To Study the Ecology and Effect of Pollution on Kanh River Indore

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Article Info

ABSTRACT : This study is a qualitative research done with the aim of understanding the ecosystem. Also the of this ecological research is to study the effect of pollution and improved status of the river Kanh. During study our focus is on reoccurrence of ecological imbalance on the present status of Kanh river. This study is carried out with the help of survey and records.

Geographical sample area of Indore city is chosen for this study and survey is done over a population sample of 100 people using a questionnaire which served as primary data and the analysis records obtained from IMC served as secondary data. The survey has been done to know the previous state of Kanh, why and how pollution level of Kanh increased and then analysis done using secondary data for a period before revival project 2018 and after 2021 on the basis of data by IMC.

Analysing the data it is evident that the increasing population and industrial growth has indirectly affected the ecosystem globally and the Kanh river locally. It is also evident from the analysis that the ecological health of river improved after revival and reform tactics. But reoccurrence of ecological imbalance is a matter of concern as evident from present status of river and views of sample population. Smart city project and the citizen's responsible behavior is the new hope as a permanent solution.

Keywords – Ecosystem, Health, Pollution, IMC, Geographical, Primary data, Secondary data, Smartcity.

INTRODUCTION

Water resources are the life of agricultural, industrial, household, urban development and recreational activities. Globalisation, increase in population, human demands to fulfil their needs are straining, resource tat for our planets limited natural resources including our river. Rivers provide crucial plants and animals including bacteria, fungi, algae, insects, snails, fish, reptiles, birds, mammals and amphibians.

Kanh river, Indore (the cleanest city of India) has been selected as ecological research area where is Indore is industrial capital of state of M. P. This river has undergone many continues changes which are clearly visible. A significant biodiversity can be observed here because of variety of habitat and varying microclimate through the year. Geographical background of research area:Kanh river

The Kanh river, a tributary of Kshipra rises. from a hill near village Umaria about seven miles south of Indore. It later on flows from KrishnapuraChhatri and also through the town. of Sanwer and joins river Kshipra at Triveni Sangam near Ujjain after travelling distance of about 72 kms. The Katkianala is a major tributary to this river which joints the river Khan near Sanwer. Total length of the river is 72 km (apprx) while it is only about 27.59 km (apprx) in the Indore city. The river khan do have itsoriginal form now rather is full of dirt, polluted water and the sewage of Indore city,Mangliya and Sanver town flows in it. There are several check dams at various locations along the Kanh river, namely Kayatkhedi, Panchpipalai, Rammaso, Jamalpuraek. to store the water for the irrigation purpose and to facilitate the downstream villages for drinking water sources.

someNalas joining Kanhriver :

a) PiliyakhalNala

b) PalasiaNala

c) Azad Nagar Nala

d) Tulsinagar - TalawaliChanda

e) Khajarana-BhamoriNalla

F) NarvarNala

g) BhourasalaNala

h) Arvindo college Nala

i) ShakkarKhediNala

j) Kathia Nala

Over a period of decades the ecosystem of Kanh river was totally spoiled and destroyed the fauna n flora of the river side region.

Various factors found to be responsible for this ecological imbalance.

Later State government of M.P. and local administration of Indore Municipal corporation designed and developed the revival plan for the Kanh river and implemented which resulted in improving the above said imbalance state of ecosystem of Kanh.

"We found pictures of people bathing in the Kahn water up to the decade of the 50s. Religious rituals were regularly performed alongside the river,"

the problem began in the 60s and the 70s. It was the time when Indore witnessed a rapid wave of industrialization. The number of mills established during the period was directly proportional to the swelling of the city's population as migrants poured from all across the country.

Few cared for the burden of the waste that this development produced. It eventually went into the rivers, as the infrastructure remained underdeveloped. Like the size of the city, the volume of the sewage disposed into the Kahn river is only increasing with time.

"The sewage is not the only problem afflicting the Kahn river. The mindless encroachment of its catchment area and 33 slum colonies have swallowed a great part of the river. Its flow has greatly reduced because of the illegal constructions cropping in Kahn's catchment area."

Over a period of time it has been observed that again the improved status of the Kanhriver is getting spoiled which motivated us to do this research project.

Aims and Objectives - The aims and objectives of this project is to
- conduct the ecological study,
- Analysing the causes of increased pollution in Kanh river.
- Examining effect of reforms and revival on pollution
- Analysis of present improved status of the River Kanh.

Hypothesis
1. Steps taken by the government and local administration has a positive impact on ecosystem of Kanh river, improved the quality of river water and helped to revive fauna and flora.
2. There is lack of public responsible behaviour and strict implementation of rules and practices.

Need statement- There have been several attempts to clean the river since 1985. In year 2014 state government and IMC started the expedition of Kanh river rejuvenation and revival. This project which improved the ecological health of the river but in last few years the cleanliness level of the river is continuously getting destroyed which given rise to the need of revisiting the causes of this eco imbalance so that as the citizens of the city we could understand our responsibility to maintain the ecological health of our city Indore as cleanest city of India

Work plan- We are going to study and analyse the ecosystem of Kanh river over a period of second half of 20 th century and 21 st century till now through survey, literature available on social media, information available on Indore municipal corporation web site, through pictures of Kanh river over this period available on social media. We will be collecting the information through literature review.

We will be studying the pH value, TDS value & BOD value for two different periods that is 2018 and 2021. Followed by the survey on changing status of Kanh river eco health.

Following this we will also be studying the components and reasons destroying the eco health of Kanh river.

METHODOLOGY

Sampling

    Universe: Kanh river over its stretch of 160 kms.

    Target area : Kanh river in Indore city of 21 km stretch

    Sample area: TejpurGadbadi area

    Sampling procedure: Selective sampling

Variables: Ph, TDS and BOD value.

Primary Data: Qualitative data obtained from google survey forms, information gathered through personal interview.

On the basis of questions answered by 101 people following is the interpretation of the data obtained by survey.

Population unit observing the subject of research for a varying period of 2 yr to 50 yr.

Survey is conducted over a sample of 101 persons including male and females both of age group

14 to 56 of which 53.5% are male and 46.4% are females.

Questionnaire consist of 20 questions of which 16 are related to the research topic and 4 are to collect Demographicinformation.

Secondary data: Data obtained from news journals, Indore Municipal corporation web site

Method of analysis: Observational data analysis using secondary data.

Percentage analysis: Using primary data through data sheets and graphical representation provided in google forms and did the percentage analysis manually for data collected and data obtained as responses to questionnaire.

OBSERVATIONS - Reason of ecological imbalance in Kanh river

There are in total 468 various sewer. outfalls meeting into Kanh rivers directly or through other channels in form of river or nalas. Out of these, about 314 outfalls are live outfalls which discharge the sewage into the river Kanh. Main Sources of pollution in river Kanh:

- Domestic waste of city directly meeting river Khan or various nallas draining into the river.
- Industrial water and waste from industries at Sanwer road/Kumedi industrial area joining BhorasalaWala.
- Domestic waste water of Sanwer town.
- Domestic waste water of the gram panchayatMangaliya including Tulsi Nagar Nala/TalawaliChandaNala of Indore.
- Industrial waste water / domestic waste from industries at lidhyog. Nagar Palda / Laxmibai Nagar/ Pologround industrial area Bhagirath Pura industrial aria / Sanwer road industrial area.
- Industrial waste water / domestic waste from industries at readymade electronic/ Garments shop.

Domestic waste water of the area near Arvindo medical college and Surrounding residential area joining Arvindomedical college Nala.

steps taken by government- To revive our river Khan government has taken various steps:

1) Taping of Nalas

2) Laying of new sewer line to stop mixing of domestic sewer waste in the river

3) Disposal of industrial waste in industrial areas only.

4. Connecting of sewer line to STP

5) Laying of not on both side of bridges on the river

6) Regular cleaning &deepening of the river

7) Plantation on river banks

8) Penalty fine on human waste / garbage in the river.

9) Adopting Solid waste management (SWM) practices

IMPORTANT SAMPLE STATISTICS- Data Secondary datafor year 2018 and year 2021 obtained from records of IMC.

Data of year 2018,

Dconcentration of SO_4 Fluoride and Heavy metals and No of GW drinking water specifications (acceptable limits)

Sl. No.	Analysis results of ground water Samples for General Parameters and Heavy Metals in mg/I									
	SO_4	F	Cd	Cu	Pb	Fe	Ni	Zn	Mn	Total Cr
1	7.94	BDL	ND	BDL	0.001	0.001	0.001	0.006	BDL	0.001

Comparative suggested criteria for bathing in river khan is given in the following Table – 2

Table 2. Suggested criteria for outdoor bathing

Sl. No.	Parameters	Class 'B' Water Quality criteria – for bathing (to be achieved)	Class 'E' water Quality Criteria for irrigation (Present Quality)
1	Ph	6.5 to 8.5	6 to 8.5

Data of year 2021,

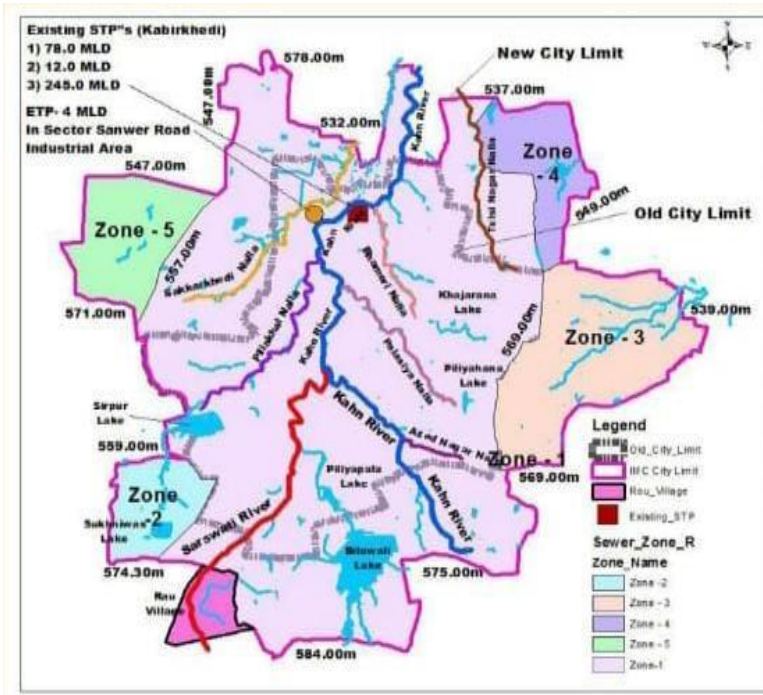Dconcentration of SO_4 Fluoride and Heavy metals and No of GW drinking water specifications (acceptable limits)

Sl. No.	Analysis results of ground water Samples for General Parameters and Heavy Metals in mg/I									
	SO_4	F	Cd	Cu	Pb	Fe	Ni	Zn	Mn	Total Cr
1	34.172	1.172	ND	ND	ND	ND	ND	ND	ND	ND

Comparative suggested criteria for bathing in river khan is given in the following Table – 2

Table 2. Suggested criteria for outdoor bathing

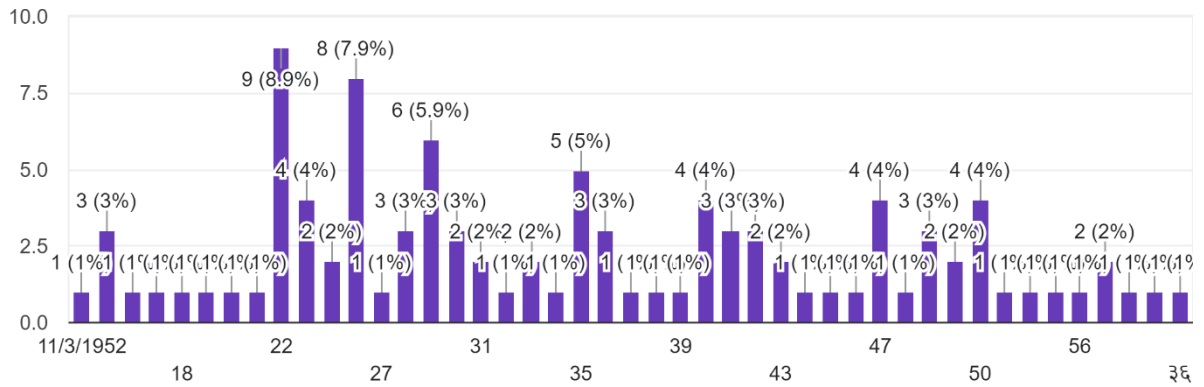| Sl. No.	Parameters	Class 'B' Water Quality criteria – for bathing (to be achieved)	Class 'E' water Quality Criteria for irrigation (Present Quality)
1	Ph	6.5 to 8.5	7.89

Geographical spread of Kanh river.
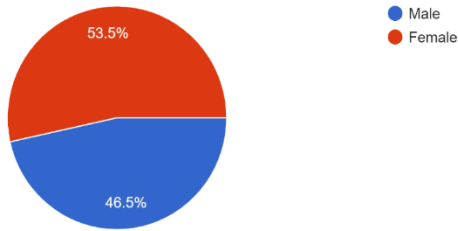
SAMPLE STATISTICS OBTAINED THROUGH SURVEY

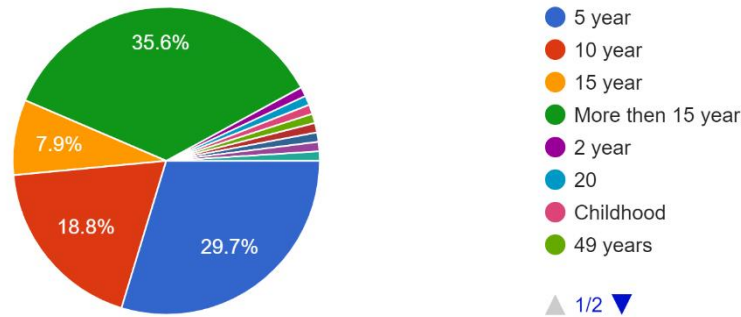https://docs.google.com/forms/d/e/1FAIpQLSe0encvO36NvN3d3BqKuG-PEwoPBGGxF3qYSSHKU174dGetrA/viewform

Age

101 responses

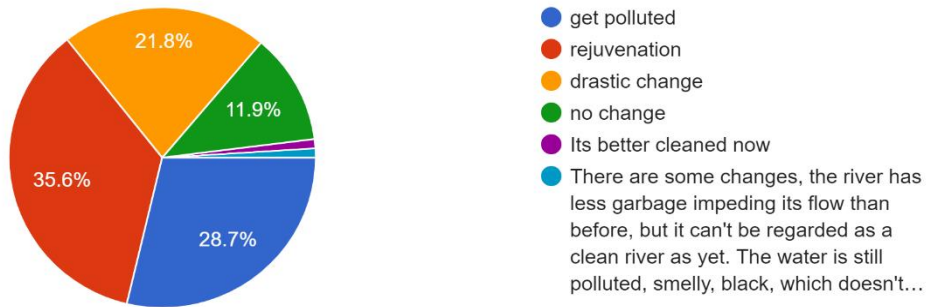**Gender**
101 responses

- Male
- Female

53.5%

46.5%

How long have you been observing this river?
101 responses

- 5 year
- 10 year
- 15 year
- More then 15 year
- 2 year
- 20
- Childhood
- 49 years

1/2

35.6%

7.9%

18.8%

29.7%

What changes have you seen?
101 responses

- get polluted
- rejuvenation
- drastic change
- no change
- Its better cleaned now
- There are some changes, the river has less garbage impeding its flow than before, but it can't be regarded as a clean river as yet. The water is still polluted, smelly, black, which doesn't…

21.8%

11.9%

35.6%

28.7%

Have you seen any particular change in this river?

101 responses

- Yes
- No

15.8%

84.2%
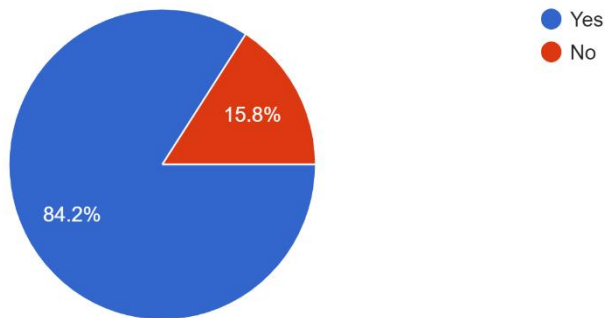
If yes, what changes have you seen, Please specify.

101 responses

- like flora and fauna was there
- fishing was there
- water quality was good
- water quality was bad
- NA
- No change
- Tourist place develop
- All of above was rapidly changed

▲ 1/2 ▼

41.6%

13.9%

9.9%

26.7%
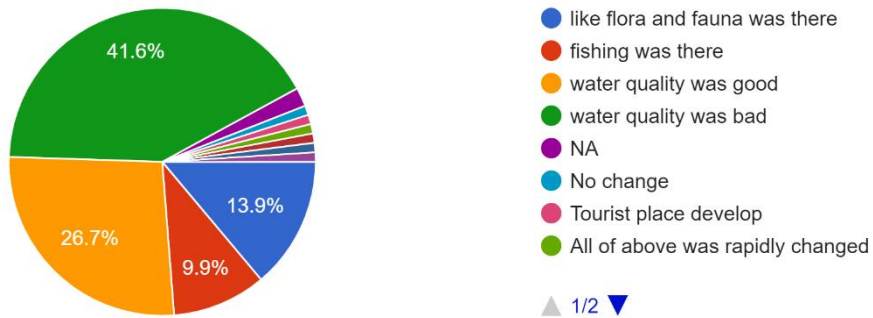
Which type of garbage do you think is dumped in river?

101 responses

- house sewage/ garbage
- factories garbage
- Nala connected to river
- all of above

60.4%

20.8%

14.9%
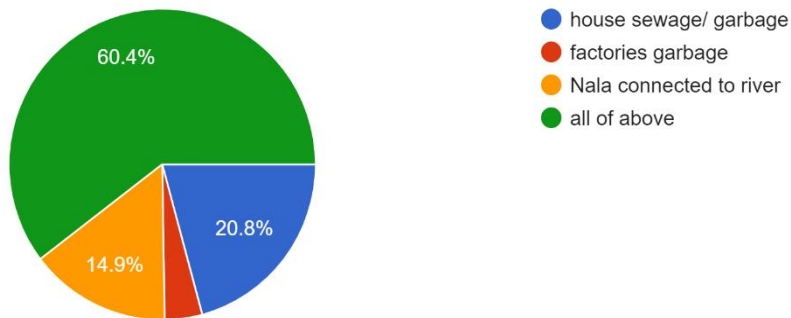
What do you think about the reasons of pollution in the river?
101 responses
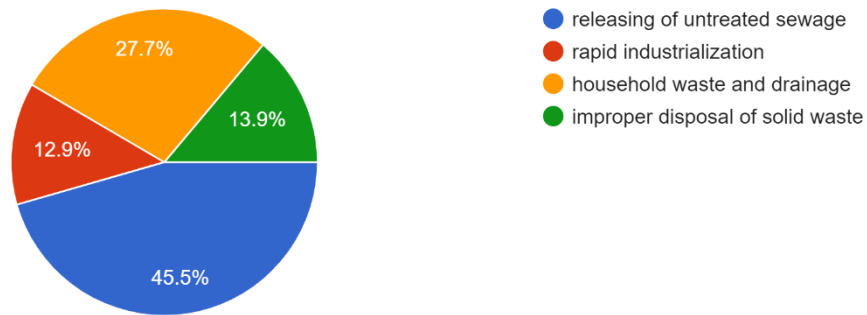
- releasing of untreated sewage
- rapid industrialization
- household waste and drainage
- improper disposal of solid waste

How long have you been observing the rejuvenation of this river?
101 responses

- 2 year
- 5 year
- 10 year
- more then above

What do you think is the reason of contaminated water of this river?
101 responses

- throwing of animal dead body
- direct dumping of human waste
- faecal water dumping
- improper sewage treatment plant
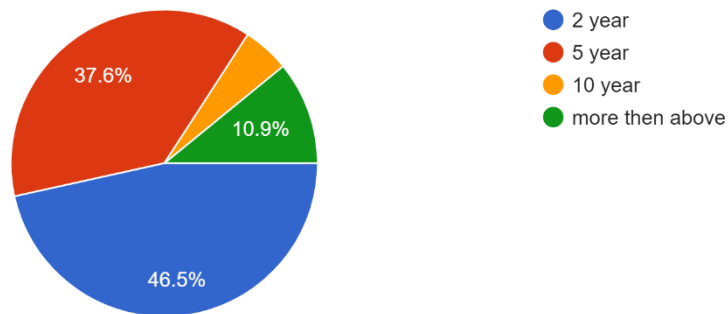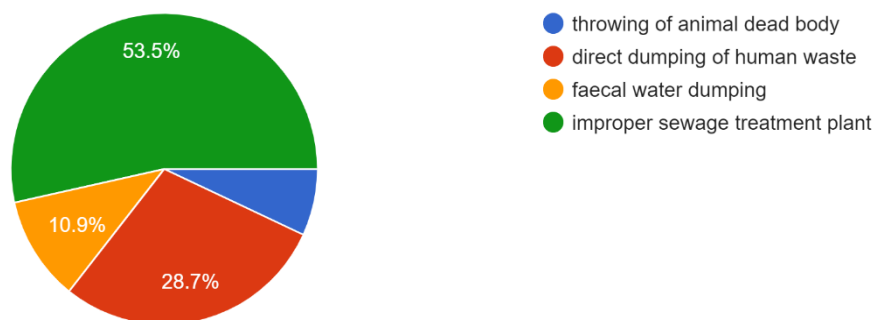
Are you satisfied with the efforts of government to rejuvenate the river?
101 responses
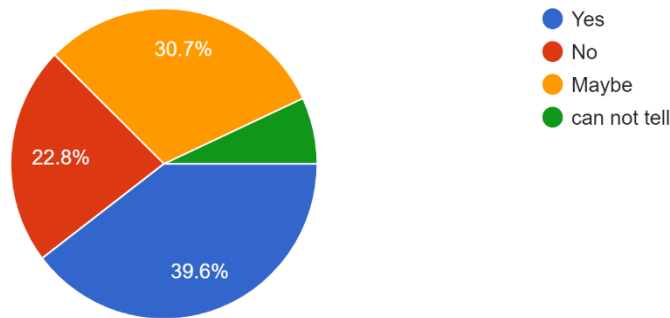
- ● Yes
- ● No
- ● Maybe
- ● can not tell

30.7%
22.8%
39.6%

What is your opinion about rejuvenation of this river?
101 responses

- ● very important for ecosystem
- ● necessary for health
- ● not needed
- ● can be useful water resource

18.8%
23.8%
54.5%
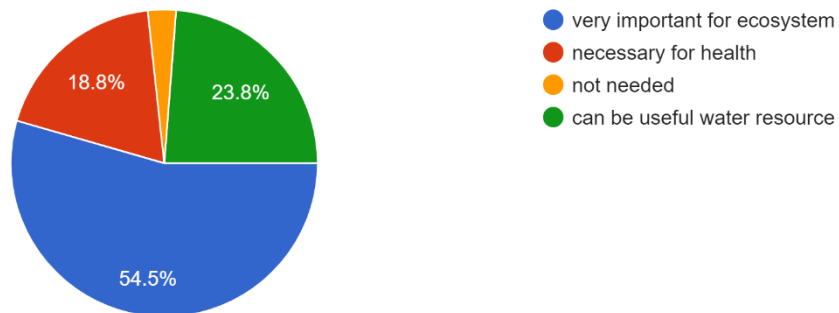
Please suggest some solutions for the improvement of water quality of kanh river?
101 responses

- ● purification plants
- ● sewage treatment
- ● stellation of compost pit at industries and housing society
- ● all of above

72.3%
7.9%
14.9%
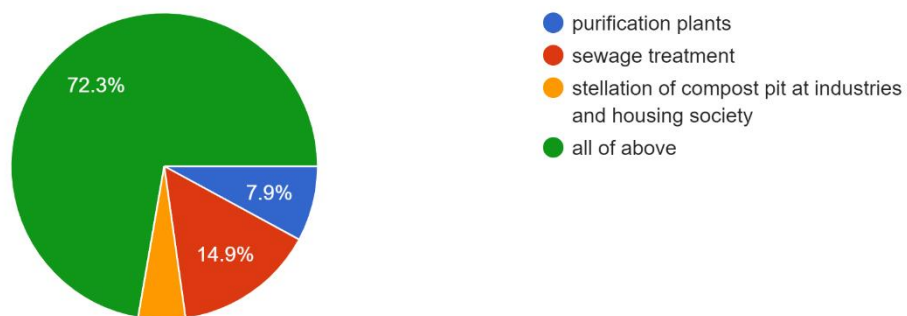
What are the legal obligations imposed on government for cleanliness of the river?
101 responses

- sewage treatment infrastructure
- river surface cleaning
- industrial effluent monitoring
- not aware

22.8%
16.8%
19.8%
40.6%
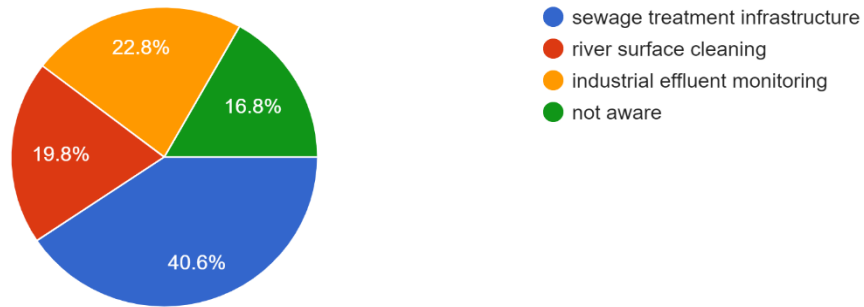
Best practice observed.
101 responses

- Iron grill
- Sewer taping
- Industrial waste taping
- Nallah taping

27.7%
23.8%
12.9%
35.6%
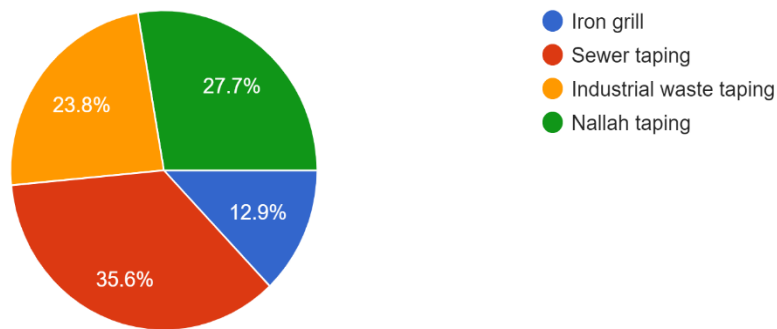
Why this river you feel is important.
101 responses

- Ancient
- Identity of indore
- Ecological balance
- Future Tourism

40.6%
10.9%
10.9%
37.6%
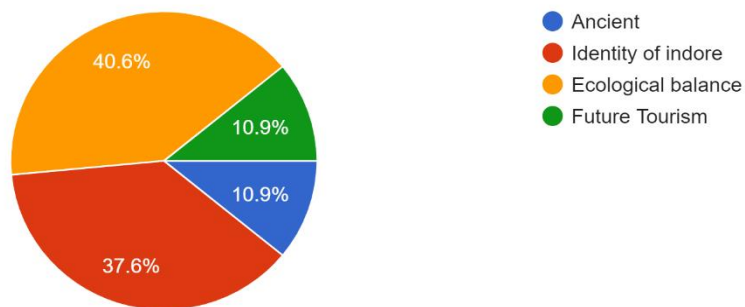
Which type of fauna have you seen when the river was not polluted?
101 responses
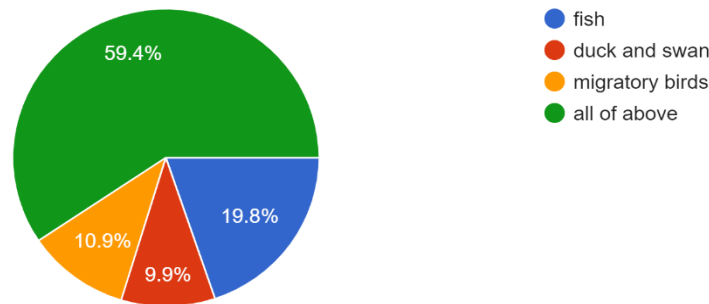
- fish
- duck and swan
- migratory birds
- all of above

on the scale of 0 to 5 how much rating do you give on government efforts for rejuvenation of river
101 responses

- 0-2
- 2-3
- 3-4
- 4-5
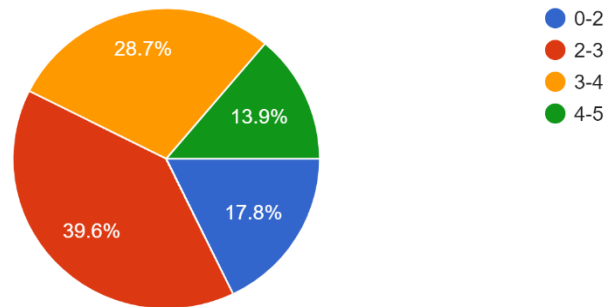
DATA ANALYSIS AND INTERPRETATION

On the basis of secondary data.

1) The water of the river has become clean and transparent.

2) Fishes and aquatic birds are visible.

3) The river water does not produce foul smell.

4) The pH value, TDS value & BOD value has been improved.

On the basis of primary data collected through survey

1 35.5% population has witnessed the rejuvenation of the river,with aopinion by 28.7% as it's still getting polluted, 11.9% as no change has been observed and 21.9% have observed drastic change.

1. 60% of population has opinion by experience and observation that domestic sewage, industrial waste and all the dirt through nalas connected to the river have been polluting the river since long.

   Also sample units from higher age group have witnessed fishing, presence of ducks, flowing water, resident birds, dense fauna and flora besides the river almost 60 % of sample population have observed fishes, ducks, swans, migrating birds in this river before it got polluted.

2. 22.8% sample population is not satisfied with government efforts,30.7% not sure and 39 % sample population is satisfied with government efforts.

3. 354% of sample population find it very important to rejuvenate the river for ecosystem balance,, 23.8% see it as potential water source for the city and 18.8% consider it good for all kind of city and citizen's health.

4. 37.6% find Kanh as identity of the city40.6% find it to be kept alive and clean for the sake of ecological balance of the environment balance.

RESULT- We accept the hypothesis as.

1. From the analysis of secondary data and views of sample population it is evident that Steps taken by the government and local administration has a positive impact on ecosystem of Kanh river, improved the quality of river water and helped to revive fauna and flora.

2. Also it is evident from pictures available , surveys and news in the news papers and social media that Recurrent ecological imbalance, constant public behaviour at social level industrial and domestic waste pushing in Kanh river polluting it back constantly. It shows that there is lack of public responsible behaviour and strict implementation of rules and practices.

CONCLUSION- From this research project we conclude that government and local administration have put in efforts to bring back the life of kanh river but any reform and revival whether it is social, cultural or environmental public and administration should go hand in hand to rebuilt it and to maintain it. Now we as responsible citizens should play our role honestly and nicely for the betterment of environment.

SOLUTION OF THE PROBLEM- Other then the efforts made by the government, Local administration and IMC it is very difficult to maintain the balance of the ecosystem and keep it working unless until public is aware and committed towards their responsibilities, rules and regulations

Following are the suggestions

1. Planting purification plants

2.Proper sewage system and sewage treatment plant

3. Strict industrial waste management

4. Installation of waste pits at industrial level and compose pit at domestic level should be made compulsory.

5. Industrial effluent monitoring

6. Best practices observed and suggested and to be adapted

a.Iron grill

b. Sewer tapping

c. Industrial waste tapping

d. Nslah tapping

SUGGESTIONS

1. Awareness campaign should be carried out

2. At the school level it should be introduced as an activity towards cleanliness drive.

3. Strict punishment and huge fine should be imposed on industries on voiding the rules and regulations.

4. Industries, IT companies , education industries should be given partial social responsibility to maintain the cleanliness of the river,

5. On the river banks public recreational events could be organized which should be kept paid so that using those funds that place can be maintained.

    Most importantly as Indore has established itself as most cleanest city of India consecutively for six years, Local administration could plan a campaign to motivate the public to prove themselves best on the country doing activities for maintaining the cleanliness of river Khan and ecological health of the city.

6. Few places like krishnpurachhatries can be made tourist attraction.

7. Achieving above could establish Indore as ideal city not only in the country but could gain recognition all over the world.

FUTURE PLAN

1. Industrial Pollution Control

2. Rejuvenation of water quality of Hukumakhedi land.

3. Protection of Simpur Band & it's Water quality.

4. Completion of Conveyance System for City Sewage

5. Implementation of Indore Sewerage project,

6. River front development of Kanh river in smart city area.

7. Zero discharge from Existing 4 mld ETP at Sonwer Rood

8. Indore is in process of of becoming smart city so Indore has already set to get a city – centric riverfront on Kahn river,

ANAXTURE

Interview questionnaire

1. Name: 2. Age: 3. Gender: 4. Adrees:

5. How long have you been observing this river?

a) 5years   b) 10 years   c) 15 years   d)more than above

6. What changes have you seen?

a) get polluted   b) rejuvenation   c) drastic change   d) no change

7. Have you seen any particular change in this river?

Yes/No

8. If yes, what changes have you seen,plz specify.

a) like flora and fauna was there   b) fishing was there   c) water quality was good   d)   water quality was bad

9. Which type of garbage do you think is dumped in river?

a) house sewage/ garbage   b) factories garbage   c) other Nala connected to river   d) all of above

10. What do you think about the reasons of pollution in the river?

a) releasing of untreated sewage   b) rapid industrialization

c) household waste and drainage   d) improper disposal of solid waste

11. How long have you been observing the rejuvenation of this river?

a) 2 years   b) 5 years   c) 10 years   d) more than above

12. What do you think is the reason of contaminated water of this river?

a) throwing of animal dead body   b) direct dumping of human waste

c) faecal water dumping   d) improper sewage treatment plant

13. Are you satisfied with the efforts of government to rejuvenate the river

a) yes   b) no   c) may be   d) can not tell

14. What is your opinion about rejuvenation of this river

a) very important for ecosystem   b) not needed   c) necessary for health   d)   can   be   usefull water resource

15. Please suggest some solutions for the improvement of water quality of kanh river

a) purification plants   b) sewage treatment

c) Installation of compost pit at industries and housing society   b) all of above

16. What are the legal obligations imposed on government for cleanliness of the river.

a) sewage treatment infrastructure   b) river surface cleaning   c) industrial effluent monitoring

b) not aware

17. Best practice observed. Choose-

A. Iron grill   B. Sewer tapingC. Industrial waste taping   D. Nallah taping

18. Why this river you feel is important.

A. Ancient   B. Identity of indore   C. Ecological balance   D. Future Tourism

19. Which type of fauna have you seen when the river was not polluted

a) fish   b) duck and swan   c) migratory birds   d) all of above

20) on the scale of 0 to 5 how much rating do you give on government efforts for rejuvenation of river

a) 0-2   b) 2-3   C) 3-4   d) 4-5

Link for google form of questionnaire

https://docs.google.com/forms/d/e/1FAIpQLSe0encvO36NvN3d3BqKuG-PEwoPBGGxF3qYSSHKU174dGetrA/viewform

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