Social and Economic Issues in the Salinity Affected Areas in Poorna Basin: An overview

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I. Introduction:

Poorna river rises in Satpura hills in Betul district of MP, meanders its course first southwards and then north westwards to eventually meet Tapti near Edlabad in Jalgaon district. The elliptically shaped Poorna basin is about 170 km E-W and about 55 km NS. Its geographic area is 7500 sq km. The basin lies in Akola, Amarawati and Buldhana districts of Vidarbha. Bound in the North by Satpura hills and in the South by Poorna and its tributaries, the basin comprises of alluvial soils deposited over Centuries. Of the 7500 sq km area of the basin, some 2700 sq km has severe problems of salinity. This belt is called "kharpan patta" in Marathi (meaning the tract of saline soil and ground water).

Availability of water often determines the nature and level of social development of a region. The Poorna basin lying in Western Vidarbha has unique features in the whole of the country in that a deeply inland area has extremely high innate soil and water salinity. A huge expanse of land mass of otherwise exceptionally high soil fertility has come to degenerate into near wastelands due to the high dissolved salts in the underground water, salts that often leach up to the surface.

The saline belt of the Poorna basin covers eight hundred and ninety four villages of sixteen tehsils of the three districts named above.[2] Prior to this estimate made in the nineties, it was assessed five hundred and forty five villages as suffering from the problem of salinity in fourteen tehsils in the three districts. These villages suffer an acute problem of drinking water. Even though the annual precipitation averages 800 mm, saline ground water forces the denizens to practice only rain fed agriculture. As a result, they are rendered vulnerable to weather induced risks and their lives are quite pathetic.

In this paper, I attempt to narrate

- the land and water situation in the saline tract,
- the cropping systems and practices,
- the characterization of the problems caused by the saline water and efforts made to alleviate them,
- the impact on farm incomes and the State measures for ameliorating the lot of the people,
- the impact on social exchange and lives of the people,
- the health problems caused by the salinity and
- the role played by the civil society organisations in the tract.

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[2] Report of the High Powered Committee on Amelioration of the Problems of the salinity Tract in the Poorna Basin of Vidarbha, (GoM) Mumbai, May 2001

For the purpose of this paper, I perused all the relevant materials including Government reports, extensively toured the whole Poorna basin for a first hand impression of the social and economic issues and conducted a formal survey of over 100 people from all strata of society in the salinity tract. I also met with NGO and other concerned persons working for the amelioration of the problems of the people here.

II. The extent of salinity tract

The tehsil wise extent of salinity affected villages is given in Table 1 below.

SN	District	Tehsil	Number of affected villages	Affected Cropped area in Ha
1	Amrawati	Amrawati	17	18471
2	aa	Bhatkuli	111	45371
3	aa	Chandur Bazar	27	9069
4	aa	Anjangaon Surji	49	21639
5	aa	Achalpur	5	2754
6	aa	Daryapur	146	76501
7	Akola	Akola	106	52608
8	aa	Akot	82	39493
9	aa	Telhara	47	27432
10	aa	Murtizapur	94	47583
11	aa	Balapur	44	26815
12	Buldhana	Jalgaon Jamod	45	20950
13		Malkapur	9	8518
		Nandura	30	19134
		Sangrampur	38	20325
		Shegaon	44	101472
Total		16	894	469222

Source: Report of the High Powered Committee

As noted earlier, prior to the submission of the report of this Committee, it was believed that the problem was restricted to 545 villages. It would thus appear that the problem caused by salinity of ground water and/or soil is spreading. Whether this is happening due to geo-physical reasons, whether this is induced by human interface or whether this reflects inclusion of new villages for mere political or administrative reasons needs to be seen.

III. The causes and the nature of the salinity problem

Though a subject of repeated and intense investigation, the pathology of existence of salinity on such a large scale has not been fully explained yet. One view consistently holds that the salinity in this tract has a marine origin. He argues that Poorna basin was a part of the Arabian sea and was connected to it via the Tapti valley. Speedier situation in the Tapti valley severed this basin from the sea. Poorna basin with its post-fault and post volcanic placement in the Eocene had come to form a salt water lake. This is the main reason of salinity. Another view considers that the saline waters are diagentically altered meteoric waters having a long residence time. Low drainage and presence of soluble salts in the soil mass are held as another anticipated reason for the high water salinity. Finally, a view holds that sluggish movement of ground water within the subsoil system of faults and aquifers is said to have caused the salinity. Current view held by specialists in the CGWB prefer the "sluggish movement" theory rather than the theory of marine origin.

Whatever be the antecedents or the causes of the a salinity, it is a fact that this salinity exists in such a large tract of land without excessive drawl of ground water (a typical cause for salinity in water as experienced in the Saurashtra and South Tamilnadu coastal areas). In fact this region has been known to be saline for all times in the popular memory of the people.[3]

IV. Features of Soil and water

4.1 Soil and Sub-soil Formations

The soil of the salinity tract is of a unique composition and texture. Said to have arisen out of deposition lava that was subsequently covered by alluvial deposits soil is deep, of a deep brown colour, very loamy and without any pebbles and stones. The soil has very low drainage capacity and porosity. The whole area is devoid of any land undulations, forests, scrubs or trees. Huge expanse of deep farm lands offer a unique panorama here. The soil has unique chemical and physical features. Though it has high innate salinity, in pockets it is extremely fertile. The deep brown soil layer is overlaid on a yellow-brown layer of varying depth. The soil composition may be summed up as sand of 4-16%, small lumps of 23-32% and loam of 54-66%. The top layer has a lower proportion of loam than the bottom layer. The soil is very prone to thermal expansion an contraction. In consequence onset of summers sees development of deep and quite broad fissures in the soil. The most important chemical feature of the soil is the occurrence of calcareous materials at all the levels. The primary porosity of the soil is low. It electrical conductivity ranges between 1.5 to 5.6 dcs/mt. The exchangeable sodium concentration associated with the soil particles ranges between 3.67 and 15.3. It rises with the depth from which soil is taken. Since the soil is made of a bulk of alluvial loamy materials, it is capable of producing excellent yields even with the minimal rains. A rainfall of barely 500 mm here is adequate o produce above average crop yields. In fact according to local farmers, kharif crops are seriously endangered in the years in which kharif rainfall exceeds 750 mm.[4] This region receives less rainfall compared to the rest of North Vidarbha and on the whole, two of every ten years are years of drought. The chemical properties of the soils here make them particularly unsuitable for irrigation. High exchangeable sodium makes the soils sodic and less permeable and unbleached salts at the top lead to further compounding of the saline ground water.

4.2 Features of ground water Poorna initially flows from North to South. It turns nearly perpendicular and starts flowing due West at the village Amla. Rivulets and streams named Chandarabhaga, Pedhi, Shahnur, Pathar, Van and Ghar flow into Poorna. The land mass has been formed by faults and depression of the alluvial deposits. The sub-terrain velocity of water is very low. The general direction of sub-terrain flows is parallel to Poorna, that is towards South and in these parts (that is before the river turns sharply West), the salinity in water is the highest. Ground water has been observed in May 1999 to occur at

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[3] For details of the technical hypothesis about the origin of salinity, see the discussion in PK Jain , "Poorna Khore Kharpan Pattyatil Adhyayan" CGWA, Nagpur 2001. Also see Jain PK, "Groundwater salinity in parts of Poorna alluvial Tract of Maharashtra", paper presented in workshop on "Rainwater Harvesting and Artificial ground water recharge" CGWA, Central Region, Nagpur, 2002

[4] Discussion with Shri Kutaskar Deshmukh, a local knowledgeable person and Secretary Poorna Vikas Mitra Mandal.

Depth below ground level	Place
1.55 in Umapur to	27.5 mt in Deolgaon (Buldhana)
5.2 in Dewarda to	18.15 Mehsang (Akola)
4.5 mt Nimbhara to	18.85in Mahimapur (Amrawati)

The map of pre-monsoon ground water availability indicates that in the saline tract ground water is available at 3 mt to 12 mt in the Northern parts, and 15 mt below ground level in the Southern parts of the basin.

V. Cropping systems of the saline tract

Of the 4.69 lakh Ha area in the affected tract, very little portion is irrigated. Surface irrigation sources are negligible here. An estimated 2123 wells irrigate a command of about 1800 Ha. The entire irrigated area is in the sweet water pockets in the Northern parts of the basin. Most of the wells are fitted with electric pumps.

The main crops of the saline tract are cotton, sorghum, pigeon pea, black gram and green gram. In the small double cropped pockets, wheat, gram and safflower are cultivated. About 40% of the kharif area is under cotton, 25% is under sorghum and the balance is planted with pulses.

Cropping pattern in 2000 of the three districts was as under

District	Area in kharif	Area in rabi
Amrawati	147413 ha	29482 ha
Akola	151428	21199
Buldhana	91998	9190
Total	390839	51600

(Naturally, the districts have areas not in the salinity tract as well.)

Assessment of the cropping pattern of the 2700 sq km area of the salinity tract as made by the Dy. Director Agriculture shows the following picture:

SN	Crop	Buldhana	Akola	Amrawati
1	Sorghum	11308	15340	10115
2	Pigeon pea	2326	10307	4336
3	Green gram	2320	23560	7642
4	Black gram	1956	5890	282
5	cotton	18259	69207	26584
6	others	2266	2946	8320
	Total kharif	38525	147250	57279
7	wheat	64	2148	833
8	gram	174	10197	8126
9	safflower	118	8243	2675
10	Rabi	356	20588	11634

Source: Dy Director, Agriculture, Amarawati, given in the workshop held by Poorna Khore Vikas Mitra Mandal, Akot, 2001.

Local farmers report that the in the past, a system of keeping the farms fallow in kharif and cultivating wheat and gram on retained moisture had prevailed. This tract was then

known for its un-irrigated wheat cultivation. However, as the population pressure mounted, kharif cultivation started increasing. As of now, about 47% area is put under cotton[5]. Cropping intensity of the saline tract is naturally lower at about 1.1 as against 1.2 for the other tract and that the proportion of land under cotton and pigeon pea is higher. Safflower and gram are cultivated under retained moisture cultivation usually without any supplementary irrigation and usually the crops are planted on those plots where pulses such as green or black gram are taken. Though the soil fertility of the saline tract is high and though it is a capable of giving good crop yields even under poor monsoon conditions, erosion of the soil and its degradation due to leaching of salts is reducing its fertility over time. The problem is compounded by increasing use of chemical fertilizers in kharif[6]. Close observation here reveals that there is an amazing absence of any kind of bunds on the soil. Vast, unbroken and flat expanse of farmlands meets the eye. Farm boundaries are not marked with the usual bunds , nor are there any contour bunds etc. As a result, run off water acquires high velocity and carries with it top soil to the streams draining the area. This leads to accelerated soil erosion. The reason for allowing run off to flow freely is that when stopped the water causes water logging leading to leaching up of salts and consequent decommissioning of the concerned farm land. The areas surrounding the saline tract (areas outside the saline tract in the same Akot, Telhara, Shegaon, Chandur Bazar, Achalpur, Anajangaon, Jalgaon Jamod, Nandura etc.) have sweet ground water and present a complete contrast with their often lush green irrigated farms or orchards. While precise estimates of yields of crops in the saline tract were not made, we were given to understand that the crop yields in most pockets are sufficiently high for a family to subsist on these lands even under a single rain fed cropping condition.

VI. Drinking water problems and Solutions

Drinking water is an essential pre-condition to settled human existence. Poor quality or insufficient drinking water leads to social tensions and can lead to mass migration. The 2700 sq km are in the saline tract has a major problem of drinking water and this problem is assuming alarming proportion over the years. The sub-soil water is completely unfit for human consumption as well as most domestic uses and hence supply of potable water is the highest priority here. As against the per capita gross water availability of 600 cu mt in Godawari and Krishna basin, the availability in Tapi is barely 525 cu mt and that in Poorna basin perhaps three fourths of the Tapi figure The problem in the salinity tract is intensified by the fact that in over 400 villages not only is the ground water saline, but soils are saline too, making surface storages impossible in many places. The salinity levels in ground water are so high that for a while before independence, well water was used for manufacturing salt! Shri Tatyarao Gawande, a senior Gandhian leader told me that when the Mahatma led the Salt Agitation with his Dandi March, they joined the agitation by making and claiming right to salt from their wells![7] It was stated that a section of the society called the kolis (the word means fishermen. In fact one denizen stated that the presence of fisher communities and names of towns such as Daryapur suggest a marine connection. This does sound a bit far fetched.) had a traditional occupation of making salt from wells and selling it in surrounding areas. The water can not be used for cooking at all. People claim that where *tur dal* is set to cook in this water

[5] Discussion with Mr. Tatyarao Gawande, a senior resident of Bhambarda in the saline tract.
[6] Discussion with Shri Zade, Amla, tehsil Bhatkuli, a senior social worker of the area.
[7] Discussion with Shri Gawande

would simply not get cooked. Not only that, when one tries to make tea with this water, the milk splits on addition to the decoction!

Earlier on, people took drinking water from such few sweet water wells that existed, or from shallow pits made in water courses (such pits were locally called *shewadi*). It appears that drinking water sources were shared equitably and with collective consensus.[8] The water in the wells in the worst affected areas was not only not potable, but it was also not suitable for cleaning utensils, bathing or washing clothes. When this water was used for construction purpose, large whitish blobs of salt would appear on walls and ceilings.

Given its scarcity, people and in particular women faced great difficulty in accessing sweet water. They would trudge miles to reach rivers, sweet water wells or shewadi in some seasonal flows. It appears that during the British Raj, villages were required to dig and make ponds that would accumulate rain water and such accumulated sweet water would be used for drinking purpose. This would never address the problem fully or adequately. The construction of sweet water tanks would not serve the purpose where soils themselves were saline. Also, the tanks would dry up by March end or so if at all they filled up in the rainy season. As a consequence, the people in salinity tract would face horrendous problems of drinking water during peak summer. Farmers, labourers, women-practically all adults would have to daily spend half the day in summers merely in obtaining potable water. The water in shewadi would normally remain sweet only upto the depth of a few feet. Its dissolved salt proportion would rise if one were to make it deeper. *Faute de millieur,* people had to settle for a slightly brackish water from the shewadi. Such brackish water, though neither potable for people like me coming from outside nor very healthy for the denizens, was called "mathe pani" in local language.

One shweadi normally yields about 80 litres of water in a day. This is normally just enough for one family. As its stock of sweet water dried up, either one had to do with *mathe pani* or one had to make another shewadi in the same or some other flow. Acute shortage of drinking water and general remoteness of sources from the resident's homesteads often tempted other people to "steal" water from the shewadi. The "owner" of the shewadi would then have to make a lockable cover to "protect" his stock of precious water. One can imagine the depravation of a society where drinking water had to be protected from thieves! This scarcity of drinking water also generated "livelihoods" for people who would undertake all the labour entailed in the steps described above for a wage. In fact commercial dealers in water also had a field day during periods of scarcity. The rates of water supply from shewadi prevailing around the 1950's as reported by Shri Kutaskar Deshmukh were 1 rupee for 4 drums of 5 gallons each. Rich farmers would make earthen storage tanks near these shewadi for watering their animals. When done commercially, charges for allowing animals to drink from a shewadi would go up to a few Rupees per week.

With the rising population and more importantly with the changing perception about the responsibility of the State to look after the basic needs of the affected population, the manifestation of the problem has changed. The basic problem of drinking water remains acute as ever. The Government of Maharashtra has initiated tapped water supply schemes in numerous villages now. The overall pattern of catering to the drinking water needs of the people of this area is:

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[8] See "Panyachi Chori-vihirila Kulup" in Daily Janvad, July 2 1992,

- Construction of jack-wells or other water holding structures in or close to river beds and their use for supplying drinking water to riparian villages and towns,
- Regional piped water schemes that connect a group of towns and villages to a source of sweet water,
- Supply of water from wells or tube wells where the desalination efforts have met with success. (desalination efforts are described a little later).

The tragedy of commons has of course hit the old system of sweet water tanks all over the region. These tanks have generally got silted up or have started yielding saline water or both. Thus an existing system that worked for a number of decades has been lost. Whenever a rare well in a village yields sweet water, the well is used for supplying drinking water to the whole village. (A gentleman named Dr. Chincholkar of Kawasa in Akot told me that his wells had saline water. But after a small earthquake that hit the region a few years back, the well water turned sweet and since then it is used by all the people of the village. The credence one places in such stories is a matter of one's own predilections!). The point remains that social custom has it that any one who has a source of sweet water will share it with all the needy who approach him for drinking water.

VII. State schemes in the saline tract

Two major schemes of the GoM in the region pertain to efforts at desalination of ground water aquifers and the Regional Piped Water supply schemes.

7.1 The Desalination Efforts: The desalination efforts launched after extensive and intensive debates and discussions among the technically qualified people were based on the belief that the cause of ground water salinity had to do with innate soil salinity of the sub-soil soil masses. Hence it was believed that if saline water were pumped out and it was slowly replace by surface water from rain precipitation, the ground water salinity would reduce over a period of time and the water may become eventually potable. To achieve this, a number of desalination wells were established and electric pumps of large capacity were established on them. The pumped out water was allowed to flow through the water courses. A scientific experiment done at village Chendkapur (Well number 13 of the desalination project) corroborated the hypothesis. Following this, the desalination project was launched in full swing from the year 1996-97[9]. The main requirement for the effort to succeed is that adequate recharge would occur from natural precipitation. This fails to happen when adequate rainfall is not received or its distribution is such that little recharge occurs. As it is, the soils are not porous and hence not amenable to rapid ground water recharge. Assessing the high probability of success if Rain God helps, the GoM has identified 342 villages in which the desalination project would be run. A sum of Rs. 2.7 crores was sanctioned by the Statutory Development Board of Vidarbha and an additional sum of Rs. 18 lakhs were given by ZP of Akola. Using these funds, a total of 132 desalination wells were sanctioned. Of the 120 tube-wells established for desalination so far, 95 are working and 9 of these are reported to be successful and the balance are under observation[10].

Though the project is meant for 342 villages, its current status is a matter of concern. Initially it was proposed that the State would construct the tube well and run the desalination well for a few months. Subsequently, the local Gram Panchayat was to take

[9] See proceedings of the workshop by Poorna Khore Vikas Mitra Mandal, Akot, 2001.
[10] See Report of the High Powered Committee, page 16.

it over. However, a large number of Sarpanchas told me that their GP simply could not pick up the bill for the electricity and O&M of the wells as they had very meager sources of revenue. As such pumping in a large number of wells has been discontinued. I was told that nearly 95% of the wells for desalination are currently out of use. I came across one village (Keliveli) in Akola tehsil where the local village development group had decided to run the desalination well by collecting people's contribution for meeting out the electricity charges and O&M expenses.

7.2 Regional Drinking Water Schemes (RWS)

The term Regional Drinking Water Scheme refers to a specific type of water supply scheme in the Poorna basin. Under such a scheme, water ground or surface is taken from the Northern part of the basin and is supplied to a group of contiguous villages. One scheme may cover twenty or even up to forty villages. The Geological Survey of India conducted its survey of this region in the fifties. Around that time, the then Central Minister for Agriculture and dion of Vidarbha region Late Panjabrao Deshmukh, had formulated a scheme that hoped to bring water from Tapti valley for supply to this area. Following his resignation on a collateral matter, no one ever followed it up and the region had to wait for state intervention in drinking water till 1966. From that time, several small and big RWS were started with Central assistance. Usually, water is pumped out of tube-wells in the Katepurna watersheds near the foothills of Satpura and conveyed 30-40 Km south to the saline tract. While the schemes were sound in original design, rise in population, rise in animal population and irregular supply are the three reasons why the schemes are not fully adequate to meet the supply needs.

The Maharashtra Jeevan Pradhikaran (MJP) reported to the High Powered Committee (as noted in their report) that till 1999 225 of the 894 problem villages have been covered and schemes for another 385 have been sanctioned and awaiting floatation of tenders under RWS. In reality, 202 villages actually receive drinking water from the schemes. The balance villages are either neglected or covered by tankers. The district wise details of the schemes supposed to be implemented now by ZP with GSDA is as follows:

Amarawati: Of the 355 affected villages in the district, it is proposed to redress the problem of 271 villages by RWS and that of 37 villages by tube wells. Thirty six villages have been assisted already in a satisfactory manner. Two hundred and twenty six villages have been covered in proposed RWS of which works for 171 are at various stages of completion. The rest are in process.

Akola: Drinking water problem of 301 affected villages (out of the 372 affected villages) is proposed to be solved through RWS. Forty three will be covered under tube well schemes. Schemes covering 103 villages are operational and those for 196 villages are in various stages of completion (this includes schemes of MJP as well as ZP).

Buldhana Of the 166 affected villages, problem of some 30 has been addressed, that of 13 I under completion and the balance are pending. The following table gives the full data:

Of the total 894 villages, 47 in Amarawati, 29 in Akola and 6 in Buldhana are recorded as without habitation

SN	District	# affected villages	# villages where problem is solved	# villages where plan is to be made	# villages where RWS/TW schemes are under completion	# total villages taken up for redressal
1	Amarawati	355	81	56	171	227
2	Akola	373	114	29	201	230
3	Buldhana	166	30	117	13	130

Source: Report of the High Powered Committee

The villages which are not covered under RWS or tube well schemes by MJP or the ZP are supplied drinking water by tankers. The popular perceptions and grievances about RWS as noted during my survey are mentioned below:

1. The source of sweet water in all RWS is the northern part of the basin adjoining Satpura hills. Each scheme shows a variant of "Head-Tail" problem. Villages closer to the source report better water supply and those towards the end of the pipeline may get water by chance. No design for equitable distribution has been implemented.
2. Gram Panchayats are expected to cover user fees or people's contribution for the scheme from each family of the village. This is seldom forthcoming. Many Sarpanchas told me that ZPs now adjust the total village contribution due from the annual grant they are supposed to give to the GP.
3. The electricity supply is erratic and hence RWS do not supply water predictably. High fluctuation in voltage leads often to burning of pumps. Thus the scheme is not reliable at all.
4. The arrangements for O&M of the RWS are fluid and as such there is gross delay in maintenance of the schemes where implemented.
5. In most of the villages, community supply taps are installed. Given the unpredictability about time and length of water supply, people have to stand in queue for an unpredictable length of time. As such there is a fair degree of discontent about the scheme. In this atmosphere, collection of water cess by GP is almost impossible. Also people want connections to each household to avoid these delays.
6. RWS covers basically human drinking water needs budgeted at 55 LPD per capita. Needs for animals, industries, shops et. are not budgeted atball. In the head region, such entities take water freely and free of cost while in the tail regions people for whom the scheme is made are deprived.
7. A large number of people and some technical experts fear that by extracting ground water from the Northern belt one may actually be assisting in export of salinity northwards.

I looked at the scheme based on Shahnoor dam. This scheme is huge. It covers two tehsil places (Daryapur and Anjangaon) and 152 villages. The scheme is planned to supply water at 55 lpd per capita for a projected population of 4.3 lakhs. These villages and towns will reach this population in 2031. The scheme is based on a dam on the river

Shanoor, located some 9 km from Anjangaon. The design storage of the dam is 12.5 million cu mt. Untreated water is conveyed by means of a canal in a tank of 1 million litres capacity. It is then conveyed by means of a pipeline to a water purification centre. A 50 lakh litres treated water tank stores the water. An elaborate system of buffer tanks and pipelines carries the water to the affected villages and towns. The beauty of the scheme is that it is almost completely based on gravity flow. Virtually no pumping is required. The scheme will hopefully recharge water and also obviate further drawn for drinking water. A sum of Rs. 95 crores has so far been spent on this scheme. Water supply has already started to the two cities and a dozen odd villages so far and the scheme will be completed by 2004. A water charge of Rs. 100 per recipient household has been levied for the installation of water meters but ehre is stiff resistance to the payment. Very little money has so far been collected. People grievously doubt the efficacy of the system and hence do not want to shell out their hard earned money. This is their version. The officials are angry and frustrated at this intransigence of the people and believe that the politicians are pampering the free-riders.

VIII. Other problems and issues in the Saline tract:

I have tried to narrate the overall physical environment and features of this region. The landscape is extremely depressing. I have also tried to briefly narrate what the State is doing. Various problems and difficulties faced by the people in consequences of the salinity are enumerated below:

Acute shortage of fodder: There are virtually no common lands that are not affected by salinity. The whole tract of the worst affected area presents a barren look. There is no grass or undergrowth, no forest, no fodder yielding trees, nothing. As such, the animals are dependent entirely on crop residues. Hence the problem of acute shortage of fodder rises almost every summer.

Health impacts of salinity are seen every where. Kidney stones is an extremely common complaint. The occurrence of this condition is far in excess of the normally observed proportion in normal circumstances. Local people also report higher incidence of problems and conditions connected with lever function and with the cardio-vascular system. Since a lot of people are still forced to drink untreated surface water (such as from the *shewadi*) , the incidence of water borne infections is very common. Use of water with high salts also has its effect on the skin. Finally, the barren topography, the hopeless future and the seemingly unending problem of daily drinking water has taken its toll and the local people believe that there is much higher occurrence of mental depression and other conditions of mental health[11]

Problems faced by women:

As elsewhere, bringing drinking water is a typical chore of the women folk here too. Thus the worst sufferers of the salinity problem have always been women of this area. For centuries here the women have spent their life time in just searching and conveying drinking water collected with great care and pains. It is as though the picture of a woman trudging miles with a *ghagar* of water on her head represents this region through the Centuries!. Women, accompanied by their children take water from surface water sources, shewadis etc and trudge niles in hot summer in a barren tract with no trees to offer them shade on the way. As a result, the women folk here suffer many health conditions.

IX. Civil Society and NGO

What I found most inexplicable is the near complete absence of civil society organizations and NGO working on the theme of drinking water in this area. I visited every possible tehsil and discussed with all the knowledgeable persons, but did not come across any one mentioning the work of NGO in designing or implementing any programme for the amelioration of the drinking water issues. NGO such as "Poorna Khore Vikas Mitra Mandal" as wll as "Poorna Khore Vikas Sangharsh Samiti"etc have been engaged in activities such as awareness generation regarding issues facing the region, holding workshops, building pressure group actions etc. For example, they coordinated the workshop at Akot in 2001. Many of them joined hands and raised voice to make the GoM take notice of the problem and appoint a High Powered Committee. But neither that NGO nor others have worked on any concrete collective and constructive action aimed at solving the issues at any scale. After all, technologies such as construction of water tanks for storing rain water have existed for Centuries in places like Rajasthan and HP. Their near complete absence in constructive work on drinking water in this region is really surprising. What is also surprising is the complete absence of any people's organized effort at jointly addressing the issues through the platform of any CSO. In fact any social capital in this respect is prominent by its absence. I have noted how the rainwater ponds created under the British Raj have been lost and silted up. I have also noted how people have shown great reluctance to actively participate in the RWS and schemes like that for their own benefit. I have tried to narrate how people put up with great personal pains to bring drinking water through shewadi etc. Yet it is a mystery why have no collective efforts been made here. Even till this day, when half of the Gujarat NGO are trying to implement Roof Rainwater Harvesting systems etc, there is not even any awareness of these possibilities here. Why is this so? I conjecture that this absence of any voluntarism is caused by three factors. In the first place, the overall high land productivity bred an attitude of complacence in the minds of the land lord, who normally provides social leadership to the ordinary farmer. After all. his drinking water needs were met by the hard labour of his servants, often perhaps bonded labourers. While I have not

[11] Discussion with several medical practitioners, notably Dr. Datkar of Chohatta Bazar)

investigated the matter, I would conjecture existence of somewhat feudalistic land holding pattern here, perhaps more pronounced than the rest of Varhad.[12]. Secondly, for many years in the nineteenth Century, this region remained under the misrule and confused rule between Nizam, the Bhosalas and the East India Company. And this meant near complete neglect of the grass root problem by the rapacious revenue collectors. This attitude, albeit unchecked by the insensitivity of the feudal lords evolved into an institutionalised neglect of the places. After all, the British rules were able to address the issue by a simple dictate of requiring rain water ponds to be made in many places. Why could this not happen every where? And why could this not continue over the decades? I suspect that the third and perhaps the most crucial factor is the attitude of helpless resignation and hopelessness that seems so common here. When people believe that a problem simply can not be solved or at any rate can not be solved by them, they stop even thinking of solving it. What then remains is individual coping for sheer survival. I think this explains why people do not believe that the modern day technologies will work, do not think it is worth their while to contribute or even get together to make things happen. The salinity seems to affect the feeling of can-do and people are hopelessly locked forever in their firm belief of external locus of control destiny or fate!

[12] See a for a brief discussion of Varhad's land tenure, SJ Phansalkar, "Political Economy of Ground water Development"