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'Rejuvenation of Yashwant Lake: Issues, Challenges and Opportunities'

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Abstract:
Yashwant Lake, in the southern part of Toranmal plateau is a serene lake fully covered by thick vegetation on its banks. Currently it stands as a topographical depression growing with overgrown grass and garbage. The lake's use as a dumping ground has raised health concerns for the local population.This can be countered by rejuvenating the Yashwant Lake.What will be the effect of rejuvenation of Yashwant lake on the surrounding settlement? is the question raised. This place has a religious, tourist and geographical researching background. The main objectives are to, examine the lake in order to decide the process of rejuvenation, study and understand the issues faced by the visitors, study the scope for further development in the surrounding after the rejuvenation of the lake. The methodology of research is done by the data collection (primary data) and through case studies (secondary data). Data is collected through observation, satellite map,field studies. This paper summarizes the problem of Yashwant lake, the measures instituted to correct the problem and the result. The expected outcome of this research is the area lacks hospitality infrastructure,andhave scope for tourism in that area.

Keywords: *Toranmal, dumping ground, rejuvenation, tourism.*

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I. INTRODUCTION TO TOPIC:

Rejuvenation of lake provides alternate opportunities of water management. Today one of the problems is water crisis, in terms of quantity and quality. This is due to the decrease in fresh water availability (S. Sengupta and S. Dasgupta, 2012).Whenwe observe the global distribution of water 3% of total water on the earth is fresh water, of which surface water constitutes 0.3%, ground water is 30.1%, icecaps and glaciers are 68.7% and others are 0.9%. Lakes, river and swamps constitute 87%, 2% and 11% of surface water respectively. Lakes are either natural or manmade. Lakes are important part of the ecosystem and play important role in microclimatic control, perform various environmental, social,Economicfunctions. Some of the direct and indirect uses of lakes are supply of water for house hold purposes, recharging ground water, flood control, providing biodiversity, recreational spaces to the societies (S. Sengupta and S. Dasgupta, 2012).

The major issues faced by water bodies are lack of action plans, encroachments and violations of laws, solid waste deposit and polluted water (Govt. of NCT of Delhi, 2013).Through an intensive revival strategy, these water bodies can be brought back to health. Further, through improvement of water quality and groundwater recharge using rainwater harvesting the native ecosystems of the area can be reestablished over time which is crucial for provision of ecosystem services and for the biodiversity of the area (S. Sengupta and S. Dasgupta, 2012).

Introduction to study Area/Site:

Toranmal is located between 21° 52′ 48″ N, 74° 27′ 36″ E latitude, at the height of 1,150 meters (3,770 ft) above mean sea level. Toranmal is a Hill Station in the municipal council of the Nandurbar district in the Indian state of Maharashtra with an approximate area of 41.43 sq. kilometers. The plateau has a soccer like shape from which a stream flows across the plateau from south to north. In southern part of the plateau, stream is bounded and forms the Yashwant Lake which spans about 1.59 km^2 and has a maximum depth of 27 meters. Further towards the north on the same stream is the Lotus lake which derives its name from the fact that it is always covered with lotus flowers. Same stream jumps down the cliff in Sita Khai, into the gorge forming an enthralling waterfall in rainy season.

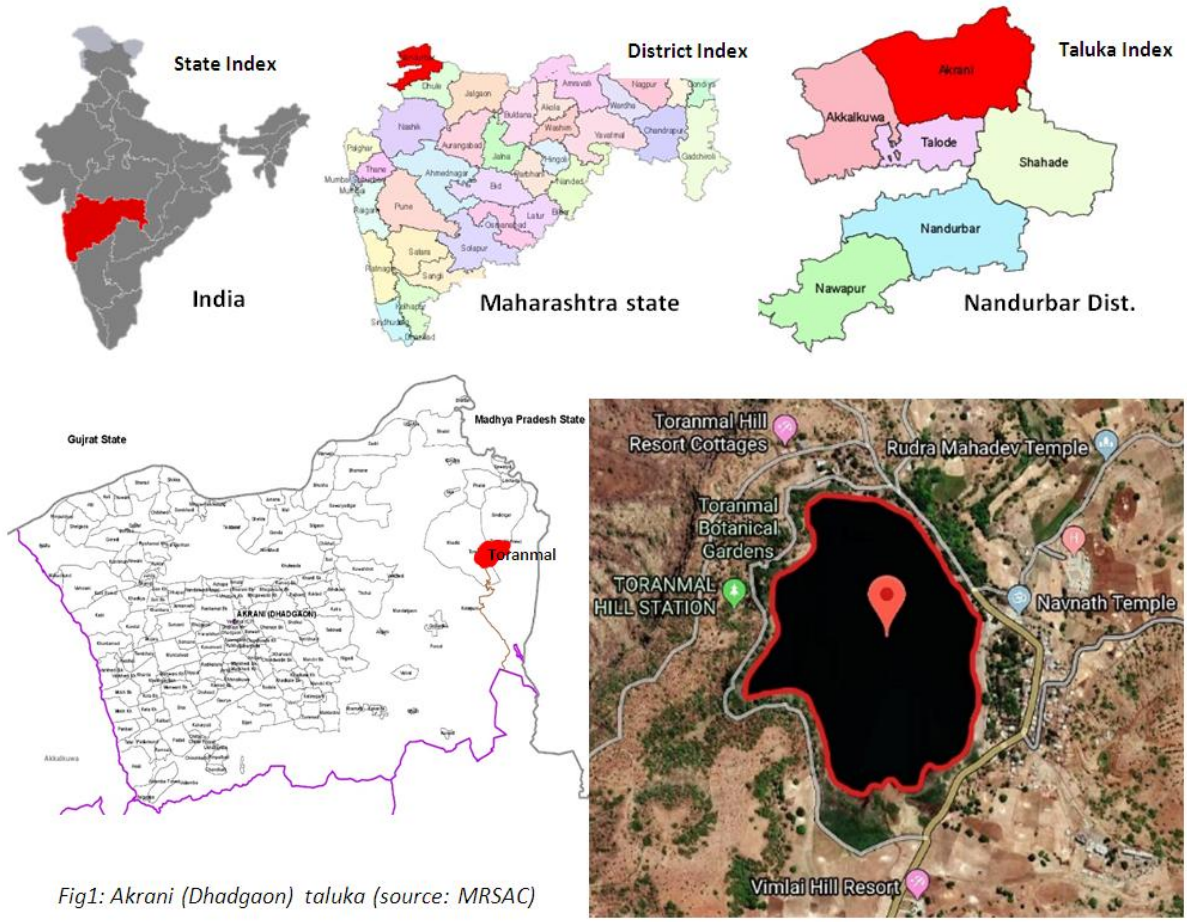


Fig1: Akrani (Dhadgaon) taluka (source: MRSAC)

Fig2: Toranmal hill station (source: Google maps)

Need of Research:

Rejuvenation truly relates to the social cohesion. As Rejuvenation of lake provides alternate opportunities of water management. This place has a religious, tourist and geographical researching background so there is a need of development. The lake's use as a dumping ground has raised health concerns for the local population. This can be countered by rejuvenating the Yashwant Lake.

Aim:

To study and analyze the impact of rejuvenation of Yashwant lake on its surrounding settlement.

Objectives:

- To examine the lake.
- To study different process of rejuvenation.
- To study and understand problems faced by local peoples and visitors.
- To study the scope for further development in the surrounding after rejuvenation of the lake.

Scope:

- Rejuvenating the whole shoreline of the lake.
- Rejuvenating the shoreline near settlement only.
- As a tourist destination there will be scope for developing lakefront at Yashwant lake.
- Strawberry is main byproduct so there will be scope for developing strawberry processing plant near Yashwant lake.
- As a tourist destination there will be scope for developing hospitality infrastructure.

Limitation:

- The research is limited only to the Rejuvenation of the shoreline near settlement.

II. METHODOLOGY:

Detailed fieldstudy was carried out to assess the present status of Yashwant Lake. Different available literature regarding rejuvenation were studied for clear understanding of the topic. During field study village people around the Yashwant lake were consulted to know their problems.

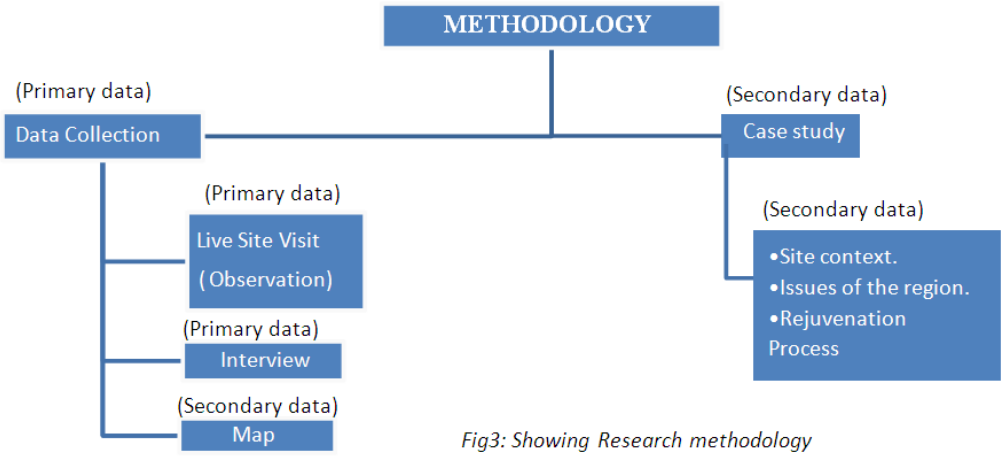


Fig3: Showing Research methodology

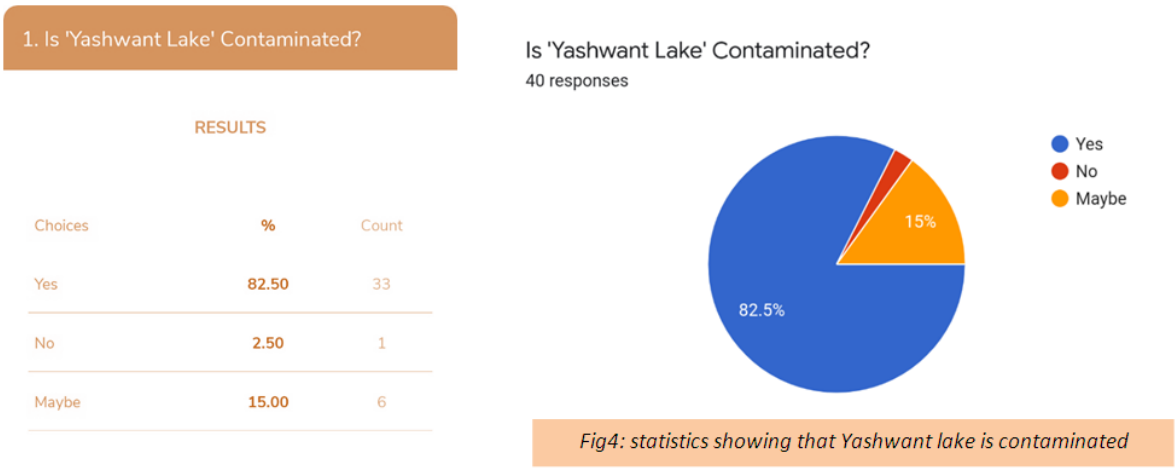


Fig4: statistics showing that Yashwant lake is contaminated

Data Collection:

Inferences:

1. Yashwant Lake is Contaminated.
2. Of the whole survey the major percentage shows that the lake is contaminated so there is need of rejuvenation.

2. What is the issue for contamination of 'Yashwant Lake'?

RESULTS

Choices	%	Count
Use as Dumping Ground	37.70	23
Overgrown grass	21.31	13
Sewage and wastewater	27.87	17
Chemical fertilizers and pesticides	13.11	8

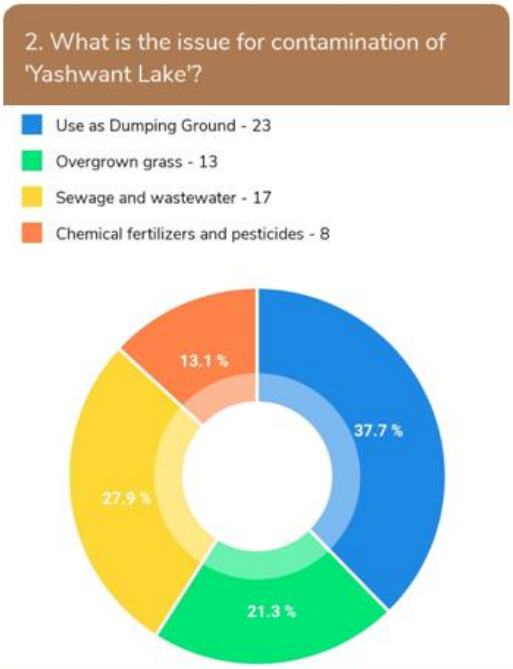
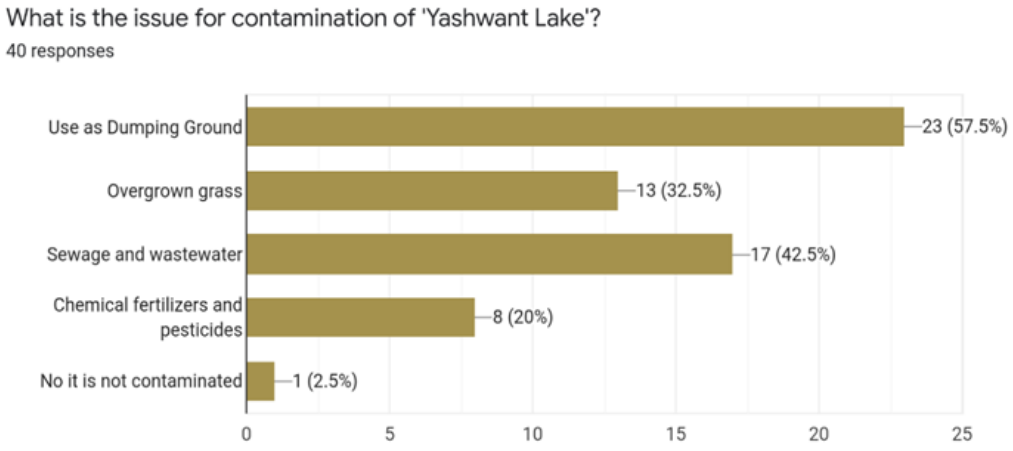


Fig5: statistics showing issue at Yashwant Lake



Inferences:

1. The major issue for the contamination of the Yashwant Lake is it's use as dumping ground.
2. Sewage and wastewater also seem to be contributing for the contamination of Yashwant lake.
3. Overgrown grass and use of chemical fertilizer / pesticides not majorly contribute to the contamination of lake.

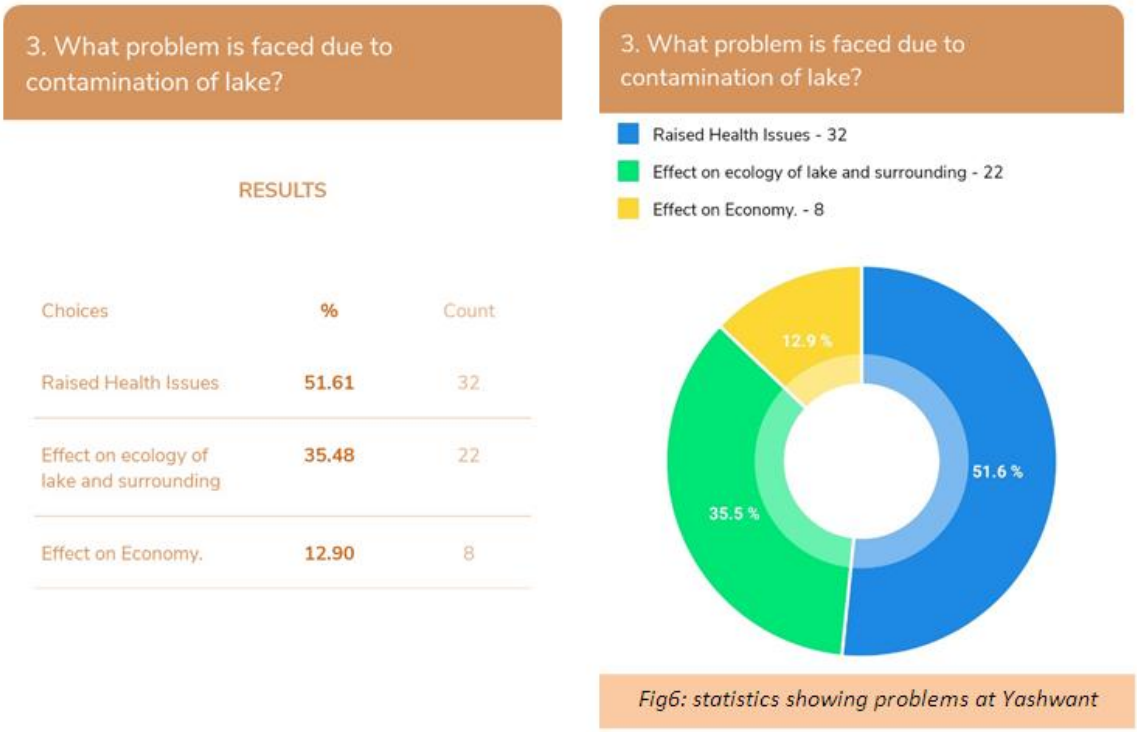
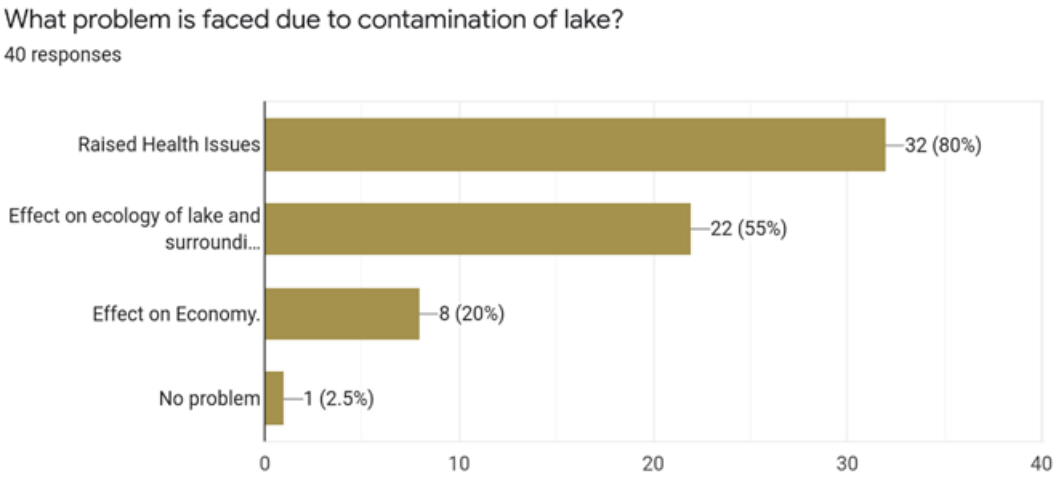


Fig6: statistics showing problems at Yashwant

Inferences:

1. There is raise in the health issues due to contamination of Yashwant lake.
2. The surrounding environment and the ecology of the lake are also affected due to the contamination of lake
3. There is indirect effect on agriculture i.e. effect on economy.



contamination of lake.

Inferences:

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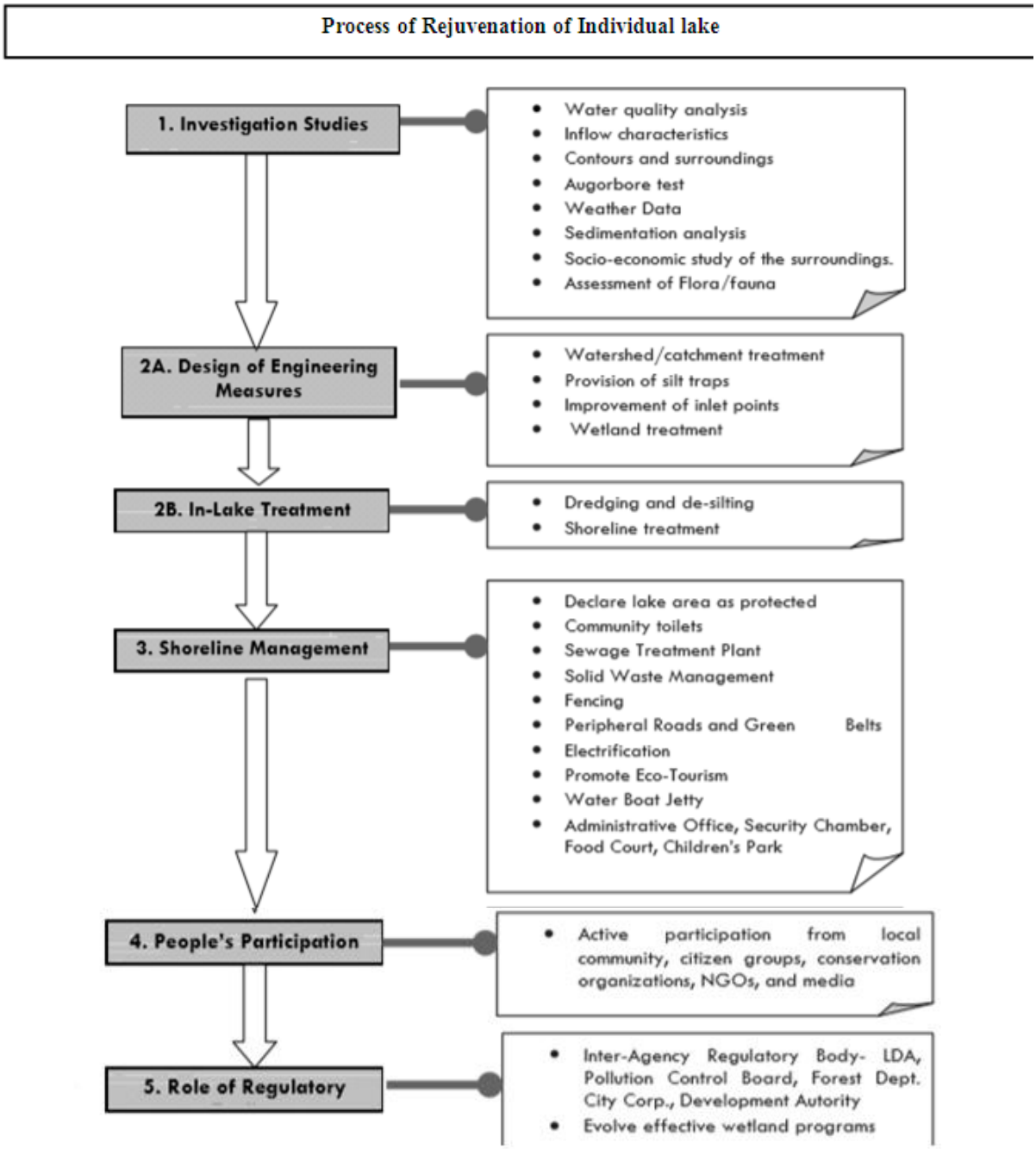

Fig7: Steps involved in individual lake conservation
Ref: IDCL (2009), development of lake conservation projects, India

Case Studies:

This study compares two lakes (Chilika and Kankaria lake) which are rejuvenate and managed by governments and public commons. The study is carried out to understand: i) uses of the lakes; ii) issues of the lake before restoration; iii) Rejuvenation process; and iv) post- rejuvenation outcome. The study helped to understand the consequences of the rejuvenation and management due to change in management model.

Name of the Lake	Chilika Lake	Kankaria Lake
Location	Bhubaneswar, Orissa	Ahmadabad, Gujarat
Area	116,500hector	25.17 hector
Type	Natural lake (Brackish)	Artificial lake
Irrigation source	Yes	No
Source of drinking Water	Yes	No
Tourism Potential	Good	Good
Introduction	Chilika Lake is a brackish waterlagoon, spread over the Puri, Khurda and Ganjam districts of Odisha state on the east coast of India, at the mouth of the Daya River, flowing into the Bay of Bengal. It is the largest wintering ground for migratory birds on the Indian sub-continent. The lake is home to a number of threatened species of plants and animals.	It represents historical and cultural value. Ahmadabad Municipal Corporation backed by Gujarat Government took up the comprehensive lakefront precinct recreational Urban Space in the heart of the city of Ahmadabad. The lakefront was revamped in 2007—2008.

Table1: Introduction to study areaStudy Areas:

Study Areas:

Chilika Lake: Chilika Lake is located in Bhubaneswar, Orissa state. It has water spread area varies between 116500 (in monsoon) to 90600 Hectors (in pre-monsoon). It is a natural brackish salt water lagoon in Asia(Rout, 2006) and is designated as a Ramsar site since 1981(P.K. Naik et al, 2008). Chilika Development Authority (CDA) with Chief Minister as a Chairperson, act as an umbrella organization for integrating various organization (11 international organization, 4 national ministries, 6 other national organizations, 17 state government organizations, 13 research institutes, 33 NGOs and Community Based Organizations and 5 Community group (Pattnaik, n.d.). They all together play active role in management of the common property resources of Chilika Lake. Legitimate stakeholders, particularly local communities and indigenous people are being strongly encouraged to take an active role in planning and restoration process (Rout, S. P., 2006.).

Fig8: Satellite map of Chilika Lake (Source: Maps of India)

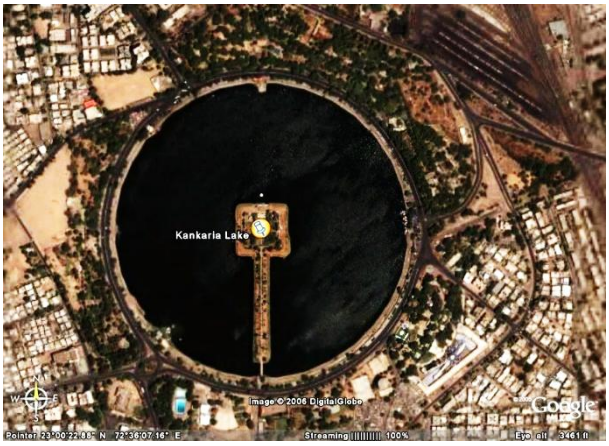

Fig9: Satellite map of Kankaria Lake (Source: google maps)

Kankaria Lake: It is the biggest lake in city of Ahmadabad, Gujarat. It was created by Sultan Qutabud-din in 1451with water purifying system but now lost with time. It has an area of 25.17 hector. It has an approximate circumference of 4.8kilometer.It represents historical and cultural value. Ahmadabad Municipal Corporation (AMC) backed by Gujarat Government took up the comprehensive lakefront precinct recreational Urban Space in the heart of the city of Ahmadabad (IDC, 2009).

Chilika Lake:

Ecological Use: It is the largest wintering ground for migratory birds (hosts over 160 species of birds) on the Indian sub-continent. The lake supports number of threatened species of plants and animals. It has rich biodiversity with variety of birds, vertebrate, marine, brackish and freshwater species and fisheries due to which it got place in Ramsar Convention for wetland. The lake is of great value in preserving genetic diversity (Rout, S. P., 2006.).

Fig10: wintering migratory birds (Ecology of chilika lake)
(Source: CDA)

Economic use: The fishery resources sustain more than 0.2 million fisher–folk and 0.8 million watershed community living in 132 villages on the shore and islands. Apart from fishing 77% of the working population in peripheral villages is engaged in Agriculture which is dependent on Chilika Lake (Pattnaik, n.d.). International tourists and ecotourism contribute to the local economy.

Issues: Increased siltation, degradation of the drainage basin, alteration of fresh water flow and decrease in salinity has resulted in shrinkage of water-spread area, loss of biodiversity and depletion of fishery resources. Tidal influx into the lake affected by the shoal formation and continuous shifting of the mouth of sea adversely affect the natural recruitment of species. Limited occupation opportunities and land holdings led to poverty and migration. Loss of biodiversity with decline in productivity adversely affected the livelihood of the community that depended on it. The conflict between fishermen and non-fishermen communities for fishing rights in the lake exist. Lack of institutional mechanism to regulate the common resources resulted in unsustainable and unbalanced resource distribution and use (Pattnaik, n.d.).

Conservation Process: CDA adopted ecosystem approach to conserve this wetland by integrating local communities. Community's capacity building was carried out with the help of local NGOs and was made aware about the ecological goods and services provided by the lake systems that contribute to their livelihood. Dangei Pahad micro watershed in degraded watershed areas is the success story with community participation. They have learned to use the watershed judiciously, not cutting the tress and planting more trees and conserving the watershed. More than 3,000 villagers including the women, children, are participated in this program. The problem of tidal influx was resolved by making a straight cut and bringing the mouth closer to the lake by 16 kilometers (Pattnaik, n.d.)

Kankaria Lake:
Ecological Use: It attracts birdlife (Centre of science environment, Amandeep Kang, 2013).
Economic use: It acts as a Tourist place which attracts the people of all age group not only from India but also from abroad. It acts as a social performance and congregation platform for events like Ras Garbha, Kankaria Carnival and Dog show by Police.

Fig11: Kankaria Lake before Rejuvenation
(Source: Ranade, P. S., 2008)

Issues: This Lake is in danger of drying due to siltation and has reduced from 16-17 feet depth to 10-12 feet depth (Ranade, P. S., 2008).
Conservation Process:AMC took up the work of de-siltation and cleaning of lake. They also developed Lake front providing facilities like Toy Train, Indoor sports Stadium, Laser show, Jogging Track, Aquarium, Zoo, Park (Nagina wadi), Amusement Park (Balwatika)Butterfly Park, Food Court, Lighting. The lake and garden attract people for walking, relaxing, yoga and running. AMC has decided to charge Rs 10 for entry ticket (IDC, 2009).

Fig12: Kankaria Lake after Rejuvenation(Source: Ranade, P. S., 2008)

Outcome after conservation process:
Chilika Lake: 57% of government and research input and 43% of NGO and community's involvement has resulted in the success of the conservation and management of the Chilika Lake. The participatory management of watershed and coastal process resulted in the functional integrity of ecosystem and enhancement of productivity thereby increasing per capita income of local community (fisherman, farmers and other dependent). Tidal influx problem and logging problem was resolved. Flora and fauna species reappeared. Fish and prawn landing increased by eight times which resulted in increased average annual income of community depending on lake by more than US $ 1,000 per family (Centre of science environment, Amandeep Kang, 2013).

Kankaria Lake: Cleaning of lake improved the quality of water inviting various bird species. Lakefront development is conceived as a memorable recreational urban space and has enriching experience. It has become a good tourist place and attracts visitors both local and tourist. Project cost can be recovered from the services provided over a period of time (IDC, 2009). The culture of littering, encroachment, building and heritage abuse in past is replaced by the culture of walkability (public friendliness), public art, festival, sports and recreation (Singh, 2013). Entry fee is relatively low thus affordable for students, low- and middle-income people. The restored and developed Kankaria Lake is awarded by HUDCO for 'Best Practices to Improve the Living

Environment' in 2012 and AMC has given special award 'Lee Kuan Yew World City Prize 2012' for Kankaria lake front development.

Comparative Analysis:

	Chilika Lake	Kankaria Lake
Ecological use	It is the largest wintering ground for migratory birds (hosts over 160 species of birds) on the Indian sub-continent. The lake supports number of threatened species of plants and animals.	It attracts birdlife.
Economic use	The fishery resources sustain more than 0.2 million fisher–folk and 0.8 million watershed community living in 132 villages on the shore and islands. Apart from fishing 77% of the working population in peripheral villages is engaged in Agriculture which is dependent on Chilika Lake	It acts as a Tourist place which attracts the people of all age group not only from India but also from abroad. It acts as a social performance and congregation platform for events like Ras Garbha, Kankaria Carnival and Dog show by Police.
Recreational use	Boat Tours, Dolphin & Whale Watching, River Rafting & Tubing, Swim with Dolphins, Fishing Charters & Tours, Stand-Up Paddle boarding.	Boating, Tethered Balloon Rides, Toy Train Rides, Kankaria Zoo, Stone Mural Park, Amusement Park, Bal Vatika, Kids City, Butterfly Park, Segway Safari, Desert Safari, etc.
Issues	Increased siltation, degradation of the drainage basin, alteration of fresh water flow and decrease in salinity has resulted in shrinkage of water-spread area, loss of biodiversity and depletion of fishery resources.	This Lake is in danger of drying due to siltation and has reduced from 16-17 feet depth to 10-12 feet depth.
Conservation Process	CDA adopted ecosystem approach to conserve this wetland by integrating local communities. Community's capacity building was carried out with the help of local NGOs and was made aware about the ecological goods and services provided by the lake systems that contribute to their livelihood.	AMC took up the work of de-siltation and cleaning of lake. They also developed Lake front providing facilities like Toy Train, Indoor sports Stadium, Laser show, Jogging Track, Aquarium, Zoo, Park (Nagina wadi), Amusement Park (Balwatika)Butterfly Park, Food Court, Lighting. The lake and garden attract people for walking, relaxing, yoga and running. AMC has decided to charge Rs 10 for entry ticket
Outcome after conservation process	57% of government and research input and 43% of NGO and community's involvement has resulted in the success of the conservation and management of the Chilika Lake. The participatory management of watershed and coastal process resulted in the functional integrity of ecosystem and enhancement of productivity thereby increasing per capita income of local community (fisherman, farmers and other dependent). Flora and fauna species reappeared. Increased average annual income of community	Cleaning of lake improved the quality of water inviting various bird species. Lakefront development is conceived as a memorable recreational urban space and has enriching experience. It has become a good tourist place and attracts visitors both local and tourist. The culture of littering, encroachment, building and heritage abuse in past is replaced by the culture of walkability (public friendliness), public art, festival, sports and recreation.

Table2: Comparative analysis of Chilika lake and Kankaria Lake

Inferences:

- Lake Development should be done considering the lake catchment, community and the use of the lake.
- Chilika Lake, the development is based on ecosystem approach which involved local community and thus led to success.
- The changes in use of the lake affect users dependent on the lake, ecology and catchment area.
- In case of Chilika Lake the sustainable approach resulted in increased employment opportunities for the local community and improved ecology of the lake.
- Chilika Lake there is an improvement in the income level of the livelihood users of the lakes
- Lake is public property and should be accessible to different income people. Kankaria lake is acting as revenue center which attracts people of different age group of people.

Comparative analysis for deriving Policy:

	Chilika Lake	Kankaria Lake
Hydrological and ecological issues	Yes	Yes
Economic issues	Yes	Yes
Ecological improvement	Yes	Yes
Recreational use	Yes	Yes
Hydrological improvements	Yes	Yes
Accessibility to different income people	Good	Good
Violations of rules and regulations	No	No
Ecological problems	No	No
Major End beneficiaries	Government and Public	Government and Public

Table3: Comparative analysis of Chilika lake and Kankaria Lake for deriving policy for rejuvenation

Deriving Policy for rejuvenation of Yashwant lake:

NMC (Nandurbar Municipal Corporation)will take up the work of removing overgrown grass and garbage and cleaning of lake. The solid waste management and sewage water treatment can be done without violation of rule and regulations. There will be accessibility to different income people. They will develop Lake front providing facilities like Toy Train, Indoor sports Stadium, Laser show, Jogging Track, Aquarium, Zoo, Park, Amusement Park, Butterfly Park, Food Court, Lighting. The lake and garden will attract local people and visitors. NMC can charge Rs 10 for entry ticket so as to recover the expenditure.

Policy for rejuvenation of Yashwant lake:

	Yashwant Lake
Hydrological and ecological issues	1. Major issues for contamination of Yashwant lake is waste dumping and sewage and wastewater 2. The overgrown grass is also issue for contamination of shoreline
Economic issues	1. Use of chemical fertilizer and pesticides in farm area near wetlands results in poor agricultural activities which leads to economy of people. 2. Also the contaminated lake reduces the tourist potential in that area.
Ecological improvement	Cleaning of lake will improve the quality of water and will invite various bird species.
Recreational use	Developing Lake front and providing facilities like Toy Train, Indoor sports Stadium, Laser show, Jogging Track, Aquarium, Zoo, Park, Amusement Park, Butterfly Park, Food Court, Lighting. The lake and garden will attract local people and visitors.
Accessibility to different income people	There will be accessibility to different income people.
Violations of rules and regulations	NMC (Nandurbar Municipal Corporation) will take up the work of removing overgrown grass and garbage and cleaning of lake. The solid waste management and sewage water treatment can be done without violation of rule and regulations.
Major End beneficiaries	Government and Public

Table4: Policy for rejuvenation of Yashwant lake.

Observations:

- The area near settlement needs to be rejuvenate as the area is used as dumping ground by people.
- Currently Yashwant lake stands as a topographical depression growing with overgrown grass and garbage.

III. RESULTS:

Cleaning of lake will improve the quality of water inviting various bird species. Lakefront development will conceived as a memorable recreational space and will have enriching experience. It will become a good tourist place and will attract visitors both, local and tourist.The culture of littering, encroachment, building and heritage abuse will be replaced by the culture of walkability (public friendliness), public art, festival, sports and recreation.

Analysis:

There are three factors on which the Rejuvenation is dependent viz; Economy, Environment and Social. Among these three factors the Social factor is quite challenging such as, publicity of the environmental benefits of the project and environmental awareness, especially among the local community. The area needs to be cleared of the garbage. And the grass grown needs to be removed.

IV. CONCLUSION:

Water bodies sustain all kinds of life forms and a project like this can be a medium through which the people can be educated about the need to revive water bodies. Such initiatives are easy to plan and implement and can spark an environmental revolution which is the need of the hour. Proper implementation and achievement of Rejuvenation activities should be with community involvement. They should be made aware about the ecological, hydrological, environmental and socio-cultural importance of the lake. This can be done through various outreach programs and publications. The active participation of the students and community in planning, design, execution, cleaning, measuring water quality, planting trees, bird watching, drawing competition and self-help program for lake rejuvenation give the opportunity for practical environmental education. Community Awareness and involvement about conservation activities will also reduce the burden on governing body. Formation of lake development trust or residents trust, involving community and NGO will help in raising funds, maintenance of lake and spreading awareness of about lake conservation activities. This will also make lake a platform for social gathering place.

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