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Somalia, Factor 2: Water Scarcity

### **Somalia: Advanced Irrigation System Needed to Challenge Water Insecurity**

Somalia is the definition of a diamond in the rough. It has never been what agriculturalists would describe as a “breadbasket” or a self-reliant source of agriculture. At periods in its history Somalia was resourceful in providing food for its people as well as grandeur; yet that livelihood relied heavily on the unpredictable commercial mercantile trade managed by ancient kingdoms and imperialists. Today the once profitable coastal trading hub located on Africa’s Horn has been consumed by the ravages of civil wars, crumbling infrastructures, climate woes, and a destabilized government. These factors have created an amalgamation of food insecurity all stemming from the agricultural life blood of all societies water. The famine that occurs in Somalia originates from causes that are linked to water scarcity in the East African region. For Somalia to become self-sustainable and successful in its national endeavors, it has to combat famine effectively and strategically. More specifically, it is crucial for Somalia to create a multi-faceted plan that adapts significantly advanced water technology and more conservatory farming practices to fight water scarcity. Despite having the longest coastline in Africa, Somalia lacks an impactful water infrastructure of which the effects are easily seen. Approximately 71 percent of Somalians do not receive the minimal dietary requirements they need on a daily basis. Many survive primarily on the small amounts of potable water available and aid given out. Only 30 percent of the total population has access to these miniscule amounts of water (World Vision). Native Somalian Shukri Sheikh Ali and her family have experienced the impact of water deficits first-hand. She states that they “were so excited” to return home from a Mogadishu United Nations displacement camp after they were initially uprooted by a terrible drought. Sadly they were never able to return. According to Shukri if she and tens of thousands of other Somalian people were still on their farms, the sporadic rainfall would have left their fields fruitless for the fourth year in a row. The possibility of a safe retreat home she says was also worsened by the dangerous activities of the jihadist terrorist group al-Shabaab that have taken control of many parts of southern Somalia (Wells).

Crop agriculture and livestock agriculture are the main sources of sustenance for the Somalian people even though at times they are not the most reliable. Many farms occupy 2-4 hecta acres of land. Somalia’s cash crops are mostly cotton, rice, and sugar. Their food crops are mostly sorghum, maize, rice, and beans. Many farmers describe themselves as pastoralists that raise cattle, sheep, camels, and goats or identify as agro-pastoralists that practice a mixture of raising livestock and traditional crop farming (Aquastat).

Somalian farms are usually taken care of by single Somalian families or farmers and are usually hosted independently, by the government, or by multiple third parties. A typical Somalian rural farm family consists of a father, a mother, and several children. Like many other countries, the households are dominated by patriarchal figures. Men are the main decision-makers, overseers of labor on farms, and migrants that go to nearby cities for work (Lewis, et al.). Economically women contribute more to their homes than men; they account for 66 percent of all subsistence farm labor. They are also able to hold land titles under their own names. In contrast to this perceived freedom, only a mere 14 percent of farmers and approximately 28 percent of pastoralists are women who own property. Instead most women work on their husbands’ farms fertilizing crops and packaging goods that will be exported for profit (FAO). The cultural subjugation of women occurs through forced genital mutilation and other gender-based violence to which 95 percent of young girls and women are subjected (World Vision).

For most children let alone their parents growing up, education is not a part of their daily rituals because only 23 percent of children are in school (World Vision). Most of these children live in urban areas where life expectancies are much higher. Children who live in rural areas are more susceptible to al-Shabaab recruitment and forced domestic labor. The gender balance in schools is promising because the average ratio in classrooms is 25 boys to 21 girls; one of the brightest in the world for a country in such distress (UNICEF). Still with this education, curriculums do not revolve around improving agricultural practices, therefore many Somalians lack certain knowledge regarding how to sustain themselves using the little use of safe water that is available to them resourcefully.

Health care in Somalia is largely private and hospitals are located long distances away. Most Somalian families are left without health care because the expenses are too high. Recent health care initiatives launched by the government have promised to provide all people with services through the Health Sector Strategic Plan (HSSP) at little to no cost. It is a joint program that is funded by the Somalian government, United Nations, and other international governments (News Medical).

Two main rivers carve the country's landscape, the Juba and the Shabelle, and the upper reaches of the latter is controlled by the neighboring state of Ethiopia. Somalia itself borders the turbulent Indian Ocean. Southwestern Somalia happens to be the most fertile region, since it is home to the country's two major river valleys. The lower lands between the two rivers are reported to have the most arable land in the country (Metz). Sediment that rises from these rivers help to naturally fertilize farmers' fields, yet the unpredictability of how high water will rise and how long it will take for it to recede can be dangerous. The plateau that surrounds the city of Hargeisa also provides favorable soils for growing sorghum and maize at greater volumes. As for the pastoralists, they migrate throughout Somalia feeding their livestock on the guban or scrub lands of the north, the seasonal water streams of the east, and the grazing land and natural water wells of the west (Metz).

The water movement patterns that are characteristic to this region have made most of Somalia's people, the ethnic Somalis nomadic. Their lives are controlled by both the natural and unnatural cycles of water on land and offshore. Water-related phenomena in Somalia include but are not limited to El Niño's in the monsoon season strongly attributed to anthropogenic climate change, rampant seasonal flooding, and daunting droughts (Ali). Somalians are slightly better protected in urban centers like Mogadishu and Hargeisa, where water is the most plentiful. For the more than two-thirds of Somalian people who live strictly agriculturally, they are left to the incalculable throws of natural disasters, which leave them starving. Such effects include a prevalence of Vitamin A deficiency, which negatively affects bone development in growing individuals (Global Nutrition Report).

Water scarcity remains one of the main sources of the problems described. The infrastructure of Somalia's irrigation systems are dilapidated, thus the methods Somalian farmers have used to water their crops and hydrate their animals have regressed tremendously in productivity. Because of how essential water is, Somalians have trouble producing enough for themselves. Not having access to the technology needed to reclaim water from terrestrial and coastal bodies is such a huge part of water scarcity. The irrigation systems implanted by Italian settlers in the twentieth century have since worn away because of the collapse of the socialist Somalian government before the civil war that once maintained it (CIA). Spate irrigation is the most commonly used crop irrigation technique in Somalia, where it accounts for 75 percent of agricultural practices (Aquastat). Its efficacy depends on how successfully a farmer can diverge flooding waters into his or her fields. When it is already hard to maintain safe farm plots in conflict-ridden areas, the productivity of land after seasons of this technique can be prone to soil erosion and in the monsoon season prone to salt water intrusion. As a result, the land is depleted of the nutrients it needs to harbor high-yielding harvests for farmers (Aquastat).

Several barriers exist that halt the government's ability to implement new irrigation techniques and systems. The looming presence of al-Shabaab, a terrorist jihadist group with ties to Al-Qaeda, is still a threat even though it has been mitigated by the Somali National Army and African Union Mission in Somalia (AMISOM) troops (Hiiraan Online). Its members rob farmers of the land security that they are entitled to have under law. They forcibly tax and in many cases threaten them (Hiiraan Online). At first disadvantaged groups like this one were granted security, however this rule has changed. There is a way to overcome this and that is through empowering those who are the most vulnerable, which are women, farmers, and children. Scientific research points out that because of hunger, these groups are most likely the targets of attacks (Land Info). Early agricultural education in the ways of sustaining families through safe irrigation practices could hopefully promote food security and decrease the likelihood of recruitment efforts. More than 80 percent of Somali government officials took money out of public funds for unknown interests (Heritage Foundation). Since the Somali government has a major task in combatting water scarcity, it must ensure the largest portion of the population, which are subsistence farmers, have their voices heard. Farmers will then have a greater say in the distribution of public funds and legislation involving the fate of farms so that decisions will no longer rest solely in the government's hands. In order for change, the citizens and the government must rise to the challenge facing them.

To overcome obstacles, ordinary Somali citizens can be empowered through similar interests in better management of their water sources and farmland. They can join with their frail government and encourage it to have more active roles in confronting water scarcity. Actions that create real differences range from giving farmers tax breaks to requesting military protection for water irrigation construction. It is up to native Somalis to find common ground in inter-clan disputes and let agricultural teamwork efforts prosper. A similar movement took place in medieval Japan, where opposing clans existed as well as a weak central government. Food was not being produced at a sufficient rate. Just like Somalia, Japan was restrained by limited arable land and limited supplies of freshwater. Decentralization was fueled by disagreements and long distances, with a strong, unilateral movement for agricultural prosperity farmers were able to overcome in the Yamato plain with the help of three shoguns, its futile emperor by uniting as one through peaceful mobilization (Woods). The systems that spawned from this political transformation were called *hans* or individual administrations that were composed of common people-led methods of governance infused with federalist principles that were strengthened in the central government (Ochiai). For this reason, Japan was able to enter a long peacetime of economic, agricultural, and civic harmony in all parts of society. The Edo period (1603-1868) that arrived shortly after unification, elevated farmers so that they were deemed heroes (Woods). Farmers, commoners, and a stronger central government also came together to create forums where cutting-edge ideas to improve agriculture and water sources were expressed. This exchange of ideas was atypical of the time; it focused on innovative eco-sustainability in recycling used water (Ochiai). Keeping this model in mind, something as simple as Somali farmers and their government implementing the tangible arts in a new cutting-edge way through foreign yet culturally congruent forms of assembly can minimize the negative effects that water scarcity has on today and tomorrow.

There are many irrigation systems that can help fight water scarcity, however not all of them are viable and realistic under current circumstances. Automated subsurface bubbler micro-irrigation systems have been scientifically proven to effectively water crop plants in semi-arid to arid global regions. They are extremely precise when it comes to distributing water to different parts of the crops' root systems, however they take extended amount of time and money to install and maintain (Hla and Scherer). Another alternative to spate irrigation that has been recently explored is the technologies involved in the \$400 million dollar desalination Sodek plant in Tel Aviv, Israel. The process of reverse osmosis is used to remove salt from seawater so it is potable for humans and livestock (Water World). Even though the plant has saved Israel huge amounts of money, a project like this in Somalia would break the country fiscally. Both potential solutions also do not align themselves with local agricultural customs and beliefs, thus

making it incredibly difficult to introduce at the grassroots level within society. Therefore, an approach that takes into consideration the practices farmers use now and in the future of agriculture is imperative. Thousands of years ago, an ingenious irrigation method in North Africa developed called *bolla* or unglazed clay pot irrigation. Potters used their ceramic masterpieces to efficiently water acres of farmland. Bill Mollison, dubbed the “father of permaculture” because of his acclaimed research in sustainable agriculture, in one of his documentaries even called it “the most efficient irrigation system in the world” (Permaculture Research Institute). Recent experimentation with the uses of clay vessels in agriculture has put a spotlight on this exceptional use. Through networks of microporous holes on the surface of the pot, tiny yet powerful suction forces draw water droplets to the sides then into the soil where localized crops stretch their roots to absorb them (Bayuk). To acquire these micro-irrigative properties, there is no need for expensive add-ons. Gentle and focused working hands are needed; while it is the role of small non-governmental organizations (NGO) to teach villages and farms how to mold and maintain clay pots so they are compatible with agricultural needs. Because pottery making is already instilled in Somalian culture, it is much easier to introduce at the grassroots level of society. A modern settlement in Burr Heybe, Somalia where potters practice this craft is an excellent example. The potters use a simple mixture of clay powder, sand, and graywater as ingredients and wooden tools and seashells as tools (Belkin and Brandt). With the participation of an entire village, each person can produce an upwards of 30 clay vessels a day (Belkin and Brandt). The pots created can have a wide range of uses from cooking to water containers for traveling herders (Belkin and Brandt). Despite lacking the trinkets that make other methods visually-appealing, clay vessels allow crop plants to absorb very close to one-hundred percent of the water they need it as they need it, so it is not lost to common water stresses like evapotranspiration and surface runoff (Bayuk). Somalian farmers must craft clay vessels and place them underneath the soil where only the long neck of the clay vessel is protruding from the ground. Once the containers are filled with the water source of their choice, whether it is floodwater, rainwater or fetched water, they must cover the opening with a rock. Multiple clay vessels can be buried in one farm plot, however they must be refilled if they are less than 50 percent full (Bayuk). The increment in which vessels must be refilled is dependent on the method of water catchment, which can range from every 24 hours to months at a time (Bayuk). Clay has been found in deposits locally and they are usually only several feet from the surface (SWALIM). It can be excavated more quickly by bigger NGO’s through the renovation of traditional forms of irrigation and man-and-machine-powered digging.

The main non-governmental leader would focus on developing water systems in regions around the world, chiefly in parched areas of Africa, and have the technological resources to bring water projects to fruition. Additionally the organization would have to have expertise in the complex relationships families and communities have with their local water irrigation customs. The fit candidate for this description is the AgWater Solutions Project of the International Water Management Institute, which is financed by the Bill and Melinda Gates Foundation, Stockholm Environmental Institute, and others (AgWaters Solutions Project). The sources of funding would come from the previously mentioned organizations since they have been successful in aiding hundreds of thousands of families. The organization American Relief Agency for the Horn of Africa has close liaisons in its local Minnesotan Somalian community that extend into the broader country of Somalia. It was first on the scene during Somalia’s most recent famine crisis with basic emergency supplies, so it would be a great candidate for initiating these projects (ARAHA). Its volunteers would instruct villages and provide materials needed for clay pot making. The Food and Agricultural Organization-sponsored Somali Water and Land Information Management could inform farmers about present water conditions and possible advancements to the further development of local irrigation practices (SWALIM). Clay pot irrigation and the construction of regulation-abiding water projects have worked so successfully in places like Brazil, a local scientific research organization built the country’s first porous pot factory (United Nations). Possible country foreign aid donors should always be interested in providing funding to NGO’s. Not only do they provide services to the underprivileged, but generous donations bring global communities and outstanding future allies closer together.

With the commencement of several water projects, the agricultural output of Somalia and the frequency at which people are starving indicates that the status of Somalia's water crisis is gradually improving. Numbers depict whether the combination of subsistence farming, impeded government help, remittances, and foreign aid is doing enough to provide the Somali people with enough agricultural assistance to support themselves (Oxfam International). One recent project carried out in rural Somalia showed the benefits of rehabilitating age-old water irrigation infrastructure with innovative technology. Barkads are traditional Somali ground or above-ground water tanks that collect rainwater. The rehabilitation of barkads in the agro-pastoralist village of Bowdha Dogore has proved to be beneficial to many residents: they no longer trek long distances to buy and attain water that would otherwise cost them one American dollar per fifty liters. For more than 43 percent of families that live on less than one dollar a day this is a boost to self-sufficiency (UNICEF). A resident villager named Abdi Ahmed Jamaa, who was benefited by this program said he was grateful for the safer and sustainable barkad. The barkad was equipped with a metallic awning that prevents individuals and wastes from accidentally falling into the village's water supply. Moreover, a state-of-the-art sand filter was added to decontaminate water of harmful bacteria (Oxfam International). With agriculture already making up 60 to 65 percent of Somalia's gross domestic product (Aquastat), a steady water supply is needed to keep families alive. Just one repaired barkad can provide 250 people in one village with water for the next twenty years (Medair). Thanks to this project and others like this over 200,000 Somalis were provided with clean water (ICRC). Practices such as clay pot making can make water reserves last even longer. This program could be up-scaled if developers educated farmers of safe water recycling behaviors involving graywater, or used household water with no fecal contact. Graywater can then be utilized in the implementation of the bolla system into agriculture. To further increase eco-sustainability, developers should also create a simple mechanism that directs solar energy reflected from the awning toward pots so they dry more quickly than the use of controlled fires. The solutions outlined will have great impact. Gender and caste-like income disparities will actually begin to close and allow underprivileged individuals, such as subsistence farmers, to transcend the rigid social hierarchy that holds them stagnant. Tasks will become less relegated to one gender or income group, instead all members of a community will be required to contribute equally for their survival. Just like in pre-industrial Japan, farmers will gain more flexibility and respect. Somalis will be able to explore new markets because the returns from self-made investments will help in widening the variety of food and cash crops that they produce, thus connecting them to the realm of possibility that is found in excellent lifetime health and the profitable African urban markets that are expected to triple in size and value in the next decade (World Bank). Somalis will be able to engage in productive and fruitful agriculture to properly feed themselves and their country. Micro-irrigative, biodegradable clay vessels are not only useful now, but in the near future will break down and leave little damage on the environment. If Somalia uses the common people-led governance model based on an agricultural initiative in improving public water irrigation, it will eventually be more integrated as a national economy, rather than negatively divided by smaller regions. Water will no longer be a luxury, but available to a more significant part of the population. Somalia has the reserves of water to grow yet needs the advanced infrastructure to promote the outcome of its agricultural practices to once again emerge as a flourishing country.

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