Simple Solutions Yield Big Results

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ABSTRACT

Recurring droughts is a regular feature and this year almost 50% area of the state i.e. the rain shadow zone of Maharashtra, India is subjected to severe famine like situation. The rainfall this year was around 50% of average. There is an acute shortage of drinking water and no fodder for the livestock. The area under horticultural plants is depleting fast. There is no water for the wild animals and birds too. Life has become difficult.

It would be unwise to put the entire blame of water scarcity on nature. The excessive extraction of groundwater through the deep bore wells for sustenance of sugarcane on almost 10 lac hectare under flood irrigation in drought prone area has pushed groundwater levels down. Farmers cultivate a crop which has an assured market. The flaw is with the policy makers who promote the water intensive agro-based processing industries in the water short areas. The agro based processing industries open marketing facilities for the primary produce from the agriculture. Sugar industry in a water scarce area is a market for the water intensive crop i.e. sugarcane. This is the paradox. The sufferers are common people and the innocent animals. There has to be a policy for a crop planning at state level. Water intensive crops could be grown on large scale in water surplus regions of the state. The productivity is related to the optimum use of water and same is governed by use of modern irrigation system.

There are few green areas who show pathways to overcome the drought cycles on a sustainable basis. A village by name 'Kadwanchi' from District Jalna located in the middle of the rain shadow terrain, was seen with comfortable living even with the scant rainfall of 198 mm. During earlier year also the rainfall was around 300 mm. The village has a population around 2500 and cultivable land of course textured nature not more than 1300 hectare. With the support of NABARD and 'Krushi Vidyan Kendra' the watershed was treated with soil and water conservation measures effectively. This activity enabled them to raise horticultural crops and vegetables on around 250 hectares with modern irrigation method. The gross produce rose almost to Rs. 150 million. Rainfed crops like cotton, soybean etc. could not be grown in kharif season due to low soil moisture. Horticultural plants were grown on drip technology. Every farmer possesses open well fitted with 3 to 5 HP pump and 50% of them

have farm ponds. They use shade-nets to grow vegetables. Most of the families shifted to farm houses. The acute shortage of water compelled them to adopt deficit irrigation to straw mulched area with 5 liter per plant per day.

Out of 300 families, 31 families supplemented household bathroom wastewater to grapes and pomegranates. The treatment given was dilution with fresh water to bring down the quality parameters to acceptable results. The wastewater was collected in a small polythene lined farm-pond and each family irrigated around 60 plants. The gross income fetched from 1000 liters of wastewater was around Rs.1200/- from grapes and 3000/- from pomegranate. A simple technology of reuse of household wastewater has given exemplary results in improving water use efficiency. The harmful effects of polluted water to the environment otherwise were also nullified. This is a very welcome change in wastewater management practices in rural areas. This can be replicated elsewhere too. During my visit I was made known that within a year 100% families will be covered under recycling technology. The creative rural mind needs admiration and recognition.

INTRODUCTION :

India needs to produce more without depleting its natural resources any further. Touching the daily life of about 600-700 million people comprising nearly 120-140 million farming families - the men and women feeding the nation – agriculture continues to be the life thread of the nation. A substantial part of agricultural growth could come through the application of new technology and new knowledge to production processes. There is a high dependence of majority of our people on agriculture for the livelihood security. Agriculture-led economic growth is central to inclusive and accelerated growth in the country. Therefore, if agriculture fails everything else will fail. During the green revolution era from mid 1960 to mid 1990s an unprecedented agrarian transformation occurred and the food production and productivity increased reducing the intensity of hunger and poverty. The problem of mass hunger, starvation and food shortages is ascribed primarily to the high and increasing population pressure, 16 million added annually to 1.2 billion and to the distributional and economic access situation.

India today, has about 17% of the world's human and 11% live stock population and against this, it has only 4.2% of world's fresh water and 2.4% of world's land area. Of the total 141 million hectare cultivated area, about 65 million ha. is irrigated by means of surface and sub-surface waters and it gives an average cropping intensity around 138%. Around 52% of the country's workforce is in agriculture. With the ever increasing demand for food and primary production, the nation will have to produce more and more from less and less of the finite natural resources base. Sustainable harnessing of water resources and enhanced use of water efficiency

are fundamental to increased production. India annually receives nearly 1200 mm of rainfall although widely vary from region to region. If properly managed, it could sustain the desired production level. The use of groundwater is to be regulated to avert drying up of rivers and contamination with toxic substances underground. More thrust needs to be given on increasing the groundwater recharge. There is a dire need to treat the waste water generated by domestic and industrial areas and reuse the same for agriculture, industries and other non drinkable purposes.

The rapid growth of population and the industrial complexes around the urban centers has given rise to generation of wastewater on a large scale. The cities and also the rural areas consume fresh water, generate waste water and pollute the adjoining streams and rivers by discharging the untreated sewage exorbitantly. This is also true for industrial areas. Nearly 80% of the sewage generated in India flows untreated in to the rivers, lakes, ponds, turning the water sources polluted to use. The groundwater in almost the entire country has nitrate levels higher than the prescribed levels as a result of sewage leaching in to groundwater aquifers. Indian cities produce nearly 40000 million liters of sewage per day which is enough to irrigate around 9 million hectares seasonal crops on modern irrigation method. 20% of this is not treated as of today. The untreated waste water is seeping into water sources thereby creating a ticking health bomb amongst our people. Almost half of the urban and 90% of the rural population still depends upon groundwater sources for drinking, cooking and bathing which puts them at direct risk from the polluted water. The situation is getting worse to worst as the country urbanizes. The lack of focus on water – sewage systems has led to a position where not a single city in the country has a sewage system that cover the entire population. The situation in villages is equally bad. In most cities the sewage simply mixes in to the open drains and storm water drains and pollutes water sources.

Unfortunately very little investment has been made on sewage treatment facilities, drinking water supplies often received more priority than waste water collection and treatment. There is a growing conflict between agricultural and non agricultural (domestic + industrial) waters. In cities like Pune and Nashik almost 75% of the storages are being consumed for non irrigation purposes without treating the waste water generated which is around 80%. This has reduced the availability of water for irrigation in the rural areas downstream and cut down the production of food grains sizably. There has been an acute unrest amongst the farmers as this is a question of their livelihood. The situation might go beyond the control and there will be a permanent social rift between the rural and urban sectors. This needs to be averted. Innovative and appropriate technologies can contribute to waste water treatment and its reuse and the conflict could be resolved.

Case Studies :

Initiative :

The Krushi Vidyan Kendra at Jalna, a district from Maharashtra, India, introduced the concept of using domestic waste water for agriculture which would eventually add value to rain water harvesting. Incidentally the district Jalna has been worst hit by the scanty rainfall during 2013. The annual rainfall was around 45% and the horticulture crops mainly Sweet oranges (Mosambi), grown over around 20000 ha. suffered heavily. The area is famous for sweet oranges plantation. The geographical area of the district is around 7 lac ha. and population around 8.5 lac. The cultivable area is around 5 lac ha. The no. of villages are 910. The urban population is around 20%. KVK Jalna has one agriculture college and one secondary school, both are residential and located in the campus area. The waste water generated from the bathrooms and other domestic activities was collected in the plastic lined ponds through 150 mm PVC pipe line by gravity. About 12000 liters waste water was being collected per day and this was used for growing pomegranates, guava and some fodder crops on drip. The waste water was tested for pH, dissolved salts, sodium absorption ratio etc. The values of the quality parameters were brought down to acceptable limits for irrigation purposes by dilution with fresh water bailed out from bore-well with various combinations such as 50:50, 75:25. The growth of the plants and the production was very attractive on the research farm. The small experiment on KVK research farm was a pilot project for the villagers around.

Technology Transfer :

The simple technology of using waste water (grey water) through drip on horticulture crops was shown to the farmers. The farmers from village Kadvanchi who were on the forefront in watershed development decided to replicate this in their own farms. Almost all the 300+ farm families have small land holdings and they shifted themselves to their farm houses, roofs covered with CGI sheets. Initially one farmer by name Nanabhau Kshirsagar with a land holding of 2.25 acres replicated the KVK model of reuse of grey water for pomegranate plantations. There were six members in his family. The waste water collected and stored in plastic lined tank of capacity around 2000 liters was of the order of 300 liters per day. He had planted 312 plants on 1 acre of land and he could survive all these plants with the application of diluted waste water at the rate varying from 1-2-3-- liter per day per plant during the initial period of one year or so. The farmer could save one acre pomegranate plantation in the acute shortage of water during 2012. This year too unfortunately, the scarcity relapsed and he was able to reap good production with a dose of not more than 5 liter per day per plant of grey water.

Impact :

The successful experiment of Mr. Nanabhau, inspired many other farmers from the village

Kadvanchi and over a period of two years 31 farm families started practicing the user friendly technology of reuse of grey water for better harvesting of horticulture crops like pomegranates, grapes and vegetables too. Some of the families have 10 members, the average availability of grey water varied from 300 to 600 liters per day. Most of the farmers were successful in harvesting very good yield from grey water farming. They were able to sustain about 60 to 100 pomegranate plants over an area of 8 to 15 R per family. On an average one family earned around Rs. 1 lac from pomegranate plantation on grey water.

During the discussions with the farmers I could easily guess that within a year all the farm families will go for grey water farming and earn lucrative benefits. The environmental ill effects both to the groundwater by sewage leaching and to the atmosphere by emitting harmful gases were nullified altogether. The mosquito breeding which had hazardous effects on human health was wiped out. The indirect benefits were immense. The village Kadvanchi is giving a viable, simple, inexpensive and user friendly solution to the disposal of house hold liquid waste i.e. grey water. This is to be replicated on a mass scale. This is the need of the day.

Re-use of sewage by using Phytorid technology :

During my tour to Nagpur city in Maharashtra, India, I came across with another technology of treating the sewage generated by the urban area. Efforts are being made to use the city sewage along with the rainwater (run off) for irrigated agriculture by giving proper physical, chemical and biological treatment to eliminate the adverse effects of sewage on soil health and water sources.

Unfortunately almost all the cities and large villages are nurturing the use of hazardous sewage generated from urban and industrial crowd for growing vegetable crops, perennially. At some places like Mumbai, this poisonous water is being sold and revenue is being generated by the railway department. The harmful effects on the human and animal bodies as a result of transmission of heavy metals like mercury, lead etc. through the food chain are not being assessed and understood in proper perspective. Our bodies have become immune and minds have become insensitive to this menace i.e. threat to the ecology.

One associate professor from College of Agriculture, Nagpur affiliated to Dr. Punjab Krushi Vidhyapeeth, Akola, India, is working on an innovative idea of treating the sewage with the use of plant species like – Alkecia, Typha, Kena, Pharagmites spp. etc.. A sewage treatment plant has been installed at college of agriculture (Maharaj Bag). The plant is having capacity of 100 M3 per day. The detention period of the plant is 24 hours. The locally grown plants in the sewage water are used on the reed beds to uptake the pollutants from the sewage water. The main objective of the study is to provide a simple, eco friendly, user friendly and cost effective solution to the recycling of the sewage generated and reuse of the same for growing various types of crops

like cotton, maize, vegetables, floriculture and so on. The filtration of sewage water is done by physical, chemical and biological treatment without using any chemicals. It is known as Phytorid technology which is based on wetland treatment methodology. The system is based on use of specific plants normally found in natural reed with filtration and treatment capacity. It is claimed that this methodology can be used for secondary and tertiary treatment of urban, industrial and agricultural waste water including the sludge management. I was told that the preliminary studies have shown very encouraging results. The removal efficiencies in respect of BOD, COD, TSS, E-coli, total nitrogen, heavy metals like lead, copper, zinc, iron, manganese, cadmium etc. vary from 60 to 94%. The treated waste water could be planned to be used for irrigating vast areas in thousands of hectares in and around the habitations without any harmful effects on human and animal health and also on environment. We need to welcome and salute such innovative ideas. These serve the society in real sense. I was given to understand that the studies are being done under the advice and guidance of NEERI (National Environmental Engineering Research Institute), Nagpur.

I happened to lay my attention on these two case studies while I was touring the places for some other purposes. I have been very sensitive towards the harmful effects of sewage / effluent generated from urban, rural and industrial areas and its free discharge in to fresh water bodies like rivers, lakes etc. The conventional sewage treatment plant which is being thought to bring in existence since last several years has been seen to be progressing at a very slow pace. The electricity consumption is also very high. There was a need to go for some alternative solutions. The above experiments seemed to be attractive, viable and eco friendly. Let us encourage them and see their performance. Hope for the better.