



# AN NGO FOR ENVIRONMENTAL EDUCATION, PROTECTION AND SECURITY

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# Wastewater: Environment, Livelihood & Health Impacts in Kanpur

## About Kanpur

- Kanpur is the 8th largest metropolis in India and largest and most important industrial town of Uttar Pradesh.
- Kanpur is sandwiched between River Ganga in the North and River Pandu in the South.
- The total area of Kanpur Nagar district is 1040 sq km
- The urban area had a population of 2.721 m persons in 2001.
- Estimated water production from all sources in 2002 was 502 mld, giving a per capita production of 140 lpcd
- Total wastewater generation is 395 mld

# KANPUR(Urban) Road Map



Map not to Scale

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**River Ganga (above) and River Pandu (below) are the recipients of roughly 300 mld of total wastewater generated in Kanpur**



# Wastewater irrigated areas in Kanpur

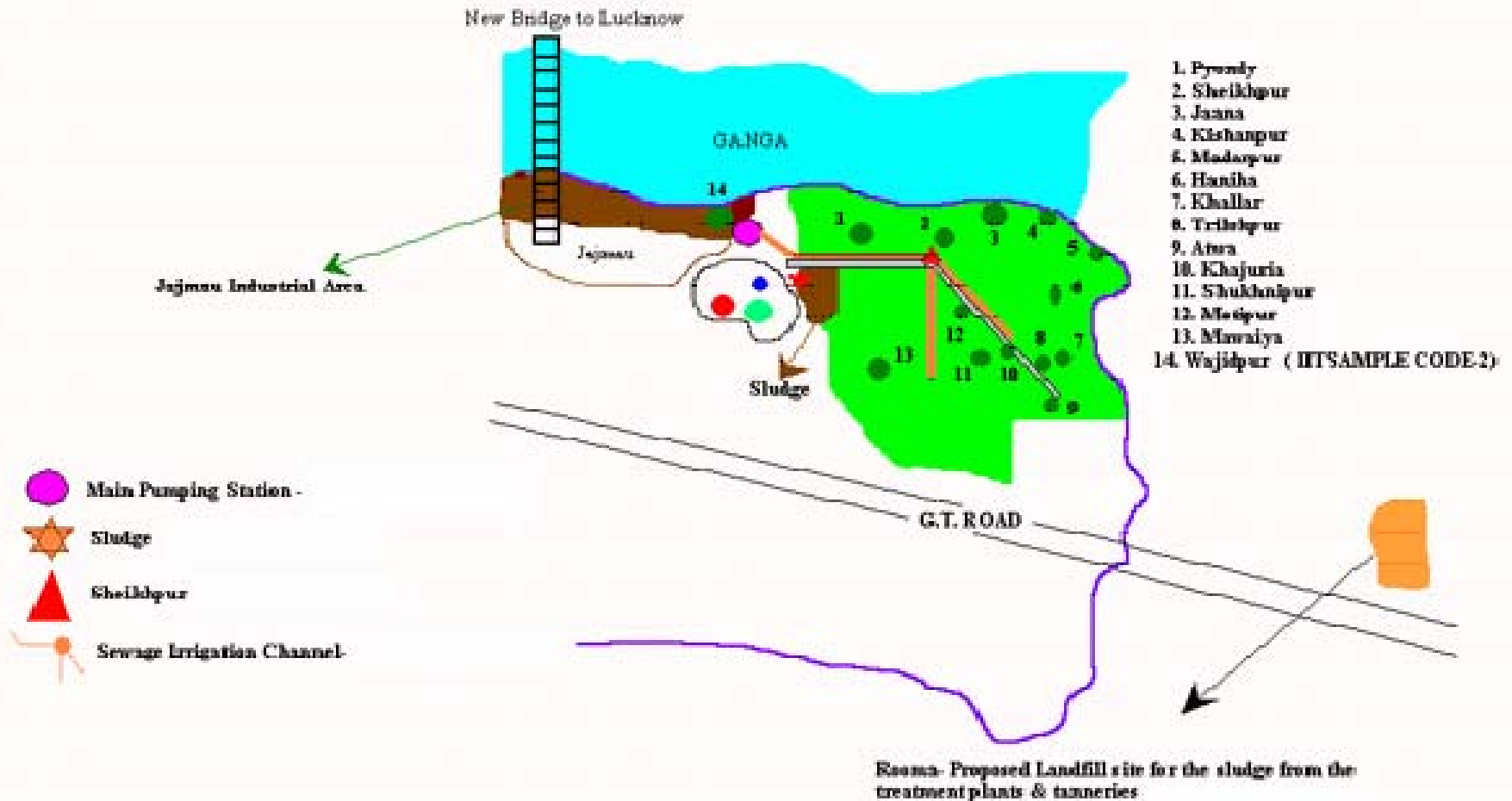
The present study area is in the northeast of Kanpur where wastewater farming is in existence since early nineteen fifties. The sewage-irrigated areas are in the east direction of Jajmau that hosts 380 highly polluting leather factories.

Surprisingly the exact area under wastewater irrigation is not known. Different government departments provide different data regarding the land area irrigated with wastewater.

There are 2770 farmers involved in wastewater agriculture. These farmers are doing agriculture on 2500 ha of land. Out of total number of farmers, 333 farmers (112 lessees + 211 encroachers) are practicing agriculture on 414.6 ha of land owned by KNN. KNN owns 511.58 ha of land in wastewater irrigated areas. There are 2447 individual farmers who are doing agriculture on 1988.42 ha of privately owned lands. Thus individual farmers have on average 0.81 ha of land holdings while lessees on an average have roughly 1.25 ha of land holding.

*\* Some of the farmers along river Pandu use the wastewater flowing in the river for irrigation purpose. Not much information is available about the wastewater irrigation along river Pandu*

# Schematic presentation of sewage irrigated areas, treatment plants etc.



Jajmau villages in the downstream of Ganga at Kanpur have been receiving city wastewater for irrigation since early fifties. Raw sewage was being diluted by the Ganga water and then supplied for irrigation till the launching of GAP. Kanpur Nagar Nigam (KNN) is responsible for supplying the wastewater and collecting irrigation charges. Under the new dispensation of GAP, the treated sewage is mixed with treated tannery effluent instead of Ganga water and then this wastewater is supplied for irrigation.



# Wastewater as irrigation water



# Profile of pollutants in sewage irrigation water and sludge generated from treatment plants.

SI No.	Parameter	Sludge, Jajmau (mg/L)	Sewage Irrigation Water (mg/L)
1.	pH	9.06	8.76
2.	Sodium	1.69	3.9
3.	Chloride	-	552.38
4.	<b>Sulphate</b>	-	<b>1138</b>
5.	Nitrate	-	43
6.	Alkalinity	-	486
7.	<b>BOD</b>	-	<b>196</b>
8.	COD	-	327
9.	<b>BHC</b>	-	<b>(<math>\alpha, \delta, \gamma</math>) - 2.069</b>
10.	Pentachlorophenol	-	Absent
11.	Phosphosphate	-	50.96
12.	Arsenic	0.33	0.25
13.	Lead	Absent	Absent
14.	<b>Cadmium</b>	<b>0.09</b>	<b>2.09</b>
15.	Zinc	0.68	Absent
16.	Mercury	Absent	0.09
17.	Nickel	Absent	0.94
18.	Copper	0.16	Absent
19.	<b>Chromium</b>	<b>60.40</b>	<b>0.15</b>
20.	<b>Chromium VI</b>	<b>46.6</b>	<b>80.87</b>
21.	Cobalt	0.05	0.05

**Source:  
ECO-FRIENDS  
– IIT TEST  
RESULTS,  
SEPTEMBER  
2002**

# Impacts

At Jajmau, Kanpur, the partially treated sewage irrigation water being supplied to the farmland has led to widespread contamination of food chains, sharp decline in productivity of food crops, soil, vegetables, livestock and even milk, and contamination of underground water. This has also resulted into severe health problems amongst the locals. The entire area with 20 villages and roughly 30,000 populations is in the tight grip of pollution.

# IMPACT ON AGRICULTURE

Deposition of fly ash in farmlands along river Pandu due to irrigation with river waters carrying fly-ash slurry



Burnt crop due to excessive wastewater irrigation

Chrome-6 content was found to be from 3.5 to 20.33 mg/g in the soil (Dr Padma S Vankar, IIT, Kanpur(2005))



# HEALTH IMPACTS

**Various kinds of skin problems (rashes, boils, papules, vesicles, eczema, ring worm, white spot, blisters, decay of nails, advance stages of leprosy, numbness of limbs).**

**Stomach ailments**

**Sexuality related problems & miscarriages**

**Dental problems**

**Mental retardation**

\* Cattle are also impacted







**Cattle drink this water and fall sick**



# Test results of ground water meant for drinking at Wajidpur, Sheikhpur villages at Jajmau :

S I N O .	Parameters (Heavy Metals/ Pesticides)	Wajidpur (mg/L) ***	Sheikhpur (mg/L)	WHO* Standards (mg/L)	No of times greater/less than WHO Standards for Wajidpur	No of times greater/less than WHO Standards for Sheikhpur	Selective Potential health impact from ingestion of water
1.	Arsenic	Absent	0.64	<b>0.01</b>	<b>NA**</b>	<b>64 Times</b>	<b>Skin damage or problems with circulatory systems and may have increased risk of cancer</b>
2.	Cadmium	1.56	Absent	<b>0.003</b>	<b>520 Times</b>	<b>NA</b>	<b>Kidney damage</b>
3.	Mercury	0.11	0.12	<b>0.001</b>	<b>110 Times</b>	<b>120 Times</b>	<b>Neurological toxicant</b>
4.	Nickel	1.45	0.01	<b>.05</b>	<b>72.5 Times</b>	<b>Below WHO Limits</b>	<b>Increased risk of cancer</b>
5.	ChromiumVI	39.52	37.57	<b>.05</b>	<b>790 Times</b>	<b>751 Times</b>	<b>Increased risk of cancer</b>
6.	Alpha, Beta, Gamma BHC	0.013 Micro grams /Litre (Beta BHC only)	1.69Micro grams/ Litre (Alpha, Beta, Gamma BHC)	<b>2 Micro grams/Litre</b>	<b>Below WHO Limits</b>	<b>Below WHO Limits</b>	<b>Liver or Kidney problems</b>
	Endosulphane	Absent	0.22 Micro grams/Litre	<b>Banned</b>	<b>NA</b>	<b>NA</b>	<b>Liver or Kidney problems</b>
	Dieldrin	Absent	0.78Micro grams/Litre	<b>.03 Micro grams/Litre</b>	<b>NA</b>	<b>26 Times</b>	<b>Liver or Kidney problems</b>
7.	Sulphate	1327	1573.6	<b>400****</b>	<b>3.3 Times</b>	<b>3.9 Times</b>	<b>Liver or Kidney problems</b>
8.	Nitrate	1200	6400	<b>50 (Acute)</b>	<b>24 Times</b>	<b>128 Times</b>	<b>Increased infant mortality (blue baby syndrome)</b>
9.	Chloride	1285.4	595.56	<b>1000***</b>	<b>1.28 Times</b>	<b>Below WHO limits</b>	<b>Liver or Kidney problems</b>

\*WHO: World Health Organisation

\*\*NA: Not Applicable

\*\*\* mg/L: Milligram Per Litre

\*\*\*\* Indian Standards

**Source: Eco-friends – IIT Test Results, September 2002**

- Land degradation due to excessive deposition of heavy metals
- 40 to 50% decline in crop yield
- Change in cropping pattern
- Decline in milk yield
- Presence of high levels of Chromium in agricultural produce and milk
- Frequent fish mortality
- Wastewater has created habitats for disease vectors

The cattle owners face difficulty in selling their milk because people are aware that the milk from Jajmau area is laced with Chromium. They also complain that the milk stinks, spoils and is yellowish in color.

Similarly farmers face difficulty in selling their agricultural produce like vegetables

The affected villages have become infamous and farmers face severe social problems. Outsiders don't want to marry in these villages.

## **Major issues:**

- 1. Should the irrigation water not be safe**
  - a) Do we have norms for safe irrigation water?**
  - b) Do we have any implementing / monitoring agency?**
- 2. With 20 years of GAP experience in Kanpur, is it sane to mix tannery waste water with sewage and use the same as irrigation water?**
- 3. Should the farmers be made to pay for the unsafe irrigation water or compensated for consuming it?**
- 4. Is it safe to use the wastewater for irrigation at all or should it, treated or untreated, simply be let into the river?**

## **Further issues of research**

- Proper documentation of wastewater irrigated land area
- Assessment of reliable clean water sources for the wastewater irrigated area
- Loss of biodiversity in the area
- Research needs to follow on creating awareness among the user groups about the occupational health risks, type of crops to be grown, methods for irrigation and probably methods of eliminating the risks associated.
- A detailed study on impact of wastewater irrigation on air because air is the fastest mean of dispersion of pollutants.
- A detailed study of wastewater impact on livestock

- A detailed study for the scope of aquaculture practice by using wastewater and its cost- benefit analysis.
- An epidemiological study to establish cause and effect in wastewater use area.
- A comprehensive health survey
- Cost-benefit analysis of wastewater reuse for irrigation
- Alternative crops most suited to wastewater irrigation and more remunerative to farmers

Thank you very much

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