Control the Evaporation of Water in Lakes and Ponds

Azolla Fern
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Abstract **- In these project is deals with control the evaporation of water in lakes and ponds using azolla fern. The project is done by experimental using chemistry and environmental laboratory. Using the instruments of Chinese glass bowl and heat the water to find out the evaporation. These projects execute in Roever Engineering College. We make pond to find the evaporation of these project deals with control the evaporation of lakes and ponds. The pond size is 2m length ,2.5m breadth and 0.3m depth, then provided with the half level of water 500 liters only. The lake to be provided the azolla to control the evaporation of water and erosion of banks, in this project execute in model protocol. Azolla is a branched free floating aquatic fern and is it is one of the food for animals like goat, cow, fish etc...**

Definition of Evaporation:

Evaporation refers to water losses from the surface of a water body to the atmosphere. Evaporation occurs when the number of moving molecules that break from the water surface and escape into the air as vapor is larger than the number that re-enters the water surface from the air and become entrapped in the liquid (Brutsaert 1982). Evaporation increases with high wind speed, high temperatures and low humidity. A sizable quantity of water is lost every year by evaporation from storage reservoirs and evaporation of water from large water bodies influences the hydrological cycle. Among the hydrological cycle, evaporation is perhaps the most difficult to estimate due to complex interactions among the components of land-plant-atmosphere system (Singh and Xu 1997).

Igor (1999) presents the trend of evaporation from reservoirs for a period from 1990 to 2010 (Figure 1). Also, evaporation reduces the yield from catchment areas to reservoirs by a considerable amount. The amount lost depends upon meteorological factors such as temperature of the air and water, wind velocity and atmospheric humidity. Monitoring of evaporation from impounding reservoirs will give an idea about the evaporation rate. Mathematically, the evaporation can be estimated using five methods and these methods are water budget, energy budget, mass transfer, combined mass transfer and energy budget and empirical formulae (Brutsaert 1982). The most common methods used for estimating evaporation form water surfaces by direct measurements are US class A pan, ISI standard pan, Colorado sunken pan and Russian GGI pan (Christiansen 1968). Monthly evaporation is most useful as they can be applied to the drier months of the year when reservoir drawdown by use of water may be expressed to be greatest (Yu and knapp1985).

Keyword- Water, Control The Evaporation, Azolla, Experiment, Ponds.

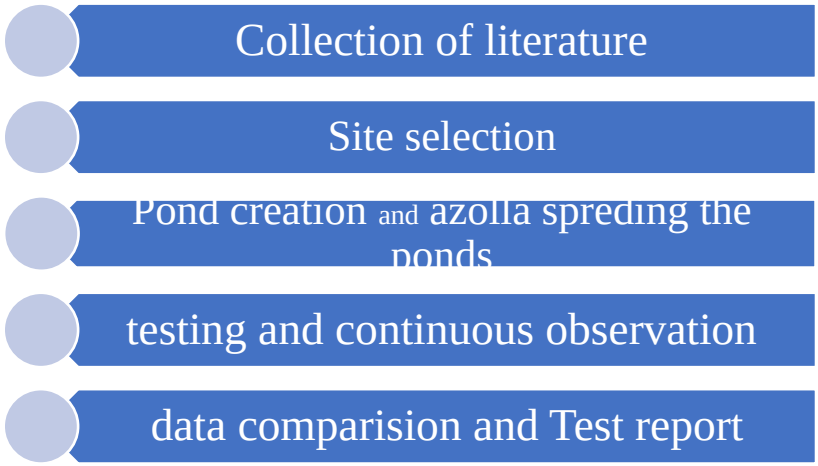
INTRODUCTION:

Azolla is a branched of free floating aquatic fern and naturally available mostly on moist soils, ponds and is widely distributed in tropical belts of India. It grows in fresh water. The shape of Indian species is typically triangular measuring about 1.5 to 3.0cm in length 1 to 2 cm in breath. Roots emanating from growing branches remained suspended in water. We are plan to get estimation on this project get protocol model size it reduces the original size of the lake the model protocol is done by our college garden. The project on of water and erosion from Esanai lake in Perambalur district. The pond size is 8.76 feet length, 4.20 feet breath and 2.0 feet depth, then provided with the half level of water 50 liters only. Reducing surface evaporation may be the most economical way of increasing water supplies in arid lands. The water thus saved is essentially distilled and is normally at the head of existing distribution systems and can be easily utilized. Evaporation loss is perhaps the major deterrent to fully utilize erratic flood flows in arid lands. The other water loss, seepage , can more easily be controlled using several available methods. In some cases, seepage loss can be recovered through wells located in the vicinity of the ponds.

AIM AND OBJECTIVE:

- It is control the evaporation of water in ponds and lake.
- It controls the erosion of banks.
- Also, it maintains the water temperature.
- Is it being good nutrition of humans and other livings.
- Azolla is green nature.
- It is food for the fishes.

METHODOLOGY



LITREATURE REVIEW:

International status:

Mostafa A. Benzaghta1,2 and Thamer A. Mohamad1 "Evaporation from reservoir and reduction methods: An overview and assessment study"

Global warming and the increasing concentration of greenhouse gases in the atmosphere will affect temperature and rainfall. This change has direct effect on reservoirs storage and availability of water resources. For example, measurements done in Australia showed that 95% of the rainfall is evaporated again which effect the available water storage. Many methods were proposed to reduce evaporation from open reservoirs. These methods can be categorized as physical and chemical methods. Research was done evaluate the effectiveness of these methods in evaporation reduction from reservoirs. Published research revealed that the physical methods can reduce evaporation effetely without environmental consequences but chemical methods effects water quality and reduce evaporation by 20 to 40% only.

Xi Yao, Hong Zhang, Charles Lemckert, Adam Brook and Peter Schouten (August 2010) Evaporation Reduction by Suspended and Floating Covers: Overview, Modelling and Efficiency

This report has been prepared for the SEQ Urban Water Security Research Alliance for the purposes of assessing the potential for floating and suspended covers to

reduce evaporation from water storages in South East Queensland (SEQ). In SEQ, large water storages or dams are the primary drinking water supply. The volume of water lost through evaporation each year is roughly equivalent to the SEQ water usage. This considerable loss of water indicates that research into innovative techniques for reducing evaporation could prove beneficial as demand increases in SEQ with rapid population growth. This report forms one of a group of reports, each of which assesses the applicability of different evaporation mitigation techniques to SEQ water supply systems.

C. Brent Cluff Water Resources Research Center University of Arizona "EVAPORATION CONTROL FOR INCREASING WATER SUPPLIES"

A summary of the leading methods of evaporation control is presented. Eight categories of evaporation control were discussed. The three leading categories of evaporation control discussed were the monolayer, the reduction of the surface- area -to volume method and floating vapor barriers. These methods are less expensive and appear to have a wider range of application than destratification, wind barriers, shading the water and floating reflective barriers. The other method of evaporation control discussed was the use of sand or rock -filled reservoirs. This method was found to be effective but limited to smaller size reservoirs. The use of fatty alcohol to form monolayers will work on larger reservoirs using either the airplane or a pipeline carrying the alcohol in slurry or an emulsified form. An airplane was used to distribute alcohol on the 12,000-hectare Vaal Dam in Africa during an extreme drought. The estimated cost was $0.021 /m6. The method is less cost - effective on smaller reservoirs due to rapid removal of the material by the wind.

The reduction of surface -to- volume ratio can be accomplished through the use of proper site selection or if in flat terrain through the use of the compartmented reservoir. The concept of the compartmented reservoir can be used on existing reservoirs but more easily on new ones since it involves the use of construction equipment. The proper use of the compartmented reservoir concept should result in a lower unit cost of water saved than any other presently known evaporation control method.

The use of floating vapor barriers of foamed rubber or wax impregnated expanded polystyrene seemed to have a wider range of use than other floating vapor barriers. The recent development of the wax -impregnated expanded polystyrene for evaporation control is described. The paper describes it to be one of the most promising floating vapor barriers in terms of cost effectiveness and weatherability. Developed at the University of Arizona, this material can be used in large 1.2 x 2.4 m sheets connected together by couplers

Arya Krishna, anandLaliNeera "Waste water treatment by azolla fern" (2013) PP:286-293

They studied about the process of plant for waste water remediation to find out the role of aquatic ferns for waste water treatment. Water bodies are the main targets for disposing the pollutants directly or indirectly. This is a paper illustrating the role of plant to assist the treatment of industry or residential wastewater. The paper discusses the potential of difference process and utilization of terrestrial and aquatic plants in purifying water and waste water from different sources.

Noorjahan C.M and s. Jamuna "biodegradation of sewage waste water using Azollamicrophylla" (2015) PP:75-80

This study focuses on the bio monitoring capacity 0oof azolla microphylla for purification of sewage waste water. 100% untreated and treated sewage sample were prepared and azolla microphylla were introduced into tubs. After 96hrs sewage sewage waste water has analysed and the result showed an active ereduction in physico-chemical parameters and heavy metals. Bio treated samples of organic matter nitrogen phosphorous removal from waste water and can be good for soil fertility.

Ranaijangwattana "Using azolla pinnata for waste water treatment from popularity farm" PP:23-27

He studied waste water from animals from especially from poultry industry is one of the sources of non-point sources for water pollution in Thailand. Plants can be a practical tool for waste water treatment. Aquatic fern (azolla pinnata) has been used to an organic matter, nitrogen and phosphorus removal from waste water treatment and can good for increasing the soil fertility. Nature treatment are not disposal practices, nor are they random application of waste and waste water in various habitats This study demonstrated that azolla pinnata can be taken into consideration as tool for waste water treatment from agriculture activities especially suitable wastewater treatment for small poultry farming.

Mostafa A. Benzaghta1,2 and Thamer A. Mohamad1 "Evaporation from reservoir and reduction methods: An overview and assessment study"

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methods effects water quality and reduce evaporation by 20 to 40% only.

Data collection:

It means data collected by the during project work time the Images should be provided in the paper.

1st site selection and preparations:

The site for the project is selected in our college campus itself. The project carries only one pit the pit carries the water of amount 500 liters. the pit carries soil dimensions of 2mx2.5mx0.3m.

Figure 1Iin this picture is pit for testing the water. Before and after providing nature of water

Collection of materials are 1st think azolla the azolla is collected from the roever institute of agriculture and rural developmental college. The pit is in our college ground the water are comes from the raining seasons in our college ground water. the temperature of the water is 38 to 40°c.

And then spreading the azolla in the pond. The azolla getting 1.5 kg to providing the pond. we are now assuming to the need of azolla in esanai lake the size of esanai lake is 100 acers. Total need of azolla in the esanai lake is 300 kg of azolla should be need. it is assumption only to control the evaporation.

Figure 2 It is Esanai lake is it in Perambalur district.

The model protocol of the pond we should be created pond is this collection of water sample that time take the picture.

Figure 3spreddind of azolla

Characteristics of azolla:

Azolla develops a symbiotic relationship with blue green algae, anabaena azolla. An azolla plants is a fern frond consisting of a main stem growing at the surface of water, with alternate leaves and adventitious roots at regular intervals along the stem. secondary stem develops at the axial of the certain leaves. Azolla fronds are triangular or polygonal and floats on the water surface individually o the pond. The plant diameter range about 1.5 to 3.0cm in length 1 to 2 cm in breath. Roots emanating from growing branches remained suspended in water.

Environmental requirements:

Azolla is found in ponds, ditches, and wetland of warm-temperature and tropical regions throughout the world. It must growth in water or in wet mud, azolla survive a water pH range of 3.5-7 the optimum temperature of azolla is between 64 and 82°f the growth rate gradually decline as salinity increases.

Testing of sample parameters:

After the making of pond we get the water sample for testing of evaporation of water without azolla the images should be provided.

Figure 4 picture taken by our chemistry lab.

The Test Report Taken On Our College Chemistry Laboratory:

Test report 1:

Time taken :1hour,
Water taken :50ml,
Temperature :40°,
Ph value of water :6.5 to 8.0
Materials using : The water it's taken by pond, Chinese glass bowl and hot plate.
Result on first test : the water will be reduced by 50ml to 39ml.

Test report 2:

Time taken	:1hour,
Water taken	:50ml,
Temperature	:40°,
Azolla added	:2.5gm,
Materials using	: the water it's taken by pond, Chinese glass bowl and hot plate, digital balance.
Result on first test	: The water will be reduced by 50ml to 44ml.

Test report 3:

Time taken	:1hour,
Water taken	:50ml,
Temperature	:40°,
Azolla added	:5gm,
Materials using	: the water it's taken by pond, Chinese glass bowl and hot plate, digital balance.
Result on first test	: the water will be reduced by 50ml to 46ml.

Conclusions and Recommendations:

The important conclusions and recommendation from this paper.

1. Evaporation control methods for large water bodies primarily consist of physical and chemical methods.

2. Physical evaporation reduction methods are able to "save" a greater percentage of water, between 70%-100% and entail a large capital cost and lower operations and maintenance costs.

3. Chemical evaporation control methods "save" a lower percentage of water, between 20%-40% and have little capital cost but higher operations and maintenance costs.

4. All of the potential measures will impact upon the aquatic ecosystems on water storages to some extent; physical control methods are likely to have a greater impact than chemical controls.

5. Size of the storage and local conditions may dictate the evaporation control techniques that are applicable to water storage

6. Chemical control techniques can be used as required where as physical control methods are more permanent.

7. If evaporation reduction methods are required in environmentally sensitive areas, a chemical evaporation retardant be employed.

8. Physical evaporation control methods only are employed in areas with little or no environmental significance.

9. If high levels of evaporation reduction are required then a physical reduction method be employed.

10. When designing new water storages that evaporation control techniques such as deeper storages, cellular construction and windbreaks be included in the design if feasible.

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