

“WATER” THE INDISPENSABLE REALITY OF THE MACROCOSM.

-Case study as a learning tool for best practices.

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ABSTRACT

The origin of the ‘elixir of the life’ WATER is divine. The availability in a country talks about its rich natural resource of great benefit to mankind. This understanding shall bring in the improvement of people of the area and thereby improving the life style of the people. Water as an economic driver harps on the agricultural and industrial impetus of the nation. This concept depicts perpetualization of the usage factor and the benefits the people of the nations derive from the source. Water resources are the cradles of civilization from the ancient past. Enhancing better irrigational facilities with advancement to hydraulic systems, purification of available surface water through simple applications for common man’s liberation using plant products available in the area, ethno-botanical applications and developing modernized systems of saving the rich harvest of rain water by reinforcing earth’s strata are some the main essentialities that are sure to develop and improve standards of life in the Sub-Saharan Africa. The perspective is broad based that requires sustainable developmental strategies and can be worked out with governmental and non-governmental agencies. Purification of water using simple mechanisms should be taught to the people to create an awareness of the natural water content, which in most Sub-Saharan regions seems to be ‘hard water’ and further designing ways to save the rain water that is received during the rainy season, to overcome paucity and to bring forth maximized agricultural produce throughout the year should be the main concern in the developing countries of Sub-Saharan sector. Ultimately this paper intends to put forth viable purification processes and details on the geographical substrata where good rain harvesting systems can be constructed for future use of the Sub-Saharan Africa, taking into consideration the Zambian geographical features.

Key words: Elixir of life, Water resources, geographical features, sustainable development, simple mechanisms, purification of water, rain harvesting systems, ethno-botanical techniques

Introduction; Water the essential human factor

Water is life. The good facts of water make us live in harmony yet the diverse differences that exists leads to poverty and diseased states. The problem of water scarcity and water deprivation is experienced most dramatically by men and women living in poverty and often in the poorest countries. The major concern of the macrocosm would be the fact that the many children die each year in poor countries due to the lack of access to safe water and sanitation which is a loss for the future of the whole world and for humanity as a whole. In this pretext, I place my paper on Zambian context as it is one of the countries of the Sub-Saharan region of Africa.

Challenges faced: On water safety and developmental efforts

The challenge faced today in the field of water safety can be taken as an opportunity both from a social as well as an economic perspective of a developing nation. Properly addressed, this challenge has great avenues to open up huge potential thereby transforming countless lives to better living standards. Developmental schemes for enhancement of safe water and usage of natural ways for purification of water are sure to be an impetus for accelerated economic growth, sustainable development and improved health. A host of factors play a major role in issues which need to be worked in collaboration with effective scientific team and resourceful innovations. As far as Zambian water scheme and development is concerned, it can be brought to reference of one improved adaptive feature in terms of the commercial utilities as initiated by 'Lukanga Water and Sewerage Company limited', based in regions bereft of heavy industrial activities, partly support business activities such as backyard gardening, poultry business, restaurants, health institutions through the provision of water. This is a viable reference taken in to study as an area development being done by LgWSC.

Basics of reality- Water as in Zambia in specific.

Water is the prime need of humanity, which can be addressed as the fundamental goodness of God's creation. It is a natural resource of vital importance to humanity. As far as Zambia is concerned, it is superfluous. There are ample rains from December until April, which fills in all the low-lying areas of the earth's strata of the country. The river Zambezi flows in its might to the happiness of everyone in the country. Zambia has an unique water system which we can observe if we go on a boat cruise up the Kafue river, very near to Lusaka. This is spell bound view of nature, vegetation and deep canyons of water flowing in its meanders. This long river course ends at the Livingstone, southern part of Zambia, as the wide, huge, high Victoria Falls, called as 'Mosi-oa-Tunya'. An amazing place of nature's splendor, that serves as a rich heritage of water resource for the nation. All the way through, its course through the country gives rich dividends of nature's gift to people of the nation. The water so pure, yet at many places turns into wet swampy areas because of the terrain, which hinders developmental processes. The hydrological effect of the natures' immense needs to be monitored as it gets polluted, making it impossible to be used for human consumption.

Elevated goodness of water is understood as the most beneficial condition allowing people to reach their full human potential. Its benefits are meant for all and not only for those who live in countries where water is abundant, well managed and well distributed. This natural resource must be equitably at the disposal of the entire human family. In such a context, it can be revealed that water in abundance in Zambia is a gift to the people yet not much is harnessed to its full potential. The very fact that the ample rainfall that pours down in surplus is not stored for future usage. There is sufficient underground water in the nation, so pumping it out in boreholes is a common usage everywhere. Simultaneously there is good storage in Kariba dam throughout the year. The river Zambezi that takes a long course from the borders of Zambia in the north near Lake Tanganyika and runs the entire country before falling down in a high wide gorge at Livingstone in the southern part of the country, is being shared by Zimbabwe.

Water: Perception of Human right

Defining access to safe water as a human right is an important step in making this access a reality in the lives of many people living in poverty. Claim for safe water is made a legal provision on a humanitarian basis for the benefit of all citizens in a country. Governments are accountable for

the access of good safe water and providing the proper water systems for daily consumption. Bringing all this into consideration, a technique based approach would lead to acceleration in achieving basic and improved levels of access to safe water.

Ground Water Potential in Zambia (All values in millions cubic metres)

	Drainage Basin	Luapula/ Chambeshi	Luangwa	Kafue	Zambezi	Total
1	Basin Area Km ²	194,500	147,500	155,000	256,000	752,000
2	Total Mean Annual Rainfall (mm)	214.1	122.3	149.72	228.69	714.85
3	Ground – water through flow	0.83	1.634	0.96	0.22	3.65
4	Vertical Recharge	41.5	33.02	24.45	64.03	160.08
5	Ground water storage	377.7	242.76	252.06	86.82	1,704.4

Data source: Government of the Republic of Zambia (National Water Policy), 1994, p. 12

Water Governance and Management: A question of justice and responsibility

Poor water management is a major contributing factor to most of the water problems evidenced today. Governance is therefore perhaps the most important requirement for solving problems of access to safe water. The problems and challenges must be looked at by all: national governments, international agencies, the private sector and local communities.

An essential component of good management is community participation of an area. Marginalized groups within the community have to be consulted about appropriate solutions to their needs. Traditional knowledge can be vital in planning water resources. More highly technological solutions can often ignore local knowledge regarding terrain and climate and more importantly the human component. Respect for the principal of subsidiary should, therefore, be a part of all water management policy. This should be the fact for consideration as the mainstay of economic activities in Zambia, mining and agriculture largely depend on water to flourish.

Public private partnership can play an important role in providing access to safe water, provided that the different stakeholders work together for a common objective: that of guaranteeing access to safe water for all.

Clean water in the right place at the right time is crucial for human health and is essential to life. It also drives the world economy. In a world of increasing population growth and climate change, access to high quality water for consumption, energy, agriculture, industry and recreation stands to significantly drive economic development for decades to come. Water will be the new oil.

While water covers two-thirds of the planet's surface, and some of its subsurface, more than 97 percent of the Earth's water is saltwater; water in icecaps/glaciers adds roughly 2 percent to that total. Accessible fresh water is very limited, water in lakes, streams, and rivers makes up less than 0.01 percent of the Earth's water. Groundwater makes up another 0.6 percent. Access to abundant clean water is an economic driver. Scarce water, either in terms of quantity or quality, will become a key limiting factor in the growth of regional economies. Currently 22 percent of the world's GDP (\$9.4 trillion at 2000 prices) is produced in water-scarce areas.

In sub Saharan Africa The UN Environment Program (UNEP) compares water scarcity and quality today with a projection for the future: Currently, access to safe water in sub-Saharan Africa is worse than any other area on the continent, with only 22 percent to 34 percent of populations in at least eight sub-Saharan countries having access to safe water. The UNEP projects that in the year 2025, as many as twenty-five African nations—roughly half the continent's countries—are expected to suffer from a greater combination of increased water scarcity and water stress. Overall, Africa has about 9% of the world's fresh water resources and 11% of the world's population.

THE VALUE OF WATER IN THE SUB SAHARAN AFRICA

Water resources will be crucial in the achievement of water security and development. water is important primarily in domestic water and sanitation services, but also for other local productive needs like community gardens, stock watering, and brick-making, all essential to secure a basic livelihood and thus to alleviate poverty. Despite the importance of

small-scale farming in Africa, there is little information on the present and potential role of water in agriculture. In contrast to its socioeconomic and ecological importance, water has remained a poorly understood and managed resource. Widespread contamination of water resources is occurring, and the important environmental services of ground water are neglected

Key benefit categories includes:

- Local business and economic development
- Avoided water treatment costs
- Tourism and recreation (and associated economic impacts)
- Avoided water treatment costs
- Public health
- Property values
- Water supply reliability

WATER AND ECONOMIC DEVELOPMENT

Experts say improving water and sanitation programs is crucial to spurring growth and sustaining economic development. Because it takes time to develop these programs, a paradox emerges: Poor economies are unable to develop because of water stress, and economic instability prohibits the development of programs to abate water stress. A 2005 report (PDF) commissioned by the governments of Norway and Sweden says that in Kenya, the 1999-2000 drought produced a 16percent decline in gross domestic product (GDP). Developments in water storage could have prevented that drought from significantly affecting Kenya's economy. Hydropower can also spark economic development. According to Giordano, "Some [trans-boundary water agreements] also play a clear role in fostering development, for example, by facilitating investment in hydropower and irrigation."

It is here, that the Sweden's investment in developing 'Rain water harvesting' system for

Tanzania and the benefits of that facilitation to the village of Arusha and the adjacent regions of the capital city, Dar-es-Salaam holds well and serve as an impetus for Zambia to adapt. Further, the rain water harvesting schemes being adapted for a long period of time in the state

of Tamil Nadu in India should also be taken into consideration for bring in the focus of the concept to be developed in rural areas of Zambia, wherein agriculture can be followed through the year. As far as the soil is concerned, it is of high edaphic value for much type of crops to be grown in Zambia. A rich dividend to realize as far as the nation is concerned.

Value of Water Supply Reliability

Agricultural development has the potential to improve African economies but requires extensive water supplies. These statistics from the Water Systems Analysis Group at the Institute for the Study of Earth, Oceans, and Space at the University of New Hampshire reveal the urgent need for sustainable agricultural development:

- About 64 percent of Africans rely on water that is limited and highly variable;
- Croplands inhabit the driest regions of Africa where some 40 percent of the irrigated land is unsustainable;
- Roughly 25 percent of Africa's population suffers from water stress;
- Nearly 13 percent of the population in Africa experiences drought -related stress once each generation.

Another aspect of water-related stress is the relationship between water, soil, and agriculture. Pedro Sanchez of the Earth Institute at Columbia University says 96 percent of agriculture in Africa is rain-fed, but soil nutrient depletion is a more pressing problem than drought in sub-Saharan Africa. 'Development of soil nutrients as opposed to only allocation of water resources to supply agricultural production is the most effective means to relieve agricultural water stress in the long-term', Sanchez says.

WATER ENERGY – FOOD NEXUS

The water-food-energy nexus is central to sustainable development. Demand for all three is increasing, driven by a rising global population, rapid urbanization, changing diets and economic

growth. Agriculture is the largest consumer of the world's freshwater resources, and more than one-quarter of the energy used globally is expended on food production and supply.

The inextricable linkages between these critical domains require a suitably integrated approach to ensuring water and food security, and sustainable agriculture and energy production worldwide.

Rising demand

Water is a finite resource having to serve exponentially more people and usages, and so ensuring everyone has access to a reliable supply is crucial to human survival and sustainable progress. As water resources become more stretched, the energy and food sectors' dependence on water, and the fact that all three underpin several of the Sustainable Development Goals, means that decision-makers in all three domains are now increasingly focusing on water resource management, ecosystem protection and water supply and sanitation as part of their policy and practice. Chemical properties such as water hardness and alkalinity generally affect water acceptability and water treatment efficiency. Problems with hard or soft water are generally site specific because they depend on the interaction of many factors including the soils and rocks from which the water is derived, which are generally site or region specific (Stumm & Morgan, 1996; WHO,2004).

Herein, it should be taken to relevance that ground water in Zambia is 'hard water', which is taken directly from the ground through bore-well systems throughout Zambia. As an observant, wish to put forward the view that this water can be purified by simple methods of purification that can be enforced to the society of both the rural and urban population. The availability of ample, varied plant products in the nation would sustain the simple purification methods that can be followed in every home for the benefit of the community, preventing the spread of water borne diseases as well maintaining good health with balanced physiological effect on the excretory system of the body. A few easy processes brought to reference as below:

One of the recently utilized water filtration techniques was laid out by a research associate from the National University of Singapore, Ramakrishna Mallampati. His method combined rubbing

alcohol with tomato and apple peelings—by soaking small strips of these fruit peelings in rubbing alcohol and drying them out, he was able to create a no-fuss fruit water filter that when placed in dirty groundwater for several hours, would absorb many toxic substances, such as pesticides, heavy metals and commercial dye. Once the peel is removed, the water is safe to drink.

Even using Moringa seeds which are available in large amounts in Zambia, is a real water purifier. It reduces the hard water content and making it more favourable for drinking. When crushed, the seed particles clump with debris and other foreign materials in water and get precipitated to the bottom. These seeds lower bacterial levels in water and make it more pure for drinking in the healthiest way. The seeds of jack fruit and Jamun fruits seeds support the process of purification and keep the water good enough to drink. Using these ethno-botanical elements are an easy access to purification in all household and handling them is most effective as they are chemical free and profitable.

Serving cities

Most of the world's rapidly growing cities are in low-income countries where authorities and utilities can have limited capacity to plan for and control urban expansion and its impacts on water and energy demand.

Consumption can be reduced, and supplies made more reliable, by such practices as using multiple water sources, including rainwater harvesting and wastewater reuse, and only treating water to be ready for its intended use, rather than treating all water to a safe drinking standard. Removing bio-solids from wastewater and using them for cooking or heating, for example, can help replace fossil fuels and reduce the amount of processing at the wastewater treatment plant.

What can be done to help alleviate water stress in Zambia?

Improved access to quality water is a long-term goal that requires more than humanitarian funds.

- Because sub-Saharan Africa is subject to more extreme climate variability than other regions, it needs improved water storage capacity. Some experts say that large dam projects would create a more sustainable reserve of water resources to combat the burden

of climate fluctuations, but others disagree, stating the harmful environmental impact of large dams.

- Many experts say more water treaties are needed. Lautze an eminent socialist, says that trans-boundary water agreements have cultivated international cooperation and reduced the "probability of conflict and its intensity."
- Better donor emphasis on water development is needed. It is concerned that global environmental issues are upstaging Africa-specific issues of water development. The major issues of water are always dealt by ZAWAFE of Zambia, which works for projects on water for a social good and economic good of the nation
- Small-scale agricultural improvements also offer a solution to water stress, including the harvest of water in shallow wells, drip irrigation for crops, the use of pumps, and other technological innovations. Sanchez says, "The key thing is the concept of green water as opposed to blue water. Blue water is the water we see in streams. Green water is the water we don't see in the soil, and green water accounts for two-thirds of the water supply." Farmers can access green water through drip irrigation (systems that slowly and consistently deliver water to plant's root system), supplemental irrigation (supplementary to natural rainfall rather than the primary source of moisture during periods of drought) and rainwater harvesting (the collection of rainwater for crops, which reduces reliance on irrigation). Crops can grow poorly even during periods of rainfall, and most farms suffer from nitrogen and phosphorus depletion in soil, which can be prevented. One way to assuage water stress in terms of food scarcity is to increase water-holding capacity with organic fertilizers that would increase availability and efficacy of green water.

Conclusion:

It is to be well accepted that water is a natural resource vital for the survival of humanity and all species on earth. As a pivotal essence of creation, water is acclaimed as the major ingredient of living for all human beings and their communities. It is a well adjudicated that

human mankind cannot do without water since it corresponds to their primary needs and constitutes a basic condition of their existence. All depends upon the fate of water. Access to safe water is indispensable for the life and full development of all human beings and communities in the world.

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