NEEDS OF DRAINAGE FOR SUSTAINABLE CROP PRODUCTION IN THE SALINE ENVIRONMENT

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ABSTRACT

Sustainability of irrigated agriculture in the arid and semi-arid regions of the country has faced the challenge of alkalinity/salinity problems associated with soils and irrigation waters. One of the major problems confronting present day agriculture is decreasing availability of good quality irrigation water. With increasing demand and decreasing availability of good quality waters, there is growing tendency among the farmers to use these poor quality waters for crop production. Indiscriminate use of poor quality waters in the absence of proper soil-water-crop management practices poses grave risks to soil health and environment. In India about 36 percent of irrigated lands have been damaged at different levels due to such practices. This disappointing picture due to faulty irrigation development. Failure to create "enabling condition", lack of institutional support, lack of provision of drainage, all contributed to failure to prevent the growing problem of water logging and salinity. Area under canal irrigation during the last three decades was only 19 percent but area increase through tubewells has been of the order of 160 and 189 percent in Haryana and Punjab, respectively. The scenario on ground water utilisation is not the same in several other states or their specific areas disadvantaged either with poor quality aquifer yields or their quality. Surveys rate 32-84 per cent of the presently operable wells of different states to be of poor quality.

A number of technological options are available (like improve water management practices through sprinkler, drip irrigation etc (ii) conjunctive use of ground water where quality is poor, (iii) skimming well/ *doruvu* technology where shallow ground water management is needed and (iv) subsurface drainage (SSD) where water table is high and quality of ground water is

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poor) to augment the effective supply of land. Though these options are crucial, they have themselves tended to be centralized and technocratic and hence capital intensive. For such reason, each of these prescribed strategies/ remedies enjoyed the status of a 'privileged solution' at one time or other. There was no effort to harness the synergic benefits of those options, with the result that no progress was achieved in testing these strategies together. It does not stimulate testing and modification and does not promote a 'learning process' strategy. This paper mainly suggests different policy options and strategic approaches like institutional intervention through participatory approaches from technical mode to participatory mode, group incentives, price policy for different water saving devices and clear cut ownership right for sustaining crop production in saline environments of India.

INTRODUCTION

India, in pursuit of irrigation development under financial constraint, has ignored the planning and implementation of the drainage systems, the consequences of which have emerged into the waterlogging and salinity in irrigation commands. 6-mha land is affected by this problem. Northwest India, comprising parts of Haryana, Punjab and Rajasthan is a highly fertile alluvial land. This region is covered under a large network of canal commands which at present suffers from the waterlogging and salinity in pockets adjoining canals and within low lying areas underlain by saline groundwater in deeper aquifers. The shallow aquifers contain large variation in water quality from fresh to marginal and saline. The climate is semiarid and arid with low annual rainfall from 100 to 500 mm under high evaporative demands from 1600 to 2000 mm. The canal water allowance varies from 2.5 to 5 cusec per 1000 acre of irrigated land. The intensity of irrigation varies from 50 to 10 percent. The land elevation is from 50 to 240 m above sea level. Soils comprise sandy loam, clayey loam, loam and sand. Two-crop system is prominent in canal commands with wheat in rabi season (winter) and rice, cotton and coarse grains in Kharif season (monsoon) as per the water availability and agroclimatic conditions.

Salinity and waterlogging in northwest India

Floods occur in Haryana and Punjab with part spillways to Rajasthan through the inland river Ghaggar. Haryana faces the waterlogging in central and western parts in less than 2 percent area in dry season (June) which expands to 15 percent in wet season (October). Punjab faces the waterlogging in the southwestern part in 2 to 3 percent area in dry season, which increases to 20 percent in wet season. Rajasthan faces waterlogging in IGNP command in northern part in about 2 percent of stage I command in dry season, which increases to 10 percent in wet season.

The irrigation bureaucracy is constrained in responsiveness to efficient water distribution, operation and maintenance for various reasons. The outcome of these are decaying of the irrigation system, mismanagement of water and existing low crop productivity below 2 ton per ha. The pricing of irrigation water revealed that 43 percent of the operation and maintenance expenses were incurred on the irrigation bureaucracy in 1986-87 which increased to 70 percent in 1990-91. Time is not far off when the entire amount shall be absorbed by the bureaucracy on its pay packets, raising an important question as to what role farmers can play in water management, water distribution, operation and maintenance with adequate financial viability.

The inherent drawback of the institutional setup in irrigation systems is promoting irregularity, uncertainty, favouritism, exploitation and corruption. To overcome during the seventies and eighties, major emphasis was shifted towards improvement of irrigation performance through on-farm development (OFD), participation in the form of involving water users and strengthening of irrigation agencies. But there was no effort to harness the synergetic benefits of those options, with the result that no progress was achieved in testing these strategies together.

From the 90's onward, rethinking is going on to transfer of responsibility and authority for irrigation management from government to non-governmental authority. Such transfer will help the water users to maintain transparency, accountability and supporting incentives to the users by managing, operating and maintaining of irrigation system. The main draw back in

the system is that it assume free market mechanisms will work implicitly i.e., well-capitalised and market-oriented farmers will take care of the operation and maintenance.

But in reality it is difficult because the inherent drawback of unsatisfactory performance of the irrigation system is due to non-fulfillment of the target, incompatible rational action with collective rationality and finally quantity-constrained behaviour compelled the individual to adjust their own private decisions. Even if the market fully reflected the values for individual goods and services, the market would still allocate less than a socially optimum amount because farms are unable to fully appropriate the gains from R&D. Without internalization of environmental externality and holistic approach, only shifting the power will not improve the system.

OBJECTIVES

Keeping in view of the above scenario, the present paper will address what form of institutional set-up is needed to take care of the drainage and irrigation system together for sustainable development of agriculture. The specific objective of this paper is to review the losses due to water logging and salinity; impact of subsurface drainage technology as a preventive/curative measure of water logging and soil salinity; why the technology is neglected and finally suggest what form of institutional set up is needed for the success of drainage technology.

EXTENT OF THE LOSSES

Several scholars have highlighted the extent of water logging and secondary salinisation due to mismanagement of irrigation. Worldwide the extent of damages due to salinisation is ranging between 36 to 12 percent. In India, the damage of irrigated area due to salinisation is more as compared to top five world wide irrigated countries (Rydzewski, 1992). In the global level the annual loss from 45.4 mha salt affected lands in irrigated area has been estimated as US $ 11.4 billion (Ghassem et al., 1995).

In India estimated losses vary in different command areas. Crop wise the pure effect of soil salinity in declining yield ranged from low level of about 3 to 1 percent for sugarcane and wheat in parts of western Yumana canal and the Bhakra system to a high level of about 74 to 64 percent for paddy and all crops in the Sharda Sahayak Irrigation Projects (Joshi et al 1995). In the Chambal irrigated command area it was about 21,000 ha (Ajmera, 1997). In Western Yumana Canal and Bhakra system the annual income losses due to water logging and salinity ranges from RS. 2455 to 3718/ha (Datta 1999). The variation of losses mainly depends on the degree of degradation of land. It is interesting to mention that farming community is still not worried about the dimension of the problem, because the severity of the problem is not uniform. Major losses due to waterlogging and soil salinity at farm level threats the sustainability of land resources, decrease the farm production by abandoning of crop production; decline in resource productivity and cut-back in resource use. At the regional level the consequences are displacement of labour from agriculture, widening income disparities and affect the sustainability of secondary and tertiary sectors. At the national level the negative effect of waterlogging and salinity are in the form of decline in agricultural production, affecting the gross domestic product, bringing down export of important crops and increased import bill (Joshi et al, 1995).

TECHNOLOGICAL OPTIONS

Various remedial measures such as better water management, conjunctive use of canal and ground waters, improvement of surface drainage, on-farm development, introduction of forestry and shallow ground water management were suggested. Increasing the ground water discharge and controlling the water table can be effective by vertical (skimming well) or horizontal drainage. In the approach paper of the Ninth Five Year plan (1997-2001), it is proposed to improve the efficiency of end-use of water through adoption of water-efficient devices and promote conjunctive use of surface and ground water. The entire attempt, which was mentioned, was present and initiative was taken for a long time, but suddenly calls for an organised solution by means of public intervention. Those solutions are not thought to require testing and modification for

sustainability in long term. Attempt is always in terms of diverting fund from one specific scheme to another alternative option. However, as a preventive measure for short run, those solutions may be effective but for long term, subsurface drainage (SSD) has been proved to be the only option to reclaim the waterlogged saline lands, where salts are accumulated both in soil and ground water. In Egypt SSD is provided in 1.75 million ha of its irrigated area, in Western U.S.A 25-30 percent irrigated area is covered under SSD, Pakistan also has embarked on a big program of providing SSD in its irrigated area. Although the history of horizontal drainage in India started in 1925 at Chakanwali (now in Pakistan) and in 1928 at Baramani in Maharastra but the concept of SSD is new. It is now realised that SSD is most important component of irrigation system management to maximize the benefits from irrigation investment. The cost of installation of SSD mainly depends on soil type, depth and spacing of drains, location under drainage and the type of the drainage material used. At present (1994-95 prices) the cost of manually installed SSD varies from RS.22, 310 to RS. 18,525 per ha in Haryana (Datta & de Jong, 1997).

There are basically three reasons for installing agricultural land drainage systems: (i) for trafficability so that seedbed preparation, planting, harvesting, and other field operations can be conducted in a timely manner, (ii) for protection of crops from excessive soil water conditions, and (iii) for salinity control. It is well documented that subsurface drainage **sustains** or **restores** the productivity of the agricultural land (Datta & de. Jong 1997).

Effects of SSD on Farm Economy

The impact of SSD both in short run and in the long run are well established both at the national and international level. The success story of SSD for sustaining the farm income is well documented in Holland, Egypt, Canada and Western part of USA. At national level, impact of SSD is yet to be established. In Chambal command area about 10 thousand ha is under SSD. In Haryana, SSD was installed in 589 ha at thirteen different locations in different years in order to prevent, or enable the reclamation of areas, which were already affected by water logging and soil salinity. That is why Haryana State was selected as the

site of the study. Moreover, about 2000 ha in two different location has been selected for SSD under Indo-Dutch collaboration. For this paper, the study was conducted in seven small-scale drainage areas in Haryana and four in Gujarat State.

On-farm benefits of subsurface drainage enables the control of the watertable level and the desalinisation of the soils by leaching, either with irrigation water or with the monsoon rains. Operational research on Sampla Farm showed that salinity in the topsoil decreased rapidly after drainage, from about 50 dSm^{-1} in June 1984 to about 5 dSm^{-1} in November 1985, in spite of low rainfall in these years (Rao et al. 1991). In all small-scale pilot projects in Haryana State, the short-term effects of subsurface drainage were:

- A considerable increase in cropping intensity;
- A shift in the cropping pattern towards more remunerative crops;
- A remarkable increase in crop yields;
- An increase in the efficiency, or productivity of fertilisers;
- Increase in gainful employment;
- Timeliness of planting and harvesting;
- Increase the land value

The combined result of these changes was a substantial increase in farm incomes (Datta et al, 1992,Datta & Joshi, 1993, Datta & de Jong,1997).

Constraints of the Technology

In the saline environment, due to fragility, low accessibility, internal resource heterogeneity and marginality of biophysical resources, the farm families sustain themselves through adaptation to harsh biophysical environments without dependable and effective external links on extensive scale. The people have to live with limited, high risk, low productivity options. To evolve their sustenance strategies through adaptations of limited natural resources, they included seasonally and spatially diversified land base activities. Despite internal inequities and occupational specific differences in gains, everybody's close dependence on local resources created an integrated collective stake in their activities. The first and foremost condition to accept the technology depends on how far the ecological constraints accept

it. Secondly it is crucial to unearth the social and institutional arrangements that determine the degree to which different groups in the society have access to the technology.

Despite yielding high dividends, collective action is required to realise the potential benefits from SSD due to indivisible nature of the technology. The study from small scale (SSD) area in Haryana and Gujarat visualises several constraints in its adoption levels (Datta & Joshi, 1993). These are (i) indivisible nature of the SSD technology, (ii) no attraction to an individual farm household on investment to prevent or cure the degraded lands, (iii) increased economic differentiation and socio-political factionalism and (iv) internal heterogeneity and inequities. The technical and economic issues relating to curative or rehabilitation of land in the saline environment depends on its productivity. Evidence shows that people care more about a more productive unit than unproductive unit.

Reconciliation of interests of divergent groups is foremost for the success of SSD. There are several factors determining the success or failure of people's participation in effectively implementing drainage activity (Datta & Joshi, 1993). These are (i) problem of "free riders", (ii) degree of participation of beneficiaries, (iii) conflicting objectives, (iv) perception of the program objectives, (v) factionalism in the village, (vi) high dependence on government patronage and (vii) completely eroded culture of group action and sharing systems.

To overcome such problems a 'weakest link ' (i.e. public output corresponds to the minimum of the outputs selected by participating farmers) is needed to establish what will work against free riding. Policies are needed such that intervention could alter the process through which each farmer experiences the effects of others so it corresponds to a ' weakest link ' technology in its effects on each participant. Mechanism to build-up the 'social capital' for promoting trusts, sharing and group action is needed. To make such social awareness and mobilisation, grassroots level voluntary agencies complemented by genuine encouragement by the state are needed. A number of participatory rural development initiatives are already in place (Krishna et al, 1997, Zazueta,

1995). To replicate such success stories in the SSD area may be the effective approach to equip the farmers to manage the SSD and build collective stake.

Participation of beneficiaries is widely accepted as the key for successful management of the drainage activity. The higher the degree of participation of the affected population, the greater will be the success. It has been realised that mere planning and executing the drainage systems to manage saline and water logged soils by a government agency may not yield the desired results unless there is a positive attitude and strong will of the beneficiaries to participate in the programme. If the conception, design and implementation of external intervention like SSD is not clear at the grass root levels, then such intervention will finally lead to dis-empowerment of the communities, disintegrate the community stakes and marginalise the local knowledge system and institutional arrangement. From the study for Haryana and Gujarat, it suggest that persuasion, education and demonstration of the beneficial role of farmers' participation is crucial for the successful operation in managing such type of problem soils (Datta & Joshi, 1993).

Differential resource endowments mainly created the incompatibility of rational individual actions with collective rationality. Any kind of formal or informal group approach to manage problem soils will have to assure each individual participant that decisions of other individuals will not cause any negative externality. But a major problem arises when all villagers do not subscribe to similar use or same product from SSD. For instance, the large farm size group wanted to grow paddy whereas the small or marginal farm size groups prefer to produce jowar for their livestock. Rice growing farmers blocked the lateral to maintain the moisture in the paddy field. On the other hand the tail-ender of the lateral block of SSD farmers did not wish to maintain such moisture in their field. For such reason a differential crop-mix in a drainage area lead to conflicts amongst the beneficiaries. Achieving higher efficiency of the investment in drainage to control salinity and water logging can solve it.

WHY ORGANISATION IS NEEDED?

To get sustainable benefit from any biological systems, management interventions are must. For the success of management of natural resources (mainly land and water) the involvement of local people is essential. This is because the use of natural resources by any user has many unintended side effects, called externalities, on other co-users. Adoption of soil water conservation measures requires the participation of all owners irrespective of whether they are owned privately or publicly. Because of interdependency, it called for co-operation of all the resource users for minimizing the externalities involved. The point of concern is not a questionof integration and its benefits but its process. It has already been mentioned in the earlier section that the loss of traditional arrangement is largely as a consequence of specific approach to integration and development. For instance, poor mobility and internal heterogeneity of resources in the saline areas focused on centralization and intensification instead of high degree of decentralization and diversification. The incorporation of community stake, local control and functional knowledge of SSD are the essential components of sustainable crop production in the saline environment.

There are many good reasons for the involvement of farmers in the development works. It is no longer possible to burden the Government organisation with such works, which are beneficial to the people, and so let people be responsible in the execution and their maintenance. In view of liberalisation and privatisation people are expected to assume greater role and share the cost of such development works. The capacity of farmers to contribute to capital, operational and maintenance expenses (O& M) in the post drainage developmental phase was explored. This could only be accomplished meaningfully by involving the farmers right from the stage one, i.e. in planning, design, construction and operational phases. As it has been mentioned earlier that irrigation and drainage works are collective in nature and are not divisible. In other words the SSD affects all the farmers and shared more or less equally in a drainage block. Even if one farmer objects to installation then the whole process is jeopardized. Therefore, the co-operation and consensus of farmers is needed at the planning and design stages as well. Unlike seed-cum-fertilizer

technology, the success of agricultural land drainage largely depends upon the nature and extent of participation of the farmers as a group or community. In the past, there were some passing references that a formal or informal group approach has immense role in managing such soils. Community management of soil resources requires a different strategy. To prevent or cure land degradation through group approach may provide useful policy prescriptions for sustaining the productivity of land in a rapidly rising population age.

Options for Drainage Organisation

For the management of SSD, focus on bottom-up approach, sensitization of the decision-makers to local people's participation through participatory approach, identification and incorporation of rationale of traditional practices into new technological and institutional measures planned should be encouraged. The question may be raised of whome will organise farmers to come together to manage their problem soils. The task may be taken-up by the government as well as non-government agencies. A preliminary review of the institutional options for creation of drainage organisation capable of implementing large scale SSD in Haryana revels, at least five distinct possibilities.

1. The recognition/ restructuring of the Soil Conservation Office and incorporating the operational pilot drainage project nucleus organisation to undertake large scale SSD.

2. Incorporating operational drainage project into the existing Haryana Land Reclamation Development Corporation (HLRDC) or with Haryana State Minor Irrigation Tubewell Irrigation (HSMITC).

3. Creation of totally new non-governmental organisation exclusively to the implementation and monitoring the SSD.

4. Creation of new department of agriculture which will solely be charged with reclamation of wastelands, where operational drainage project will work as a nodal organisational unit.

5. Creation of drainage co-operative like *Pani panchayats* in Maharashtra may be another form.

In brief three general directions for long term establishment of a drainage organisation appear plausible, placing it in a governmental context or a non-governmental organisation or an incorporated public enterprise environment. To recognise government agency seems pragmatic because of the pressures to minimize expansion of the public sector generally. But scaling up the existing drainage staff from department of agriculture, to a level sufficient to meet the challenges of large scale SSD could be accepted since this would be a budget neutral solution, consistent with the policy of restraining growth in the public sector.

Involvement of some Non Government Organisation (NGO) was recommended in order to mobilise and seek participation of farmers with a view to cover larger drainage area. The major constraints of NGO's are non-existing in such a system in Haryana, an out-side NGO has its own problem of communication, lack of accountability on the part of NGO, lack of knowledge of SSD, understanding the nature of the problem, and getting access to different interests groups for developing strategies to evolve solutions.

Other alternative is in the form of drainage co-operative like in Gujarat, which was registered as 'Saline land agricultural development Co-operative' in 1989-90 under the Gujarat Co-operative registration Act of 1860. The main activity of this co-operative was to share O& M cost. Widening the activities of drainage co-operative is essential for its sustainability because the need for soil improvement will not be uniform in the entire drainage area. The farmers located in disadvantageous position may not be enthusiastic to participate in such co-operatives in the long run (Datta & Joshi, 1993).

Place the Haryana Operational Pilot Project (HOPP) in the semi-governmental corporation: This could be accomplished by either creating a new organisation with exclusive mandate for large scale mechanized SSD works or to integrate the same into an existing corporate entity as HLRDC or HSMITC. A move in this direction would potentially have advantages over the government locus. But its success mainly depends on commitment and motivation of the staff.

Approach to Set Up for SSD

Since participation, power and well being are the key factors for the success of any technological intervention, bottom-up and countervailing actions by the farmers to influence decision made through direct and informal means has been given priority in Haryana Operational Pilot Project area. Participatory approach besides co-lateral relations and linkages at all level has emphasised.

The most distinguishing and striking part of SSD in Haryana is its vibrant and constant interaction with farmers, or rather all stakeholders. One entire farmers' participation section (FPS) was created just to ensure that farmers and other stakeholders developed a basic awareness about what is SSD, what are waterlogging and salinity, what are their pernicious influences and design of works. A very well defined system of mass awareness coupled with gender focus was developed through FPS section. Farmers have been sensitized and enlightened about SSD. This section is always in touch with the village Sarpanch. FPS section also developed good rapport with the progressive farmers, key and effective persons in the villages in order to settle any disputes arising during the process of installation of drainage who has good rapport with the villagers. Parallel Women's informal organization was emphasized.

Farmer's participation is based upon bottom up, decentralized, democratic, strategy in which farmers have the sense of owners of the drainage system. Flexible and learning approach to inculcate their maximum participation and interaction at every stage, consensus and co-operation of farmers is also essential to keep the construction process smooth. Their co-operation also contributes to reduce the conflict during construction. To keep in such spirit it is decided consciously that the component of crop compensation need not be perused in view of the large-scale implementation of similar projects in the state. This policy decision helps to check the farmer's opinions about the involvement in the scheme. For accomplishing this task, farmers' participation supported with the consultants was created in the project as an important wing.
In the FPS section the important role of the Community Organiser and Women mitigators in conflict resolution,

when drainage block farmers are resistant during field construction activities. It also works as a second-line defence for Farmers' Drainage Society (FDS). FPS section acts as an interface between farmers and the project. To motivate and for mobilization a written agreement is also done with all farmers on a drainage block basis. Farmers realize that major beneficiaries would be those landowners who are covered under SSD. Drainage Block of about 50 ha was made in order to maintain optimum group of persons. Since larger groups, higher the transaction costs of bringing them together, and hence the higher the tendency of free rider. In order to avoid it, the number of farm families kept in a group is quite small. The number of farm families in FDS blocks ranges between 30-35. The societies are registered under Societies Registration Act 1860 under Section 21.

The main objective of the FDS is to take care of operation and maintenance of the SSD system. There are about 22 FDS blocks planned in 1000 hectare (of saline waterlogged area) in Gohana. The preliminary task of each block of the FDS is to de-watering the initial drainage saline water (effluent) from the sump. Accordingly they have created their own bylaws so that the group's activities address the felt needs of the group members. The group has enough solidarity to compel other people and organisation to cooperate with them in addressing the group member common needs. FDS tend to be strongest when they (i) collect members' monthly or yearly fees in order to strengthen the financial position of the society; (ii) the members of the society should give time as and when it is needed for the success of the group (FDS); and (iii) provide credit facilities to their members through a carefully planned, mutually accountable credit programme.

Already about 14 such societies are registered and functional. The operation for de-watering was initiated through those societies. At present about seven such cooperatives are operating smoothly for initial de-watering. Mid Term Review of the project observed that participatory aspect is encouraging and turnover of the operation and maintenance responsibilities to farmer's societies. In fact the effort is mainly to break down the old culture of dependence on public sector subsidies. It has to be careful to find out tailoring solutions to this fiscal challenge by the FPS per the site conditions of different drainage blocks in the

area. FDS require common funds to prolong the O& M works on a sustainable basis. The effectiveness of first drainage Block is precedent for the subsequent efforts made in this direction. It is a learning process and must be stepped up systematically. An apex body of all the FDS is to be established to co-ordinate and pull the experiences at the project level.

It must be mentioned here that as the construction work of SSD accelerates the workload of the FPS increases. At present this section is motivating, collecting construction consent signatures, conflict resolution, organising and registering FDS's. Too many activities forced the section to thinly spread to follow up and support the FDS. The vitality of the FDS's will mainly depend upon considerable follow up required by the FPS with each FDS. At present the turnover of SSD systems to the farmers (FDS) appears to be on an informal adhoc basis. As the actual status of the turnover in different drainage blocks is unclear, it is imperative that a clearly defined system is needed before handing over to FDS. For instance in FDS block 12, even though installation of SSD was complete for a long time but still the pump set for de-watering is not functional and there are no clear cut guidelines for passing the drainage effluent. Similarly in FDS block 13, the surface drainage through which effluent passes is not enough. Overflowing the saline effluent drainage water spoiled the paddy crops during 1998 to the nearby farmers' field.

In FDS block 14, due to negligence of supervising role and management, de-watering activity is neglected even though record shows that the expense for pumping is going on. There is much malpractice going on even though the village Pradhan who is also the president of FDS block 14 appoints pump operator. In order to remove the stagnant water from the (matured) paddy field, pumping for de-watering is needed to bring confidence to the farmers in FDS block 7 but such activity is not taking place due to some technical fault of the pump. There is much seepage of canal water directly to the sump, reducing the confidence of SSD technology in the farmers. It is essential to solve such problems immediately before taking up new areas for drainage installation. Unless a fully operational SSD system is provided, farmers will be hesitant to cooperate with O& M of FDS. Success of FDS primarily depends on the strong determination and commitment of the project

personnel authority to demonstrate exceptionally good performance and to solve farmers' problems regarding water logging and soil salinity in their field.

Alternative to Farmers' Drainage Societies i.e. involving of some Non Government Organisation (NGO) was recommended in order to mobilise and have participation of farmers with a view to cover larger drainage area. In the process, NGOs may not only focus on selling their own perspectives and approaches but tend to build their own space and indispensability that will help the state, which neither understands the rural communities well enough nor can deliver promised goods and services.

Whatever may be the form and its nature, drainage requires huge investment. In addition to that O& M cost is needed. Unless such costs are recovered from beneficiaries, the state has to incur large subsidies. Since drainage technology is indivisible in nature, to an individual farmer adopting the technology in isolation is financially non-viable. It requires certain institutional arrangement. The issue is whether drainage will be treated as public well or private.

In any case farmers should pay the operation and maintenance cost, because:

a). it would assure the sustainability of the project;
b). it would give the farmers the sense of ownership and responsibility;
c). it would alleviate the burden on public exchequer.

In view of the modest return on drainage investment and the limited repayment capacity of the beneficiaries, the question is whether to drain or not to drain. It is clear that the farmer cannot bear the full burden of the cost of drainage. But, since the deterioration of valuable agricultural land has to be controlled for the sake of farmer and the society as a whole, land drainage is a joint responsibility of the Government and the farmers. The arguments for this are:

i). Land is needed to feed the growing population;
ii). Good agricultural land is scarce;
iii).Irrigated land is highly valuable;
iv). The cost of drainage is only one-third of the cost of irrigation;

v). Waterlogging and salinity are partly due to the farmers;
vi). The damage is unevenly spread over the farmers' land. It is externality for the affected farmers;
vii).Large-scale soil salinity causes social disruption;
viii)Large-scale salinisation is a threat to the environment;
ix). Proper drainage is beyond the financial capacity of the farmers.

As conservationists all over the world advocate, the required return on the invested capital for conservation and environmental protection should be lower than for other investments, say 6 per cent. In that case subsurface drainage projects would become economically feasible before the land is seriously affected and farmers suffer great income losses.

PROFILE OF THE DRAINAGE SOCIETY AT HARYANA

Particulars	***Description***
Name of the Society	Farmers Drainage Society
Registration Act	State co-op Registration Act, 1860.
Area of operation	saline and waterlogged area belonging to the farmers of Farmers Drainage Society Block
Objective	i) regulate the pumping of the saline water and discharge the effluent from the outlet to the main drain; ii) Operation and maintenance of SSD system; iii) To raise resources through collection from the members for meeting the O& M cost; iv) To arrange loans, subsidies, grants etc. for the society toward reinvestment in the development of SSD, agricultural productivity and reclamation of saline soils;

	v) To take any official and legal action deemed necessary to achieve the above mentioned objectives
Aims	1. Increasing agricultural production and reclamation of saline land, 2. Adoption of improved methods of water and land management, 3. Monitoring the ground water level; quality of land and water and crop yields, 4. Reuse of the effluent for irrigation, 5. Involving women of the member households in the management and functions of the society,
Membership	Farmers, both men and women, who own or have land under their control under the jurisdiction of the Society and their spouse, above 18 years of age and sound of mind are eligible for membership, Members have to pay non refundable fee of RS. 21/-, Farmers and their spouses who lose possession of land automatically cease to be members, The ADO (Soil Conservation) of the respective area shall be the ex-officio member of the society.
General Body	All members together constitute the General Body and any decision of the General Body is binding and final, The General Body has the power to prepare and amend the bylaws, An annual meeting of the Society will be conducted during September every year. Special meetings can be

	convened whenever need arises. At least seven days notice will be given for holding the meeting,
	To pass proposal for amendment of the bylaws, vote of at least sixty percent of all members present is required.
Executive Committee	The general Body will elect at least seven members to the Executive Committee for one financial year,
	The ADO from APO office will be ex-official member of the society who will be responsible to check the registers and other records maintained by the society,
Funds	Funds can be raised by the Society for its functioning in several ways, such as : 1. Membership fee, annual fee, or land fee; 2. Proportion of crops; 3. Fines; 4. Donations from well wishers; 5. Loans from banking institutions, etc. 6. Funds from HOPP, Govt. and other agencies, 7. The Functioning of the society will be on a no-loss and no-profit basis.
Relation to HOPP and Government	HOPP-Dept of Agriculture Haryana Officials shall have the right to verify the records and accounts of the society at any point,
	On the dissolution of the Society, all its assets and liabilities shall vest with HOPP-Dept. Of Agriculture Haryana

The society is registered under the societies registration Act, 1860 and all provisions of the said act are applicable to the society.

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