

RURAL WATER SUPPLY AND DRAINAGE

Water supply and Sanitary Drainage is to be provided in the rural areas. Measure to provide these services vary with methods this in turn governs the cost. Cost variation can be from a low of 10% to a high of 1000% of urban costs new prevalent. The cost criteria vary. These can be indigenous technologies or advance imported technologies. The quality of system and life expectancy of the systems will equally be variable. Where it is cheap, life may be 5-10 years and in case of costly technologies a life of 40 years or more can easily be achievable. Maintenance costs too vary. The decision to adopt a technology depends on these, so many variables.

On one hand government would like to expand the services to larger areas, from the existing funds as cheaply as possible, on other hand government would also like to pay the minimum running and maintenance costs.

Technologies are also dependent on existing environments. For example there are areas having fresh ground water. Water supply from tube wells may be practical but rural population may not be adequate to justify cost of a tube well which is economical only t high discharge and longer pumping hours. In some areas rural population maybe adequate to justify tube well installation, but fresh water may not be available.

There again may be areas, having sweet water in a shallow depth only. Dug wells may be an answer to these situations. Dug well is indigenous technology. It can be made sanitary by a covering the top and pumping mechanically. Area around it is to be kept impermeable for polluted water to seep back. It is a task easily achievable by proper education.

In general if adequate measures are taken no filtration and no chlorination may be needed in case of dug wells and tube wells. In villages with population of less than 500 people needing 20,000 gallons of water per day for domestic use and about the same amount i.e., 40,000 gallons per day is needed for cattle. This is a large quantum of water for a dug well and two or three wells may be needed pumping for 10 hour a day. On other hand one tube well can supply twice this water in 6 hours.

Cost is another criteria. We have to know cost of wells, pumping and distribution equipment and select the most economical source.

Sanitation measures mean disposal of human and cattle excreta and wastes and also kitchen waste disposal. There is need for proper study of most hygienic methods of disposal at economical costs and also alternative uses of by-products of this disposal. They probably can have some application in rural economy.

No such study has yet been conducted.

It is proposed to make a study of alternative methods and costs, before executing the plans. It is proposed to appoint consultants to carry out this study. The scope of work shall be as under:

a) **Water Supply.**

1. From the existing data of rural population grouped as; less than 100, 100-199, 200-400, 500-999, 1000-1999, 2000-3999, 4000-4999 and above 5000 as given in Appendix-I, work out water supply requirements, taking into account the average domesticated animals in each of such settlements.
2. Assuming that 60% of rural area needs water supply and 15% needs sanitation, work out the most economical source of water supply, the equipment needed, life expectancy of installation, operational and maintenance costs of equipment, capacity of such sources, cost for each category of settlements, the most economical methods of water distribution, proper arrangement for watering cattle and techniques for maintenance water supply free of pollution, suspended impurities, bacteria, and disease carrying insects and nitrites and nitrates.
3. Where-ever fresh ground water is available either in shallow or deep layers, study is to be done to find out most economical methods of exploiting them by dug and lined wells, skimming wells, tube wells, deep hand or power reciprocating pumps, taking care in each case, that civil works so carried out, shall ensure sanitary conditions of water supply.
4. Suggest civil structures to achieve objectives laid down under number 2 and 3 above.
5. To give general recommendation for location of wells.
6. In case fresh water is not available, suggest sources of water from the existing canal systems, after proper filtration and chlorination, to make the disease and dirt free and fit for use of cattle and animals.

7. Based on use of international standards for water quality for cattle and humans to find out water supply sources for cattle and human separately, in areas of brackish water, so that cost on water supply is reduced without ill effects on cattle health.
8. In case of Kohistan and Thar desert find out sources of perennial water i.e., springs and perennial streams, which provide reasonable and assured quantities of water for settlements nearby. Water of such sources may be examined for its quality and fitness for human and cattle use.
9. In case of Kohistan besides springs, suggest sweet water locations, near each of major settlements, suggest most economical method for development of this water for human and cattle use.
10. In case of Thar and Kohistan if sweet water is not available, suggest ground water sources or surface water for storage near large settlements.
11. In case of water storage for settlements suggest methods so that annual evaporation loss (more than 100 inches water column) is reduced to negligible, seepage is reduced and hygienic condition of water is unaffected by algae population, caused by birds, wild animals, domestic animals, and human specially while washing clothes and bathing.
12. Suggest suitable methods of taking out water, from stage tanks to ensure hygienic conditions.
13. Suggest suitable methods of pumping out water from wells or storage tanks in case of Thar and Kohistan keeping in view the use of wind power or other renewable source of energy.
14. In case of irrigated areas, suggested areas suitable for wind power pumping so that this cheap source is used for pumping water from wells and storage tanks.
15. Suggest general but most economical methods for storage of water.
16. Suggest general methods for water supply tank for use of cattle, with provision that no excess water is allowed to flow out of the watering tanks and is wasted.

17. Suggest general methods for periodic check-up and cleanup of systems.
18. Suggest organisational set up for maintaining the rural water supply system.

b) Sanitation.

In case of rural Sanitation suggest:-

1. The cheapest and fool proof methods of disposal of human wastes excreta so as not to cause any odours, spread diseases, contaminate ground water, cause in convenience to neighbours or need costly periodic check-up or clean up.
2. Suggest best and cheapest methods for installation of system in every village.
3. Suggest best cheapest methods for storage of water for domestic use.
4. Suggest cheapest and easiest methods for disposal kitchen wastes.
5. Suggest best, cheapest and practical methods for disposal of cattle wastes, animal feed wastes, slaughter house wastes, to improve sanitation conditions, make a better and financially rewarding use of these wastes, finding out impact of such method, and suggest practical methods of carrying this out, in a manner, most acceptable, within socially acceptable.

c) General.

1. Give detailed report on (a) item 1 to 17 and (b) item 1 to 5.
2. To provide designs, drawings, cost estimates for water supply. Sanitation measures in the rural areas, suggest, equipment to needed for the purpose.