

Assessing pollution from tannery effluents in a South Indian village

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· Introduction

The leather industry is an important foreign exchange earner for India. The states of Tamil Nadu, West Bengal and Uttar Pradesh together have 88 percent of the tannery units of the country. Tanners use a large number of chemicals during the process, discharging toxic wastes into the rivers and degrading agricultural land.

All of the 68 tanneries in Dindigul, Tamil Nadu, South India, are situated within a 5 km distance from the centre of the town. Several of them have been in existence for thirty to forty years. Effluents from the tanneries are discharged in to streams which drain into ponds, thereby polluting the ground water sources and cultivable land.

Pollution due to tannery effluents

A variety of chemicals are used in the tanning industries, including lime, sodium chloride, sodium carbonate, ammonium chloride, sulphuric acid, tannins and dyes. All tanneries need a large amount of water for processing leather and depend on ground water sources for their daily requirements. The discharged effluents from the processing units are stored in large lagoons and pollution occurs as the dissolved salts percolate into the surrounding soil. Thus, the ground water sources are exploited to their fullest potential and polluted to a great extent. A state of severe pollution results from the cluster of tanneries in close proximity to each other.

This study was carried out to assess the magnitude of the pollution problem in Kamatchipuram village, 5 kms away from

Dindigul town. PRA techniques were used in combination with well-established scientific water analysis techniques. The aim was to analyse and understand the toxic effects of tannery effluents on agriculture and the day-to-day life of people in Kamatchipuram village.

· Methods

As part of their outreach programme, the staff and students of the Department of Chemistry worked with the PRA Unit of the Gandhigram Rural Institute to conduct the in-depth study of the effects of pollution caused by tannery effluents. Together, the team from the Department and the PRA Unit made two visits to the village to explain the purpose of the study and to ask people to participate in it. It was during these visits that the team learned that an NGO, the Peace Trust, had been organising environmental awareness campaigns on pollution and its effects. The team decided to involve this NGO in the appraisal. Thus the final team for appraisal comprised chemists, environmentalists, social scientists and extension specialists.

Field exercises were conducted for three days in Kamatchipuram village. Social mapping was used to understand the social structure of the village and to know the families whose livelihood opportunities are linked to the tanning industry. While drawing the social map, a discussion evolved around the problems of polluted drinking and irrigation water. This led to the drawing of a resource map indicating clean and contaminated water sources, including ponds, wells, streams and boreholes. After drawing the map, people suggested that one could only understand the seriousness of the problem by observing it. This prompted us to go for a transect walk.

The occasion was also used to collect water samples for chemical analysis.

The other tools employed included a 'time line' to obtain a historical profile of the problem, 'trend change' to ascertain the effect of tannery effluents on the life of people, and 'focused group discussions' to have more insights into the problem and to find out possible solutions.

The findings of the appraisal on each day were presented in a plenary attended by villagers and the PRA team. This facilitated the cross-checking of information and also enabled issues, whether raised by villagers or the team, to be clarified. A plenary on the last day of the meeting was used to discuss possible solutions to the problems and the follow-up required.

• **Results of the appraisal**

Genesis of the problem

About 50 years ago, ten tanneries were started 5km away from the village. People did not feel the problem of effluents in the initial stages as tanning used natural materials, such as the bark of tamarind and Indian gooseberry trees. As the years passed, the number of tanneries in the Dindigul area increased and competition among the tanners intensified. This led to the introduction of chemical processing of hides. The tannery wastes containing these chemicals were emptied in to streams and open fields. Consequently, the land and the water in this region were contaminated.

The effect of tannery effluents

The tannery effluents have damaged the environment and affected people's livelihood opportunities. The effect of effluents on water, soil, employment and health are described below, as are the findings of the chemical analysis.

Water

Of the 56 wells located in Kamatchipuram, only 16 wells, those near the river, are uncontaminated (see Figure 1). The 16 'clean' wells cannot be used as drinking water sources

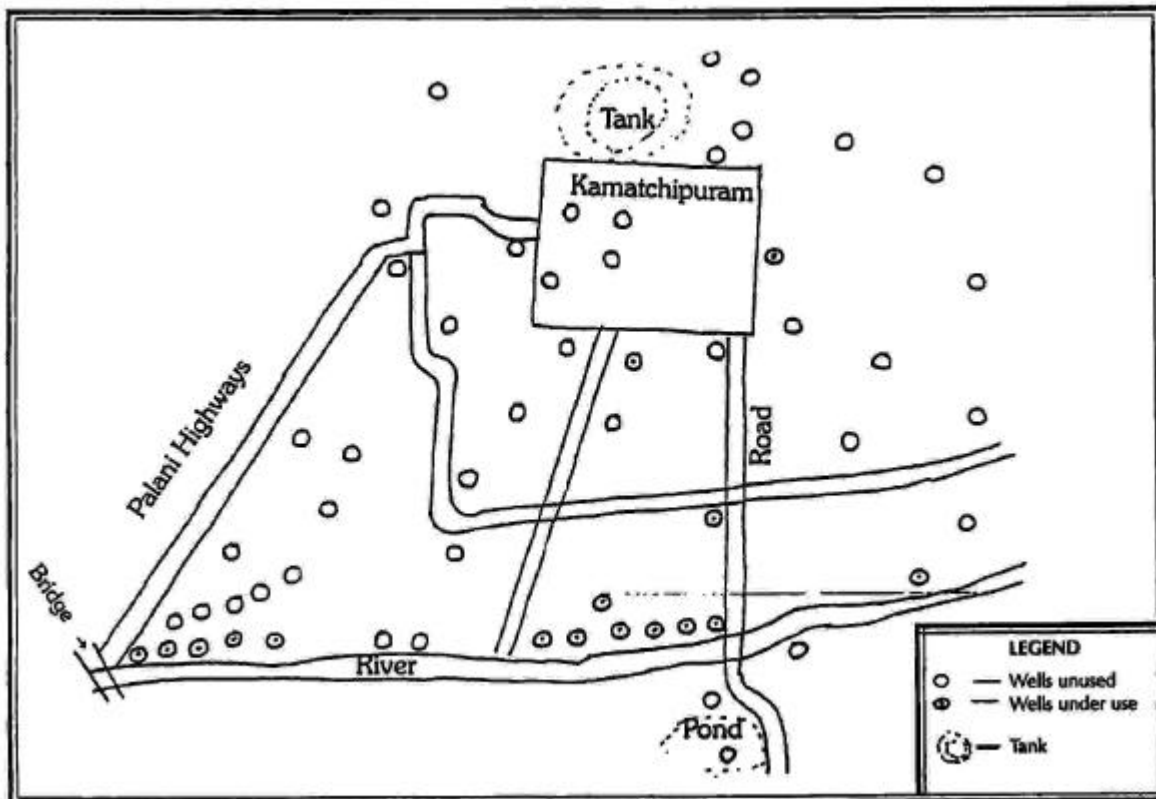
or for watering animals, but are used for irrigation. During the rainy season, farmers divert or pump water into the wells situated on the banks of the river and use it for irrigation purposes. In the non-rainy season, water in the wells is salty and cannot be used for irrigation. Our chemical analysis of the water showed that, in fact, it is neither fit for drinking nor for irrigation.

A public well in this village, which was once an important source of drinking water for the whole village is considered 'as a deep pit with poisonous water'. The village women have to walk two to three kilometres to fetch drinking water from less polluted areas.

Soil

Effluents containing toxic chemicals have seeped into the arable land. Food crops, such as paddy rice and sorghum, and cash crops, such as cotton, chillies, cereals and pulses, were cultivated in the past. But now, agriculture is in decline because of the effects of tannery effluents. Some of the farmers have shifted to coconut cultivation because of the water and soil pollution, but even the coconut trees showed stunted growth. A farmer with 1000 coconut trees in his land reported that the yield from all the trees put together is just enough to meet his domestic consumption. With the decline in productivity, the land value has also decreased. A local woman commented; 'you cannot equate two acres of land here with two acres of land elsewhere – its value is less here due to the toxicity in the soil'.

Figure 1. Water resource map of Kamatchipuram showing wells that can and can't be used by local people. Drawn by the people of the village



Employment

There has been a notable change in the occupations of people over a period of 25 years. There was a time when every family depended on agriculture; but now, only about 30 families, 16% of the village, pursue agricultural operations. The rest have shifted to non-agricultural pursuits, such as wood cutting, labouring in small and big industrial units, cart pulling, loading and unloading goods and charcoal making.

Health

The effluents have also affected the health of livestock and humans. When cattle drink the water drawn from local wells or feed themselves on the grass, they become sick. The humans are also prone to epidemic diseases, like cholera, jaundice and malaria. Summing up the problem, an old woman said

‘can you purify cancerous blood in the human body? This is the condition of the soil and water in this village, due to the effects of tannery effluents’.

Water analysis

The chemical analysis carried out in the laboratory reveals that the ground water has high saline content, high values for both biochemical oxygen demand and chemical oxygen demand. The agricultural land has been made unsuitable for crop production because of high saline deposits over the soil.

• Conclusion

The study offered a valuable opportunity of approaching a problem by combining methodologies and using PRA together with chemical analyses. The lessons we learnt are summarised below:

- Chemists normally study problems by conducting soil and water analyses, based on standardised procedures and established technologies. We realised the value of sitting, listening and learning from the people and blending the conventional analysis with a more participatory approach and methods. The exercise gave us an opportunity to understand the diverse nature of the problem of tannery effluents.
- Combining the results of the laboratory water analysis with the real situation of the village people helped us to jointly analyse the problem and draw conclusions with a high degree of reliability.
- This study showed that the knowledge of local people is considerable, up-to-date and provides a long term perspective. In this context, it should be of great relevance to decision-makers.
- This study offered an opportunity for physical scientists and social scientists to work together to tackle a serious environmental problem and learn from each others' approaches.

The exercise has highlighted the importance of the local analysis of a problem. We are reminded of the words of Mahatma Gandhi; 'your laboratories are devil's workshops unless they serve the rural poor'.

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