

Expectations of farmers from research and extension personnel and prescriptive model to overcome the pollution effects

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ABSTRACT

The study was conducted in Tiruppur and Erode districts of Tamil Nadu. From each district one block and from each block three revenue villages were selected. The respondents were categorized into affected and unaffected farmers based on their proximity to Noyyal river as well as well water quality parameters. A sample of 90 (affected and not affected) farmers was considered for the study. The data revealed that farmers from affected area expected more research on soil and water reclamation process to overcome dyeing industrial effluents that ranked at first position among the ten statements. Most of the farmers expected sustainable farming technologies to continue agriculture in Noyyal river basin followed by need of financial assistance from the banks to cultivate commercial and tree crops at their farm. Some of the farmers expected that scientists and extension workers should make periodical visits to their farms. Some of the farmers expected compensation from government to bear their agriculture losses. An action model is suggested based on the implications drawn out of the results to the researchers, extension workers, Tamil Nadu Pollution Control Board and Government of Tamil Nadu to take actions based on the recommendations so that the affected farmers could be benefitted.

Keywords: Dyeing pollution; expectations; farmers, pollution effects

INTRODUCTION

In recent times many of the south Asian countries are experiencing severe environmental problems due to rapid industrialization. It is very common in areas where the polluting industries viz textile dyeing, leather tanning, pulp and paper processing and sugar manufacturing are located. The effluents discharged by

these industries have led to severe pollution in groundwater sources and soil ultimately affecting the livelihood of the poor. Industrial units in general function at small/medium scale with high employment generation and foreign exchange potential. But the pollution control mechanisms enforced by these units are extremely weak (Nelliyat 2007).

Though pollution is a long recurring phenomenon the severity has become a critical issue during the recent decades both to the producers and policy makers. Environmental pollution is increasing due to more urbanization and industrialization. The disposal of industrial waste and industrial effluents is becoming a major problem. Pollution is any undesirable change in the physical, chemical or biological characteristics of air, water or land. UN has estimated that the amount of waste water produced annually is about 1500 km³ ie six times more water than that exists in all rivers of the world (Anon 2006).

Pollution is not simply a national level problem but an international one faced by developed and developing countries. Water, soil and atmospheric pollution has increased alarmingly at the global level. The textile industry being one of the major foreign exchange earners plays an important role in the economy of a country. About 70 per cent of pollution in textile industry comes from the wet processing activity. It is one among the 17 most polluting industries in India (Anon 2010). There are about 12500 garment manufacturers and 2100 bleaching and dyeing industries in India (Rameshkumar 2012). Majority of them are concentrated in the states of Tamil Nadu, Punjab and Gujarat (Eswaramoorthi et al 2004).

In Tiruppur around 727 units are engaged in dyeing and bleaching operations.

These units are water intensive and generate a large quantity of wastewater. Typical water consumption in Tiruppur is around 200 to 400 l/kg of finished product compared to the international norm of 120 to 140 l/kg. Around 281 small and medium scale textile units are connected to common effluent treatment plants (CETPs) and the remaining units either have individual effluent treatment plants or discharge directly into Noyyal river. The rapid growth of textile units in the last two decades in Tiruppur has led to the depletion of groundwater resources and serious deterioration in environmental quality of both surface and groundwater in the area (Nelliyat 2007).

The effluent released by dyeing industries causes adverse effects on soil properties and seed germination and also causes reduction in the growth of seedlings. The negative externalities of industries would lead to loss in crop area, production changes in cropping pattern, health problems and socio-economic imbalance in the affected regions. The dyeing industrial pollution might cause labour migration, unemployment or change in employment pattern and decrease in share of farm income to the total household income. Furn (2004) reported that the majority of the farmers in Noyyal river basin have shifted their cropping pattern from food crops to fodder crops due to pollution. According to the survey conducted by Tamil Nadu Agricultural University nearly 35000 hectares of agricultural land in the

bleaching and dyeing units' belt had turned out partially or totally unfit for cultivation (Srinivasan et al 2014).

Thus industrial pollution has adversely affected the livelihood of the people. There are 600000 people in upstream and around 800000 in downstream of river affected by dyeing industrial pollution (Jayanth Sarathi et al 2011).

In Tamil Nadu four districts are having major dyeing industries viz Coimbatore, Erode, Tiruppur and Karur. It affected the water sources, land, human and livestock in these four districts. Among these Erode and Tiruppur have maximum number of dyeing industries. This article concentrates mainly on expectations of farmers from research and extension personnel to overcome dyeing industrial effluents.

The study will provide a base for researchers in environmental extension to standardise and popularise eco-friendly agricultural practices to cope up with the polluted environment. This is also expected to suggest guidelines for the enforcing authorities to control the problems due to dyeing industrial effluents on agriculture in specific and on environment in broader sense. An action model suggested would help the betterment of affected farmers in the study region to overcome dyeing industrial pollution.

METHODOLOGY

Garrett's ranking technique was adopted to find out the expectations of farmers from research and extension scientists to overcome the dyeing industrial pollution effects.

Garrett and Woodworth (1973) have elucidated a scoring procedure for converting the ranks into scores when the number of items are ranked and it differed from respondent to respondent. The conversion method used is as follows:

As a first step the per cent position of each rank was found out by the following formula:

$$\text{Position (\%)} = \frac{100 (R_{ij} - 0.5)}{N_j}$$

where R_{ij} = Rank given for i^{th} item by the j^{th} individual, N_j = Number of items ranked by j^{th} individual

The per cent position of each rank thus obtained was then converted into scores by referring to the table given by Garrett and Woodworth (1973). The respondents were requested to rank the constraints relevant to them according to the degree of importance. The ranks given by each of the respondents were converted into scores. For each constraint the scores of individual respondents were added

together and divided by the total number of respondents. These mean scores for all the constraints were arranged in the descending order and ranks were given. By this method the accuracy in determining the expectation was obtained.

RESULTS and DISCUSSION

Expectations of farmers from research and extension personnel to overcome pollution effects

The results of Garrett rank value and the overall rank are given in Table 1.

Data reveal that farmers from affected area expected more research on soil and water reclamation process to overcome dyeing industrial effluents that was ranked first among the ten statements. Most of the farmers expected sustainable farming technologies to continue agriculture in Noyyal river basin followed by need of financial assistance from the banks to cultivate commercial and tree crops at their farms. Some of the farmers expected that scientists and extension workers should make periodical visits to their farms and some expected compensation from government to bear their agricultural losses. Farmers in the affected areas had already received compensation from the government but they felt that it could not meet out their loss. Farmers also expected subsidies from government and needed special care to continue profitable farming at their respective places. The results of

adoption of pollution management practices revealed that most of the farmers were not aware about the water conservation practices. Hence some expected that agriculture departments should make them aware of water conservation practices followed by making them aware of organic farming and eco-friendly technologies to do sustainable agriculture.

Prescriptive model for betterment of affected farmers through holistic model for overcoming pollution effects (HOPE) in Noyyal river basin

This prescriptive model named HOPE is constructed based on the contents derived from the field experiences and major research outcomes of this study. The outcomes of the results based on thorough investigation led to a number of significant conclusions. The conclusions derived from this study can be recommended to the state and central government, Pollution Control Board researchers, extension and non-government organizations to solve the complex problems posed to agriculture and environment along the Noyyal river polluted dyeing effluent.

Water pollution policy: Water pollution policies are necessary to restrict the release of dyeing industrial effluents into the water resources thereby to manage and control the water pollution. Central and state governments should create policies that are easier to be implemented and understood by public. Government should encourage

Table 1. Expectations of farmers from research and extension personnel (n=90)

Statement	Rank										Total score	Average score	Rank
	I	II	III	IV	V	VI	VII	VIII	IX	X			
More research needed on soil and water reclamation process	13	3	3	8	27	2	2	16	4	12	7380	82.00	I
Need low cost sustainable technologies	4	1	3	4	3	16	14	12	15	18	6148	68.31	II
Need financial assistance from bank to cultivate crops	8	10	40	3	4	8	3	10	3	1	5512	61.24	III
Need to evolve pollution tolerant varieties	3	3	3	4	19	13	11	14	11	9	5233	58.14	IV
Scientists should visit farmers' fields periodically	2	4	17	1	3	3	26	13	12	9	5068	56.31	V
Expect compensation from government	3	3	2	2	4	36	6	3	12	19	4421	49.12	VI
Expect subsidies from government to continue agriculture	38	21	7	8	3	3	3	3	3	2	3943	43.81	VII
Create awareness about water conservation practices	3	2	2	3	7	2	19	12	26	14	3684	40.93	VIII
Need more trainings related to organic farming	6	35	10	21	4	4	2	4	2	2	3522	39.13	IX
Formulation of contingency plans to save the crop	10	8	3	36	16	3	4	3	3	4	3382	37.58	X

active participation of the local community, the private sector and the stakeholders in the process of implementation of water pollution policy; it should be a collective responsibility for better implementation and management.

Awareness and sensitization: The government, civil organizations, private sector and Ministry of Environment and Forests should sensitize the public about water pollution policy on better management system. Public awareness should be done through the mass media.

Training and education: The people should be educated to understand what water pollution is and what effects it may cause and also how to implement the existing water pollution policies in an efficient manner. The local staff at all levels of the government should be given training to help them in the process of water pollution management. Environmental education should be incorporated into the school curriculum at all levels in order to build a generation of environmentally conscious citizens.

Monitoring: The Tamil Nadu Pollution Control Board (TNPCB) may periodically publish the results of the analysis of effluent samples taken from the industries along with permissible levels so as to bring in accountability and create public awareness. Quality monitoring of water resources, point and non-point sources of pollution on a continuous basis may be entrusted to

research institutions like universities, colleges etc for reporting back to government for remedial measures and designing conservation compliance programmes.

Cleaner production: The standards should be framed for the industries by the Ministry of Commerce and Industry Commission for the production methods, effluent release and waste disposal with periodic monitoring. The operating industries can be provided subsidies for clean and eco-friendly production. All the industries should be encouraged to use technologies and equipments which have less impact on the environment. The Ministry of Commerce and Industry Commission should promote the cleaner production policies. The operating industries should be given a condition of market economy; all the industries should promote new technologies and new equipments that have less impact on the environment.

Policy advocacy and governance: There should be strict laws that combat corruption in the water sector especially in the Noyyal river basin where there is an ineffective implementation of pollution prevention policies. Policy formulation and decision making for water pollution prevention should be clear and transparent for the public. The industries releasing the effluent and their wastes into the water sources should be strictly monitored. The identified polluters should be made to bear the cost of the ill-effects caused by the pollution and

also for recycling of polluted water. Polluter pays principle may be advocated based on the quality and quantity of pollutants released in the environment and green tax may be introduced effectively.

Financial resources: The government should allocate enough financial resources in water pollution sectors. The government, donors, NGOs, local and international private sectors and water user associations should work in collaboration with one another to improve the utilization of funds. The government should increase their powers and budget for environmental enforcements.

Legal reforms: Provision of legal procedures is of great concern in minimizing the level of pollution. Water pollution should be made a punishable offence. Dyeing units should be established only with proper effluent treatment plant system and with all license certificates required by fulfilling all conditions of Department of Environment (DoE) to ensure environmental preservation. The relevant authority from Ministry of Environment should be strict in providing license and periodic monitoring has to be effected.

Technology: Reverse osmosis has been identified as a technologically suitable option for treating textile industry effluent from large and medium units. Large units should have invested in individual ETPs and medium scale units should have invested in CETPs.

Each technology which is applied should be specifically adapted to the people's socio-cultural background.

CONCLUSION

From this study it is clearly noted that the farming community was drastically affected by the dyeing industrial effluents in Tiruppur and Erode districts. An action model was suggested based on the implications drawn out of the results to the researchers, extension workers, Tamil Nadu Pollution Control Board and government of Tamil Nadu to take actions based on the recommendations so that the affected farmers could be benefitted.

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