CHAPTER II

AN ASSESSMENT OF WASTELAND RECLAMATION POLICIES AND STRATEGIES

Introduction

Irrigated agriculture in arid parts of western Rajasthan became a reality with the availability of irrigation water from Indira Gandhi Nahar Pariyojana (Project) that has converted the desert into agriculturally productive area, which is also clear from the change detection study during 1970-71 and 1996-97. However, water management issues have largely remained neglected and ill effects of irrigation and poor farm management practises in the form of waterlogging and secondary salinization at one end and sandy and scrublands at the other are seen in some part of the region.

After studying the various aspects of wasteland formation one can notice four types of wastelands in the district. They are, sandy area, scrub land, waterlogged areas, areas affected by salinity/alkalinity, in which the latter two problems viz., waterlogged areas and areas affected by secondary salinity/alkalinity are post IGNP results. Hence, it is important to have clear strategies for conservation and reclamation policies in order to reduce the extent of wastelands. An attempt will be made to mention some of the strategies for conservation by different agencies and institutes.

Wind break

A wind break is defined as "as belt of trees /and or shrubs maintained for the purpose of shelter from wind, sun and sand draft[25]." Permeability of wind breaks to air flow is the main factor affecting the distribution of wind speed on the leeward side.

Main advantages of wind breaks in cultivators fields are;

[25] Government of Rajasthan, Indira Gandhi Nahar Board, (1995), Indira Gandhi Nahar project, Stage II, Feasibility report, Volume III, Water and Power Consultancy Services (India) Limited, New Delhi, pp 12-32.

- To protect land from wind erosion caused by high wind velocity. The windbreaks decrease the wind velocity and help in preserving the soil and moisture in field.
- To improve microclimate through increasing humidity in command areas, reducing the evapo-transpiration.
- To improve the soil fertility by incorporating the organic matter through foliage and decaying roots.
- To check rising of ground water table through bio-drainage
- To provide fuel and fodder and timber to the household needs

The selected species should be drought tolerant, wind resistant and having deep root system. Suitable trees suggested for the areas are *Acacia nilotica*, *Azadiracht indica*, *Albizzia lebbeck*, *Cacia siamia* and *Dalbergia sissoo*. The shrub species include *Zizyphus rotundifolia*, *Acacia bevinosa*, *Calasphosperum mopane*, *Dichrostachys cineraria* / (*nutan*), *Clerodendrum pheomoides* and *Prosopis cineraria. (khejri).*

Sand dune stabilization

Situation of shifting sand dunes is confined to small pockets here and there on land designated as sandy wastes and to some extent on agricultural lands. These lands need to be brought under a cover of trees, shrubs or grasses in a selvi – pastoral management system. The combination will not only stabilise these lands but also ensure economic returns in the form of fodder, fuel and timber. The initial step is mulching with brush – woodwind breaks in parallel strips across the wind direction two meters apart at the crest and five-meter apart on the flank.

Acacia nilotica, *Prosopis cineraria* amongst the tree, *Acacia jacquemontie* and *Zyzyphus nummelaria* amongst the shrubs and *Cenchrus ciliaris* and *Cenchrus setigerus* amongst the grasses have been found to be best suited.

Minimizing total irrigation requirement

In order to minimize the total irrigation requirements, drought resistant crops including cereals, as pearl, millet, barley, cluster beans, pulses as moong, moth, lobia, arhar, urad, mustard, and gram etc., should be incorporated in the cropping pattern. An application of efficient field irrigation method also helps in minimizing total irrigation requirements. Water-resistant crops have to be avoided.

1. Wastelands with or without scrub

This category of wastelands usually form village CPR's (Common Property Resource). Because of neglect, collections of fuel and overgrazing the lands have hardly any vegetation cover. These factors along with and have severe wind erosion has degraded the land.

Natural re-generation and plantation of hardy trees species like *Crotalaria burhic*, *Aerva persica*, *Leptadnia phyrotechnica*, *Clerodendrum phlomoides*, *Zizypus nummularia*, *Calatropis procera*, *Tephrosia purpuria*, *T, falciformis*, etc, are recommended for planting in regular grid pattern creating micro-wind breaks. The direction of planting should be perpendicular to the wind direction. Reseeding with grasses and planting of trees with protection in the first two years and a controlled utilization thereafter is essential.

2. Degraded pasturelands

The soil, climate and landforms permit excellent grass cover in this area; however, present degradation is due to overgrazing. The land can be rehabilitated with reseeding of perennial grasses followed by controlled grazing.

A. Ingredients of improved technology

i. Closure of grazing

The area to be developed should be closed for grazing, which can be achieved by teaching the villagers about;

a) Ditch digging and core wall fencing all around the area
b) Angle iron and barbed wire fencing, which is, however, costly
c) Live hedge fencing, which is cost effective and can be undertaken in all the compartments simultaneously to be developed in future as well

ii. Reseeding of grazing land

In order to boost the yield and status of the grazing lands, these should be reseeded with perennial and high yielding nutritive grasses such as *Cenchrus cilliaris*, *C setigeregerus* and *Lasiurus sindicus* are most suitable species for this tract.

iii. Introduction of top feed species

Nutritive and palatable hardy species like *Zizyphus rotundifolia*, *Dicrostchys nutan*, *Calaphosperum mopane*, *Acacia nilorica*, *A. tortilis* and *Prosopis cineraria* would be ideal. These species are highly compatible with grass species, as they do not have root competition with them.

3. Problem of waterlogging

Most part of Sri Ganganagar falls under the Indira Gandhi Canal (Nahar) Project (IGNP), which has changed the environment of the district, from dry and desertic tract to highly productive land. In about two decades now the **Scarcity – Prosperity – Scarcity** cycle seems to be coming a full circle. Introduction of canal irrigation in the deserts of western Rajasthan has completed journey from one wasteland (Water Starved) to another wasteland (Water soaked).

Thus, surface irrigation system enjoys a grace period before the provision of any ground water drainage becomes necessary. The grace period is certainly dependent on initial depth, rate of rise, fillable storage capacity of the aquifer etc. If waterlogging and secondary salinization conditions occur, the result would be disastrous. At first instance, reduction in crop yield is observed which is followed by restrictions on the type of crop, and ultimately may lead to the abandonment of previously productive land.

There are two different sources of soluble salts which are accumulated in irrigated soil;

- The irrigation water itself, and
- The sub-soil or the parent rock impregnated with salts before irrigation began.

The ground water in arid and sub-arid zones usually contains considerable amount of dissolved salts. Seepage from canal surface flow irrigation and the application of excessive amount of water may cause the groundwater to rise, sometimes, almost to the surface of the soils. As the groundwater rises, the soluble salts of the sub-strata dissolve and this increases the concentration of salts in the ground water. When the ground water comes sufficiently near the surface, evaporation brings the salts in the soil.

The development of salinity in the newly canal irrigated areas has arisen chiefly from the pre-existing salt deposits in the sub-stratum rather than from the irrigation water. Sub-soil conditions, resulting in waterlogging, a rising water table (43 to 83 cm / year) and the resultant salinity has already rendered major parts of the land useless for agriculture. It is anticipated that 20 – 60% of the canal-irrigated area may develop drainage and salinity problems within 30 – 100 years[26].

I. Drainage problem

The topography of the study area is undulating without any marked surface drainage as the rainfall is scanty and the sand dunes block the drainage lines from inter dunal flats. This is particularly true of the lands in the right side of the main canal that includes Sri Ganganagar.

A hydrological barrier at varying depths underlies the entire command area, except close to the main canal. The hydro geological barrier generally comprises pinching and bulging lenses of Clay-Kankar layers at varying depths, gently sloping towards west. The deep percolation losses from the irrigated area in the lift command will accumulate on left side of the main canal. This is proposed to be checked/ prevented by restricted application of water through wells and bio-drainage. The seepage losses from the main canal are proposed to be recovered either by augmentation of tube wells wherever feasible or by interceptor drains and pumped into the main canal for conjunctive use.

On account of dilution effect, even saline water can also be pumped into the main canal. Closing the canal periodically, however, breaks the hydro-geological barrier

[26] Garg, BK and IC Gupta (1997), Saline wastelands Environment and Plant Growth, Scientific Publishers, PO Box 91, Jodhpur, India, p64

created by the zone of saturation along the main canal, but unless the closure period is sufficiently long, no appreciable drainage from left to right can take place.

The natural drainage outflow from the command, even with the raised water conditions will be inadequate to maintain the ground water balance. On account of scanty rainfall in the area, no surface drainage has been developed. The natural drainage lines in inter - dunal flat lands are blocked by sand dunes. Construction of open drains in sandy soils (to collect drainage water from sub-surface pipe drains) and to find a natural outfall for the open drains is physically not possible in this desert area. Open drains, even if constructed, will get silted up and become inoperative due to sandstorms in summer months. The drainage plans for IGNP command area are, therefore, required to be prepared keeping in view the existence of hard pan at varying depths, absence of natural outfall points for artificial drainage, difficulties in construction and maintenance of open drains, quality of ground water, soil characteristics etc.

At present, the ground water table is rather deep in most of the command area and the ground water generally exists under phreatic conditions with a few aquifers attaining confined or semi-confined state. Most of the ground water is saline and is unfit for conjunctive use. Since rainfall is scanty, the seasonal fluctuations in water table are not significant. With the introduction of irrigation, the water table is expected to rise. Present studies indicate that the rise is more rapid along the main canal where waterlogging conditions have already manifested at some places. Rate of rise of more than 1m per annum has been indicated at places[27]. Such areas need adoption of measures for artificial drainage immediately.

The preventive measures and the sub-surface drainage method, which can possibly be used, are listed below:

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[27] Government of Rajasthan, Indira Gandhi Nahar Board, Indira Gandhi Nahar project Stage – II, Feasibility Report, Vol-III, water and power Consultancy Services (India) Limited, "Kailash" 26, Kasturba Gandhi Marg, N-Delhi – 110001, India, March- 95, pp11-10

II. Strategies to mitigate the problem of waterlogging and secondary salinity in IGNP command

Since the study area forms a part of IGNP, no district level policy has been prepared to alleviate the problem of waterlogging and secondary salinity or sandy areas, hence it is important to study and analyze the policies in the IGNP as a whole.

The ground water wing of Command Area Development after conducting pre-feasibility studies, prepared a pilot project entitled **"Ground water management and salinity protection through vertical drainage in TIBI sector of IGNP Stage I, District Sri Ganganagar in June 1990".** In the project report 24 tube wells and 15 shallow skimming wells were proposed. The government of Rajasthan accorded an administrative and financial sanction for the construction of tube wells (6) and shallow skimming wells (5) in the month of October 1990 at Masitawali Head and Lunio Ki Dhani (Erstwhile Sri Ganganagar, now falls in Hanumangarh district)[28].

A. Vertical drainage

Pumping from dug wells and tube wells, or allowing water to flow into diffusion wells or inverted wells can accomplish vertical drainage. This type of the well most suitable for drainage depends on the thickness and sub surface distribution of permeable layers in the vadose and saturated zones, the quality of water, the depth to the present and future water tables, recharge and distance to the canal, etc.

The comparative advantages and disadvantages of vertical drainage system through wells are as follows:

Advantages

- The first, and probably the most important advantage, is the flexibility with which they can be operated. Once an adequate well field has been installed, the water table can be controlled at virtually any desired level. Another facet of the flexibility of wells is that drainage water can be pumped at any time. Because of this flexibility it is not necessary to design wells for the peak recharge conditions

[28] Monitoring of Water table and drainage Trials in Command of IGNP Stage I (November 1994), Government of Rajasthan, Technical Report IV, Commissioner, Area Development IGNP, Bikaner p.22

since pumping in advance in period with lesser discharge can compensate this for.

- In areas with fresh ground water, wells have the great advantage of providing minimal disturbance to the existing irrigation system.
- Maintenance required can be handled by relatively less labour. The labour required must, however, be highly skilled and trained which may be a disadvantage.

Disadvantages

- The chief disadvantage of the well is their tendency to bring water from the deeper part of the aquifer, which is generally, more saline. The disposal of this saline water is difficult.
- The system is non-selective, the water table being lowered in all parts of the area of the well.
- Collection and disposal of water into permeable layers of he vadose zone and deep aquifer by puncturing the hard pan, if of limited thickness (say 10m or so) and if the quality of ground water is not fit for conjunctive use.

III. Vertical drainage through shallow skimming wells

A battery of 5 shallow skimming wells at a spacing of 115 m was constructed at village Lunio Ki Dhani in Chak I MSTM near 18 RD on the right hand side of the main canal. The wells were constructed above the clay horizon ad within permeable sand zones. The wells are tapping only the upper most aquifer, where the ground water is comparatively less saline having resultant Ec value 10,000 microsiemens/cm at 25^0C.

A network of 6 to 10 piezometers has also been created for regular monitoring so as to establish the performance of the vertical drainage. The drained water is being collected at specially designed sump wells, from where it is pumped into the main canal.

The operation of skimming wells have not only arrested the present rise in water table, but also lowered down the water table by 1 meter in a span of 6 months, thereby reclaiming 18 ha. of land. Moreover, due to continuous pumping, the ground water quality has improved remarkably.

However, it was observed that the discharge of the wells has been reduced considerably due to silting. The area under operation has not been increased due to the problem of silting. Efforts are being made to install the horizontal galleries to enhance the flow of water into the well.

IV. Vertical drainage through tube wells

To demonstrate the vertical drainage through tube wells, 6 tube wells were proposed in Masitawali Head. Initially only one tube well of 35 meters depth had been constructed, which was electrically logged for determination of various aquifer parameters and quality variation in depth. On the basis of result obtained from electrical logging, the appropriate pipe assembly was lowered. Pump test, specially aquifer performance test and step draw down test were conducted for the determination of optimum draw-down, discharge ground water quality, transmissivity, permeability etc. on the basis of the above tests a second well at a distance of 125 meters was drilled within the zone of influence, and similar tests were performed in the remaining tube wells too. The discharge of each tube well is 30^3 m/hr, and the quality is fresh. The tube wells are connected through pipelines with a sump well where the Ec of drained water determined and then blended with canal water in pre-determined ratio.

V. Vertical drainage through tube well (245) in stage–I command of IGNP

The Kapoor Committee was constituted in September 1994, by the government of Rajasthan to suggest measures to reclaim waterlogged lands around Baropal in Hanumangarh district. The committee suggested construction of 245 tube wells for reclamation of lands by way of vertical drainage.

"The committee had stated that the problem of waterlogging is quite complex. Solutions are not going to be simple or easy nor quick. Some answers are well known, like reducing water allowance, but their implementations are difficult. Other measures would emerge in the final form by trial and adjustments with skill and efforts. The aterloggedarea can be wholly reclaimed and made fully productive at reasonable cost[29]."

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[29] Impact Evaluation of Vertical drainage Through Tube wells (245) in Stage – I Command of IGNP (March 2002), Government of Rajasthan, Technical Report, Commissioner, O/C CAD, IGNP. Bikaner.

In addition following recommendations were made by the committee for the success of the project:

- The tube wells having average depth of 30 meters be installed at a spacing of 250 meters between two tube wells and at a distance 150 meters from the canal bank.
- The tube wells should operate at least 16 hours per day at a discharge rate of 30 cusec so as to draw water level below root zone and reclaim the waterlogged area.
- The water received from the tube wells as drainage effluent may be discharged into the canal so as to take the drainage effluent out of the waterlogged area.
- After the finalization of the project, the tube well may be handed over to the households on cost. The responsibility of operation and maintenance would then be that of the households.

227 tube wells out of 245 were installed during the period 1996-1998. The progress achieved up to April 2001 is depicted in table 2.1.

Out of 146 tube wells made operational, only 69 tube wells are in actual operation and remaining 77 tube wells are nor operating due to the reason stated below;

a) 32 tube wells not in operation due to defect in pump motor
b) 17 tube wells unoperational due to silting
c) In 13 tube wells pump motors have fallen
d) 15 tube wells rendered unoperational due to other reasons such as cavity formation etc.

Table 2.1

Physical progress of tube well program

S.No.	Location	No. of tube wells installed	No. of tube wells in operation	Remarks
1	Along Suratgarh Branch	158	102	56 tube wells not in operation due to non-construction of switch room
2	Along Kalibanga-Baropal Road	26	26	-
3	Along Sardarpura Distributary Rd 0.00 to 120.00	18	18	-
4	Along GDC-IGMN Road	20	-	20 tube wells not in operation due to non construction of pipe line
5	Along Suratgarh-Bareka-jkharawali Rd.	5	-	5 tube wells not in operation due to non-construction of switch room
	Total	**227**	**146**	

Source: Impact Evaluation of Vertical drainage Through Tube wells (245) in Stage – I Command of IGNP (March 2002), Government of Rajasthan, Technical Report, Commissioner, O/C CAD, IGNP. Bikaner.

It was also envisaged in the scheme that the tube wells would run continuously for a minimum of 16 hours a day to withdraw at least 30 cusec of water, which would make a significant impact on ground water regime and deplete ground water levels sufficiently and reclaim waterlogged lands. But it has been observed that the electric supply was available only for 6-8 hours on an average.

The inadequate supply of electricity has been one of the reasons for not obtaining the desired results

It has also been observed that out of 69 tube wells which are operational, the water from 27 tube wells is being pumped into the canal, and water from 46 tube wells is being used by the households, in whose field the tube wells have been installed.

After analyzing the work done in last the four years, following points were observed

- No significant change in ground water level has been observed, due to insufficient availability of electricity supply. The, running of pumps below optimal capacity is not likely to yield any significant result. The expenditure being incurred at present is futile, as envisaged results in the project were not achieved.
- The tube wells (106) have not been energized by the State Electricity Board, thus few of them are non-functional
- The intermittent and irregular operation of tube wells has shown that there was no significant effect on the rising trend of water table due to inconsistent pumping. If the desired pumping would have been achieved the rising trend of water table could have been arrested and lowered further.
- As per the recommendation water allowance was not reduced to 3-cusec/1000 acre, from 5.23 cusec/1000 acre. This further aggravated the situation.
- It was foreseen that Rajasthan State Electricity Board was not in the position to provide regular supply of electricity in near future without which the desired effect on water table as envisaged in the project report could not be achieved. Pumping of wells at the present status of supply of electricity was found to be a futile expenditure, which was unnecessary burden on state exchequer.

- The households of the area were not ready to pay the electricity bills at the industrial rate charged by Rajasthan State Electricity Board, which was much higher compared to the agricultural charges.
- Therefore, the project ended up and it was suggested that the government departments would utilize the surplus material, where such articles were used.

Indo dutch project

Looking at the severity of waterlogging and soil salinity problems in the region, one of the centers of Indo-Dutch Network Program for operational research on the control of waterlogging and salinization in irrigated agricultural lands was sanctioned to Rajasthan Agricultural university, Bikaner[30]. The head quarter of the project was at agricultural research sub-Station, Hanumangarh.

A pilot area of 75 ha. was selected at village Lakhuwali, about 30 Km south of Hanumangarh. Drainage investigations were carried out to collect information on topography, soil texture, and hydraulic conductivity, salinity status of soil and ground water, water conveyance and application losses, water table fluctuations and cropping pattern, yield of crop and socio-economic conditions of the households of the pilot area.

On the basis of the investigation, it was concluded that the problem of waterlogging and soil salinity could be solved by sub-surface drainage. This can be achieved by laying a sub-surface pipe drainage system and disposing off drainage effluent into a running source of wastewater like Ghaggar Diversion Channel by the provision of sump and pump in the absence of a gravity outlet.

However, the major loophole of this study was lack of monitoring of water table and salinity change after laying the sub surface drainage. Hence, this kind of research could not be carried out in any other region having similar kind of problem.

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[30] Pre Drainage Investigation in Lakhuwali Pilot area: Indo Dutch Network Project, (2001), Agricultura Research Sub Station (Rajasthan Agricultura University, Bikaner), Hanumangarh, Rajasthan.

B. Horizontal drainage

i. Field drains

Field drains involves Installation of a system of buried pipe drains for interception of ground water and a system of open or closed collector drains for disposal of the drainage water. The main advantage of horizontal drainage is that the area served by each unit is relatively small and thus the channel needs only to be installed in those areas actually cultivated and requiring drainage. Another advantage is the fact that in case, pumping is necessary, and then it need only be from a relatively shallow depth compared with wells. Also, since the drainage flow is taking place in the upper aquifer and soil only, the drainage effluent will tend to be a problem in consequence.

The disadvantages of horizontal systems mainly stem from their flexible nature. Once the drain has been installed, the level to which water can be lowered is fixed and thereafter it becomes a function of the drainable surplus only. Fluctuation in drainable surplus lead to changes in water table level and the system should be designed to cope with the worst condition. In addition there are difficulties and hence, expenses increase in installing buried field drain deeper than about 2.5m and in areas where the water table is already high. Horizontal drainage systems whether with buried or open drains require more maintenance can be carried out with relatively unskilled labour.

In areas where both horizontal and vertical drainage are feasible alternatives, horizontal forms of drainage are usually considerably more expansive both in total and capital costs and running charges than vertical drainage.

ii. Interceptor drains

The principal function of interceptor drains is to intercept seepage along canals and control ground water level at certain depth which can be accomplished by providing buried perforated pipe drains along both banks of the canal system and collecting the water at specific interval through sump wells. The water to be so collected is relatively fresh and can be pumped back into the canal system for further reuse.

C. Bio drainage

In areas where land topography does not permit gravity surface drains, and where ground waters are saline, water table control can be obtained by bio-drainage to some extent. The potential of certain tree species to draw more water than the agricultural crops because of their deeper root systems, higher transpiration rates throughout the year and the ability to minimize recharge from rain by intercepting it on their foliage, provides a technique for keeping water table under control. These plantations in fact work as biological pumps that can transpire large quantities of water.

In planning the afforestation programs for ground water table control, the important aspects include:

- Rate of evapo-transpiration by different forest species,
- Location and extent of recharge and discharge areas where planting will be more effective
- Selection of species tolerant to waterlogging and salinity, and
- The cost-effectiveness of afforestation in combination with hydro-technical measures.

Afforestation helps in minimizing ground water recharge in three ways:

- Intercepting rainfall on plant foliage,
- Reducing the deep percolation losses by the way of higher evapo-transpiration, and
- Transpiring the ground water pumped through their root system.

Selection of appropriate tree species for water table control will essentially depend upon their capacity to transpire water. Being a new field to activity, many details about useful trees for anti-water-logging purposes are not available. Studies conducted at the Forest Research Institute, Dehradun have sown that the average weekly transpiration rate of six eucalyptus species of one year age was between 2.5 to11.5 gm of water/day/100sq.cm of leaf area. Experimental evidence from Central Soil Salinity Research Institute, Karnal, shows that both eucalyptuses as well as poplar have very high potential for water consumption. In a continuing study conducted over a period of 4

Years, it was observed that as much as 3-6 mm water/day could be disposed off through these plantations without any surface inundation or much ground water recharge. Studies in soils of West Bengal have indicated that a five-year-old plantation of eucalyptus hybrid is likely to transpire about 99 percent of effective rainfall compared to dry deciduous plantation that transpire only about 50 percent of rainfall.

Eucalyptus is a fast growing tree and works as a water pump in soil. It pumps water from deeper soils (as deep as 20m). Eucalyptus species like *Eucalyptus hybrid, Eucalypti occidentals, Eucalyptus microtheca, Eucalyptus cameldulensis* grow well in waterlogged soils, improve them in a few yeas and give high yield of wood.

Though the drainage through quick growing plants is a feasible proposition, its careful planning in conjunction with other methods of drainage, which are in operation, needs proper investigation. Open wells or skimming wells in areas of fresh ground water should be preferred as compared to plantation, but in saline areas, careful selection of transpiring trees species would be essential for reducing ground water table.

Tree species like *Acacia auriculaformis*, *Terminalia Arjuna* and *Leucaena Leucocephala* can be planted in saline areas without high water table. *Casuarinas equisetifolia, Tamarix articulata* and *Prosopia julifora* could withstand both high salinity as well as high water table conditions.

Summing up

As far we have seen that there are four types of wastelands occur in the study area viz; sandy area, land with or without scrub, waterlogged and saline areas. Windbreak is one of the important approaches to check the wind velocity by planting tree / shrubs. Further sand dune stabilization is also important in order to control further movement of the sand. Natural re-generation and plantation of hardy trees species should be grown in regular grid pattern which will also act as micro-wind breaks. Since the study area forms a part of IGNP, no district level policy has been prepared to alleviate the problem of waterlogging and secondary salinity or sandy areas, but the entire command area or the more problematic areas of the command have been considered, among them, vertical drainage through shallow skimming wells, vertical drainage through tube well (stage - I) and Indo Dutch project are worth mentioning. However due to inadequate supply of electricity, no significant change in ground water level was observed. Further, the intermittent and irregular operation of tube wells showed that there was no significant effect on the rising trend of water table de to inconsistent pumping. Similarly, the Indo Dutch project at village Lakhuwali, about 30 Km south of Hanumangarh could not get extension due to the lack of monitoring of water table and salinity change after laying the sub surface drainage. Solutions are not simple and quick. Some well-known answers like reducing water allowance are a must. Other measures can be adopted by trial and adjustment, for example, the problem of waterlogging could be alleviated to some extent by way of vertical drainage, which envisages that the water pumped out with the help of tube wells will be put back into the canal. The other important measures are horizontal drainage, bio drainage along with creating awareness among the farmers about practice of less water intensive crops. These solutions although appear less effective but in the long run would certainly prove beneficial for the command area.