Successful Management for Conservation of Sukhniwas Lake at Indore

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ABSTRACT

Ramsar Convention 1971 was formulated to conserve global wet lands as wet lands form a unique and sensitive eco system, the loss of which is irreparable. In the concluding session of convention, 138 nations including India signed an undertaking which poses a legal obligation of protecting the wet lands. Article 2(i) of the convention mandates, the concerned nations to designate suitable wet lands within their territories for inclusion in the list of wet lands of international importance. India has listed 19 sites of wet lands. This is really less as compared to the enlistments recommended by smaller countries. The list includes 50 wet lands of Netherlands and 150 wet lands of UK. One of the lake of UK included in the list is not even of the size of 14 hectare. Once a wet land is enlisted its conservation is monitored internationally. In view of increased awareness and realization of people at large, conservation of lake is being taken seriously. Negligence in the past has resulted into sinking of lake due to obstructions entered in the water sheds and encroachments on wet lands. Many of the lakes in India and aoroad have become dumping ground for wastes.

The present paper highlights the strategies being adopted to conserve Sukhniwas lake, the paper also discusses the natural features of Sukhniwas lake, eutrofication problems, analysis of causes, possible strategies to minimize the problem and management of conservation of Sukhniwas lake being practiced at RRCAT.

ABOUT THE LAKE

The city of Indore was ruled by Holkar Dynasty. Sukhniwas palace constructed in 1893 on the banks of a natural water body, popularly known as Sukhniwas lake. The lake of area 25 hectare was the centre of attraction for Indorians and used to be a picnic spot. After establishment of Raja Ramanna Centre for Advanced Technology, the lake is now within the premises of RRCAT and now the lake is epitomizing the beauty of campus. The lake is perennial type and because of proper water shed management of RRCAT, it gets maximum run off even during minor rains. The depth of water in the lake is in the range of 2 to 10 meters. The highest flood level of the

lake is 572.00 meter. The shrinking of lake is very common phenomenon; however, the size of Sukhniwas lake has increased from 25 hectare to 40 hectares.

THE EUTROPHICATION PROBLEMS IN SUKHNIWAS LAKE

The lake is infested with aquatic as well as marshland weeds. The degraded weeds enhance eutrophication process which result in emitting foul smell. The phenomenal growth of weeds confirms existence of octhonous providing nutrients. In order to conserve the lake, it needs to be ensured that water of lake is reasonably clean and wild weed growth is arrested. The common species that are observed are in Sukhniwas lake are Ipomea aquatic, Azola, Allicata, hyacinth etc.

CAUSES OF EUTROPHICATION IN SUKHNIWAS LAKE

Eutrophication is caused when the lake water becomes artificially enriched with nutrients causing abnormal plant growth. Decaying organic matter produces unpleasant odour and unsightly green scum of algae. The abnormal growth of weeds infest the water way. The problem of eutrophication in Sukhniwas lake was severe during 1980. Due to series of measures taken from time to time, the lake has regained its ancient glory.

ANALYSIS OF THE PROBLEM

The sample of lake water tested recently indicates that phosphorus contents have come down from 7 PPM in 1980 to 0.7 PPM in 2008. Phosphorus is a naturally occurring nutrient which is required by all living beings for their growth and healthy existence. Excess of phosphorus is however, detrimental to eco system. The phosphorus content of 0.7 PPM is enough for the growth and sustenance of weeds. The water entering into the lake travels some distance in the water shed and gains phosphorus from the surface over which storm water flows and that is how water in the lake contains phosphorus. It is therefore, necessary to continue remedial measures for conserving the lake.

Methods of Conservation

Following are some of the methods of conserving the lake.

1. Application of Glyphosate
2. Use of Rope wick applicator
3. Hydro Jet apparatus
4. Preventive 'V' canals on water shed ways
5. Manual Method using boat, cutting tools & tackles and ropes.

Application of Glyphosate

Application of Glyphosate @ 1.00 kg to 2.00 kg per hectare is reported to

give successful results for controlling the growth of floating aquatic weeds like eichhornia, crassipes, salvinia, natans, pistia, stratirtes etc. It does not deplete oxygen nor hydrolyze to produce toxicity. Fishes and other aquatic lives are tolerant to Glyphosate. It is advisable that the dosage should be given in installments to avoid depletion of oxygen by decaying vegetation.

In India, application of Glyphosate was tried to control the growth of hyaciath in a canal in Cochin in Kerala. The weeds were eliminated but vast organic matter deposited in the canal posed great difficulty in removal of the deposits. RRCAT, therefore, did not consider this option for conservation of Sukhniwas lake.

Use of Rope wick applicator

This applicator comprises of a cylinder and a rope through which herbicides comes out of the reservoir and rub to the weeds when driven in between two crop rows. This can be mounted on a tractor to pull the rope wick applicator. The Malwa region is well known for its black cotton soil which is highly expansive and sticky which poses difficulty in hauling the tractors from the banks of Sukhniwas lake. RRCAT, therefore, did not consider this option for conservation of Sukhniwas lake.

Hydro Jet Apparatus

It is an apparatus for removing weed growth from soil under water through the use of Hydro Jet action. This apparatus employs a Jet tube assembly with jets at regular spacing to provide high pressure sweeping action resulting in removal of soil around the roots of weeds. It employs a floatable platform which mounts a motor-driven jet assembly being pivoted on the platform. The jet assembly is adjustable relative to the soil surface to ensure effective de-weeding & cleaning operations.

After intensive market survey, no vendor manufacturing hydro jet apparatus could be traced in our surroundings hence RRCAT could not consider this option for conservation of Sukhniwas lake.

Preventive 'V' canals on water shed ways

The phosphorous reaches lake as floating water brings soil also. The Sukhniwas lake receives water from three sides. If a deep V channel lined with cement concrete is constructed on all the three sides, whose over flow is admitted into the lake and the channel has regular dosing of alum then the problem of entry of phosphorous into the lake can be controlled. As no soil containing phosphorous would enter the lake, hence process of eutrophication shall stop as no nutrients will be available for aquatic weeds.

This would, however, be a costly option and shall require a recurring

expenditure for cleaning and maintenance of the channel. As detention time in channels may not prove adequate hence entry of small quantity into the lake shall not be ruled out. In order to avoid this problem, parallel channels may have to be laid thus increasing the initial and maintenance costs. Moreover the channels if not maintained frequently might result in to mosquito menace. Since Sukhniwas lake is not being used for drinking water purposes, hence RRCAT did not consider this option for conservation of Sukhniwas lake.

Manual method using boat, cutting tools & tackles and ropes

In this method fibre glass boat is deployed. A skilled & experienced worker sails through the boat and dredges the weeds. Bigger ones are pulled using ropes and these are collected manually and transported to banks for further disposal.

PROPOSED MEASURE TO CONTROL EVAPORATION LOSSES

Losses on account of evaporation from water bodies have attended such sizable dimensions that the same can not be overlooked anymore. In view of ever increasing demand of water, controlling of evaporation losses is high on agenda. Evapo retardant chemicals are widely used for this purpose. Fatty, long chained alcohols are the most popular evapo retardants. A small dose of evapo retardants can minimize evaporation losses from the surface of a fairly large area of water body. Fortunately the film created by evapo retardants do not interfere with the aquatic life nor it prevents penetration of oxygen but it only disallows sun rays. As per the study carried out at Sirpur lake of Indore, by an M E student it is reported that a dose of 400 mg per hectare reduces evaporation losses in a significant range depending upon other climatic factors. The study was carried out using Linoxd CS 40 and Acilol & TA - 1618 as evapo retardants. It is proposed to use a proven evapo retardant for controlling evaporation losses from Sukhniwas lake.

CONCLUSION

The conservation of lake has resulted into some tangible and intangible benefits. The lake is surrounded by 10 tube wells. The standing water of lake has improved the subsoil water table and aquifers of all the ten tube wells. These tube wells supplement about 25% of drinking water requirements of the Centre. The lake is thus providing scenic beauty and raising water level of drinking water in adjoining tube wells thus providing a great intangible benefit to the residents of RRCAT Colony. The quantity of water received from tube well is of the order of 180 million litres per annum which @ Rs 12.00 per kilolitre amounts to a gross saving of approximately Rs 2.16 million per annum and a net saving of Rs 1.50 million per annum. In fact looking to our water requirement, the accrued benefits cannot be quantified arithmetically.

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REFERENCES

1. Efficacy of Glyph sate in controlling floating aquatic weeds published in Indian Journal weed sciences in 1990, authored by Shri J C Prusty etal.
2. Rope wick applicator for controlling weeds in maize published in Indian Journal weed sciences in 1990, authored by Shri S.D. singh etal.
3. ME thesis titled " Methodology for determination of optimal dosing of evapo retardant for reducing evaporation losses from water bodies by R.Wangdhare, SATI,Vidisha (M.P.).