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Lake Chad's Decreasing Water

Chad, a country nestled in north-central Africa is facing the issue of the desertification of its vitally important Lake Chad. In only sixty years ninety percent of the lake has been lost.

This body of water is an incredibly critical source of freshwater, food, and income for the thousands of people living along its shores. The depletion of the water directly correlates with the increasing amount of people that now rely on the lake. The deadly terrorist group, Boko Haram has pushed people living near Nigeria into Chad, Niger, and Cameroon. This influx of people is depleting the waters of Lake Chad but deforestation, droughts, and water mismanagement also contributes to the problem, resulting in the lake becoming a biohazard with a dying ecosystem.

The average family in Chad faces food and water instability and about forty percent of the population lives below the poverty line. Sixty five percent of the population is made up of people under the age of 25 with low life expectancy and high mortality rates. The average family in Chad also faces issues from poverty, rural habitation, poor education, lack of family planning, and medical care. Most Chadian families practice the Muslim religion and may speak the official French and Arabic language or one of the 120 other languages and dialects. Mothers in Chadian families generally start having children at about the age of eighteen but Chad has the third highest infant mortality rate in the world. Chadian women have limited access to contraceptives and family planning so the average woman has about six children. Most children of Chadian families receive poor education with only about twenty two percent of the population being literate. Most families live in impoverished rural areas relying on agriculture as a source of income, and Lake Chad is a major source of water for agricultural endeavors.

The lake provides people with many opportunities with its fertility, even as it is being depleted. Some of the resources provided include fish, freshwater, natron, and oil. One of these resources, fish, is important to fishermen who sell fish in local markets or in markets within Chad's capital city, N'djamena. Unfortunately the fish populations within the body of water are greatly declining from drought, stream diversion or mismanagement of water, overfishing, and the use of smaller mesh nets which catch younger fish. The two main species of fish, Nile perch and

characin rarely weigh more than 8 kg. The lake is one of the richest bodies of water in fish within Africa but this fact may soon be inaccurate. The fertile lands surrounding the lake are used to grow wheat and the mineral Natron can be found along the shores. Natron is a sodium carbonate used as salt in medicines and soap. Chad's most important resource, oil, is found in an area north of Lake Chad and petroleum is now the country's main export.

Since the levels of water in the lake fluctuate greatly, people who rely on the lake for food and water are more vulnerable to food insecurity, poverty, and violence. In 2019 alone, the population of people living along Lake Chad narrowly escaped famine as food aid to the region increased. Food instability is only exacerbated by the violence that surrounds the poverty stricken region. Chad's military has attempted to suppress insurgent groups but has not been successful to date. Food insecurity and poverty actually push people to join the insurgent groups rather than overcome them. Although some Chadians end up joining the insurgent groups at least two percent of the population immigrated from Nigeria in order to escape the intense violence of Boko Haram.

To begin examining the issues with Lake Chad, one must first examine the lake's sources of water that feed it. Water flows into Lake Chad from the Chari and Logone rivers. The Chari river begins in the Central African Republic, flows through a swampland in between Niellim and Dourbali, goes through a delta, and finally into the lake. This river is joined at certain points by other rivers such as the Salamat Wadi and the Ouham river. The second river that feeds into Lake Chad, the Logone river, begins at a junction of the Pendé and Mbéré rivers. From there the Logone flows and eventually joins the Chari at N'Djamena. These two rivers affect the water levels of the lake but the lake also fluctuates because of precipitation, seepage, and evaporation.

The UN cites inefficient damming and irrigation of the Chari river as part of the problem concerning Lake Chad. Dams change the impacts and timing of seasonal floods but also disturb migrating fish, which are important to the economy and are a valuable food source for a region that is struggling with food instability. Irrigation is also part of the problem because if it is done inefficiently the lake's freshwaters can become salinated. Many farmers along Lake Chad mismanage the water by redirecting instream flows to agricultural land, without thinking about the effects on ground and surface water. To build more sustainable water plans of Lake Chad the dynamics of ground and surface water must be taken into consideration.

A proposed solution for replenishing the waters of Lake Chad is the construction of a canal, which would move waters from the Zaire river to the lake. The proposed canal would be 2,400 km long and would annually move one billion m³ of water. Another part of the project that has been discussed is the idea of using the movement of water within the canal to generate

electricity, but the Lake Chad basin would have to undergo more irrigation. Currently five million dollars has been raised, in order to do a feasibility study which would examine the cost of the project and the practicality of it as well.

One main concern with this proposed solution is the fact that it may not actually address the real issues that affect the lake. This canal is highly lucrative but the money may enrich the wrong people and could even cause issues with corruption. This solution could also cause water depletion issues in the Zaire river as one billion m³ of water is moved to Lake Chad. Not only could this solution cause corruption, and water issues this project also costs millions of dollars which would have to be raised. The feasibility study alone costs about five million dollars. Although this solution is fraught with issues it is very lucrative, which could be a benefit for a developing country in need of finances.

One irrigation project is known as the South Chad Irrigation Project or SCIP. This project's goal is to irrigate the lands around the lake and divert about three percent of the lake's water to achieve its goal. Currently the project has not yet been finished, with only two stages out of three being finished because of droughts. If this project is to be successful water mismanagement must be eradicated, which requires education and better water practices.

The solution to the water crisis in Chad has multiple parts which involve anti corruption policies, education or awareness, improving irrigation or damming practices, and the implementation of water conservation technologies. Chadians must learn and be taught how to improve their water practices because the water crisis can not change for the better unless people have access to better practices. To develop better irrigation and damming practices the Lake Chad area must be mapped out and observed to find all the issues and address them. Dams must be either moved or completely taken away. Princeton, itself already has a working Lake Chad drought and flood monitor that monitors precipitation, evaporation, and soil moisture. This monitor could be very useful for developing any water conservation plans because the yearly fluctuations may change certain aspects of the project. For example if water evaporates rapidly in one part of the lake the water practices will have to adapt to this change.

The United Nations could manage this project and even help fund it because the United Nations has listed Lake Chad as a World Heritage Site and has even made plans to raise five billion dollars for the canal project. Funds for the canal project could be allocated to a better plan that implements these steps. The United Nations also has the United Nations Convention Against Corruption or UNAC, a treaty used to evaluate the extent of governmental corruption in place such as Chad and develop policies to combat the corruption that would hinder a project like this. Having UNAC assess and develop anti corruption policies for this project would be crucial because of how profitable environmental corruption is. Environmental corruption includes

illegal activities such as exploiting natural resources, animal poaching, and dumping waste unlawfully. Since resources in the Lake Chad area are becoming more scarce this most likely has created a profitable black market which is causing the issue of natural resource trafficking.

There are different types of corruption that should be addressed in the Lake Chad area, so with this project, the corruption that would most probably have to be addressed would be bribery for land or resource permits, trafficking of natural resources such as minerals and oil, and illegal logging or damming. UNAC would combat this corruption by monitoring and creating policies with its four pillars of prevention, law enforcement, international cooperation, and asset recovery. The pillars of UNAC include applying, maintaining, and reinforcing environmental laws that better obstruct corruption and increase societal involvement. The pillars also serve to bring natural resources or assets back to the area as environmental crimes are obstructed. Since UNAC is a part of the United Nations it is well equipped to deal with corruption in Lake Chad because of the United Nations access to funding and its international reach. Although corruption is not the only problem that must be fixed, Chadians must also have access to knowledge and educational resources to better learn how to take care of Lake Chad.

When it comes to educating Chadians and spreading awareness it would be best to start with community leaders and then work through the community. People are much more likely to listen if their leaders agree with what is being said and done. Chadians themselves could be taught and recruited to spread awareness as well, which would involve many community members. Not only would community leaders have to be on board with spreading awareness the government would also have to agree with the plan of action. People brought in to teach Chadians about better water practices and water conservation may need government protection from insurgent groups that threaten the area.

After educating Chadians on better water practices and water conservation it would be time to implement these better practices and conservation water technologies could also be brought into the area. Some of the possible water practices that could be instituted are very simple and others are more complicated. For example when it comes to irrigation systems, the most efficient system is called drip irrigation. Drip irrigation systems are made up of plastic pipes which bring water straight to plants. Drip irrigation is an appropriate technology because of how water is not wasted on areas that do not need to be watered. Other simpler water practices include ideas such as watering crops at night to avoid evaporation and using hydro zoning. Hydro zoning is the concept of grouping areas of land based on their water needs. Moisture sensors would be a beneficial technology to help place land in hydrozones. Another beneficial water technology that could be used is a backflow prevention valve which prevents contamination of water supplies.

These ideas could be used to help conserve the water of Lake Chad because they are all fairly simple to install but they are also very effective at what they do. Having technologies with these qualities are crucial for struggling communities such as the ones in the Lake Chad area.

Another part of the Lake Chad solution includes the reforestation and encouragement of vegetation growth around the lake. This part of the solution is supported by the United Nations Development Programme which signed a 1.7 million dollar agreement with the US Ministry of Ecology to restore vegetation. Restoring the lake's vegetation cover is another valuable part of the solution because vegetation prevents silting and helps rehabilitate the priceless Lake ecosystem. Not only does this plan rehabilitate the ecosystem it also introduces the concept of community as community members pull together to form committees that oversee the success of the project. The committee is made up of men, women, and youth preventing violence as people come together.

Chad is an important country with a high population of people centered around Lake Chad. These people face food and water insecurity as the waters of Lake Chad are steadily becoming depleted. The lack of water affects the economy and income of the people and even serves to exacerbate violence as people turn to insurgent groups. The solution to this issue is to educate Chadians on the problem and better water practices, help Chadians implement better water practices, and bring water technologies that help conserve this important resource. Having the communities around Lake Chad pull together for this crucial task can change the Lakes future for the better, thus improving food and water security for the Chadian population.

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