Summary


9.0 SUMMARY

Studies on drinking water quality, especially of ground and pond water at panchayat level are rare in Kerala. Therefore, the present study was attempted in Chirayinkeezhu grama panchayat of Thiruvananthapuram district in Kerala.

The major objectives of the study were:

(1) To make a qualitative analysis of water sources of Chirayinkeezhu panchayat viz., selected dugwells, ponds, river and taps (2) to find out the suitability of river and pond for primary productivity (3) to understand the water related issues faced by the residents and (4) to suggest suitable recommendations to solve the water crisis of the panchayat.

For laboratory examination of water samples, fifteen sites were selected including wells, ponds, river and taps of the panchayat. Water samples were collected monthly from the sites during November 2003 to October 2004. Samples were analyzed for various physico-chemical and bacteriological parameters following standard methods. The physico-chemical parameters studied for water quality analysis included Temperature, Turbidity, Conductivity, Chloride, Total solids, Total dissolved solids, Nitrate, Nitrite, Phosphate, Silicate, pH, Dissolved oxygen, Total hardness, Calcium hardness, Magnesium hardness, Iron, Sodium, Potassium, and Biological oxygen demand.

Primary productivity was studied seasonally (pre monsoon, monsoon and post monsoon) during November 2003 and October 2004 in six stations following dark & light bottle experiment. The six stations were Vamanapuram river (R1, R2, R3 and R4) and Ponds (P1 & P2). The estimation of coliforms was done following Membrane filtration technique. The survey on water quality status was conducted during October to November 2004 in Chirayinkeezhu grama panchayat.
Water quality

Based on annual mean values, it was derived that water of all wells was potable or drinkable. However, since the mean pH of W2 and W7 was below 6.5, water treatment of these wells is recommended to elevate pH. A larger number of positive and negative correlations of water quality parameters were noted for both seasons than those obtained monthwise.

Based on water characteristics, it was noted that the ponds could be used either as domestic water source or as pisciculture ponds. However, decontamination should be undertaken prior to domestic use in view of the high occurrence of coliforms in the water. Correlation analysis of monthwise and seasonwise data of water quality parameters of ponds revealed matrices which differed one from the other during the same period of observation.

Analytical results of water of Vamanapuram river indicated that water was generally good except for the slightly higher turbidity noticed. The correlation matrix of water parameters of river during rainy and non-rainy season showed a good number of correlations. The number of significant positive and negative correlations obtained seasonwise was, however, much higher than yearwise number of correlations. The study indicated that all the parameters were within the desirable limit of BIS except turbidity and coliforms and that the river was free from chemical contamination.

Tap water consisted of characteristics quite suitable for drinking purpose, although iron content was slightly higher than desirable limit during rainy months. Coliforms were not detected in the tap water samples studied. The correlation matrix of water parameters of public taps during rainy and non-rainy season showed a number of significant positive and negative correlations. Seasonal
correlations were much higher than the correlations obtained for the whole year 2003-2004.

Bacteriological study indicated that all water sources except tap water were contaminated, as indicated by the high count of faecal coliforms beyond the limit set by BIS (1991) for drinking water. It was inferred then that the water distributed in pipelines in Chirayinkeezhu panchayat was of good quality as per BIS (1991). It was free from coliform bacteria.

Seasonal variation

In dugwell, pond, Vamanapuram river and tap water the following significant variations were noticed during the rainy season: (1) in dugwells statistically significant decrease in temperature and nitrate as well as significant increase in pH, total hardness, calcium hardness and iron (2) in ponds statistically significant decrease in temperature, conductivity and silicate as well as statistically significant increase in calcium hardness and iron. (3) In river statistically significant decrease in potassium, magnesium hardness, DO and nitrate as well as significant increase in turbidity, conductivity, chloride, total solids, calcium hardness and iron. (4) in tap water statistically significant decrease in temperature, nitrite, and total hardness as well as significant increase in turbidity, chloride and iron. In short, significant decrease in temperature and significant increase in iron during rainy season were common to all the four water sources. In addition, significant increase in calcium hardness was noticed with respect to dugwell, pond and river but not to tap water during rainy season. It was concluded from the study that seasonal variations in water characteristics were not similar for all water sources except with respect to temperature and iron. It implied that besides rain, several other factors might interact to produce changes in water quality. Therefore, appropriate treatment technologies seasonwise are needed.
Survey on water status among households

The survey revealed that most (84%) of the people in the panchayat used well water for drinking, cooking, and bathing purposes. It was also observed that 63% of households consumed 500 litres per day and the consumption of water by females was greater than males. The per capita per day consumption was 101 litres. Most of the households (62%) who participated in the survey reported that well water was good, and that 80% of people faced water scarcity during summer season because of the lowering of water table in their wells. About 88% of the people reported that the water supplied to them through pipe line was safe, but 73% of the people used only boiled water for drinking. Water borne diseases, especially diarrhoea were, however, reported from majority of the households.

It was concluded from the study that the best solution to drinking water scarcity of the panchayat was to augment the pipe water supply schemes of Vamanapuram river. Detailed recommendations are thus given for improving the water quality and for solving scarcity.