policies are increasing the quality and availability of drinking water in cities ("Water Supply and Sanitation In Uganda"). Rural areas do not have such protection, however; there, villagers must acquire what water they can from naturally polluted rivers, watering holes, or wells, many of which only seasonably fill with the precious liquid.

Impact on Women and Children

Lack of access to potable water particularly affects Ugandan women and children, upon whom

the duty of acquiring water for the family falls. One organization estimates that women and children spend about 25% of their time acquiring water for their families ("FRESH WATER WELL! \$8000.00").

The vast amount of time it takes these women and children to find, gather, and retrieve water keeps many out of school and otherwise fulfilling their potential outside the home.

Groups Affected

Although all are hurt by the deficiency of clean water, certain groups are more susceptible to specific dangers than others. Elders and children are more prone to get sick from the bacteria in the available water due to their weaker immune systems, and the aforementioned unsuitable healthcare system is in many cases little help. With higher mortality rates in the young and the old, community demographics alter unfavorably.

Uganda's water crisis even extends to impact foreigners. Uganda currently hosts approximately 1 million refugees, one of the largest refugee populations in the world ("8 Things You Need to Know about Refugees in Uganda"). These people, too, are suffering from lack of potable water in addition to the original traumas of being a refugee.

The harm caused by Uganda's limited clean water supply does not stop at the human population; crops and wildlife need water just as much and so compete with humans for water. Water shared between

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wildlife and humans provokes additional dangers; water sources become further polluted with animal waste, increasing the health risks of drinking what is often the only water available. With all groups needing access to clean water for a variety of reasons, it is crucial that such access be provided.

Learning from Failures

The severity of this problem has called the attention of numerous groups and organizations, but

attempts at a solution so far have fallen short. In order to effectively bring accessible, potable, and abundant water to Uganda, innovations must be affordable, sustainable, consistent, and produce a plentiful amount of potable water. By evaluating the principle attempts to end Uganda's water crisis, it can be determined which solutions have a false claim to the title of "solution" and why, and where the next idea can begin.

Wells

When brainstorming ideas of how to make potable water accessible in Uganda, wells are often the first thing to come to mind. Although established in the minds of many as the ideal way to establish access to water, these devices have faults aplenty that prevent them from being the solution to Uganda's water crisis. To begin with, the price of wells is extortionate, anywhere around \$8,000 ("FRESH WATER WELL! \$8000.00"). That price varies greatly depending on how deep the well must be drilled and through what types of rock and soil, factors that are likely unknown until the well is in the process of being built.

Once a well is constructed and paid for, however much that may turn out to be, the system has a hard time living up to its price tag. Too often a community is minimally consulted before a well is installed; the clean water might be a nice surprise, but the costs of maintenance are not. In many cases, communities cannot afford to maintain their well, and as the helpful installment organization has

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moved on, the well falls to malfunction or abandonment (Kelly). For these reasons, wells are neither

affordable nor sustainable and thus fail to be the means through which accessible, potable water can be

established in

Uganda.

Rainwater Collection Systems

Some devices look to the sky rather than the ground for a supply of clean water. Rainwater collection systems, a set-up composed of gutters and closed-top collection barrels, are prevalent throughout Uganda. These storage units cost about \$700 and rely on precipitation to provide a community or household with water (“Rainwater Collection”).

Although this technology is much cheaper than many alternatives including wells, it disappoints in reliability. Even though Uganda receives more rain than many of its African counterparts (“Climate and Average Weather in Uganda”), rainfall is characteristically uncontrollable and unpredictable, and so it is not wise to depend entirely on precipitation for water.

Even if rainfall could be relied on for water, would this system collect enough? No. Considering

the average household size in Uganda is 5 people (United Nations), and the total water needed for daily

consumption by a high-consuming assortment of 5 people is approximately 14 liters (“Water: How Much

Should You Drink Every Day?”), the annual rainfall of approximately 2,048 liters (“ENDMEMO”) would

only provide the household with enough drinking water for 146 days, and solely under the highly improbable conditions that it rains 10 inches a day and the gutter system collect every drop. These factors expose the inconsistency of and unacceptable quantity of water collected by rainwater collection systems and thus spotlight the inability of these systems to end Uganda’s water crisis. What Uganda needs is a method of potable water extraction that is cost-effective, sustainable, reliable, and produces a high yield.

There is a new technology that not only meets but surpasses this criteria, and it is called the Warka Tower.

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Warka Towers

What They Are, How They Work

Imagine being able to harvest clean, drinkable water directly from the air. Warka Towers provide communities with access to plentiful, potable water through this very process, anywhere and every day.

Inspired by biomimicry and weaving techniques native to Ethiopia, the Warka Tower collects water from the air using the natural forces of gravity, condensation, and evaporation. On the tower’s polyester mesh

surface, water vapor condenses each night, a process caused by the daily cooling of temperature (diurnal

temperature variation). Water droplets are then funneled by the tower’s shape into a storage unit for

collection, filtration, and extraction each morning. Between the clean air of remote villages and the

light

filtration system included with the tower, water collected by these devices is entirely potable. Not only do

Warka Towers make potable water accessible to villages, these structures also act as community centers;

the shade of the towers' canopies provide a place for meetings and activities, and solar-powered lighting

is being developed to accommodate nighttime activities ("Every Drop Counts").

Cost-Effective

At approximately \$1,000 a unit, Warka Towers lie in the narrow range of being affordable while

still worth the money. Indeed the price of establishing a tower in a community ranges, but it does so

minimally and according to predictable circumstances. Transportation and availability of local labor and

building materials influence the price of establishing a Warka Tower, but these factors can be easily

prognosticated, thus significantly reducing the likelihood of surprise costs. Forecasting costs of tower

construction is enabled largely by the pretesting of locations; before a Warka Tower is established in a

village, a smaller prototype is erected and monitored for 6 months to make sure the technology will be

effective in a specific location ("Every Drop Counts"). Significantly more affordable than many

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man-made water sources such as wells, funding a Warka Tower is an achievable goal for clubs,

communities, churches, and other groups, and the device's sustainability, reliability, and plentiful production prove the tower to be well worth the money.

Sustainability

Warka Towers are constructed entirely of biodegradable and recyclable materials, a large portion of which can be grown in Uganda such as bamboo and hemp (WDCD Climate Challenge). This is one of the many factors that contribute to the Warka Tower's sustainability. Considering the country's weak infrastructure, independent construction and maintenance of these water sources is an important criterion to consider and one the Warka Tower is designed to meet; these devices are specifically created to be built by the community, with help as needed by the Warka Water team members, and maintained independently. Within 4 weeks with the help of 8 people, Warka Towers can be constructed, erected and functioning with no scaffolding or power tools needed. Scaffolding and power tools are also unnecessary for maintenance, a 2-hour task with the help of 16 people. Frequency of maintenance depends on necessity, whenever the filters need replacing, the polyester mesh needs reparation or a hemp rope needs to be tightened. Properly tended to, a Warka Tower lasts 6-10 years ("Every Drop Counts"), enough time for the community to become accustomed to both the caretaking and production of the device, and even enough time for the community to begin to understand how they might independently create more.

Reliability The Warka Tower is reliable in addition to sustainable, harvesting potable water daily, no matter

the weather. Wherever there is air, there is water vapor, and the Warka Tower can extract it and make it available to those who need it. Although these devices collect more water in times of rain or fog, these conditions are not needed for the tower to collect its daily 40-80 liters of potable water (depending on the

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location) (“Every Drop Counts”). Independence from weather conditions means villagers can safely rely

on the tower’s consistent collection of potable water, making rain and fog added bonuses.

Plentiful Production

The Warka Tower’s sustainability and consistency are only of value because the device itself collects enough water to be a reasonable solution. At the lowest point of its estimated range, a tower can provide enough daily drinking water for 2.5 families of 5, or about 13 people (40 liters divided by 14 liters per example family). At the highest point of its estimated range, a tower can provide enough daily drinking water for 5 families, or 25 people (80 liters divided by 14 liters per example family). Indeed

these calculations only consider water for drinking, and there are a variety of other necessities of water,

including cooking, cleaning, sanitation, and food production. However, these calculations also exclude the

collection of rain and fog, conditions that occur frequently in Uganda's tropical climate, meaning more water is collected than what is shown by these computations. This additional water can account for what is needed for additional household tasks and purposes.

Also to consider; these calculations are based on a high-consuming example family and the

recommended daily consumption of water for adults, 3 liters for adult men, 2 liters for adult women

("Water: How Much Should You Drink Every Day?"). The example family used for these calculations consists of 4 adult men and 1 adult woman (4 men, 3 liters each, added to 1 woman, 2 liters each, 14 total liters), a composition representing the most logical, highest water-consuming family of Uganda that fits the average size. Because the family used in the calculations is at the highest end of average consumption,

it is highly probable that more families can be provided with water by a Warka Tower than what is computed in these estimations.

Another nuance to consider is how these calculations are based on doctors' recommendations for water consumption, not necessarily what is likely to be consumed or the minimum needed. The average
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adult American drinks only .6 liters of water daily (Hamblin) and can survive on it. Evidently different amounts of water are needed depending on a variety of factors, but fundamentally, survival is possible

and popular on less water than what was used to calculate these estimations. For these reasons, 2.5 and 5

families are the minimum estimated amounts of how many people could be supplied with water by

a

Warka Tower daily. As shown by these calculations, water collection by Warka Towers meets the needs of a community, especially considering the additional factors of precipitation and fog, the diversity in family composition and water necessities, and the reality of less than ideal individual water consumption.

Warka Towers have proven themselves to be cost-effective, sustainable, reliable, and plentiful-producing, meeting all the major criteria for making clean, abundant water accessible to Ugandans. The next step is to make sure this technology is applicable to Uganda and plan how these devices would be established there.

From Ethiopia To Uganda

Warka Tower technology is developed in Italy by a team headed by Arturo Vittori and was piloted in Dorze, Ethiopia in 2015. Since then, Dorze's Warka Tower has proved itself highly effective in reliably and sustainably providing the village with plentiful, potable water. Just because a certain technology is effective in one place does not necessarily mean it is effective in another. However, in the case of the Warka Tower, the opposite is indicated to be true; because of the similarity in climate between Ethiopia and Uganda, the success of the Warka Tower in one country suggests that the device will be equally effective in the other, and it will only take a series of steps and developments to make this theory reality

*Climate
Comparisons*

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Although there is yet to be a Warka Tower installed in Uganda, by comparing the climate of this country to the climate of Ethiopia, it is evident that Warka Towers would be just as successful in providing Ugandans with drinking water as they are providing Ethiopians. An important factor to consider is the similarity in diurnal temperature variation; this temperature change causes the condensation of water that allows Warka Towers to reliably harvest water from the air (“Every Drop Counts”). In Uganda, temperatures drop an approximate 14-18° F from day to night (“Climate and Average Weather in Uganda”). Although this average temperature change is slightly less than that of Ethiopia, meaning comparatively less water would be collected through condensation, this difference is made up by Uganda’s more frequent rainfall. As Uganda is closer to the equator than Ethiopia, Uganda has a more tropical climate (“Uganda”), and thus receives more precipitation in both quantity and frequency. Even during Uganda’s dry seasons, rain is still received, just in lesser amounts. In summary, Uganda and Ethiopia have similar climates, although Ethiopia has a greater average diurnal temperature variation and Uganda receives a greater amount of rain due to its more tropical climate. These conditions indicate that Warka Towers would be similarly effective in Uganda as they are in Ethiopia.

Steps Needed to Bring Warka Towers to Uganda

Bringing Warka Towers to Uganda would require several steps to be taken and build-outs to be made. Ideally, a partnership between Warka Water and an outside group or separate branch would form so that the duties of development and installation could be generally split for higher efficiency and more installations. Support, funding, and publicity for the Uganda Warka Towers project would be sought from big and small organizations alike, everything from the UN to the plethora of lesser-known, water-oriented non-profits. Successful and prevalent social media campaigns would be crucial; civilian groups like schools, churches, and clubs of first-world countries cannot fundraise for the installment of Warka Towers unless they know about this technology. Warka Water is already present on Twitter, Facebook, and Instagram, but these pages need to be upscaled for greater outreach to install more towers.

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Policies of Warka Towers in Uganda

To effectively end Uganda's water crisis, the installment of the Warka Tower technology would need to be partnered by the installment of several policies. For example, explicit consent must be made by a community before the installation of a tower is planned and executed, and the organization must

check-in consistently with the community to make sure everything is running smoothly. Although both of these criteria are met by Warka Water at present due to the mandates of the process of development, these policies might be forgotten as the organization scales; this must not occur. Without consent or consistent availability of help, these towers would lose their sustainability.

Additional regulations would be implemented to ensure that the Warka Towers create desired effects beyond accessible drinking water. One such policy would regulate the towers' locations; by installing towers close to schools, the necessity of potable water would come to accompany the necessity of education. By code, installation of a Warka Tower would also come to mean helping a community develop access to local construction and maintenance resources, like hemp gardens and bamboo groves.

All policies would be flexible and dependent on specific locations; if a village lacks a school or land for growing construction materials, this will not prohibit the community from a Warka Tower. To the extent that they wish to be, villages will be cared for by their Warka Tower and Warka Water, by whatever alternatives and special cases required.

Conclusion

It is well known that without food, there is no life, but it is often forgotten that without water, there is no food. Without food or proper digestion, health is compromised, restricting activities, and thus

many people who lack clean water, including the majority of Ugandans, are unable to reach their full potential. Warka Towers are the tool through which the foundation of this issue can be addressed and corrected, providing Ugandans with water and thus allowing many the means to fulfill their golden prospects. Through the sustainability, reliability, plentiful production, and affordability of these devices, Ugandan communities can develop long-lasting access to the magic of *maji*.

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Works Cited

(“10 Countries With the Worst Drinking Water”). U.S. News & World Report, U.S. News & World Report,
www.usnews.com/news/best-countries/slideshows/10-countries-with-the-worst-water-supply?slide=11.

(“10 Important Facts to Know About Education in Uganda”). The Borgen Project, Borgen Project

https://borgenproject.org/Wp-Content/Uploads/The_Borgen_Project_Logo_small.Jpg, 22 Nov. 2017, borgenproject.org/10-facts-about-education-in-uganda/.

(“8 Things You Need to Know about Refugees in Uganda”). 8 Things You Need to Know about Refugees in Uganda | Amnesty International,
www.amnesty.org/en/latest/campaigns/2017/06/8-things-you-need-to-know-about-refugees-in-uganda/.

(“Agriculture & Agribusiness”). Uganda Investment Authority,

www.ugandainvest.go.ug/priority-sectors/agriculture-agribusiness/.

(“Children of Uganda”). Humanium,
www.humanium.org/en/uganda/.

(“Climate and Average Weather in Uganda”). World Weather & Climate Information,

www.weather-and-climate.com/average-monthly-Rainfall-Temperature-Sunshine-in-Uganda.

(“Discover the Climate and Geography of Uganda”). World Travel Guide,

www.worldtravelguide.net/guides/africa/uganda/weather-climate-geography/

(“ENDMEMO”). EndMemo,
www.endmemo.com/cconvert/lin.php.

(“Every Drop Counts”), Warka Water,
www.warkawater.org/.

(Hamblin), James. “How Much Water Do People Drink?” The Atlantic, Atlantic Media Company, 12 Mar. 2013,
www.theatlantic.com/health/archive/2013/03/how-much-water-do-people-drink/273936/.

(Ingham), Kenneth, and M. Semakula M. Kiwanuka. “Daily Life and Social Customs.” Encyclopædia

Britannica, Encyclopædia Britannica, Inc., 21 Nov. 2019,
www.britannica.com/place/Uganda/Daily-life-and-social-customs

Chuhta 17

(Kelly), Annie. “Money 'Wasted' on Water Projects in Africa.” The Guardian, Guardian News and Media, 26 Mar. 2009,
www.theguardian.com/society/katineblog/2009/mar/26/water-projects-wasted-money.

(Lyons), Maryinez, and Omari H. Kokole. “Religion.” Encyclopædia Britannica, Encyclopædia Britannica, Inc., 21 Nov. 2019,
www.britannica.com/place/Uganda/Religion#ref37602.

(“Rainwater Collection”). WaterSchool, www.waterschool.com/rainwater-collection.

("FRESH WATER WELL! \$8000.00"). Return Hope International, a 501(c)3 Not for Profit Org, 9 Apr. 2019, www.returnhope.com/fresh-water/.

(Sawe), Benjamin Elisha. "What Type Of Government Does Uganda Have?" WorldAtlas, 14 June 2017, www.worldatlas.com/articles/what-type-of-government-does-uganda-have.html

(Ssebutinde), Christopher. "What Type Of Work Do People In Uganda Do?" Quora, 1 Nov. 2018, www.globalagriculture.org/report-topics/industrial-agriculture-and-small-scale-farming.html

(Staff), Science X. "Calculating Water Footprints of Animal, Plant Proteins." Phys.org, Phys.org, 31 Jan. 2011, phys.org/news/2011-01-footprints-animal-proteins.html.

("The State of Healthcare in Uganda"). Bulamu Healthcare, 25 May 2018, bulamuhealthcare.org/healthcare-in-uganda/.

("Uganda"). Countries and Their Cultures, www.everyculture.com/To-Z/Uganda.html.

("Uganda - Environment"). Encyclopedia of the Nations, www.nationsencyclopedia.com/Africa/Uganda-ENVIRONMENT.html

("Uganda - Rural Population % of Total Population"). Uganda - Rural Population (% of Total Population), www.indexmundi.com/facts/uganda/indicator/SP.RUR.TOTL.ZS.

("Uganda Population LIVE"). Worldometers, www.worldometers.info/world-population/uganda-population/.

("Uganda: 2019/20 Average Salary Survey"). Average Salary Survey,

www.averagesalarysurvey.com/uganda.

(“Ugandan Families Stick Together, They Don't Fly Far from the Nest”). Karungi Camp, 16 Dec. 2019,

karungicamp.com/ugandan-families-stick-together/

(“Unemployment, Total % of Total Labor Force Modeled ILO Estimate”). Data,

data.worldbank.org/indicator/SL.UEM.TOTL.ZS?most_recent_value_desc=true.

(United Nations), Department of Economic and Social Affairs, Population Division (2017).
Household

Size and Composition Around the World 2017 – Data Booklet

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https://www.un.org/en/development/desa/population/publications/pdf/ageing/household_size_and_composition_around_the_world_2017_data_booklet.pdf

(“Water: How Much Should You Drink Every Day?”) Mayo Clinic, Mayo Foundation for Medical Education and Research, 6 Sept. 2017,

www.mayoclinic.org/healthy-lifestyle/nutrition-and-healthy-eating/in-depth/water/art-20044256

(“Water Supply and Sanitation In Uganda”). WSP, 2011,

www.wsp.org/sites/wsp.org/files/publications/CSO-uganda.pdf.

(WDCD Climate Challenge). “Warka Tower.” WDCD Climate Challenge,
challenge.whatdesigncando.com/projects/warka-tower/.

(“Women And Water - A Woman's Crisis”). Water.org,
water.org/our-impact/water-crisis/womens-crisis/.