PURIFICATION OF WATER AND WATERING PLANTS USING SOLAR POWER

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***Abstract*: This work has been created to improve the quality of water thrown out of factories or industries and used that purified water to surrounding plants or gardens. During this work first we have observed the suspended particle, acids etc. and which processes is suitable for purifying water. For minimizing the electricity used for transferring water solar power is used. After distillation process we will add minerals so the plants and agriculture plant will get benefited. Electricity used by motor will be reducing by the help of solar panel. Impure water contains acid, suspended particles and this type of water is not suitable for any purpose. By purifying this water we can use that water for various purposes. If we use acidic/impure water directly for agriculture its impurity transfer from plants to human and it will be very hazardous for living organisms. That's why we need to pure water and removes acids from water. After purification of water for transferring water for agricultural purposes we need electricity. So by using solar panel and DC water pump purified water is transferred for various agricultural purposes. The main objective of our model is to re utilization of water.**

***Keywords*: Screening, Sedimentation, Micron Filtration, Distillation, Condensation.**

I. INTRODUCTION

Water is everywhere, and may be a vital for each living organism. Water is universal solvent. Water is additionally used for industrial processes on giant scale. Consistent with the globe Health Organization report of 1971, the quality of water means that absence of suspended solids, inorganic solids and pathogens. Water cowl 71% of earth's surface. 96.5% of the planet's water is found in ocean, 1.7% in groundwater, 1.7% in ice mass and therefore the ice cap of Antarctica, 0.003% in atmosphere. To the good extent, recently, components of the world have already started feeling the "water crunch". It's believed that by 2025, India, China and chosen countries of Europe and Africa can face water scarcity. Water treatment is most vital field of study nowadays in wide subject of pollution downside solving. Currently a day, pollution may be an advanced development that involves whole biosphere. Water, in fact, includes a cycle that enables it to move, among 3 stages (solid, liquid, gaseous), at numerous place in hydrological cycle. Thus, water will transport and unharnessed contaminants coming back from industrial and agricultural wastes or from alternative human activities. Organic matter is among the foremost common compounds answerable for water pollution. Most are diagrammatical by solvent, resembling acetone, dissolving agent and benzene, utilized in industrial processes, and by pesticides and insecticides, used in agriculture.

Water treatment describes those processes concerned in removal of contaminants so as to get the next water quality for various end-users. Industrial sewer water has terribly variable quality and volume betting on the kind of trade manufacturing it. It's going to be extremely perishable or not at all, and will or might not content recalcitrant to treatment. Water treatment processes consume an outsized quantity of electricity. Water treatment system may be shaped together of technologies from primary, secondary, tertiary treatment for industrial and municipal discharge. Some systems involve mix biological and chemical processes within the treatment. Consistent with Muga and Mihelcic (2008) sewer water treatment technologies can be broadly speaking divided into mechanical, lagoon, and land treatment systems. Systems aim at removing nutrients, pathogens, metals, and different virulent compounds exploitation physical, chemical, and biological mechanisms. Economically this method needed the best capital, operation, and management costs.

Environmentally, these system are high energy user and will generate odor which will impact on the we tend toll-being of the neighboring communities. Therefore to save lots of electricity in processes we use solar array during this system. Alternative energy could be an essential supply of renewable energy, and its technologies are broadly speaking characterized as either passive star or active solar counting on however they capture and convert it into solar power. Active solar techniques embrace the utilization of electrical phenomenon systems, concentration solar power, and solar water heating to harness the energy.

In 2011, the International Energy Agency aforementioned that "the development of affordable, inexhaustible and clean alternative energy technologies will have vast longer-term benefits. it'll increase countries energy security through reliance on an indigenous, inexhaustible, and largely import-independent resource, enhance sustainability, scale back pollution, lower prices |the values} of mitigating international warming, and keep fuel price below otherwise. These benefits are global. Thence the extra cost of the incentives for early preparation ought to be think about learning investments; they have to be sagely spent and need to be wide shared".

II. METHODS

1. Screening:

This is the primary process. Screening method is employed to get rid of massive size particles like leaves, Brushes, Branches, etcetera thus at first it'll remove large size particles like leaves, wood chips, aquatic plants and floating impurities by victimization screening process. Screen may be a device won't to retain the solids found within the inflowing waste product to the treatment plants. So, usually screens are classified into 3 sorts supported the scale of their openings in the screening component and mechanism of removal i.e. course screens, fine screens and small screens. However, in our model we've got used fine screens for carried out screening method. In our Model fine screens have clear openings lower than 6mm. They consisted of perforated plates, wire cloth, wedge wire components that have smaller openings. When screening, additional compact suspended particles are going to be removed to permit water to flow through the chamber within which it'll settle to the bottom. Screening process limits the entry of suspended solids cherishes garbage within the water treatment plant. It conjointly prevents pump, pipe, and instrumentality from preventive or damage. When screening process has been completed water is launched for subsequent process. Massive particle are removed here and water is transfer for next method

2. Sedimentation and Coagulation:

After screening method water is tense and keeps in massive alluviation tank. During this process impure water is unbroken undisturbed for few hours. This process removes insoluble impurities or suspended particles. Suspended particles are also clay particles, soil particles or gravels; and so on subsidence rate of suspended particles depends upon rate of water, Density of water, relative density of particles and form and size of the particles. A particle settles down faster in water at heat than at low temperature. This process removes 60% of suspended particles and 75% of bacteria. The determination time open a normal sedimentation tank is 6 to eight hours. The depth of alluviation tank is three meters to six meters. The rate of flow of water is obtained by mechanical drawing of tank. The rate mustn't be exit 5mm/s or thirty cm/min.

It additionally involves activity process. Activity process involves adding agent agents to the water. Once coagulant agents are additional to the water, the particles are bind along or coagulate. During this process, the coagulant is added to the water and it's chop-chop mixed, so the coagulant is circulated throughout the water. Alum is usually used agent that forces small particles of dirt to stay along and settles down. During an alluviation tank, significant particles settle to the lowest and are removed, and therefore the water is tense for filtration process.

2. Micron filtration:

The smaller the metric linear unit size, the finer the particles are removed. For example, a twenty five-micron filter removes these fine particles. Everything else like 25 microns passes through the pores. The silt filter is that the commonest styles of micron filter. Once ever water flows through media admire blow filters or resin-bonded filters, the water is subject to sure restrictions throughout the passage. When the filter is jam-packed with debris, the pressure drop can increase. The increase in pressure may be a smart indication that the filter has reached its most capacity. The size of the filter sometimes varies consistent with conditions. One hundred fifty microns will filter impurities that don't exceed the typical size of human hair, and twenty five microns can strain fluff and exposed visible particles. A spy hole of ten microns can filter out loads of dust, fertilizer, and pollen. 10-5 microns can filter medium-sized dust, plant spores and mold. 1-5 microns can filter microorganism and animal hair. 3–1 µm can filter tobacco, and 001–0.01 µm room smoke can filter viruses.

3. Distillation and condensation:

Distillation is that the method of heating water to make vapors and so cooling that vapors to induce a liquid. Distillation is employed to purify water by separating parts of water Mixture. For this process Distillation setup is required. Distillation process depends on evaporation to purify water. Contaminated water is heated to form a steam. The steam then cools and condenses to form sublimate water. The distillation process conjointly kills microorganisms like bacterium and a few viruses. Distillation process typically consists of a boiling chamber, condensation chamber and storage tank. In Boiling chamber the water enters, is heated and vaporized. In Condensing chamber water is cooled and reborn back to liquid water. When condensation sublimate water is wired and holds on to the storage tank.

4. Micron filters (0.003):

In this process water is again filter using micron filter (0.003). By using micro filter (0.003) virus, bacteria, pollen etc will be removed. After this process water will further transfer to next process where minerals and nutrients are added.

5. Adding minerals and nutrients:

Humans and plants both require minerals and nutrients for their essential growth. Mineral less water reduced the stomata aperture and the water content of the shoots, indicating the mineral nutrients plays an important role in the water economy of plants. As distillation process removes minerals and nutrients from water. If we use direct distilled water to plants or agriculture it will affect the grow of plants. According to WHO 1996 water should contain 0.3mg/L of iron, 3.0mg/L of zinc, 1.0mg/L of copper, 100mg/L of magnesium etc, For growth of agriculture primary nutrients are nitrogen, phosphorus and potassium will be added according to their needs.

6. Solar plate and dc water pump:

After Purification of water, pure water is employed for many methods. The goal is to supply water appropriate specific processes. By mistreatment star plate and DC pump the purified water is transferred for agricultural purposes. For this process terminals of solar plate are connected with 2 terminals of DC water pump through switch. This method also will act with alternative energy once purification of process that utilizes this water for agricultural purposes. Once the sun is shining is will produce electricity (DC) supply, which is able to apply on to a DC motor which pumps the water.

III. RESULT

At the end we will receive pure water without bacteria, virus, pollen etc and full of minerals and nutrients so that water use for agriculture with help in its growth. So in first stage water travels from screening process. After screening process we get 10% of pure water. After screening process water is transferred for sedimentation and coagulation process. In this process water is kept undisturbed for few hours. After some time suspended particles or insoluble impurities settles down. So all the insoluble impurities settle down and we get clear water. It also involves coagulation process in which coagulant agent is added to the water and so that this process becomes more faster than the normal process. After sedimentation and coagulation process we get 30% of pure water.

Diameter of Particle	Type of Particle	Settling time through 1 m. of water
10mm	Gravel	1 second
1mm	Sand	10 second
0.1mm	Fine sand	2 minutes
10 micron	Protozoa, Algae, Clay	2 hours
1 micron	Bacteria, Algae	8 days
0.1 micron	Viruses, colloids	7 days
10 nm	Viruses, colloids	70 years
1 nm	Viruses, colloids	200 years

Fig 1. Settling time for different types of particles

After sedimentation and coagulation process micron filtration process is carried out. For this 25 micron is used. After micron filtration process we get 40% of pure water. After micron filtration process, distillation process is carried out. In distillation process, all soluble impurities as well as acids are removed and we get 90% of pure water. After distillation process, again micron filtration process is carried out. In this 0.001 to 0.01 microns are used for purification process. After this process we get 100% of purified water and we can use this water for any purpose. Given diagram below will be the result model.

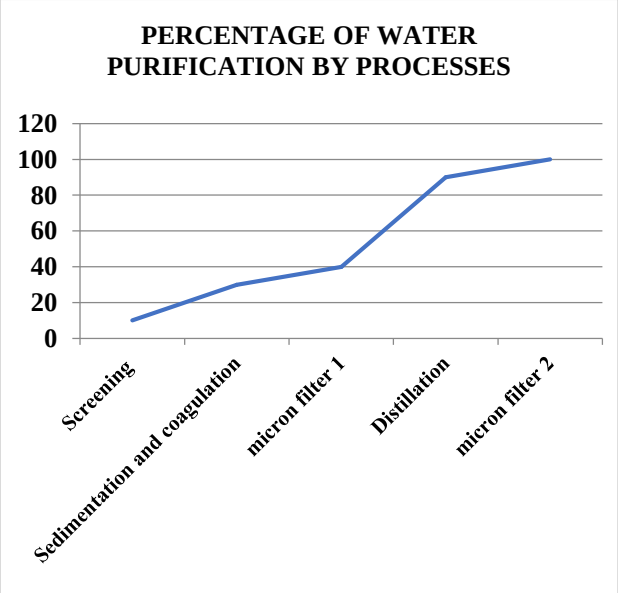

Fig 2. Graphical representation of purification process

If we concentrates on 100% of purification of water then we get result that screening process contributes 8% in purification of water which removes large size particles from water. After screening process, sedimentation and coagulation process is carried out. This contributes 16% in purification process. It removes all the suspended particles from the water like mud, soil, clay, etc by settles down at the bottom. Micro filtration process contributes 24% in purification process. After filtration distillation process comes in picture. It contributes 4% in purification process. After Distillation process water is launched for second filtration process which contributes 12% in purification process.

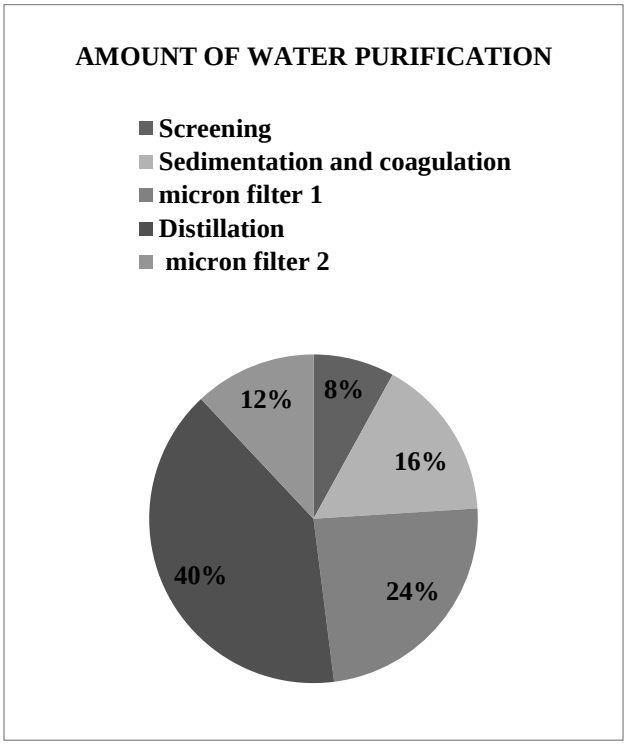

Fig 3. Amount of water purification by using pie chart

IV. METHODOLOGY

The proposed model will interact with the impure water which is further send for purification process. After purification process purified water is send for agricultural purposes.

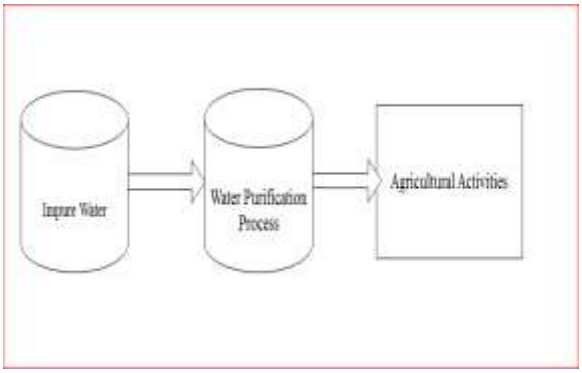

Fig 4. Product perspective

It will interact with impure water which is then transfer for screening process which removes large size particles from the water. To perform screening process fine screens are used. When screening process has been completed water is send for next process which is sedimentation and coagulation process. In sedimentation process water kept undisturbed for few hours. At the same time coagulant agent alum is added to the water. After adding alum it will circulate throughout the water and bind suspended particles together so that it will get heavy and settles down to the Bottom. After sedimentation and coagulation process we get clear water without suspended particles or mud.

After sedimentation and coagulation water is transfer for filtration process. In this process water is filtered by using 25 Micron and then it will send for Distillation process. After distillation process we get 90% of pure water which will again send for filtration process which uses 0.001 to 0.01 Microns. After this process we get 100% of pure water. So after purification of water, water is tested. Humans and plants both require minerals and nutrients for their essential growth. As distillation process removes minerals and nutrients from water and if we use direct distilled water to plants or agriculture it will affect the grow of plants. So Minerals are

added to the water according to the minerals suitable for plants. After water treatment water is supplied for agricultural process for utilization. Here solar power is used for transfer of water. It needs to connect terminals of solar plate and DC water pump through switch. So by using solar plate and DC water pump, Purified water is supplied for various agricultural processes.

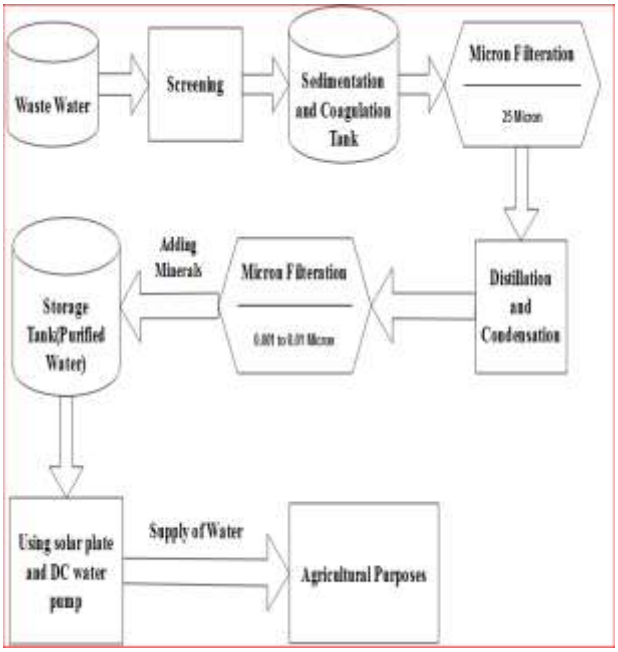

Fig 5. System Design

V. RELATED WORK

According to 2007 World health Organization report(WHO), Billion peoples lack access to an pure water system, 88% of 4 Billion peoples suffers from Diarrheal Disease Because of unsafe water and inadequate sanitation and Hygiene. WHO Estimated that 94% of those diarrheal diseases are prevented due to of modification to environment, which has main step is to access pure water. The united nation (UN) set a goal to cut back the number of individuals who access unsafe water by half the year 2015. Safe potable for human consumption should be free from pathogens like bacteria, Viruses, meet quality guidelines for taste odour, appearance and chemical concentration. Inadequate sanitation and accessing contaminates water source is responsible for both developing people similarly developing country which not having access to microbiologically safe drinkable and tormented by diarrheal diseases. Diarrheal diseases are accountable for approximately 2.5 deaths annually in developing countries; affecting children are younger than 5 years. Impure water contains acids and suspended particles and this kind of water isn't suitable for any purpose. If we use acidic/impure water onto the agriculture its impurity transfers from plants to human and it'll be very hazardous for living organisms.

VI. CONCLUSION

The proposed model of water purification is used to provide pure water which involves various processes such as screening, sedimentation and coagulation, filtration, distillation, etc. after completion of all this processes we get purified water with no any impurities. If we use acidic or impure water directly for agriculture its impurities transfer from plants to human and it will be very hazardous for living organisms. So our model provides purified water and that purified water is then transfer for agricultural processes by using solar plate and DC water pump.

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