International Journal on Recent and Innovation Trends in Computing and Communication ISSN: 2321-8169
Volume: 3 Issue: 11 6379 - 6383

Implementation of Sea Water in Construction

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Abstract- As a population increase the requirement of various things also increases which would create a scarcity problems in the world. As we see in surrounding, the water scarcity is a big issue today and we could not think our life without water. So, it's today need to find a solution for water scarcity. While finding the solution for water scarcity it is necessary to keep in mind that whatever solution we find should be ecological. Solution should be such that should not create any further problem. Nature is expert in maintaining balance in environment and how to keep the water sources clean and nourishing. Our traditions, also could maintain their water sources for the past many years. Water quality problems and water scarcity both are due to population and pollution of air, caused by increase in industrialization and the use of fossil fuels. This produces rain with nitrates and acidity. This pollutes the surface water bodies and also the groundwater. Agrochemicals also leach into the ground and surface water and create pollution. Conventional wastewater treatment technologies involve use of external inputs of recurring chemicals and also use of electricity,only to cause pollution, electricity scarcity problem due to overuse of fossil fuels, destruction/separation/disposal of valuable plant nutrients.

This paper discusses ecological seawater treatments. This paper study the compressive strength of concrete block using tap water and sea water by biosanitizer and. In the ecological approach, biosanitizer eco-chips are first used to make the wastewater eco-friendly. Use of this treated water as a construction water gives greater compressive strength to the concrete. Strength of concrete increases when seawater is treated by biosanitizer. In this paper various problems of unavailability of water is described. The solution for this problem of water is solved by using the seawater which is available at a large quantity. It gives better result in water scarcity problem in construction field.
This paper has gives guidelines to carry out study of implementation of sea water in construction areas and useful to prepare a feasibility report.

Keywords: - *Population, Water Demand, Implementation of seawater, Construction Field, Biosanitizer Ecological System, Compressive strength of Concrete.*

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INTRODUCTION

As the technologies and facilities is developed the population is increases rapidly which will further create a various problems in world. In the age of increasing population and dwindling resources coupled with the need of curb expenditure in the various sectors of the government's budget. Attention has to be brought to reuse of resources whenever possible. Perhaps most valuable is water. Therefore efforts towards wastewater reuse made worldwide. If the next world war happens, it may well be triggered by water scarcity across the continents. It has been already found that the third of the world is suffering from water shortages. Increasing demand for water with rapidly growing rate of population, inadequate rainfall, uncontrolled use of water and climate change are some of the reasons behind it. Some of the major reasons behind water scarcity are:-

- Population growth and Food production (Agriculture)
- Increasing construction/ infrastructure development Activities
- Massive urbanization and industrialization throughout the country
- Climatic change and variability- Depleting of natural resources due to changing climate conditions (Deforestation etc.)
- Lack of implementation of effective water management systems

All of this will result in increased consumption of water. That is why there is urgent requirement to address the issue of water scarcity in India to make better policy decisions which will affect its availability in future. If the conditions remain same; water will turn out to be the world's most precious resource soon.

Conventional Wastewater treatment is very costly and requires skilled labors and operational cost is also high
India's population is expected to increase from 1.21 Billion in 2011 to 1.66 Billion by 2050. Out of that the urban population is expected to grow from 29.2% of the total population in 2007 to 55.2% by 2050. First and foremost result of the increasing population is the growing demand for more food-grains and allied agricultural produce. It results in expanding area of land under the crops especially high yielding crop varieties. It is estimated that the production of water-intensive crops is expected to grow by 80% between 2000 and 2050.

Another area of concern is the water Intensive Industries. India's economic growth has been gargantuan in the last decade. Foreign direct investment equity inflow in the industrial sector has grown to $17.68 Billion in 2007–2008. Steel and energy sector will need to keep pace in order to fulfilling the demands of sectors like manufacturing and production. Annual per capita consumption of power is expected to reach its maximum level as compared to present installed power generation capacity. As per the ministry of power, thermal power plants which are the most water-intensive industrial units, constitute around 65% of the installed power capacity in India. Industrial water consumption is expected to shoot up its growth between 2000 and 2050.

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Fresh water is available only 2.7 per cent though the surface of earth is geographically covered more than 70 per cent with water. Traditionally, agriculture has been the major source of livelihood of the Indian population. However, after Independence our founding leaders envisioned the nation progressing with a decent industrial base. This triggered the formulation of programs and strategies to construct a proper infrastructure for speedy industrialization. Industrial water consumption is expected to multiply and will reach 18 per cent of total annual water writes about the need for government to encourage large industries to set-up their own wastewater treatment plants and utilize the treated water for industrial purposes. The evaluation is supported by the overall development in all the sectors in India, in which the key sector is the industry sector. Common effluent treatment plants (CETPs) were perceived to be a feasible solution for abatement of industrial wastewater pollution. However complexities involved with practical application.[15,27,28,29]

Water Supply Sector in India:-

In India distribution of water for domestic as well as for industrial purposes are not evenly. Only 50% urban community well under the water distribution network. Only 40-50% water is available to use from total availability of water at the water purification project as remaining is lost in transmission, purification, evaporation and theft. In India only 24% of water connections are metered as the production cost is very higher as compared to the lower level recoveries, also the maintenance cost is very high and due to the limited fund availability, the services are restricted.

Problems with Water Treatment

- Water availability at low cost and in large amount from the municipal corporation (0.04p/l)
- Lack of initiatives taken by the government. Indian government is focusing on water conservation rather than providing schemes for waste water treatment.
- Recycling plants require regular maintenance & supervision for proper functioning of plants which water increase total cost of the plant.
- Establishment of treatment plant requires many government approvals which is very tedious process
- Establishment of treatment plant is having very high cost as compared to saving expense by saving water.
- as nearly 20% of treated water is required for periodic cleaning known as backwashing of the filter media to remove the clogged particles. This increases the overall maintenance of the plant.
- Lack of government incentives to convince public

ADVANTAGES OF ECOLOGICAL TRETMENT

1) It is ecofriendly.
2) It is cost effective technique to recycle wastewater.
3) It saves potable water.
4) It can be use in concrete effectively and it gives higher strength.
5) Biosanitizer is a catalyst and it is lifetime investment to recycle wastewater.
6) Well water present in the area in 100m circle from sea coast can be effectively used for irrigation purposes before it was not useful for irrigation.

Need of sea water treatment

 Reduced use of freshwater — Treated Sea water can replace freshwater for some construction work . This saves money and increases the effective water supply, especially in construction.

 Reduced use of energy and chemicals—Due to the reduced amount of freshwater and wastewater that needs pumping and treatment. If you provide your own water or electricity, you'll benefit directly from lessening this burden. And also for solving the water scarcity problem it is needed to treat sea water.

BIOSANITIZER ECOCHIPS

Biosanitizer is a natural granular bio-catalyst that has been developed by the Bhawalkar Ecological Research Institute (BERI), using the Eco-Logic. It is kept in contact with water, inside a storage tank or even in a well or bore well. The catalyst has a long working life and uses harmful salts (such as nitrates, phosphates, heavy metals, etc.) as raw materials. Useful minerals and active oxygen is produced during the process. Active oxygen cleans the water, of toxic chemicals (such as pesticides) and pathogens (harmful bacteria and even

the viruses). The oxygenated water also has cleansing properties. Use of this water for all its intended purposes, is a simple way to take care of land, water and air pollution[15]

BIOSANITIZER ECOCHIPS[15]

Composition of Biosanitizer

Thousands of plant enzymes are used to make the Biosanitizer ecochips. Approximately 100mg of Biosanitizer = 1acre of biodiversity rich forest. [16]

Functions of Biosanitizer

Biosanitizer is a natural biocatalyst that converts any polluted, dead water into living or bio-water. Its action is based on the ecological principle of utilization of wastes as valuable raw materials, turning them into resources, rather than separation/ concentration and disposal. Bio-water resists scaling, corrosion, algal growth, befouling, chemical contamination and growth of pathogens/ pests. The key reaction of this product involves production of active oxygen, which can drive several resource-producing reactions. Harmful salts, for instance, become useful minerals.

In nature, coconut water is produced from seawater using a similar reaction. This reaction is used to convert saline/ brackish water into rich mineral water BIOSANITIZER Ecotechnology has been developed over a period of 36 years, to arrive at an eco-friendly solution to this challenge. It applies to all sorts of waste, chemical/biological, organic/inorganic or solid/liquid/gaseous wastes, too. This approach involves tackling the root cause that produces the waste, in the first place.

It is necessary to have study on the problems of water scarcity in construction. Hence the further study is based on above points. Now it is necessary to find the solution for make the water available for construction. In this project is all about the seawater treatment and make sure that it can able to achieve the required compressive strength of concrete which will use in construction. Which will further reduces the load of water demand for construction [16]

Bio-indicators of Pollution:-

Man could develop and sustain all these years on the earth, only because he used common sense bio-indicators of pollution, health and prosperity. All pleasant events and creatures indicate health and prosperity. On the other hand, unpleasant events and creatures that cause some nuisance, indicate pollution. With better knowledge of evolving branches of ecology and ecological engineering, we can understand these bio-indicators in a better way now and use them to educate a common man so that everybody can contribute and keep our environment clean and green.

This method is more advanced and accurate than the conventional methods of laboratory analysis and also instrumental methods. These conventional methods are quite costly, hence not within the reach of a common man (who is sometimes the creator of pollution and also one who suffers from it, all the time). There is also a possibility of both intentional and unintentional human errors that can arise in these conventional methods.

Bio-indicators of pollution are based on following lessons drawn from the fields of ecology and ecological engineering:

- Nature is well designed and hence needs no _improvements‘ aimed at correcting the _faulty‘ design.
- Each organism has a role and is designed to play this role effectively. Population is decided by the task posed to the organism, at a given time.
- Organisms are of two types: resource builders (K-selected) and those who manage spillage of resources (r-selected). The former types are unseen, quiet or pleasant whereas the latter types cause various unpleasant alarms such as odour-pathogens-pests. The unpleasant nature of the latter organisms is only to warn us that resources are being wasted. They are, thus, the fire fighters of Nature.
- Even the unpleasant events such as earthquakes, cyclones, hurricanes, forest fires, epidemics and human madness (bad habits and crime) can be traced to large scale spillage of resources (pollution), in spite of and because of the current 6.7 billion population of *Homo sapiens* (man, the wise). [15]

Limitations

- Problem of corrosion to recycle sea water when the concrete structure is reinforced. But, there will be no problem occurs to plain concrete member.
- When we use sea water in concreting the problem of corrosion occurs even after use of Biosanitizer which can corrodes steel reinforcement in concrete. but this problems can be solved by applying more dose of Biosanitizer.
- The implementation of seawater in construction is possible only when if the seashore is near to that construction site and will be beneficial .

Methodology for Testing compressive strength of concrete using Treated Seawater:-

LAB WORK

Mix Design for Concrete Grade M40

Data-

1) Grade of concrete- M40
2) Water cement ratio- 0.40
3) Type of cement used- OPC-53
4) Size of aggregate- 20mm
5) Type of sand used- river sand
2) Collection of water-
1) Tap water-It is collected from Hostel Building.
3) Sea water- It is collected from sea of Ratnagiri

C1.Design Stipulation

- Characteristic compressive strength = 40N/sq.mm
- Max. size of aggregate = 20mm
- Degree of workability = 0.8
- Degree of quality =Good
- Type of Exposure =Mild

C2.Test data for materials

- Cement used =PPC
- Specific gravity of cement =3
- Specific gravity
  1. Fine Aggregate =2.8
  2. Coarse Aggregate =2.61
- Water absorption
  1. Fine Aggregate =2.1%
  2. Coarse Aggregate =0.78%
- Fine Aggregate confirming to table 4, IS383-Zone =3 zone

C3.Target Mean strength = 48.25N/sq.mm

C4.Water Cement Ratio = 0.40

WORKING OF BIOSANITIZER REACTOR

1. Sea water is collected from the Ratnagiri directly collected to collection tank.
2. Sea water is then allowed to treat for 24 hours by bacteria present in the tank which absorb all the suspended food particles.
3. Presence of bacteria is due to addition of Biosanitizer which multiply themselves and grow with the help of suspended solids and dissolved oxygen.
4. After the water is treated with the help of Biosanitizer it is then taken out from the outlet which can be used for concreting.[Ref.No.15]

Mechanism of Biosanitizer:

Biosanitizer Ecotechnology involves using the Biosanitizer bio-catalyst granules in fluids (liquids and gases) and using the remediated fluid as a resource for healing the ecosystem. Biosanitizer granules convert polluted water into clean water, which also becomes a resource for eco-logical restoration of wells, bore wells, water storage tanks, ponds and lakes. This action can be summarized as follows:

- Pollution problems arise due to nitrates. Hence nitrate management is crucial. Low-nitrate systems develop self-healing ability. Inorganic as well as toxic organic pollutants get converted into resources, in low-nitrate systems.
- Conventional denitrification technique consumes organic food and oxygen, to produce CO2 and waste heat. Nature prefers another reaction, i.e., combining nitrates, CO2 and waste heat to produce organics and oxygen. Green plants and also the Biosanitizer use this reaction. It is a resource-generating mechanism, while conventional denitrification is a wasteful reaction**.** Hence there are alarms associated with the conventional denitrification process.
- Biosanitizer is a natural catalyst; 100 mg of this product has the capacity of 1 acre of rich natural forest, in terms of its nitrate utilization, CO2 trapping and oxygen production ability.
- By adding Biosanitizer in a stream or a reservoir of polluted water, we get not only clean water, but the treated water has a potential to clean the whole ecosystem, without producing any other waste stream and without producing greenhouse gases. In fact, the treated water starts absorbing the CO2 and NOx from the air, thus helping ease the pollution that has increased by about 25% after we started using the fossil fuels.
- The following digital scale was also useful in analyzing the natural events. Mild (1st digit) pollution is

converted into _visible'indicators. A 2nd digit pollution sounds audible alarms, 3rd digit pollution is indicated to our skin, 4th digit pollution warns us through creation of odor or through short-term illness and 5th digit pollution causes premature deal [15,31]

Data Analysis:

Analysis of Concrete Test:-

TYPE OF WATER	7 DAYS (KN/M2)	14 DAYS (KN/M2)	28 DAYS (KN/M2)
TAP WATER	22.8	34.5	44.44
SEA WATER	25.9	40.7	43.5

RESULTS OBTAINED IN CONCRETE CUBE TESTING

The compressive strength of concrete increase with increase in time. The compressive strength of cube using tap water is 44.44 KN/m2 after 28days . We were made concrete blocks by also using sea water with treatment of biosanitiser.It also gives better results as compare to tap water. It gives strength 43.5KN/m2.in this case problem of corrosion occurs but by applying more dose of Biosanitizer, we can minimize it at desired level. From the above results we conclude that sea water can be effectively treated by biosanitizer and can be safely use for construction purpose. Compressive strength increases and water can be effectively use in concrete mixing.

Conclusion:-

The current status of urban water supply sector in India is gaining understanding. There are some treatment is available for seawater treatment but those all are not economical and required electricity, chemicals etc.so, now there is need for focus on ecological water treatment. As per the population increases the water demand will be increases and for cope up with the increasing demand of water it is necessary to treat the seawater for construction. Automatically the total water demand for drinking will be reduced. From the above results we conclude that sea water can be effectively treated by biosanitizer and can be safely use for construction purpose. From result, we conclude that treated sea water can achieve the good compressive strength and water can be effectively use in concrete mixing.

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