WATER QUALITY IN RAJASTHAN: ISSUES AND CHALLENGES

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RAJASTHAN

It covers an area of 342,239 square Kilometers with 33 districts

Also known as the gateway of thar desert as most of the northwestern part of Rajasthan is covered by thar desert

Famous for its printed textile in various forms like, *sanganeri* prints, *bandhej*, block prints etc.

Largest producer of marble and limestone

MAJOR ISSUES

Scarcity of surface and groundwater

High TDS in ground water

High Fluoride

Content in ground water

Heavy metal contamination in surface and groundwater

FLUORIDE CONTAMINATION

16,560 fluoride endemic habitation	50% districts are highly affected by fluoride	It ranges between 0.03 ppm to a high as 82 ppm in most of the places in Rajasthan	Prevalence of Fluorosis is reported in more than 45 % of population of Rajasthan

CAUSES FOR HIGH FLUORIDE

- Presence of rocks like Pegmatite , Gabbros etc. containing minerals like Fluorspar,Fluorite, Lepidolite, Tremolite
- Presence of calcite and dolomite which accelerate the leaching of fluoride to the groundwater
- The arid climate with high evaporation and insignificant natural recharge increase fluoride concentration in the groundwater

HIGHLY AFFECTED REGIONS

Northern Region

Jaipur

Southern Region

Bhilwara and Bundi

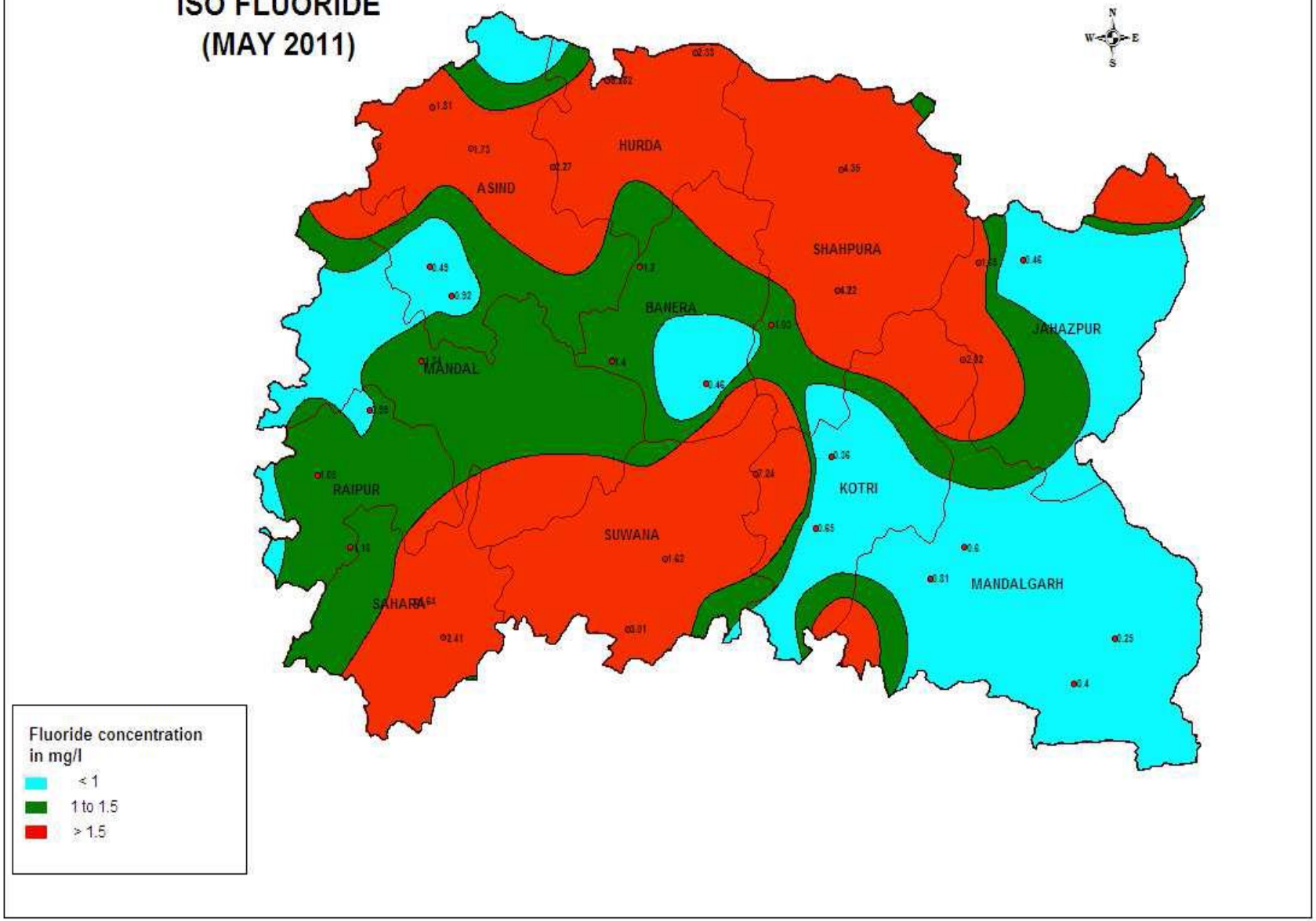
Eastern Region

Dausa

Western

Ajmer

DISTRICT BHILWADA, RAJASTHAN
ISO FLUORIDE
(MAY 2011)



EFFECTS OF FLUOROSIS

Rural people are highly affected due to lack of information and reach of technology

High Total Dissolved Solids

- Aquifer structure in most places of Rajasthan affect the quality of water with respect to hardness, alkalinity and TDS

- Mineral composition of aquifers is Ca-Mg Cl SO4 NO3 type

- Thus Sulphate, Calcium,Magnisium, Chloride and nitrate ions are dominant increasing the Hardness, Alkalinity and TDS of water

Ground and surface water contamination by toxic metals

Rajasthan has clusters of textile printing units emitting wastewater containing dyes leading to heavy metal pollution of surface and groundwater

Jaipur, *Pali* and *Bhilwara* are the major hubs of textile printing units in Rajasthan

WATER QUALITY ISSUES IN SELECTED DISTRICTS OF RAJASTHAN

JAIPUR

Capital city of Rajasthan known as the PINK city

Famous for *Sanganeri* block print textile

A cluster of 865 Textile printing units in *Sanganer* area of Jaipur

MAJOR ISSUES

- Large quantities of wastewater generated from the textile printing units
- Effluent Treatment plants are of low capacity as compared to the wastewater generated
- Wastewater disposed off without treatment in to *Amahnisha Nalla*

AMAHNISHA NALLA

- Amahnisha Nala runs appproximately 35 km across the city of Jaipur
- In 1874 water of *Amanishah Nala* supplied to Jaipur city through network of pipeline
- Soon after the damming of the *Amanishah Nala*, low inflow and silting of the dam reduced its capacity but was still a source of surface water transporting water through a canal and collecting this water into kunds
- At present drainage canal with cocktail of chemicals

Untreated Wastewater directly dumped into *Amahnisha nalla* by textile units

Polluted water in *Amahnisha nala*

Various studies on Wastewater analysis from *Amahnisha nalla* shows high levels of toxic metals

Metal	Concentration	Permissible limit
Lead	2.01-6.35mg/l	0.1 mg/l
Zinc	3.5-5.8mg/l	5.0 mg/l
Chromium	4.5-7.63mg/l	0.05mg/l
Cadmium	2.3-8.62mg/l	0.05mg/l
Copper	5.1-7.54 mg/l	1.0 mg/l

Goyal and Chauhan (2014), Jaishree and Khan(2014),Jhamaria and Bhatnagar(2016)

EFFECT OF HEAVY METALS ON HUMAN HEALTH	
METAL	**EFFECTS**
Cadmium	❖ Kidney Damage ❖ Adversely affects the production of progesterone and testosterone ❖ Bone Damage(low grade of bone mineralization, high rate of fractures, increased rate of osteoporosis, and intense bone associated pain ❖ Carcinogenic
Chromium	❖ Hexavalent chromium is a human carcinogen ❖ Chronic exposure causes adverse effects on Liver ,Kidney, gastrointestinal and immune system ❖ Mutagenic
Nickel	❖ Mutagenic ❖ Interfere with the metabolism of iron, calcium, magnesium, or manganese to produce its toxic ❖ Carcinogenic
Lead	❖ Encephalopathy in children ❖ Peripheral neuropathy, chronic nephropathy, and hypertension in adults ❖ Adversely affects gastrointestinal, immune, skeletal and reproductive system ❖ Disrupts heme biosynthesis ❖ Carcinogenic

राजस्थान प्रदूषण नियंत्रण मंडल की रिपोर्ट- पानी न पीने काबिल न खेती लायक

अमानीशाह के पास का भूजल भी खेती के लायक नहीं बचा

भास्कर मुद्दा

सरकार-प्रशासन की आंखों के सामने

जहर की खेती क्यों?

श्रृंखला-4

भास्कर न्यूज | जयपुर

पानी का स्तर मापदंड से ज्यादा खराब

पाइंट ऑफ कलेक्शन	टीएसएस	बीओडी	ऑइल और ग्रीस
स्टैंडर्ड फॉर इरीगेशन	200	100	10
स्टैंडर्ड फॉर सरफेस वाटर	100	30	10
ओवरफ्लो ऑफ गूलर डैम	296	70	12
(शिकारपुरा रोड नाला, सांगानेर)			
रामसिंहपुरा एरिया नाला	204	57	7
गोविंदपुरा, सांगानेर नाला	172	79	8
मुहाना रोड, सांगानेर नाला	442	114	14
(सांगानेर ब्रिज से पहले)			
अमानीशाह नाला		464	101.16

टीएसएस: टोटल सस्पेंडेड सॉलिड अर्थात पानी में तैरते हुए सॉलिड।

बीओडी: बायोलॉजिकल ऑक्सीजन डिमांड अर्थात पानी में प्रदूषण के चलते ऑक्सीजन की कमी।

तीन साल में और बिगड़े हालात

"Groundwater near *Amahnisha Nalla* not fit for irrigation"

"Vegetables grown in 20 km area near *amahnisha nalla* contains toxic metals (poison)"

जयपुर शुक्रवार, 7 मार्च, 2014

20 किमी. क्षेत्र की हरी सब्जियों में घुला जहर

भास्कर मुद्दा

सरकार-प्रशासन की आंखों के सामने

जहर की खेती क्यों?

श्रृंखला-1

» अमानीशाह नाले के पानी से सब्जी उगाने वालों पर नहीं लग पाया अंकुश

महेश शर्मा | जयपुर

भास्कर एक्सपर्ट पैनल

सलाद में कच्ची सब्जियां ज्यादा खतरनाक : न्यूरोलॉजिस्ट

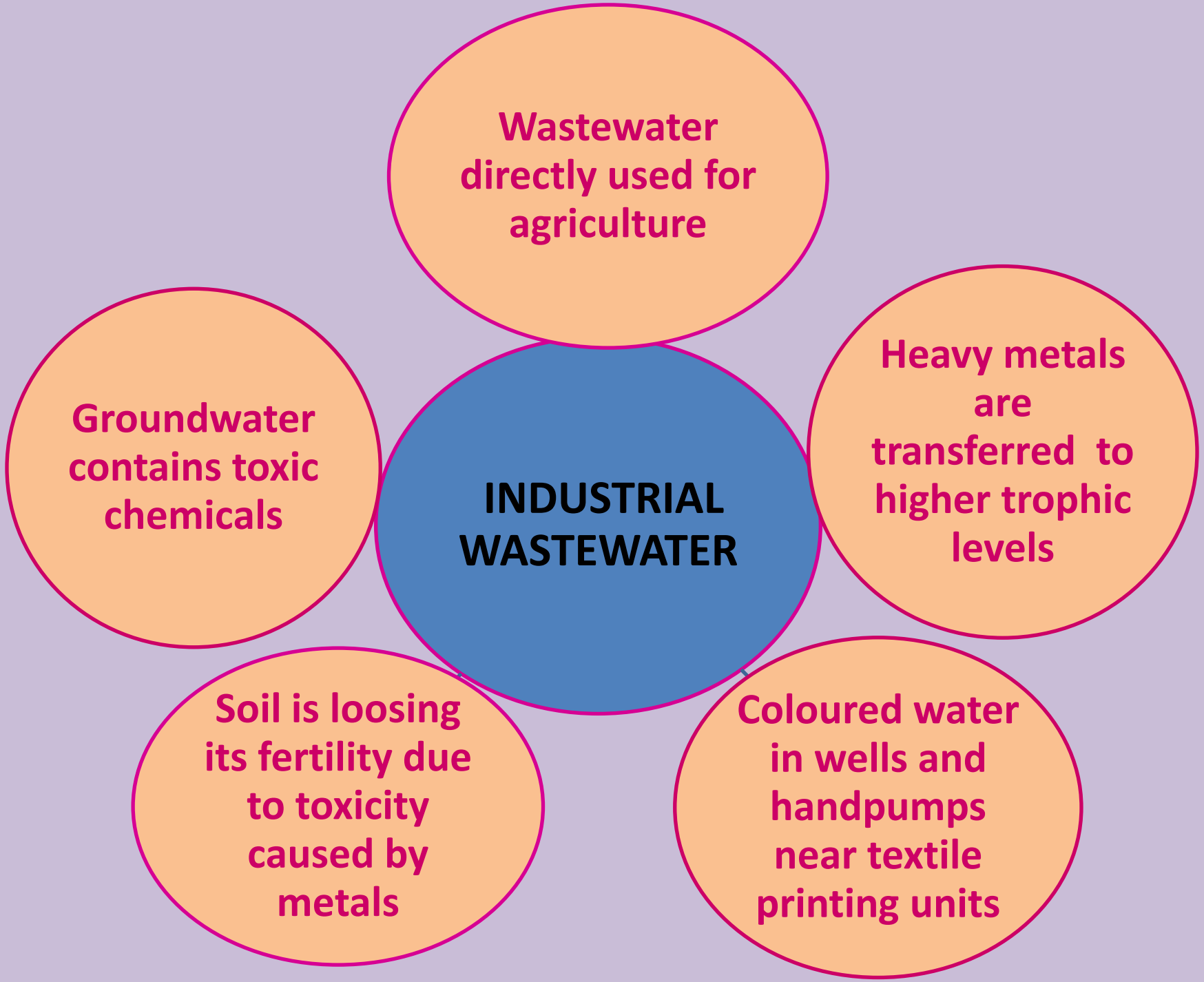
ये तो जानवरों को भी बीमार कर दे: कृषि वैज्ञानिक

उबालने पर भी खत्म नहीं होते हैवी मेटल : रसायनशास्त्री

चिंता क्यों? गर्मियों में ज्यादा लहलहाएगी 'हरे जहर' की खेती

Pumps used to apply wastewater directly from the *Amahnisha nala* in the agricultural Fields

Agricultural fields near *Amahnisha Nalla*


Wastewater directly used for agriculture
Groundwater contains toxic chemicals
INDUSTRIAL WASTEWATER
Heavy metals are transferred to higher trophic levels
Soil is loosing its fertility due to toxicity caused by metals
Coloured water in wells and handpumps near textile printing units

Common vegetables like Spinach, Brinjal, Mint,Lady Finger grown on waste water irrigated agriculture fields

Concentration of heavy metals like Pb, Cr, Ni found above permissible limits in vegetables

BHILWARA

Bhilwara is a city in the Mewar region of Rajasthan

Also known as manchaster of Rajasthan

About 500 synthetic textile units in outskirts of bhilwara on chittorgarh, Gangapur and Mandal road which are the main water guzzelers

- 500 units require 24.80 millon liters of water per day(Mewar Chamber of Commerce and Industry)
- Processing units use around 80% of water
- Untreated wastewater is disposed in the nearby Kothari river

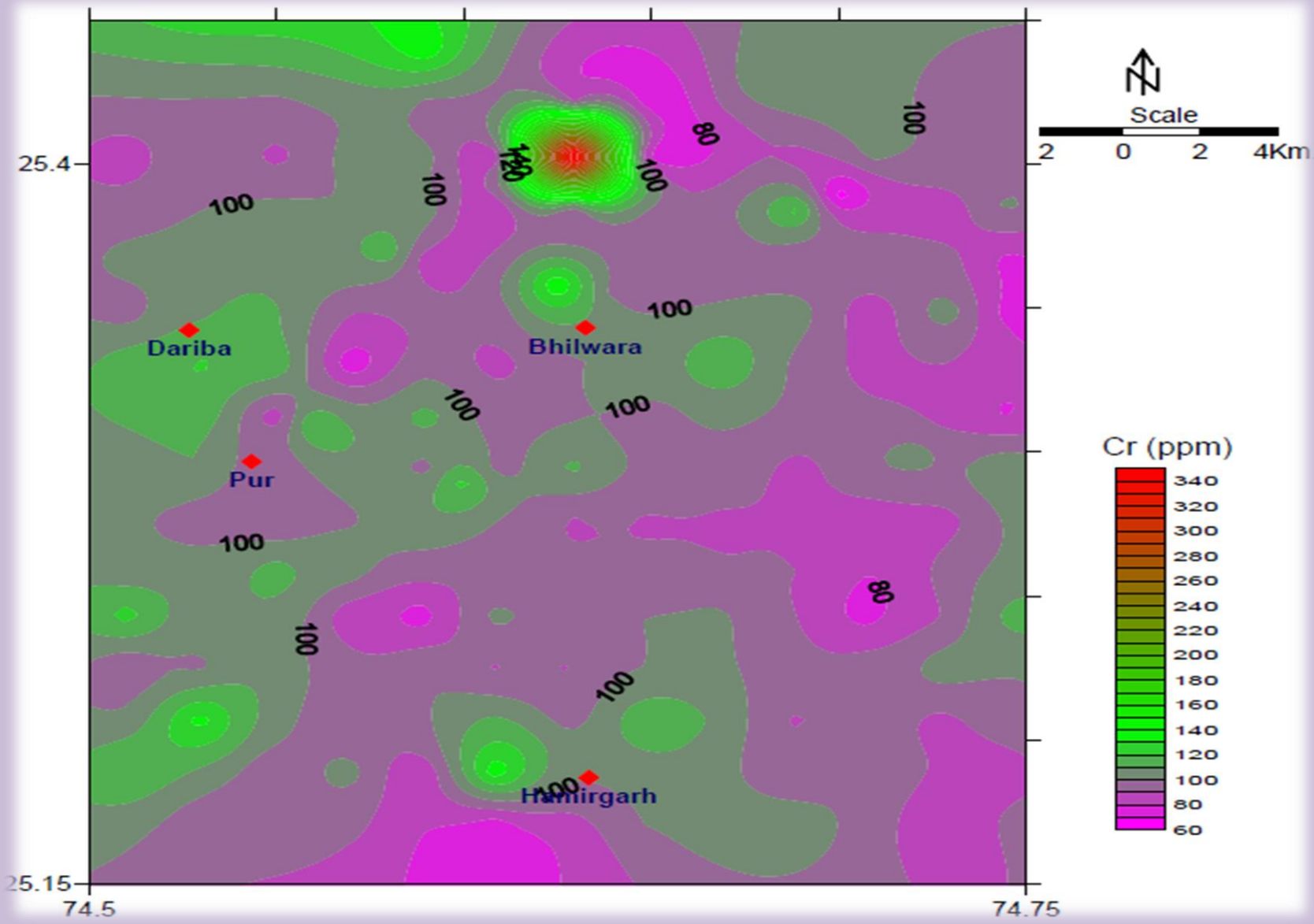
- According to a study conducted by PHED , open wells in the villages near the Kothari river flowing besides industrial belt showed high levels of Chromium,Lead,Iron Zinc and Sodium much above the permissible limits set by Bureau of Indian standard

- Effluent treatment plant are non functional as the treatment costs approx Rs. 4.5 lakh per day for three stages of effluent treatment
- Untreated effluents are dumped in the Kothari river
- After order of Zero discharge from Rajasthan pollution control board eucalyptus trees are grown in the area using untreated waste water thus injecting the wastewater in ground

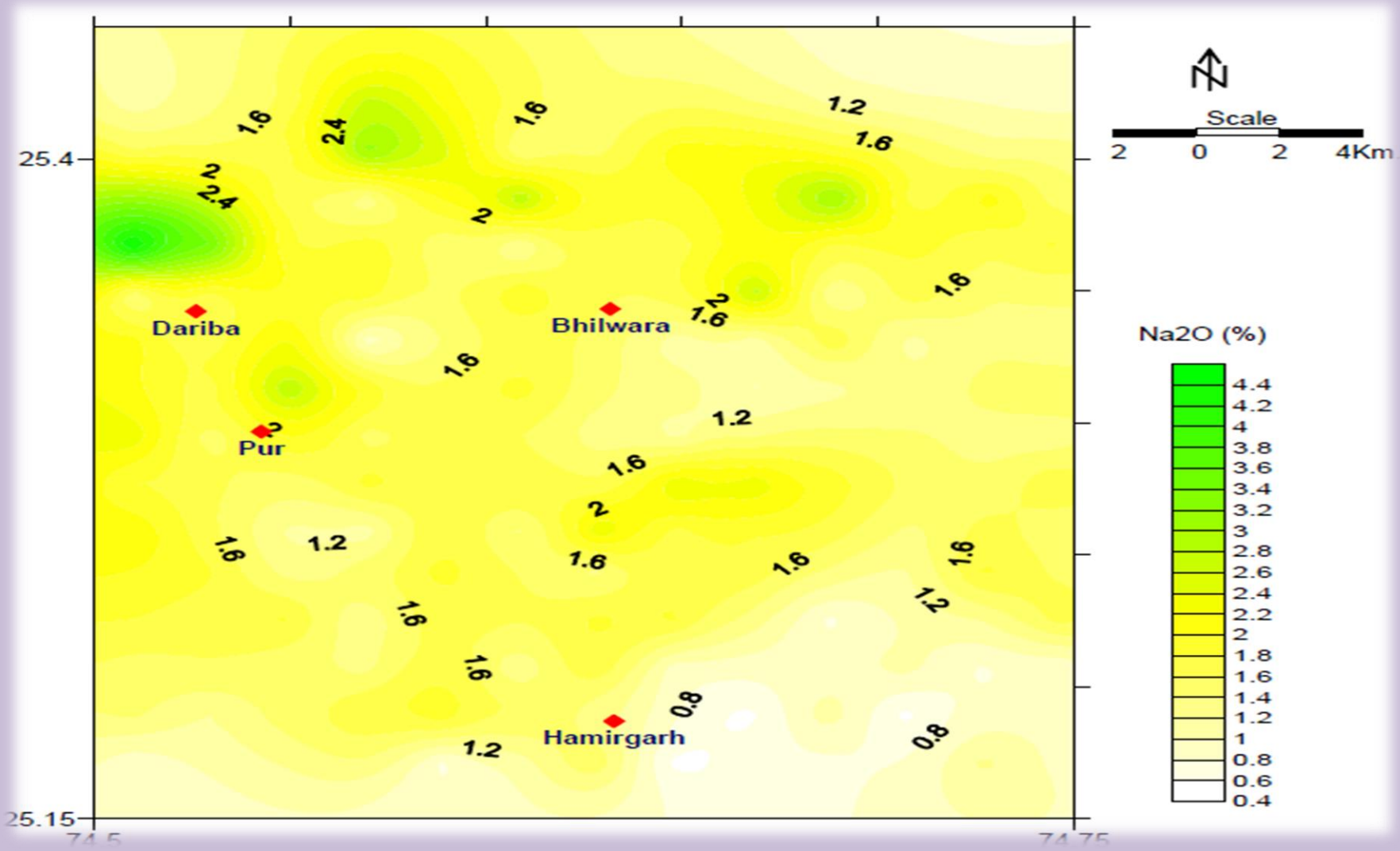
Partially treated wastewater in Kothari river

Toxic effluent released from the textile units in Kothari river

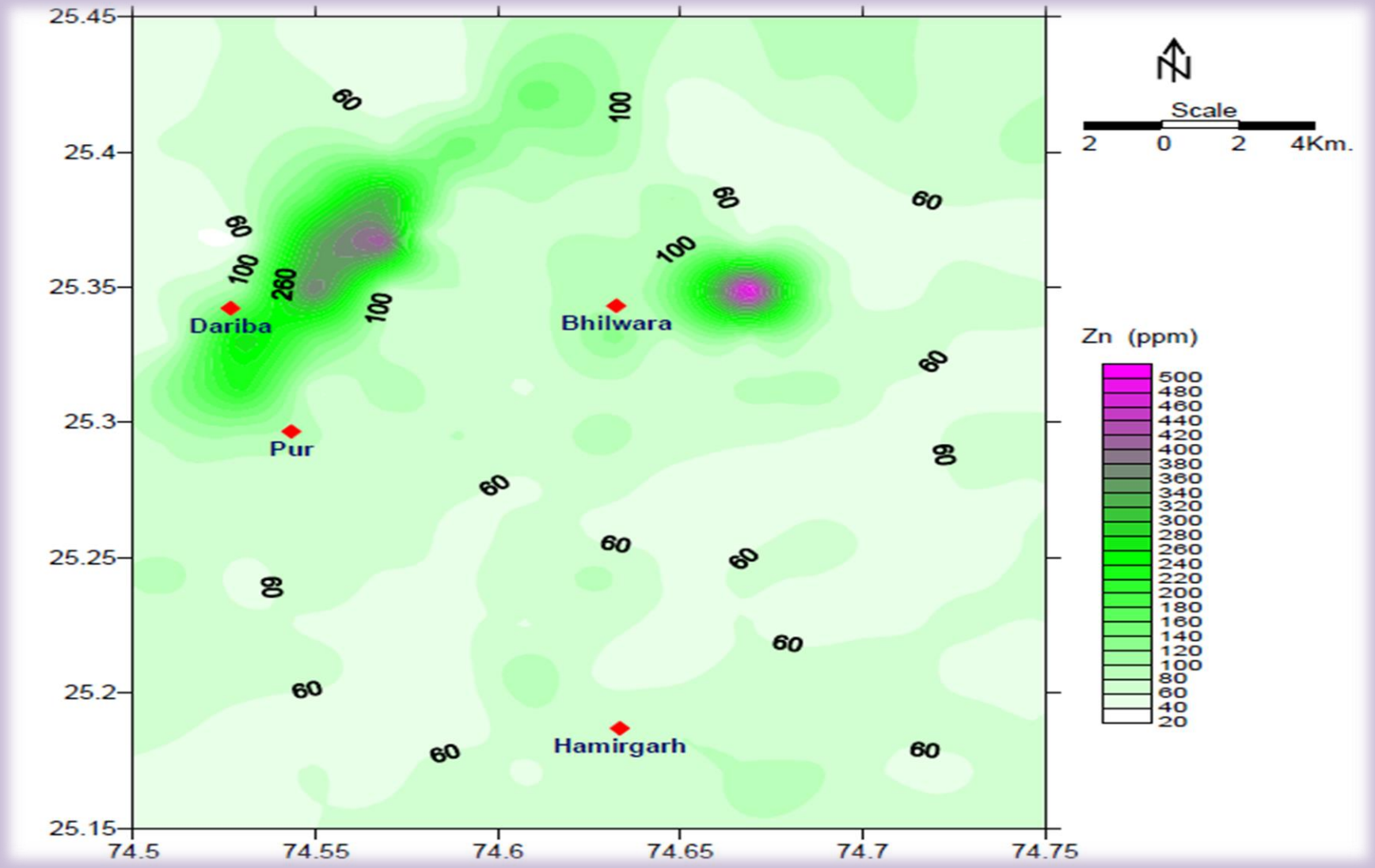
Toxic effluents allowed to percolate through the sandy bed



Distribution of Cr in the industrial belt of Bhilwara, Rajasthan(GSI report, 2014)



Distribution of Na2O in the industrial belt of Bhilwara, Rajasthan (GSI report 2014)



Distribution of Zn in the industrial belt of Bhilwara(GSI Report 2014)

- *Water in open wells have turned blue green in colour and water from hand pumps have smell and taste of chemicals(CSE report 2014)*

Polluted ground water is not anymore used by the industries itself due to its poor quality

Industries get water from outside city in tankers

HIGH PREVALENCE OF HEALTH ISSUES

- Gastroenterititis
- Stomach disorders
- Skin diseases

PALI

- Pali district is 70 km east of Jodhpur and on the bank of Bandi river
- 11,562 registered textile printing units in Pali
- Common effluent treatment plant of capacity 34.86 million liters a day is installed for treating alkaline effluent

- Due to changing market trends industries replaced cotton fabric with synthetic fabric Effluent thus become acidic in nature which could not be treated in the existing CEPT

- Untreated wastewater discharged in the seasonal river Bandi and Nehra dam with no flow in lean period

- Wastewater has contaminated groundwater along i adjacent banks of Bandi river up to 55 km downstream (CSE report 2014)

- Chloride, sulphate,dissolved soilds and heavy metals(lead,arsenic, chromium and nickle above permissible limits(CSE report 2014)

- Chloride ions ranged between 1027 to2020mg/l and fluoride ranged between 2.1-3.6 mg/l in bandi river

Water quality of wastewater from textile industry in Pali

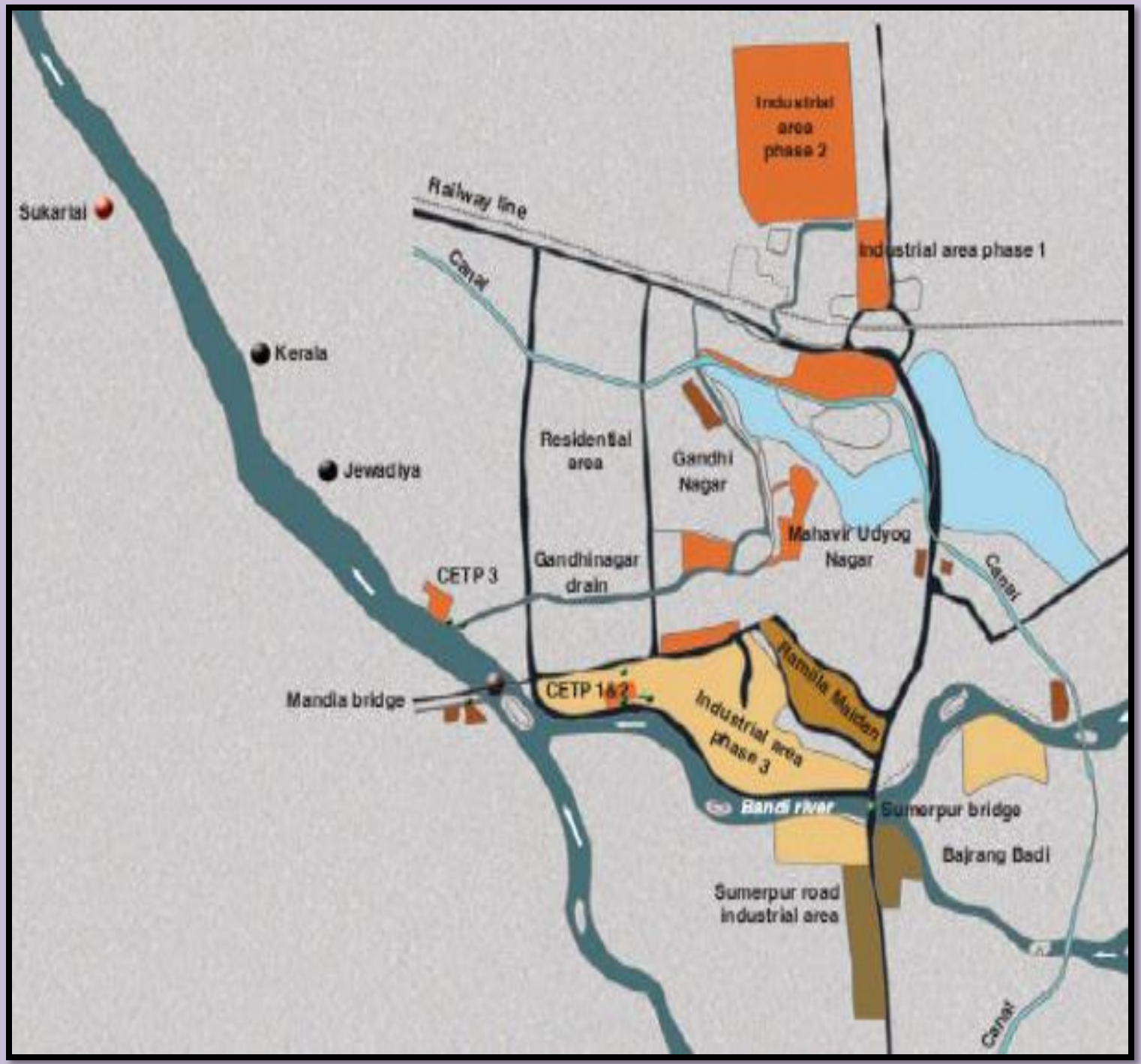
Parameters	Concentration
ECµS/cm	8210
BOD mg/l	28.4
COD mg/l	314
Cl^- mg/l	1507
NO_3^-	405
SO_4^{2-}	1540

Source: Rathore, J(2012)

Pali textile units have turned water toxic, unusable: CSE

Polluted *Bandi* River at Pali

“Poisonous water flowing in the Bandi river”


Industrial area phase 2
Railway line
Sukartal
Canal
Industrial area phase 1
Kerala
Residential area
Gandhi Nagar
Jewadiya
Mahavir Udyog Nagar
CETP 3
Gandhinagar drain
Canal
Ramala Maidan
Mandla bridge
CETP 1&2
Industrial area phase 3
Bandi river
Sumerpur bridge
Bajrang Badi
Sumerpur road industrial area
Canal

NEED OF THE HOUR

- Development of low cost effluent treatment plants
- Cost effective Technologies for use of natural dyes in textile printing industries
- Development of technologies for remediating the polluted surface and ground water

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THANK YOU