

THE IMPACT OF WATER SUPPLY ON DEVELOPMENTAL PROJECTS AND CONSTRUCTION WORKS: INSIGHTS AND EXPERIENCES OF ADO-EKITI, NIGERIA

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ABSTRACT

Water is the most common substance on earth. It covers more than 70 per cent of the earth's surface. It fills the oceans, rivers, and lakes, and is in the ground and in the air we breathe. Water is everywhere. Regardless of language or culture, all humans share this basic need that is essential for survival. We drink water, cook with it, bathe in it, sprinkle our lawns with it, fill our backyard swimming pools with it - even create theme parks based on it. More than half of Africa's villages lack access to a clean water supply. In many of these villages, women and children must walk up to ten miles every day carrying heavy buckets and containers to fetch the day's supply of potable water for their households. Those hours could be spent on other more profitable ways.

Without water, there can be no life. In fact, every living thing consists mostly of water. Your body is about two-thirds water. A chicken is about three-fourths water, and a pineapple is about four-fifths water. Most scientists believe that life itself began in water, in the salty water of the sea. Animals share the same water sources as humans, doing neither any good. During the dry seasons, water supplies are inadequate or non-existent in many villages so that both people and

cattle go thirsty while contaminated water is responsible for a myriad of health problems in the country including dysentery and malaria. Ever since the world began, water has been shaping the earth. Rain hammers at the land and washes soil into rivers. Water helps keep the earth's climate from getting too hot or too cold. Land absorbs and releases heat from the sun quickly. But the oceans absorb and release the sun's heat slowly. So breezes from the oceans bring warmth to the land in winter and coolness in summer. Throughout history, water has been people's slave - and their master. Great civilizations have risen where water supplies were plentiful.

Keyword: Water, Development, Projects, Admixtures, Economy, Ado – Ekiti.

INTRODUCTION

Water is vital to a productive and growing economy in the United States, directly and indirectly affecting the production of goods and services in many sectors. Current economic literature provides some insights into the importance of water to various sectors – including agriculture, tourism, fishing, manufacturing, and energy production also in engineering works. As a result of the economic importance of water, the field of water resources engineering was established. This field was established to find better means of acquiring water resources and to control the exploitation of water resources.

Water has played a role not only in the history of countries, but in religion, mythology, and art.

Water in many religions cleanses the soul through holy water. For example, the water at Lourdes, France is thought by many religions to be sacred water with healing powers. In Egyptian mythology, the Nu was the beginning of everything and represented water. It brought life to their people, but in drought, produced chaos.

Water has always been perceived as a gift from the gods as it rained from the heavens.

WATER AS AN IMPORTANT ASSET TO THE ECONOMY

Access to water is critical to production in a number of economic sectors. It serves as an essential input in agriculture, and is used to extract energy and mineral resources from the earth, refine petroleum and chemicals, roll steel, mill paper, and produce uncounted other goods, from semiconductors to the foods and beverages that line supermarket shelves. It cools the generators and drives the turbines that produce electricity, and sustains the habitat and fish stocks that are vital to the commercial fishing industry.

Rivers, lakes and oceans provide a natural highway for commercial navigation, as well as places to swim, fish, and boat, helping to fuel economic activity in the recreation and tourism industry.

Nearly every sector of the economy is influenced in some way by water.

But understanding the overall economic importance of water requires using a conceptual framework to illustrate how the most water-dependent economic sectors interact with the rest of the economy. The use of water is heavily concentrated in the extraction and processing mega-sectors of the economy, which includes agriculture, energy, manufacturing and utilities. These sectors produce output that supports economic activity in the delivery and information mega-sectors, which includes industries such as trade, transportation, real estate, recreation and tourism. Negative impacts to the quality and quantity of water used by the extraction and processing mega-sectors therefore have significant ripple effects throughout the economy.

THE ECONOMIC VALUE OF WATER IS SIGNIFICANT BUT ELUSIVE

A great deal is generally known about the economic importance of water. It is known that because water is essential to human life, its total economic value is without measure. It is also known that many sectors that serve as the foundation for the economy depend on water.

But understanding the economic importance of water is, in many ways, limited to these kinds of general observations. Some reasons why there is not more detailed information on the value of water include a lack of market transaction data, limited pricing data because water rights are only infrequently bought and sold, and altered prices because of subsidies.

It is also difficult to determine water's value because it depends upon multiple dimensions – the volume of water supplied, where the water is supplied, when it is supplied, whether the supply is reliable, and whether the quality of the water meets the requirements of the intended use.

There is also a lack of tools to evaluate the economic implications of changes in the availability and quality of water at a local, regional, or national level. This is a significant concern, especially because of increasing strain on water resources across the country. We also lack tools and information because the price charged for water fails to reflect the full cost of its use, which also increases the likelihood that the resource will be used inefficiently. The economic implications of inefficient use could be significant and will grow over time.

IMPACTS OF WATER SUPPLY ON DEVELOPMENTAL PROJECTS AND CONSTRUCTION WORK

Water is a very important asset when it comes to developmental projects considering its doesn't diminishes, it could be gotten from different sources at different point of need, looking at the various developmental projects and construction works in progress at ADO-EKITI, NIGERIA.

Developmental projects including;

-Ensuring universal primary education; Access to quality water makes it possible to save time and keep children in good health so they can regularly attend school. A good hygiene of the environment and good water provision facilities foster a safe school environment.

- **Eradicate extreme poverty and hunger;** Water is an essential commodity for survival and the improvement of quality of life – for health (drinking, eating and washing) economic development (agro-industry). It increases the production activities by reducing the number of days off sick and through the time saved on the water collection.

-**Ensure ecological viability;** The competencies acquired in the management of water supply and sanitation strengthens the social capital which can be used to better manage the environment and water resources locally. Water supply operations include raising the awareness of the environment and constitute a means to improve environmental management.

- **Reduction of child mortality;** the supply of quality water supply reduce the percentage of infection either malaria, diarrhoea, hook and ring worm, leading to reduction in rate of mortality amongst human being.

Advancing into the construction use of water, water is one of the most important elements in construction but people still ignore quality aspect of this element. The water is required for preparation of mortar, mixing of cement concrete and for curing work etc during construction work. The quality and quantity of water has much effect on the strength of mortar and cement concrete in construction work.

Quality of Water

The water used for mixing and curing should be clean and free from injurious quantities of alkalis, acid, oils, salt, sugar, organic materials, vegetable growth and other substances that may be deleterious to bricks, stone, concrete or steel. Potable water is generally considered satisfactory for mixing. The [pH](#) value of water should be not less than 6.

Effects of Bad Quality Water on Cement Concrete

It has been observed that certain common impurities in water affect the quality of mortar or concrete. Many times in spite of using best material i.e. cement, coarse sand, coarse aggregate etc. in cement concrete, required results are not achieved. Most of Engineers/Contractors think that there is something wrong in cement, but they do not consider quality of water being used.

Some bad effects of water containing impurities are following.

- Presence of salt in water such as Calcium Chloride, Iron Salts, inorganic salts and sodium etc. are so dangerous that they reduce initial strength of concrete and in some cases no strength can be achieved. There is rusting problem in steel provided in RCC.
- Presence of acid, alkali, industrial waste, sanitary sewage and water with sugar also reduce the strength of concrete.
- Presence of silt or suspended particle in water has adverse effect on strength of concrete.
- Presence of oil such as linseed oil, vegetable oil or mineral oil in water above 2 % reduces the strength of concrete up to 25 %.

Presence of algae/vegetable growth in water used for mixing in cement concrete reduce of the strength of concrete considerably and also reduce the bond between cement paste and aggregate.

Considering some of the buildings in ADO-EKITI, NGERIA, It has been observed at various places that cement concrete start falling down in pieces after rusting mild steel from RCC slab, which is due to use of bad quality/salty water in RCC slab. All this is due to negligence or ignorance which creates great problems and also bears a heavy loss. It is advisable that the water must be tested before using in construction work.

It is a common thinking in construction work that the water fit for human consumption is generally acceptable for mixing mortar or concrete and curing work. However, the water must be tested before using in construction work. When you are making huge expenditure on construction work, a negligible amount spent on water testing should not be saved. Tested water or treated water should be used as this will increase the strength of cement concrete and enhance the life of building.

Treatment of Water: It is advisable that water should be tested in lab and if found unsatisfactory, it should be treated according to directions of laboratory. It is generally observed that ground water has some quantities of salt. In case of small work or in a situation where good water is not available, salty water must be treated with HCL @ 10 ml for 100 liters of water.

Quantity of Water: Water is an important component for mortar or concrete. The quantity and quality of water have much effect on the strength of mortar and cement concrete. It has been observed many times that in spite of using best raw materials, cement and tested water; concrete does not provide required results. Engineers/contractors think that there is something wrong in cement, but they do not consider water cement ratio or quantity of water added in the mix.

When the water is mixed in mortar, it reacts with cement and forms a binding paste which fills small voids in the sand. This creates a close cohesion of sand particles and cement. In case of cement concrete the voids formed between sand and coarse aggregate gets filled with the paste forming a cohesive substance/concrete. The required quantity of water is used to prepare mortar or concrete, but in practice it is seen that more water is mixed to make the mix workable. This is

a bad practice and additional water weakens the strength of cement paste. Extra water also weakens adhesive quality.

Main disadvantages of mixing too much water in mortar and concrete

- The water occupies space in sand and it evaporates to create voids. Moreover the water voids will be more and this will reduce the density, strength and durability of mortar or concrete.
- When more water is used in concrete excess water brings a mixture of excess cement paste with water floating on the surface. This material forms a thin layer of chalky material on the surface which reduces proper bonding with second layer of cement concrete in case of water tank and dams etc. This will affect the strength of concrete.
- When more water is used, the cement slurry starts coming out from from cement concrete mix. The excess slurry formed by water and cement comes out through shuttering joints. This makes concrete of less cement and reduces the strength of concrete.
- When more water is used, proper compaction is not achieved and there is bleeding, large voids and more shrinkage, less durability and less strength.
- When more water is mixed in cement concrete, the problem of segregation of material is faced at the time of laying the mix. As a result Coarse Aggregate and cement paste separate from each other.

Hence strict control should be kept on water cement ratio for preparing the mortar or concrete for qualitative finish/ strength.

Quantity of Water for One Bag Mix

- Approximate 32 liters of water is required where the ratio 1:2:4 of cement concrete is used.
- Approximate 30 liters of water is required where the ratio 1:1.5:3 of cement concrete is used.

Water for Cement Concrete

- Water for ordinary cement concrete mix should be equal to 5% by weight of aggregate and 30% by weight of cement.
- The actual quantity of water required to be added in the field depends on availability of aggregate and surface water present in the aggregate.
- It should be calculated by slump test.
- Generally for vibrated concrete the quantity of water is less by 20%.

Water Reducing Admixtures

The water reducer admixture improves workability of concrete/mortar for the same water cement ratio. The determination of workability is an important factor in testing concrete admixture.

Rapid loss of workability occurs during first few minutes after mixing concrete and gradual loss of workability takes place over a period from 15 to 60 minutes after mixing. Thus relative advantages of water reducing admixture decrease with time after mixing. These admixtures increase setting time by about 2 to 6 hours during which concrete can be vibrated. This is

particularly important in hot weather conditions or where the nature of construction demands a time gap between the placements of successive layers of concrete.

ADVANTAGES

- It can reduce 10% of water consumption.
- It can improve mixture of cement concrete for workability.
- Compression strength improves by more than 15 %.
- It can reduce initial stage of cement heat hydration by large margin.
- It has no function of corrosion reinforcing bars.
- It increases workability, density and strength without increasing the quantity of cement.

Hence in the area where there is less availability of water and the water is carried from long distances for construction work, the water reducing admixture is most beneficial for cement concrete work as it saves water up to 10%. It also increases the strength of cement concrete with the same quantity of cement

CONCLUSION

The impact of water quality on the value of water varies significantly by sector. Some users of water – like commercial shipping – are typically not affected by water quality. Sectors that use water as a processing input – such as thermoelectric cooling, mining and energy resource extraction, and manufacturing – generally have less stringent water quality needs. Many other users, however, are very sensitive to the level of water quality and require clean water to support their economic activity. Uses that involve human consumption or contact – such as drinking

water, food and beverage manufacturing, or recreation – need to meet water quality standards designed to protect human health.

Water quality is also a critical consideration in the commercial and recreational fishing industries, as well as tourism. Water that is poor quality is of diminished value to these sectors and can impose substantial costs on society if it is harmful to human health. Finally, any understanding of the economic importance of water must account for the ways that different economic activities affect the quality of water available for other uses. If one use of water pollutes a nearby water body, then others incur treatment costs required to restore water quality downstream to suitable levels.

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