

TREATMENT OF UNCULTIVATED LAND UNDER  
WATERSHED DEVELOPMENT APPROACH ;  
INSTITUTIONAL AND ECONOMIC ASPECTS

R S DESHPANDE AND S R NIKUMBH

GOKHALE INSTITUTE OF POLITICS AND ECONOMICS

PUNE - 411 004

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### ACKNOWLEDGEMENT

This work was undertaken by the first author under the overall guidance of Professor M.V. Nadkarni for the project. This is one of the links in the continued research theme of the author. Our grateful thanks are due to Professor Nadkarni for initiating the work. Dr. Alfred Frischknecht of Swiss Development Corporation had given his detailed comments on the substantive part of this work. I am grateful to him. My friends Dr. M.G. Chandrakanth, Dr. V.R. Reddy, Dr. Badri Narayanan offered many suggestions and I incorporated some of them. My sincere thanks are due to them for the encouragement. The Financial support was provided by Institute for Social and Economic Change, Bangalore. We are thankful to the Director ISEC for the academic and financial support. I am happy to record my gratitude to the Director, Gokhale Institute of Politics and Economics, Pune for continuous encouragement. Administrative staff both at ISEC and GIPE helped in many respects. I am grateful to them. The field work of the project was carried<sup>out</sup> by Shri Nikumbh, Shri Ranganatha and Shri Jaisheela. I must put on record their ungrudging assistance. The usual disclaimers apply here too.

R.S. Deshpande.

## TREATMENT OF UNCULTIVATED LAND UNDER WATERSHED DEVELOPMENT

### APPROACH : INSTITUTIONAL AND ECONOMIC ASPECTS

#### I. INTRODUCTION :

Sustainability of the growth obtained after mid sixties has posed a challenge to developmental thinkers on three frontiers. Firstly, on one hand we had the technological options across the shelf and the by-passed regions as well as classes were on the other hand. This posed a formidable mismatch under present structural conditions. Secondly, the fragile resource regions are not exactly suitable <sup>and</sup> do not offer material suitable for the technological philosophy of early seventies developed under extremely diverse situation. Lastly, the rate of economic depletion of resources especially land, if not averted, may cause a set back for any policy solution. Under these circumstances, planning the use of resources obtains a prime position in developmental scenario. Hanumantha Rao pointed out that under the different agrarian situations prevailing in the country, only with the exclusion of the "most dynamic zone", the remaining regions are extremely degraded and these regions, constitute the economic base for the bulk of the poor (Rao, 1988). His

analysis brings out the necessity of land augmenting and land-saving technological changes with ecological balance. In other words the basic solution about sustainable development emanates from proper land use planning for the fragile resource regions.

Land - use planning always focussed more on the cultivated land mass and forests leaving uncultivated land as an incidental outcome. It is well recognised now that the uncultivated land resource poses difficult ecological problems due to consistent degradation.

In the case of depleting soil structure and cumulative accumulation of wastelands, the inter temporal use rates and their differentials become important. Wantrup's questions viz; Is there a social optimum in the inter-temporal distribution of use rates? Whether, why and under what conditions conflicts exist between an inter-temporal distribution of these rates assume large significance (Wantrup, 1968, p.22). Under Indian context, the economic effects of social institutions are undoubtedly widely diffused than the effects of economic policy. This underscores our approach of analysing the wasteland development scenario on the background of changing



institutional structure. The history of social institutions in India and their interface with economic policy is replete with interesting issues. For example : ill defined and indefinite property rights in some regions along with the agrarian reforms under different institutional regimes have given rise to a complex of ownership. A large proportion of uncultivated land arises due to such imperfections. The analysis of waste lands in the cross-institutional environs and over the decision system above, would lead to some definite policy clues. Bromley and Szarleta categorised resources by institutional structures. In a particular society, institutional changes condition the natural resource structure across zones (based on criticality of use rate). Therefore, technologies, resources and eco-systems should be studied in the context of changing institutional structure. While matching the eco-developmental objectives with the social system, the resource control centres must make appropriate choices about use rates. (Bromley and Szarleta, 1986).

Further, under the pressure, the economic linkages between cultivated and uncultivated area are getting distorted. This happened due to a long cumulative decision making process, prominent determinants among many are - i.

the type of ownership (Common property, Open access and Private property); ii. population pressure and resulting scarcity of resources; iii. misguided commercialisation; iv. emerging market forces furthering lopsided land use; v. collapse of binding institutions; vi. technological changes under non-conducive environment and vii. other structural changes (Jodha, 1990 and Nadkarni, 1989). Given all these factors, it is not surprising that more than 2 lakh sq. kms area comes under different categories of waste lands and forms more than one fifth of the geographical area (NRSA,

**Table 1 :Proposed Land Use Planning by 2000 AD**

	Area in million Hectares	
	1980	2000
Forests	67.4	115.0
Grass Lands	12.0	22.0
Other Nonusable Lands	90.1	16.5
Urbanisation and Other Uses	19.5	25.5
Net Sown Area	140.0	150.0

(Source : National Land Use Policy, quoted by Bali, JS. Soil & Water conservation, ARPU Tech. Paper 3)

wasteland Report). Even excluding the snow covered regions, deserts and the sheet rock area, the remaining usable wasteland forms a sizeable part of the resource. National land use policy envisaged the land use shifts indicated in the table which will have to be brought about with a strong land and water management programme. It is quite clear that the land use policy document proposed to utilise 74 million hectares of uncultivated lands by bringing about 60 million hectares under silvi-pastoral systems in about two decades<sup>1</sup>. \* A huge task indeed !

One of the dominant variables which is a cause, as well as offers the solution for the problem is the type of ownership of land<sup>2</sup>. Most of the uncultivated land falls under public ownership which can either be categorised as Common Property Resource (CPR) or Open Access Resource (OAR). Studies on CPR are unanimous about their level of degradation, significant role in the eco-system and the potential economic value. Bromley and Cernea ( 1989 ) demonstrated the economic value of commons. Hardin's often quoted pronouncement that whenever, many individuals freely use CPR, it is doomed to be degraded and will bring ruin to

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\* Notes at the end of the text

all (Hardin, 1968), forms the theme of many arguments. World bank analysts went ahead arguing privatisation of CPR by bringing them under different programmes. Strong observations were made against such approach on account of the probable impact on beneficiaries (mostly poor) (Gupta, 1986) and the very philosophy of the approach (Adams 1990).

CPR management systems under public policy framework show a bright theoretically productive perspective but suffer from unwieldy bureaucracies, lower public participation and extreme resource crunch. In a similar theme, it was argued that the policy approach towards symptoms of degradation of commons are often mistaken as causes (Adams 1990). That is when pastoralists (often poor) are restricted from utilisation of the land that they have traditionally used, their tendency would be either shift to virgin pastures or seek new vocation. This creates a new degraded patch or loss of welfare. Further, such approach always causes a rebound for the often sought participation of this group. The motivation towards maintaining CPR can come only in the form of an economic stake represented either by a secure tenure or institutional arrangement. Studies have shown deleterious

effects, that lack of secured land tenure, has had on local participation rates in the environmental rehabilitation (Stahl, 1990).

People who rely on natural resources tend to develop a framework to sustain the stream of benefits given least interference from the unmatching systems. On a social group level, resource management systems get formalised under economic or ecological stress conditions sans external "fire fighting" approach. There are numerous examples of such traditional institutions existing and maintaining the natural resource base. Literature on these social institutions provides clues for proper management of eco-systems (Nadkarni 1989, Gadgil, 1985, Gadgil and Vartak 1976, Sankhala and Jackson 1985). In addition to these explicit social controls, there are instances of institutional frames emerging only when over exploitation threatens to degrade the resource base. Where, still extant today, these systems involve elaborate social, technological and economic mechanisms to restrain the over exploitation of resources especially land and water. Even under the traditional village set up, the beneficiaries of commons had a typical "tenurial" arrangement with an "unknown landlord". Under these the

beneficiaries were to share the economic gains from the commons and in return tend these lands to sustain their productivity in the form of an "imaginary rent paid" to the "imaginary landlord". It however, should be clear that the most fragile institutional mechanism can emerge with the intervention from policy makers especially when there exists a long standing duality between policy makers and beneficiaries. Such governmental intervention may not generate a conducive institutional framework.

- \* -

## II APPROACH :

Present environmental problems pose a challenge to our thinking habits, conceptual framework about developmental complexities and analytical methodology. On the background of Caldwell's (1982) "Methodological Pluralism", Peter Soderbaum (1990) suggested an approach of "Paradigmatic Pluralism" for analysing environmental issues. The nature of environmental problems is : multidisciplinary, multidimensional, non-monetary as well as monetary physical and socio-cultural and hence offer a complex decision environment. These also extend beyond the actors involved in market transactions. Hence, institutional economics with paradigmatic pluralism offers holistic, exemplified, interdisciplinary approach against only the neo-classical framework (Soderbaum, 1990). A study of environmental (uncultivated land in this case) degradation must take note of the failure and re-emergence of social institutional structure. These therefore, are of fundamental interest to conservation policy. More often, though wrongly, social institutions are interpreted as a residual agglomeration of past social actions; a fine cut definition of a social institution is difficult. Economic forces are strongly

conditioned and interact with social institutions at times, effecting inherent definitional conflicts. Since, these institutions have important influences on property rights, they in turn affect the conservation decisions through uncertainty, if property rights are unstable. Therefore, social village institutions are of fundamental interest to our analysis.

In the present study, we intend to focus on the economic and institutional aspects of treatment of uncultivated lands. Uncultivated lands constitute other fallows, culturable wastes, forest fallows, land not suitable for agriculture and degraded forest lands. There are five major factors determining the behaviour of this land use group. Firstly, over-exploitation of the cultivated land without proper replenishment of nutrients and improper crop rotations causes severe degradation pushing portions out of cultivation. Secondly, improper land and water management methods with a total disregard to the type of soil and topography causes severe losses of the top soil. Thirdly, choice of the ecologically unsuitable but commercially attractive cropping system pushes marginal lands out of cultivation at the



fastest rate. Fourthly, the one way dependence on the forests and pastures also degrade and balden the lands due to lack of replacement. Lastly, the collapse of the village level institutions governing land and water management along with little scope for revitalisation of old or emergence of new institutions also leave the marginal lands uncared. Certainly, there were attempts at providing some developmental institutions at village levels (panchayat's, village committees etc.) but perhaps their priorities and roles set up for participation did not provide for any aggregate land use planning. Possibly, either the group whose interests were tied with the commons (uncultivated commons), did not get adequate representation in such bodies or the interests of these institutions were totally opposite.

The problem posed before us can thus be summarised as bringing the uncultivated land into the mainstream of development by transferring its' role as "dead weight" to "net contributor". Given the method of emergence of the problem and its' continuation, a natural choice is to look at the uncultivated land in the form of entire land use system. In other words, the economic use of these lands can not be visualised in isolation because both the emergence and

economic uses are tied with the other sections of land use policy. Since water and soil are the basic organically interconnected resources, it becomes necessary to categorise the eco-systems on this count in order to analyse the culturing practices.

Watershed is an eco-unit defined by keeping land and water as nucleus themes. It is a 'resource region' where the two basic resources interact with each other to generate bio-systems under suitable ecological precincts. To quote Barrow (1988): "It is not ephemeral in the way administrative districts might be, within watershed physical and biological resources are linked by a complex of processes, changes in any of them can cause serious effects on others". Hence, treatment of any biological resource in isolation and without considering the contours (developmental and bio-physical) of watershed will not yield intended results. Management of eco-system on the basis of a watershed is both ecologically sound and operationally viable.

In any watershed we find five broad agro-eco-systems viz., i. Ridge portion with shallow soil cover, ii. Steep sloping degraded lands, iii. Moderately sloping lands with

medium depth of soil, iv. Rainfed low lying region with medium soil depth, v. Flat low lying lands situated near the water sources with good soil depth and vegetation (Deshpande and Reddy, 1991). Uncultivated lands occur in all the situations but more prominent under the first three agro-eco systems. Generally, the uncultivated lands in the low lying areas are under private ownership whereas those on the upper slopes are under public holding. The technical treatments of the uncultivated lands in the first three regions include i. contour and graded bunds, ii. Gully and ravine check structures, iii. training of water flows, iv. Silvi-pastoral systems (combination of fast growing, sturdy and economic varieties), v. Horti-pastoral systems. This is a most generalised form of treatment classification. Specific bio-systems would be dictated by the parameters of the habitat. Watershed being a bio-ecological classification, the treatments fall in the broad bio-ecological sciences. But the components of these treatments and their interaction with people in the process brings it under the premise of institutional economics.

**Table 2 : Categorywise Estimates of Wastelands in Maharashtra and Karnataka**

sr.no.	Category	Maharashtra	Karnataka
1	Gullied and/or ravinous land	2.73	2.36
2	land with or without sourb	46.44	43.02
3	Under utilised/degraded notified forest land	28.17	42.36
4	Degraded pastures/grazing land	5.26	0.83
5	Degraded land under Plantation crop	2.68	0.33
6	Sands desertic/Coastal	0.20	0.25
7	Barren Rocky/Stony waste/ sheet rock area	7.73	10.63
8	Steep slopping area	5.30	0.03
9	Other wasteland area	1.48	0.19
10	Total wasteland area	25607.23 (20.85)	11833.17 (15.20)

- Note : (1) Rows 1 to 8 are percent to total wasteland area in respective states  
(2) Figures in parantheses in row 9 are percent to total Geographical area  
(3) The estimates are for 10 districts of Maharashtra and 8 districts of Karnataka  
(4) Source : NRSA, Wastelands in India, 1989

Thus far we have reviewed four essential factors as pre-conditions for the analysis of an under utilisation of

land : Viz. i. Land use and degradation of eco-system, ii. Uncultivated land and its role, iii. institutional interventions, iv. approach to the analysis. Keeping in view the above discussion, the present study endeavours to analyse following specific objectives :

1. What is the nature and operation of the symbiotic relationship between cultivated and uncultivated lands?
2. What are the operational aspects of treatment of uncultivated land under watershed approach and their working under different operational conditions?
3. How the treatment of uncultivated land and the responses differ under different institutional alternatives?
4. What are the operational constraints under different institutional framework ?

### III SETTING :

At the state level programmes of the treatment of uncultivated land has received fairly good attention in the watershed development programme of Karnataka. As between the two states, Maharashtra has larger area under uncultivated lands, as well as waste lands compared to Karnataka. (see table 2 and appendix tables). At the same time it is important to observe that the treatment of uncultivated lands has received larger attention in the watershed Development Programme of Karnataka than the COWDEP Programme of Maharashtra. (Appendix table II(A) and II (B)) .

Keeping this in view along with the broad objectives of the proposed study, we chose four different situations of which the first two were voluntary efforts, developing watersheds by entreating a proper institutional framework within the present structure<sup>3</sup>. Though these two situations have some similarity they differ on certain finer issues. The next two situations are the Government initiated watershed programmes in the States of Maharashtra and Karnataka. The analysis offers not only contrasts between the projects oriented Government schemes and voluntary efforts under emerging institutional framework


but also between different approaches within these two groups. We selected Sadalli micro watershed from Chitravati watershed area of Karnataka and Mokhada (Ase.-Poshera) micro watershed from Thane district of Maharashtra. Sadalli watershed is undertaken for development under State Dry Land Development Board of Karnataka whereas, the Mokhada watershed comes under Comprehensive Watershed Development Programme (COWDEP) of Maharashtra. The village watersheds taken for analysis under voluntary sector with emerging institutional framework are Adgaon and Ralegan Shindi (in Aurangabad and Ahmednagar districts of Maharashtra respectively). We sketch below the broad setting of these four situations.

### III.1. Sadalli Watershed :

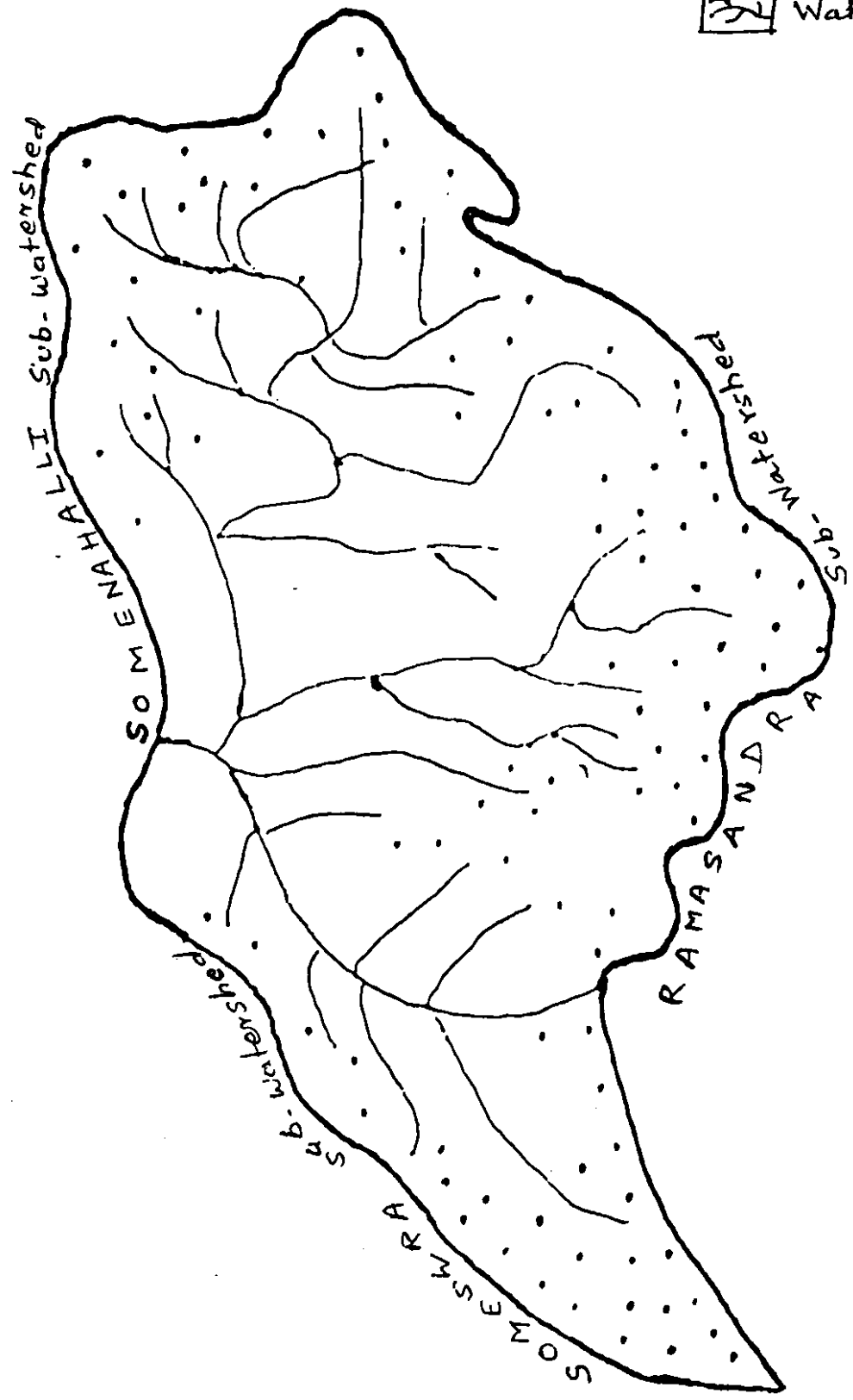
Government of Karnataka initiated an ambitious programme under Dry Land Development Board in all the districts of the State by taking up a watershed of about 30 thousand hectares each for development. Administrative set up for development of watershed in Karnataka is different as compared to other States. Here, each of the watershed has a Project Director, who works in close co-ordination with the Divisional Commissioner. The Project Director is helped by a

Fig 3-1 : Land Treatment Map : Sadalli Watershed (sub).

Legend :

-  Treated  
Uncultivated  
Land
-  Water ways

N ↑





team of technical experts from different disciplines viz., agriculture, horticulture, forestry soil-conservation and statistics. Hence, it is a technically well represented team. Sadalli watershed is a part of Chitravati watershed and was taken up for development in the 2nd phase work. It is categorised as fully tackled (GOK, 1990). It covers thirteen villages and geographical area of 4001 ha. The cultivated land under the watershed is above two thousand hectares and about eight hundred hectares are classified as waste land. It has about eight percent of forest area and 20 percent waste land of which major portion is extremely degraded. The activities undertaken for treatment of uncultivated lands include i. Block Plantation, ii. Plantation on Private lands, iii. Fodder farms, iv. Hemata seeds sown on soil conservation work, v. Road side Plantation, vi. Vegetative gully checks, vii. Gully revitment, viii. Ravine control Structure, ix. Water ways, x. Masonary Gully checks, xi. Silvi-Horti plantation on community lands and in schools. Though the number of activities undertaken are numerous their concentration is not very extensive. ( see map 3.1)

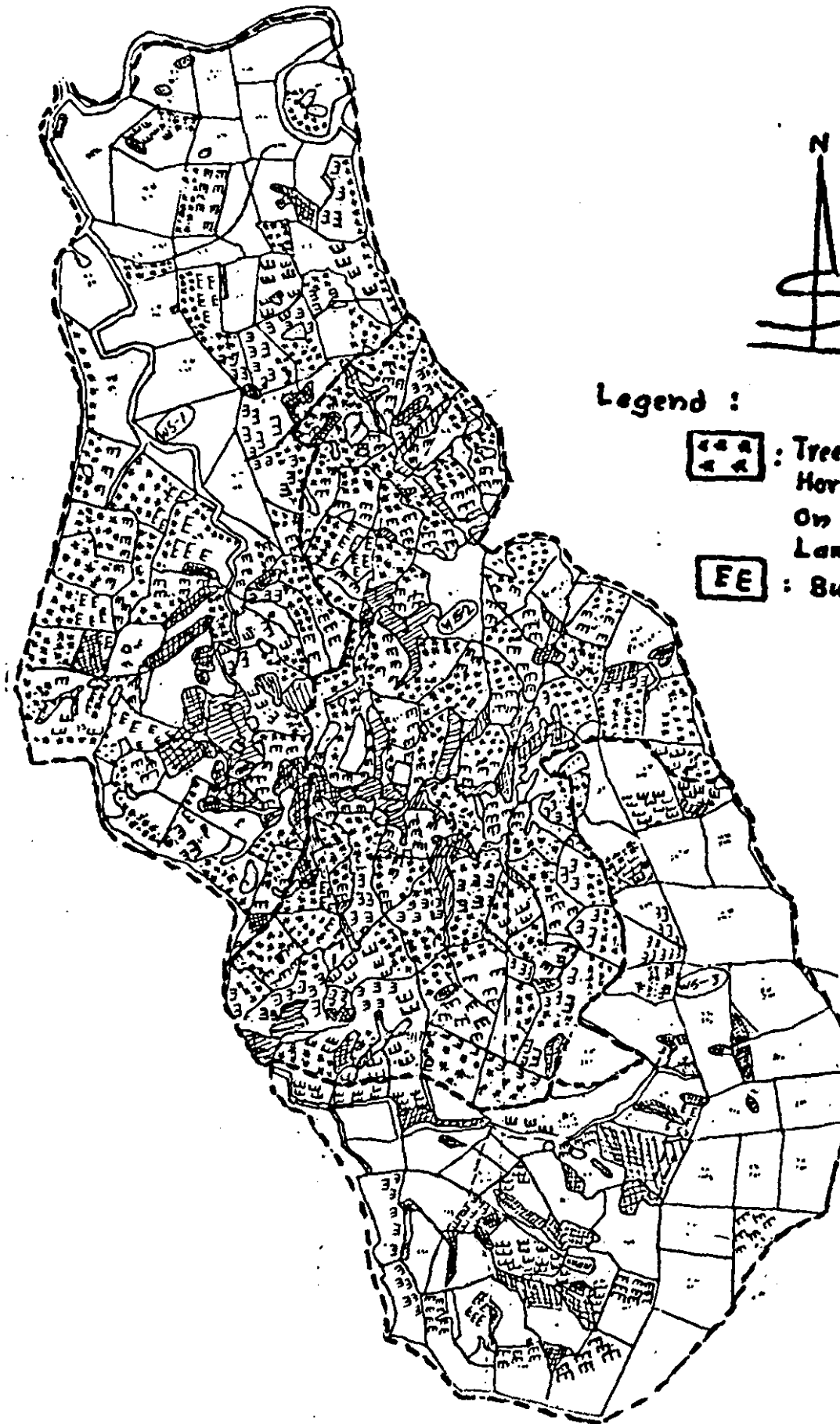
Sadalli watershed offers a case of well designed Governmental programme with technical inputs. However, the

programme did not have an explicit component of enlisting participation though implicitly it was derived through night meetings in the villages and contact farmers. Hence, on the count of participation this experiment would not be at very high level.



### III.2. Mokhada Watershed :

Mokhada comes under Thane district of Maharashtra and is situated on the eastern slopes of Western Sahyadri ranges. The area is inhabited mostly by tribals and the economy is forest dependent economy. The selected watershed is divided in to two sub-watersheds viz., Ase and Poshera villages and covers about a thousand hectares of land.(see map 3.2.1 and 3.2.2) Major portion of this comes under cultivated area with terraced fields. The proportion of cultivated land is about forty percent with more than 30 percent of its area coming under forest. The proportion of waste land is less than 10 percent but the degradation of forest area is increasing. Government of Maharashtra had initiated Comprehensive Watershed Development Programme (COWDEP) in 1982 under the administrative responsibility of Soil Conservation Department, working under Directorate of

Fig. 3-2-1 : Land Treatment Map : Poshera (Mokhada)



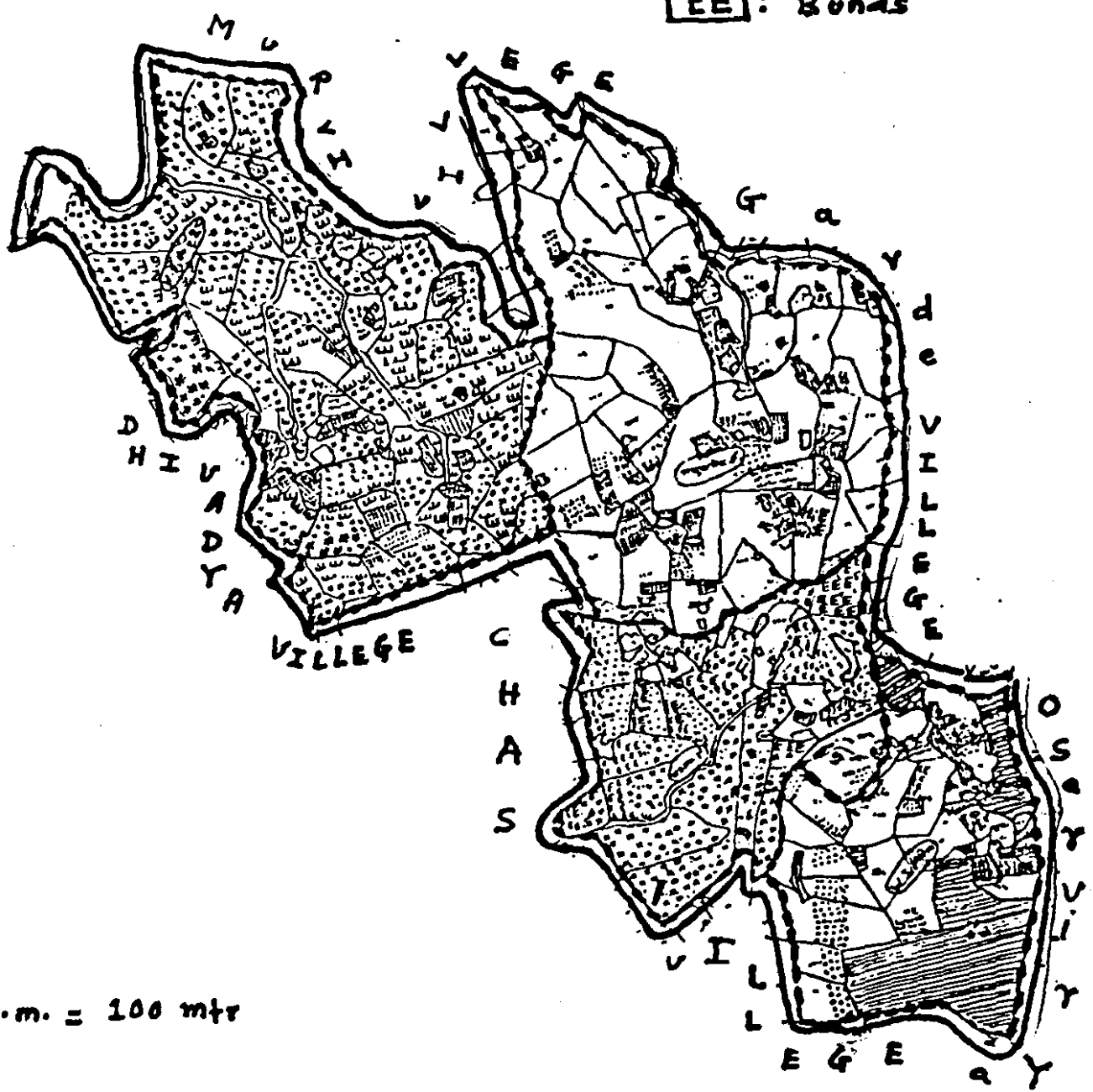
Legend :

-  : Trees and Horticultural Crops On uncultivated Land.
-  : Bunds

14.3.2.2 : Land Treatment Map : Ase (Mokhada)

Legend:

- \*\*\*  
\*\*\* : Trees and horticultural crops on uncultivated Land
- EE : Bunds



Scale : 1 c.m. = 100 mtr

Agriculture. It was not surprising hence, that the COWDEP was more directed towards soil conservation measures rather than other equally relevant components of watershed treatment. In other words, the spread of components (if any) was more incidental than designed.

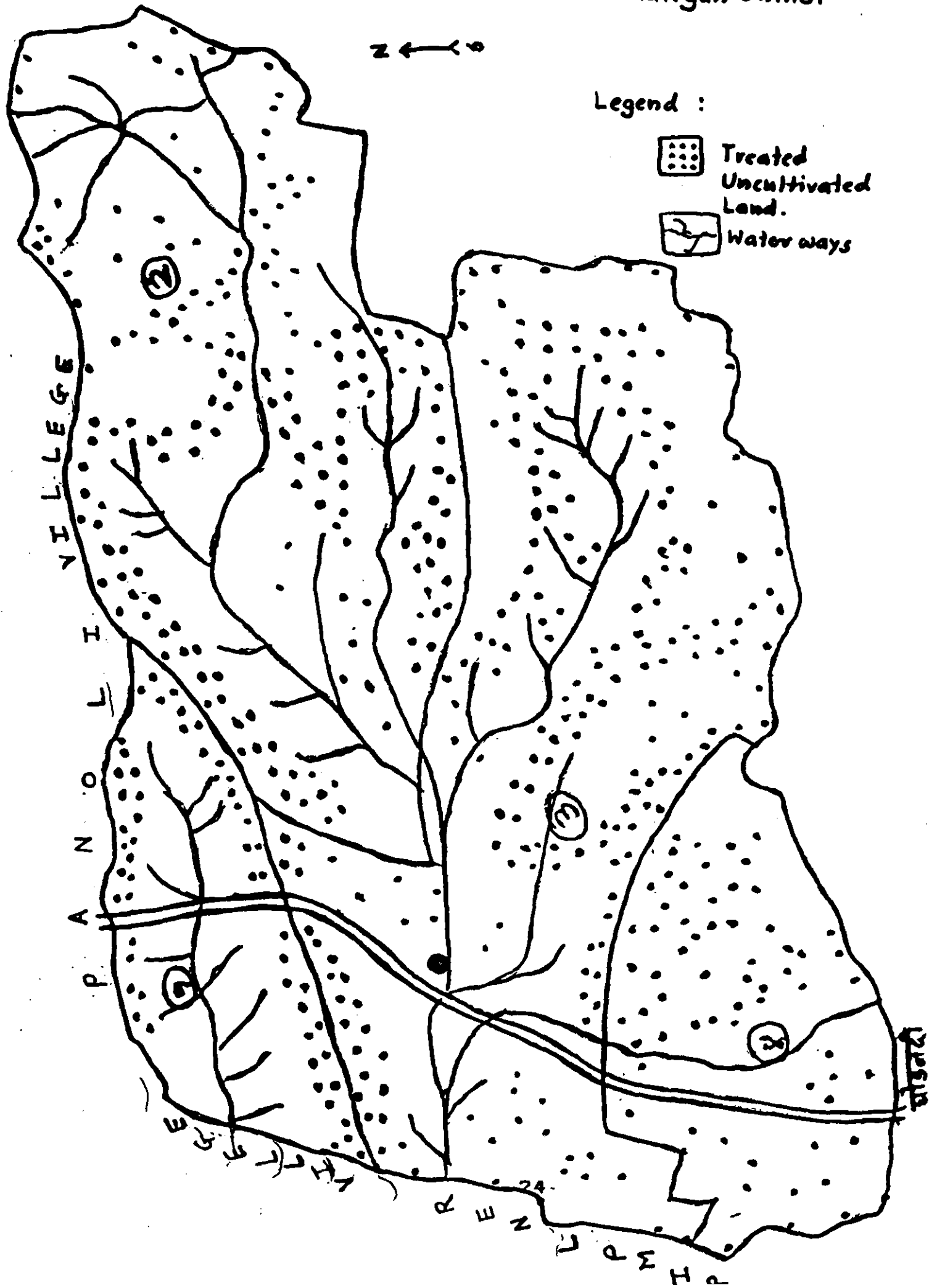
Mokhada poses a situation where the population is directly dependent on non-agricultural profession, more so on uncultivated and forest lands. The Government operated programme does not have any explicit component of treatment of uncultivated lands but the treatments are incidental in the overall programme. People's participation is neither sought nor offered voluntarily. The beneficiaries are aware of the programme but then no special efforts are made on their part to sustain the spirit of the programme. In that sense, this is a case of "Passive Participatory Process". This area shows high density of trees and horticultural crops.

### III.3 Ralegan Shindi Watershed:

Ralegan Shindi has acquired a name for itself in the development process of the country. It has featured in most of the often quoted model village development programmes. It is a small village in Parner taluka of Ahmednagar district of Maharashtra with population of less than 2000 persons and

Fig 3-3 : Land Treatment Map





: Ralegan Shindi



total geographical area of 971 hectares. About 129 hectares is waste land in the village with 137 hectares of notified forest area. This village comes under the chronic drought prone area of the state and receives annual precipitation of 450 to 500 mm. (see map 3.3)

The economic condition of the village was quite bad. Shri Hajare (a native of the same village commonly known as Anna Hajare) came to the village after his tenure of services in armed forces. Initially he started by bringing together the youth of the village, for which he used the cultural ethos of the village mass as base. The movement began with prohibition on alcoholism as its first step and slowly transcended to economic life and well being. Certain rules and regulations were operating in the village and complete authority was vested with Anna. The collective decision making process began with his initiative and a village institution was revitalised. The village did not lose much time in recognising the economic potential offered by watershed management and hence, categorised the village into four micro watersheds. The treatment of watershed began with the initiative of the villagers under the COWDEP programme.

FIG. 3.4.1: LAND TREATMENT MAP ADGAON

- HA.  
230 TREATMENT (MSSM)   
270 TREATMENT (DEPT)   
77 L.G.S. (DEPT)   
125 WASTE LAND-  
-TREATMENT (MSSM) 

SCALE 1CM = 160MTR

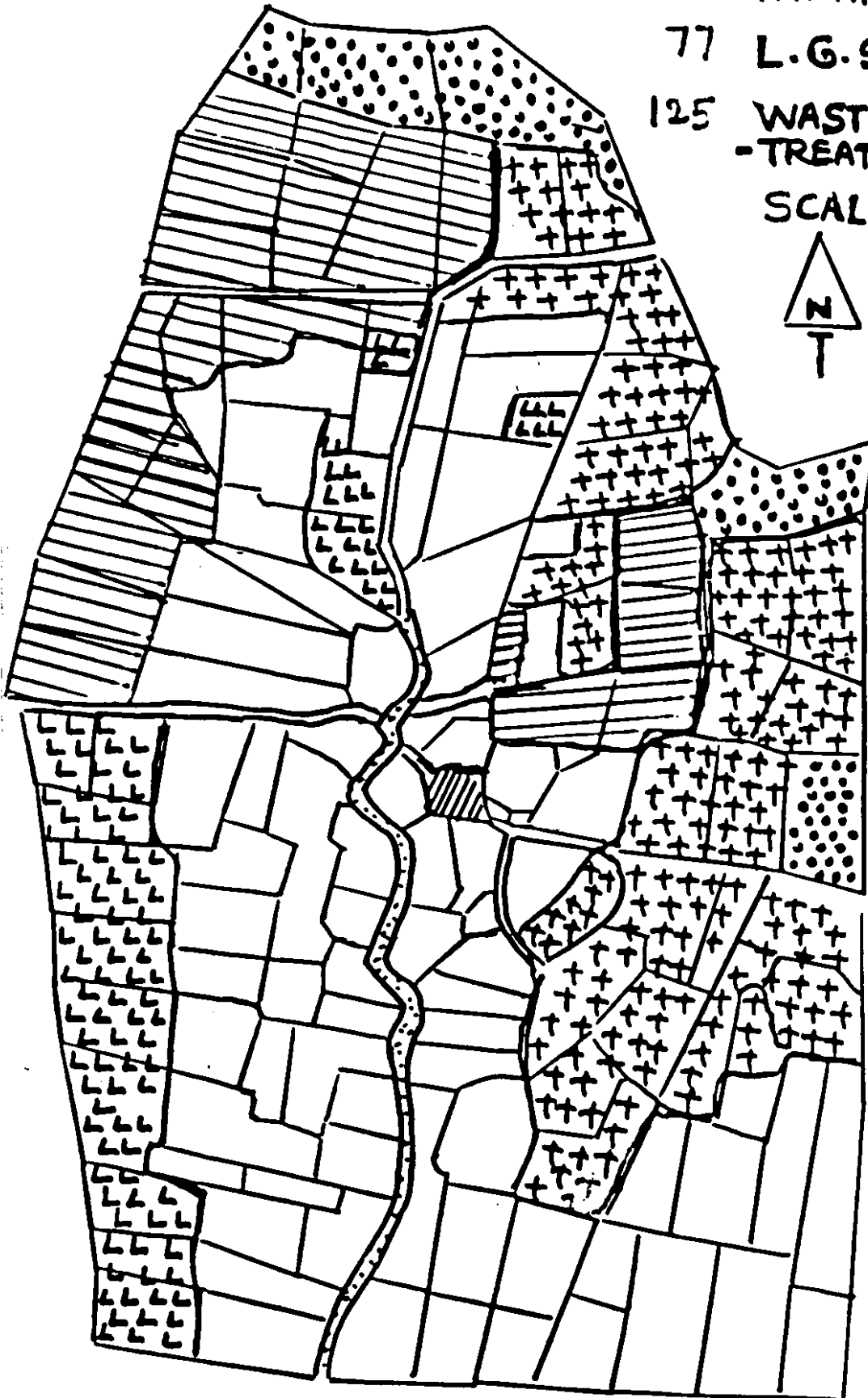
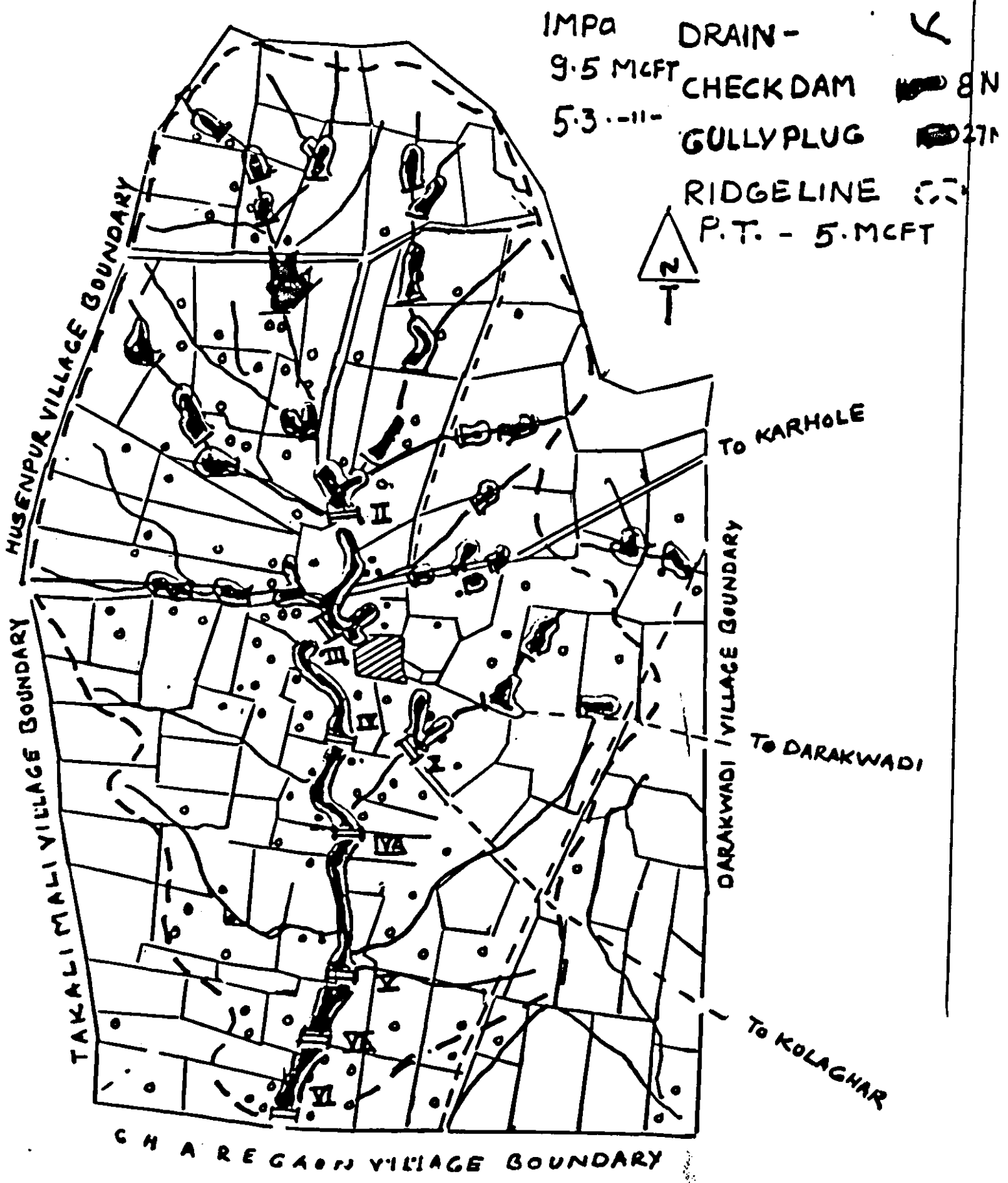




FIG. 3.4.2 : WATER CONSERVATION MAP



and lands was extremely degraded. This is also a small village with a population of less than 2000 and geographical area of 1063 hectares. More than 120 hectares were degraded waste lands and the village had sizeable notified forest area. With hardly any supportive irrigation, the production environs was subjected to chronic instability.

Shetkari Sahayak Mandal (SSM) under the guidance of Shri J.M.Gandhi and Shri Vijay Borade had started the work of organising farmers in a nearby village called Pimpalgaon. Shri Borade belonged to a closeby village and hence had many people known in the surroundings. However, it was difficult for them to bring together the people of Pimpalgaon due to various factors. Prominent among these were i. non-homogeneity of the group, ii. extreme political factions, iii. relative economic well being, iv. extreme suspicious nature, v. Reward structure (described by Miller and Hamblin 1963). and lastly vi. Social loafing and lack of groupness (illustrated by Mitchell, 1982). But the incidental outcome was that the Adgaon people invited Shri Borade and associates to their village which offered a more challenging task. The institutional framework got ready in the village group

discussions and a work on nalla bunding started under the ongoing Govt. programme. The villagers not only offered their labour for the work but also incurred certain cost for the society.

Major part of the development of watershed and treatment of uncultivated land was undertaken under one or the other Governmental programmes. But the efforts towards planning, implementation and monitoring were organised by the village society (see map 3.4.1 and 3.4.2). Apart from this, the village body also unanimously agreed on certain norms about the use of CPR and treatment of private marginal lands which were strictly adhered to. In other words, a new institutional form emerged superimposing itself on the traditional village institution and the village body defined under administrative framework. This as well as Ralegan Shindi experiments confirm to what Wantrup describes as emerging social institutions and confirm to Summers basic concepts of social institutions. (Wantrup, 1968, Summers, 1906). Hence, we refer to both Ralegan Shindi and Adgaon experiment as those of active peoples participation (APP).



is mostly derived out of the increased water table, water harvesting structures and co-operative lift irrigation schemes. Usually it is observed that when area under irrigation increases, the farmers tend to concentrate cash resources on smaller patches of land, pushing marginal lands out of cultivation (Deshpande & Ramakrishna, 1987, Deshpande, Chandrakanth and Chandrashekhar, 1986).

Basic clues offered by the regional land use patterns can be enlisted as : i. The land use pattern of Mokhada region is distinct compared with the other three regions due to its forest based economy, ii. Sadalli region has high proportion of uncultivated lands and also forest area, iii. Ralegan Shindi and Adgaon regions have a higher irrigation facilities as compared to Sadalli and Mokhada, iv. Uncultivated waste lands have been almost fully utilised in Adgaon and Ralegan as compared to Mokhada and Sadalli, v. Area under the tree crops (included in forest area to avoid definitional problems) is quite high in the Adgaon and Ralegan Shindi villages in contrast with the surrounding regions. Sadalli shows a totally reverse situation. In fact the area around Sadalli village was quite rocky and had plantation of very tender age which might not have been recorded in village statistics.

**Table 3: Land Utilisation in the selected Regions.  
(Proportion to Total Geographical Area)**

Land use category	Proportion of Area to Total Geographical in the Regions of			
	Adgaon	Ralegan Shindi	Mokhada	Sadalli
Net Cultivated Area	55.13 (46.84)	62.44 (67.03)	40.54 (43.02)	30.61 (43.87)
Irrigated Area	21.83 (21.81)	11.15 (47.87)	-	8.82 (5.83)
Unirrigated Area	33.30 (25.03)	51.29 (19.16)	40.54 (43.02)	21.79 (38.04)
Uncultivated Waste Lands	10.09 (1.88)	6.07 (-)	8.61 (2.61)	13.32 (8.04)
i. Culturable Waste	6.21 (-)	2.58 (-)	4.39 (2.61)	3.14 (1.62)
ii. Other fallows	- (-)	- (-)	3.00 (-)	2.36 (1.42)
iii. Barren Unculturable land	3.88 (1.88)	3.49 (-)	1.22 (-)	7.82 (5.00)
Permanent Pastures and Grazing Lands	4.81 (3.01)	3.06 (5.23)	0.30 (-)	11.48 (10.64)
Forests	6.84 (43.13)	3.08 (14.09)	30.46 (40.91)	20.61 (14.49)
Land Put Non Agri. Uses	3.32 (4.29)	1.16 (13.66)	2.79 (10.54)	8.81 (5.54)
Land Not Suitable for Pastures, Agri, Forests etc.	11.65 (-)	24.19 (-)	16.12 (-)	12.43 (8.82)

Note: Figures in parentheses indicate the situation of the village (central village of the watershed) whereas, those outside figures are averages of five villages in the neighbourhood of the indicated village.

The village land use pattern shows that under 'active participatory process' the uncultivated land is almost fully used as against the public programs where, such participation is taken for granted. The existing commercial farming framework of Sadalli and Mokhada precludes any active participation though there are no hindrances for the ongoing work. The participation in the earlier cases emerges both due to personal and situational characteristics as well as the group structures.

Rapid deforestation is believed to be accompanied by many undesirable environmental and socio-economic consequences. A neat distinction between ecological and social impacts of deforestation is rather arbitrary and that to speak of causes and effects is a gross oversimplification. The environmental damage and causes widely are discussed (Ives and Pitt 1988; Gradwohl and Greenberg, 1988). While there is a considerable work on the causes and consequences of deforestation, not much is written about what happens when the deforestation/degradation process is reverted and how this change takes place. Similarly, the facile explanations that deforestation is primarily caused by poverty or wasteful

consumption are mostly tautological (Nadkarni, 1989 and Gupta, 1986). In this context the institutions influencing exploitative use of commons deserve added attention. The failure of interdependence between commons and cultivated lands, between owners of forest and pasture resources and consumer, the dominant determining role of "time productivity" under the pressure of poverty have created conditions leading to failure of village institutions.

It was observed that the caring for uncultivated lands and degraded forest in Adgaon and Ralegan Shindi has rejuvenated the village institutions in a new form. Infact more often the farmers refer to common afforested and pasture lands as own lands which do not have such legal status. It can be easily misunderstood as encroachment of commons or privatisation. The treatment did not only stop with the lands under public holding but the area under private ownership also showed quite encouraging trends.

The land use pattern on own lands also follows similar pattern as that of the village land use. The two cases of active participatory process fall out distinctly in the comparison. Large portions of operated area in Mokhada and Sadalli are left uncultivated as compared to the other two

**Table 4 : Land Utilisation of the Selected Farmers.****(Percent to Operated Area)**

Land use category	Adgaon	Ralegaon Shindi	Mokhada	Sadalli
Average Size of Holding	3.06	2.20	4.35	1.75
Percent of Net Cultivated Area	94.04	92.26	52.74	89.92
Proportion of Uncultivated Land	0.96	1.74	47.26	10.08
Proportion of Land Put Under Misc.Tree Crops and Pastures	5.93	7.17	18.06	3.18
Proportion of Area Cropped More Than Once	26.91	89.98	-	5.25
Proportion of Irrigated Area	50.73	52.84	Nil	20.33
Cropping Intentsity	128	183	100	124
Irrigation Intensity	141	241	100	102

Note : Table based on the data collected from sample farmers.

cases. But in all the four regions these lands are used for tree as well as horticultural crops along with small pastures. The most common tree crops are Subabul (*Leucaena leucocephala*), Neem (*Azadirachta indica*) Ramkathi Babul



(Acacia nilotica), Israeli Babul (Acacia tortilis) Vilayati Babul (Prosopis Juliflora), Sisoo (Dalbergia sissoo) Nilgiri (Eucalyptus hybrid), Kashid (Cassia siamia), Glyricidia (Glyricidia Maculata), Limbara (Melia azadirachta) whereas, the horticultural crops included Mosambi, Chiku, Papaya, Mango, Amla, Ber and Jamun. The plantations not necessarily follow any determined design but mostly the bunds are covered and the farmers have avoided the mono tree cultures. Within, even an half acre we find varieties of tree crops. The decision making factors are fodder for the animals, wood for repairing implements and fruits for sale. Both in Ralegan Shindi and Adgaon farmers use the green manure available out of Subabul and Glyricidia for their crops. Use of Glyricidia manure and other green manure was also noted in Mokhada. But such use was not very common in Sadalli.

One important feature of plantations both on private and common lands was that in the region of active participatory process, this was guided by the village committees and with discussion among peers. Hence, the designing always had the technology of watershed treatment in the background along with the economic use of the species selected. Experience of Mokhada and Sadalli was extremely different. The emphasis

here was almost exclusively on forest plantations as a mean of combating deforestation and "programme" implementation. The programme was more often dictated from above keeping in view the availability of samplings State policies and choices of the bureaucrats. Such emphasis on plantations has tended to relegate other forest management and afforestation practices to a secondary role, even when these could have been more economic and effective in many circumstances. Their assumptions about local institutions, soils, climates available technologies, economic needs, costs and about the real alternatives of those involved were more erroneous than conducive. Hence, social afforestation programmes are less 'social' from the standpoint of local communities because they are premised on only superficial knowledge of the extant institutions. It was observed that both in Sadalli and Mokhada, choice of species (eucalyptus, honge, sissoo, jack fruit, subabul) were combined more in a random pattern without much attention paid to their linkages with the need of the type of biomass, availability period, market and social interventions. The plantations are taken up in rainy season when everyone is occupied with the crop economy

naturally their involvement is neither sought nor required.

Among the various size groups of operational holdings, the proportion of uncultivated land was larger in the higher size groups. Therefore, it was not unexpected that this group of farm households may devote larger areas of the uncultivated area for tree crops. Table 5 presents the proportion of number of trees under each size group of operational holding to total number of trees. It can be seen that the number of trees grown on uncultivated lands are more in Adgaon and Ralegan Shindi per hectare of uncultivated land. Mokhada has higher number of trees mainly due to its agro-climatic situations where, trees grow even without much attention. What strikes important here is that the farm forestry programme is a straight derivative of the social forestry in the case of Mokhada and Sadalli whereas, both in Adgaon and Ralegaon Shindi the two programmes have distinct determinants. The strong linkages between the farm and social forestry were brought out in our earlier study (Deshpande, Reddy and Borse, 1991). The methods of maintaining the commons are derived out of those practiced at own farm and the production at farm forestry and pasture supplement these obtained from commons.

It is clear from the above discussion that the programme of treatment of uncultivated lands under active participatory process has five distinctive features. Firstly, the choice

**Table 5 : Proportion of Tree Crops and Horticultural Crops By Size of Operational Holdings .**  
(Percent to Total Number of Trees)

Size Group		Adgaon	Ralegaon Shindi	Mokhada	Sadalli
Up to 1 hectare	T	-	0.46	0.09	-
	H	-	0.64	0.32	-
1 to 2 hectares	T	16.37	73.51	0.07	10.29
	H	10.60	16.23	1.59	17.64
2 to 4 hectares	T	31.66	7.36	87.06	27.95
	H	46.38	78.10	65.29	35.29
Above 4 hectares	T	51.97	18.69	12.78	61.76
	H	41.02	5.04	32.80	47.06

Note: T - Represents tree crops.  
H - Represents Horticulture crops.

of species, location and combination is fully decided by the village community. Secondly, all the local level technological and social parameters are accounted for in a broad watershed framework before planning the plantation. Thirdly, there is a strong institutional linkage between farm

and social forestry. Fourthly, a good portion of the cost of maintaining the woodlot is borne by the community and therefore the survival rate of new saplings is much higher. Lastly, both the villages have adopted a seven point charter viz,. i. trees will not be cut, ii. indiscriminate grazing is prohibited, iii. only twigs and branches fallen be collected for fuel, iv. each household is allotted responsibility to look after certain portion of the woodlot, v. each household must contribute by way of labour towards betterment of the social forestry programme, vi. energy efficient fuel be used, viii. not to keep small ruminants.

-The economic pressure on commons not only emerges out of the unsatisfactory returns from the farm economy but also due to the structure of such returns. Higher commercialisation in the farm economy most of the times leads to an improper use of uncultivated lands. A crop pattern which offers sufficient bio-mass in addition to the cash requirement is always conducive for the proper use of uncultivated CPR's and PPRs. It is not simply the pressure of local demand that draws on the biomass of the CPRs but the trends of commercialisation in the absence of institutional checks leads to such a situation. Table 6 shows the cropping

**Table 6 : Cropping Pattern on Beneficiary Farms**  
(Proportion to gross cropped area)

Crops	Adgaon	Ralegan	Mokhada	Sadalli
<b>A Kharif crops</b>				
1 Bjara	48.67	28.30	-	-
2 Moog	3.69	16.13	-	-
3 Kulith	6.81	-	0.84	-
4 Matki	3.29	3.18	-	-
5 Maize	0.68	1.66	-	1.49
6 Cotton	1.36	-	-	-
7 Rice	-	-	24.96	8.34
8 Ragi (Nagli)	-	-	36.18	38.79
9 Wari	-	-	23.91	-
10 Udid	-	-	5.43	-
11 Tur	9.53	0.46	6.22	0.66
12 Groundnut	-	-	-	37.18
<b>B Rabi Crops</b>				
1 Jowar	12.37	39.87	-	4.05
2 Wheat	4.54	3.66	-	-
3 Horsegram	0.45	0.91	-	0.50
4 Safflower	0.34	-	-	-
5 Onion	-	1.72	-	5.53
6 G.nut	-	1.49	-	-
<b>C Other</b>	<b>8.28</b>	<b>2.63</b>	<b>2.45</b>	<b>3.47</b>

pattern on cultivated lands under the four situations. Adgaon and Ralegan Shindi show a widely diversified crop pattern as against Mokhada and Sadalli. The utilisation pattern also suggests a combination of legumes with cereals

providing availability of fodder and to some extent fuel. These also do not suggest excessive commercialisation. More important is the fact that the cropping pattern under "participatory process" is arrived out of social synthesis whereas, the same under Government programmes is out of the haphazard responses.

The farm economy is closely related with the use of commons and especially the uncultivated lands. The lower the returns from farm economy, higher will be the level of exploitation of other natural resources and once this vicious circle begins, it leads to the ruin of commons. The basic components of the symbiotic relationship between farm economy and that of uncultivated land are quite known. We intend to look here as to how these components operate under the four situations. Table 7 presents these situations and the level of linkages based on the experience of ten senior villagers of the selected villages. This method allowed only qualitative information about the components since quantification was extremely difficult and such quantification cannot be brought on ordinal scale under different agro climatic situations. For example the time spent on collection of fuel and fodder in Adgaon and Ralegan Shindi is certainly larger than that

**Table 7 : Nature of the Sybiotic Relationship Between Farm Economy and Uncultivated Land**

Relation Component	Level of relationship			
	Adgaon	Ralegan Shindi	Mokhada	Sadalli
1.Availability of fodder for supporting animal husbandary	***	***	***	**
2.Availability of green manure (Glyricidia, Subabul,Honge,etc.)	**	***	***	*
3.Availability of fuel in terms of lops & tops	***	***	***	**
4.Availability of fruits from common lands	***	**	***	**
5.Savings in time spent for collection of fodder and fuel	***	***	**	***
6.Stoppage of the soil losses on steep slopes	***	***	**	***
7.Increased moisture availability and increased ground water	***	***	**	**
8.Shield against wind erosion	**	**	**	***
9.Additional Employment availability	***	***	***	**
10.Strengthening of village institution	***	***	*	*



Note : \*\*\* - indicates strong linkage; \*\* - indicates moderate linkage; \* - indicates weak linkage or no change in earlier position.  
\*\*\* - more than 70 percent villagers of the sample giving this opinion;  
\*\* - more than 50 percent villagers of the sample indicating this;  
\* - less than 50 percent villagers of the sample indicating this.

in Mokhada but the watershed treatment has brought in larger saving of time being spent earlier.

It can be seen from the table that the linkages are relatively stronger in the case of active participatory process. In Adgaon though green manure is available, it is not used so commonly as done in Mokhada. Similarly, wind erosion was never a serious problem both in Adgaon and Ralegan Shindi. Mokhada being a traditionally forest based economy offers a commendable level of linkages and in fact it represents an apt case for strengthening such linkages. The farm economy of Mokhada depends more on the supporting sector than the other three regions.

In order to analyse the strength of the farm economy as against that of the Silvi-horti-pastoral systems, we had collected the gross income out of the farm economy and that obtained from the tree crops and fruit crops. It may be

**Table 8 : Gross Income Per Hectare From Annual Crops as Against Tree Crops (Uncultivated lands)**  
(In Rs. per hectare)

Crops	Adgaon	Ralegan Shindi	Mokhada	Sadalli
<b>1. Annual crops</b>	2941	2445	2312	5701
<b>2. Fuel/Fodder Crops</b>				
Subabul	6650	2045	-	4375
Nilgiri	11000	13428	-	13048
Neem	4655	4888	-	-
Babul	11729	5047	-	-
Umbre	-	-	4687	-
Sadada	-	-	1480	-
Dhamoda	-	-	966	-
Sag	-	-	12300	-
Bambu	-	-	3200	-
Honge	-	-	-	3841
Glyricinia	3694	4313	2125	3978
<b>3. Fruit Trees</b>				
Ber	6990	4600	2138	-
Shevaga	-	5317	-	2879
Mango	8943	5945	9901	-
Mosambi	9000	-	-	-
Chiku	2300	1376	-	3984
Chinch	7500	6487	5754	-
Others	4618	4958	2734	3173

**Note:** The table shows gross income per hectare per year over the life of the tree.

noted that though the density of tree and horticultural plantation was higher, the income per hectare is lower due to the presence of immature trees. The plantations in all the situations are not monospecies and mixed as well as sporadic. This causes a difficulty in aggregating production by types of trees. Hence, by assuming standard densities of trees and horticultural plantations we computed the gross income per hectare out of the uncultivated lands for each crop.

It can be seen from table 8 that the tree crops as well as horticultural crops yield better income than annual crops and also strengthen the field crop economy. As stated earlier quite a few of the tree crops are planted in combinations and sometimes on the bunds, hence, though the per hectare income seems to be substantial, only a portion (often sizeable) is accrued to the household income. In gist, the farm forestry stays an effectively supporting farm activity though not replacing the main activity itself. The gross income figures seem to be on the lower side mainly due to the underdeveloped fruit market and difficulties in accounting for twigs and branches. We have followed the computing methods of Hegade (1987) however, it was difficult for accounting of each and every aspect. The cost of raising

a mixed plantation of the type examined here would come upto Rs. 5 thousand for establishment and about Rs.2600 of recurring cost.

It is noted above that the treatment of uncultivated land offers a substantial economic support under all the four distinct situations. The economic sustainance gathered through farm forestry also in turn helps in maintaining the social forests and pastures of the village. Questions are always raised about the management of the common lands (including uncultivated land under public holding) and the arrangements to institutionalise their use. The environmental activism begins when the very source of livelihood is threatened. The poor societies have highest incentives to manage their environment effectively and can emerge with an institutional framework. Our enquiry with the senior villagers from each of the selected locations indicated quite a few interesting issues. The theme of our enquiry was the depth of acceptance of the emerging institutional framework and its sustenance ahead. Adgaon and Ralegan Shindi experiments suggest that the societies have developed confidence in themselves and can manage their

common resources. (see table 9). On the contrary the dependence on the Government initiated programmes is borne out in the expressions obtained from Sadalli and Mokhada. Here, the respondents felt that the uncultivated lands should be managed by the Government or in other words they do not explicitly recognise the community responsibility of this resource. It is not that the dependence on uncultivated land is lower in the later two cases as compared with the Adgaon or Ralegan, but possibly the society has not come to the recognition level of its true potentials. Alternatively, it is also possible that their dependence on Government is perpetuated by the programme approach. It is interesting however, that there are about half of the respondents in Mokhada and Sadalli area who feel that institutionalisation is a suitable alternative as compared to the present approach.

There are two important aspects that provoke our inquisitiveness about the dynamics of group behaviour and dimensions of the participation. The questions are how a group gets formed? and what constitute the main features of the participatory process? While analysing the group behaviour social psychologist analyse personal

**Table 9 : Responses of Senior Villagers to the Proposed Arrangements**

(percent frequencies)

Questions	Adgaon	Ralegan Shindi	Mokhada	Sadalli
<b>1. Uncultivated land should be looked after by</b>				
i) Govt.	20	42	49	50
ii) Inst.	80	58	51	50
<b>2. Fuel requirements can be met from</b>				
i) Market source	82	58	47	52
ii) Own Source	18	42	53	48
<b>3. Fodder demand can be met from</b>				
i) Market source	20	44	64	55
ii) Own Source	80	56	36	45
<b>4. Management of village forest land can be done by</b>				
i) Govt.	32	46	52	34
ii) Inst.	68	54	48	66
<b>5. Uncultivated land can be best managed by</b>				
i) Govt.	16	36	49	57
ii) Inst.	84	64	51	43
<b>6. Community Restrictions should be enforced</b>				
i) Yes	100	90	47	56
ii) No	0	10	53	44

Note: Proportions to total number of respondents.

characteristics and environmental situations. Larger importance is attached to the level of stress (economic, social or political), type of rewards, status of problem (degradation) and the resident attitudes of the society. These have to be matched with the abilities, backgrounds, influence and level of communication of the initiator. A proper match of these characteristics leads to a group formation and its sustenance. (Mitchell, 1982). In the case of Ralegan Shindi the group clustered around a single individual and the secondary leadership has not emerged fully. But there does not seem to be any difficulty in the first periphery of leadership development due to the cohesive group behaviour. The case of Adgaon is slightly different, where the group was assembled together and the initiator was outside the ambit of the village. In such cases either the longer sustenance is automatically ensured or an immediate fall out begins.

The analysis of these participatory processes under the framework elaborated by Cohen and Uphoff (1980) suggests three important aspects. Firstly among the dimensions of participation decision making process and its implementation are quite cohesive in both the groups. The openness of the

decision process, contribution towards the resource regeneration through labour, material and close coordination indicate cohesive characteristic of the group. Secondly, the personal characteristics of the individuals are not extremely mismatching and since the participatory process takes village as a unit, the traditional institutional behaviour is revoked. Lastly, the form of participation, its extent and effect in both the places suggest an emergence of a stronger institution which would sustain if not vitiated by highly commercial or politically charged neighbourhood.



## V. RESUME :

The problem of treatment of uncultivated land assumes importance not only because these areas support the farm economy in more than one way while treated but also due to its detrimental impact on the level of degradation, it inflicts on the cultivated lands. The present paper tried to bring out the symbiotic relationship between the cultivated area and uncultivated lands under different institutional situations. Uncultivated lands being an economically important part of the overall land resource must be analysed in the perspective of a resource region. Hence, treatment of these under watershed approach can only lead to fully realise their potential. Under the broad watershed treatment regimes, the uncultivated lands are usually located on the ridge slopes and middle reach regions. The suggested treatment for these lands naturally is the development of silvi-horti-pastoral systems. Further, there are portions falling in the lower reaches and in continuity of cultivated lands. These are left out uncared mainly due to resource crunch or quality of land. Horticultural crops are best suited here under the farm forestry system.

We have taken four situations for our analysis. First, two are the cases of emerging participatory processes under

an emerging institutional framework. The latter two represent different administrative approaches- One with a higher level technical support and blue print planning whereas, the other within the existing multi-functional administrative framework. The analysis of the emerging institutional framework suggests a long term sustainability on the basis of the behavioural group dynamics. These cases also showed stronger linkages of farm economy with the uncultivated region and a continued mutual dependence. On the contrary the linkages in the Government led programmes are not weak but show a relative lower relegation. The preferences indicated by respondents clearly suggest superiority of the self binding institutions on one hand and continued economic dependence on the other.

The emergence of an ecological movement can be traced to the eminent threat to the economic well being. It comes out strongly when they are deprived of the access to the resources on which they depend, their right to use these lands are constrained from outside and other influences are abrogated. Over years, they are forced under a decision environment where, they confine only to their private ownership and their views about commons are neither called nor heeded to. Under the community management of commons each participant was provided right to decide about the probable

use under a broad institutional frame. If we, may call this a tenurial arrangement between individual decision maker and the community as a whole, then the failure of this systems leads to the uncaring of the community lands. The poor communities under conditions of economic stress find the means of managing the resources sustainably and these methods if nurtured properly can lead to a firm participatory process. The question arises then about the extreme necessity of the programme approach followed in public policy.

## NOTES

1) Before we begin to use the concepts of uncultivated land, waste lands, Land as Common property Resources, Private Property Resource, we must make clear the distinctions that we have in mind for our analysis. Firstly, we make for broad categories of land use namely, 1) Forest land 2) Cultivated land 3) Uncultivated land, 4) Land under different uses and not available for any vegetative growth. These groups can further be subdivided to match the land use classification. Essentially, we are ourselves to the present use categorisation rather than the restricting legal status of land. This avoids some of the complex issues. Taking the group of uncultivated lands which can be divided into Common Property (or open access) resource and Private property (or limited access) resources, waste lands form a subset of this entire set and it can be found both under CPR or PPR but proportionately higher under CPR. There can be a portion of waste land which is utilised for other purposes (may be uneconomic and ecologically undesired) and hence can not be termed strictly as waste lands.

2) Possibly the solution lies in assuring tenure on such

lands with controlled use. It is quite possible that under such arrangements local population would take care of the lands and forests only if <sup>a</sup> along term assurance of benefit is given.

3) It is indeed difficult to prove the underlain hypothesis about the categorical role of emerging institutions with two case studies. Incidentally both the cases have behind them a powerful person who guided the developmental efforts even sometimes forcibly against the irrational behaviour of some of the individuals. It would have been worth, had we also looked into some of the experiments where the development has taken place in the absence of such a central force. A recent book bringing many case studies together however, can help in understanding the process (see Deshpande, 1992)

**ANNEX I(A) : PHYSICAL PROGRAMME FOR TREATMENT OF UNCULTIVATED LAND UNDER DRY LAND DEVELOPMENT PROGRAMME OF KARNATAKA  
1981-94 FOREST SECTOR (NOW ARABLE LAND)**

<b>Districts</b>	<b>BLOCK PLANTATION ha</b>	<b>RAISING SEEDING FOR ABOVE LAKH</b>	<b>RAI. SEED. FOR FREE DIS</b>	<b>RAI. SEED. FOR PLANTING ON COM BUNDS/GULLIES C-DAMS &amp; MALLABUNDS LAKHS</b>	<b>RAIS. KHU SLIPS LAKHS</b>	<b>SOWING OF HEMAT ON BUNDS HECTARES</b>	<b>KHUS PLAN. ON NON LAND HECTARE</b>
BAR	245.00	7.85	0.00	2.63	16.79	0.00	0.00
BELUR	520.00	9.15	5.00	0.50	63.00	0.00	8982.00
BELURUR	83.71	2.50	0.00	3.00	23.50	3050.00	0.00
BIDGA	96.00	1.50	1.00	2.00	13.00	800.00	25.00
BIRE	86.00	2.74	2.00	4.13	39.97	1842.00	72.00
BIVYA	143.84	4.50	2.00	2.00	40.00	1063.26	75.07
BIDGU	40.00	1.50	1.50	0.00	20.00	0.00	50.00
BIDNADA	50.00	2.05	1.20	0.00	13.00	0.00	50.00
BIDGAN	103.00	4.36	1.60	0.35	50.00	2063.00	104.50
BIDKARNAGALUR	39.26	1.23	2.00	1.50	117.00	1434.00	0.00
BIDGAUM	73.00	0.20	2.50	1.90	2.50	1975.56	0.00
BIDWAR	10.00	0.50	0.50	1.00	6.00	2000.00	6.00
BIDPUR	5.65	0.90	2.14	1.62	30.66	3142.00	0.00
BIDBIDNADA	1000.00	0.40	1.00	0.00	1.00	0.00	0.00
BIDMARGA	70.00	4.00	1.00	1.00	10.00	2464.00	600.00
BIDCHUR	9.50	4.40	2.30	1.00	20.00	2300.00	0.00
BIDLARY	330.00	7.92	2.50	4.10	69.00	1614.00	10.00
BIDR	83.00	3.00	6.00	3.00	40.00	2046.00	745.00

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Districts	BLOCK PLANTATION ha	RAISING SEEDING FOR ABOVE LAKH	RAI. SEED. FOR FREE DIS	RAI. SEED. FOR PLANTING ON COM BUNDS/GULLIES C-DAMS & MALLABUNDS LAKHS	RAIS. KHU SLIPS LAKHS	SOWING OF HENAT ON BUNDS HECTARES	KHUS PLAN. ON NON LAND HECTARE
AKSHAIKUR	245.00	7.85	0.00	2.63	16.79	0.00	0.00
CHANNarayana	520.00	9.15	5.00	0.50	63.00	0.00	8902.00
CHANNarayana	83.71	2.50	0.00	3.00	23.50	3050.00	0.00
CHANNarayana	96.00	1.50	1.00	2.00	13.00	800.00	25.00
CHANNarayana	86.00	2.74	2.00	4.13	39.97	1842.00	72.00
CHANNarayana	143.04	4.50	2.00	2.00	40.00	1063.26	75.07
CHANNarayana	40.00	1.50	1.50	0.00	20.00	0.00	50.00
CHANNarayana	50.00	2.05	1.20	0.00	13.00	0.00	50.00
CHANNarayana	103.00	4.36	1.60	0.35	50.00	2063.00	104.50
CHANNarayana	39.26	1.23	2.00	1.50	117.00	1434.00	0.00
CHANNarayana	73.00	0.20	2.50	1.90	2.50	1975.56	0.00
CHANNarayana	10.00	0.50	0.50	1.00	6.00	2000.00	6.00
CHANNarayana	5.65	0.90	2.14	1.62	30.66	3142.00	0.00
CHANNarayana	1000.00	0.40	1.00	0.00	1.00	0.00	0.00
CHANNarayana	70.00	4.00	1.00	1.00	10.00	2464.00	600.00
CHANNarayana	9.50	4.40	2.30	1.00	20.00	2300.00	0.00
CHANNarayana	330.00	7.92	2.50	4.10	69.00	1614.00	10.00
CHANNarayana	83.00	3.00	6.00	3.00	40.00	2046.00	745.00

PERCENT OF CONT LANDS PLANTED HECTARE	FODDER FARMS HECTARES	VEGE. GULLY CHECK/BRUSH WOOD HECTARES	ROAD SIDE PLANTING HECTARE	PLANTING IN PVT. LANDS HECTARES	PLANTING AROUND GULLY CHECKS NOS	GULLIED TREATMENT HECTARES	REHABI. OF DEGRADED FOREST HECTARES
825.00	0.00	337.00	0.00	0.00	124.00	30.35	200.00
160.00	7.00	4450.00	7.00	10.00	0.00	0.00	375.00
2250.00	0.00	522.00	24.50	101.00	1.70	0.00	0.00
800.00	20.00	2800.00	6.00	0.00	0.00	0.00	0.00
1842.00	0.00	400.00	39.90	21.00	447.00	0.00	0.00
0.00	11.47	1095.00	0.00	34.21	0.00	0.00	0.00
0.00	0.00	1750.00	10.00	26.00	0.00	0.00	0.00
0.00	0.00	50.00	4.00	0.00	50.00	0.00	0.00
266.00	25.50	500.00	24.50	0.00	297.00	0.00	0.00
1434.00	0.00	70.00	10.00	0.00	900.00	0.00	0.00
1975.56	40.00	150.00	0.00	100.00	533.00	0.00	0.00
2000.00	5.00	100.00	0.00	6.00	500.00	105.00	0.00
3142.00	1.44	0.00	16.00	09.00	1129.00	0.00	0.00
0.00	240.00	1000.00	0.00	0.00	39.00	0.00	0.00
2464.00	5.00	1000.00	10.00	00.00	0.00	4.00	0.00
2300.00	0.00	4500.00	4.50	110.00	120.00	0.00	0.00
1614.00	10.00	2610.00	0.00	0.00	434.00	0.00	115.00
1700.00	15.00	2150.00	5.00	60.00	17.50	0.00	240.00



HORTICULTURE SECTOR (NON ARABLE LAND)

RAISING AGAVE	EQUIPMENT & MISC	EMPLOYMENT GENERATED LAKH MANDAYS	SILVI-HORTI PLANT. ON COMMU. & GOVT LAND IN HECT	ORCHARD HORT. PVT.LAND HECTARE	EMPLOYMENT GENERATED LAKH MANDAYS
1228.00	0.00	2.29	114.00	0.00	1.28
2.60	0.00	3.68	855.63	0.00	2.01
0.00	0.00	1.42	698.12	311.03	1.79
4.00	0.00	1.29	96.00	0.00	1.75
0.00	0.00	2.18	29.95	526.00	1.27
0.00	0.00	2.17	125.00	65.00	1.17
0.00	0.00	0.88	6.00	77.24	0.36
0.00	0.00	1.50	26.00	45.60	0.38
1.77	0.00	2.59	47.00	0.00	1.69
0.00	0.00	0.96	15.10	16.00	0.89
16.92	0.00	2.87	50.00	368.00	0.67
3.84	0.00	1.20	18.00	100.00	0.77
11.71	0.00	2.45	0.00	0.00	0.73
2.00	322.00	3.10	25.00	0.00	0.58
10.00	0.00	3.20	0.00	20.00	0.56
9.00	0.00	2.44	0.00	0.00	0.46
20.90	0.00	4.85	160.50	0.00	1.30
15.50	0.00	3.92	43.70	0.00	1.29

**Appendix I(B) : Treatment of Uncultivated Land under  
Watershed Programme of Maharashtra  
( Outlay in Lakhs)**

District	Horticulture	Fodder	Land devel.	Total Uncult. land
Thane	1079.04	249.35	-	1328.39
Raigad	728.36	53.32	-	781.68
Ratnangiri	3666.24	573.72	-	4239.96
Sindhudurg	3309.50	325.88	-	3635.38
Nasik	39.19	157.37	2219.46	2413.02
Dhule	2.49	53.23	1373.76	1429.48
Jalgaon	-	37.00	-	37.00
Ahmadnagar	8.46	279.82	3241.86	3530.16
Pune	203.38	414.75	1913.34	3531.47
Solapur	-	1184.15	4589.72	5773.87
Satara	32.19	154.26	1104.98	1291.43
Sangli	35.00	311.14	1910.99	2257.13
Kolhapur	146.63	124.07	1.27	271.91
Aurangabad	46.02	41.96	2056.97	2144.95
Jalna	28.78	42.66	1045.24	1116.68
Parbhani	2.78	130.53	378.24	511.55
Beed	-	365.41	2757.12	3122.53
Nanded	13.86	64.55	671.98	750.39
Osmanabad	-	132.08	884.02	1016.10
Latur	-	90.59	1272.58	1363.17
Buldhana	31.21	15.04	387.82	434.04
Akola	61.71	149.87	397.75	609.40
Amravati	43.63	52.13	179.13	274.89
Yeotmal	94.30	164.70	1115.74	1374.74
Wardha	22.37	59.32	61.33	143.02
Nagpur	34.14	82.19	409.90	526.23
Bhandara	4.50	13.80	-	18.30
Chandrapur	28.47	15.73	48.42	92.62
Gadchiroli	3.29	3.40	-	6.69

Note: Physical target were not available at the time of finalising of this report. The figures are for 1989-90

Source : Directorate of Agriculture, Govt of Maharashtra  
Pune 411 001

**Appendix II(A) : Achievement under Watershed development  
Programme of Karnataka. 1989-90**

Items of work		Achievement
<b>(a) Agricultural Sector</b>		
<b>A. Moisture conservation in situ (by motivating farmers)</b>		
1 land smoothening	ha	32622.49
2 Contour cultivation	ha	76011.35
3 small section bunds	ha	61649.38
4 Compartment bunding	ha	12226.35
<b>B. Prevention of soil Erosion &amp; water run-off (by development works)</b>		
1 Contour/graded bunding		
a) soil works	ha	8117.51
b) Vegetative	ha	10150.86
2 Diversion channel	mtrs	166519
3 Waterways with Drops	lakh mtr	284171
4 Gully checks	nos	3892
5 Strengthening of exiting bunds with \Vege. means	ha	9662.77
<b>C. Water storage structure</b>		
1 Farm Ponds	nos	215
2 Nala bunds/percolation tanks	nos	126
3 Check dams	nos	89
4 RCS	nos	389
5 Total water storage capacity to be created	CMT	1135679
<b>D. Other items</b>		
1 Financial	lakh	344.93
2 Food grain distribution	M.Ts	1147.44
3 Employment generation	lakh	21.54

**Appendix II(A) : Achievement under Watershed development  
Programme of Karnataka. 1989-90**

Items of work		Achievement
<b>(a) Agricultural Sector</b>		
<b>A. Moisture conservation in situ</b>		
<b>(by motivating farmers)</b>		
1 land smootening	ha	32622.49
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3 small section bunds	ha	61649.38
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<b>B. Prevention of soil Erosion &amp; water run-off (by development works)</b>		
1 Contour/graded bunding		
a) soil works	ha	8117.51
b) Vegetative	ha	10150.86
2 Diversion channel	mtrs	166519
3 Waterways with Drops	lakh mtr	284171
4 Gully checks	nos	3892
5 Strengthening of exiting bunds with \Vege. means	ha	9662.77
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1 Farm Ponds	nos	215
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3 Check dams	nos	89
4 RCS	nos	389
5 Total water storage capacity to be created	CMT	1135679
<b>D. Other items</b>		
1 Financial	lakh	344.93
2 Food grain distribution	M.Ts	1147.44
3 Employment generation	lakh	21.54

(b) Forest Sector

1. Block plantation		
a. Advanced trenching	ha	455.00
b. Monsoon planting	ha	1491.21
c. Monsoon trenching & planting	ha	1306.00
d. Area sown with Stylosanthus	ha	12241.00
2. Avenue planting		
a. No. of roads	nos	45
b. length of roads	kms	182.50
c. No of plants	thou.	217.00
3. Planting in Pvt. lands		
a. No of farmers	nos	492.00
b. Area	ha	438.68
4. Fodder farms		
a. No of locations		27.00
b. Area	ha	324.94
c. Qty. of fodder to be supplied	M.Ts	600.75
5. Stabilizing soil con. structures		
a. planting on bunds in farmers fields	lakh	226.42
b. planting on Gully checks/ Nala bunds/check dams etc.	lakh	20.76
c. No of structures/Gully checks/ Nala bunds/check dams etc. protected	nos	4014.00
6. No of seedling raised for next year (1990-91)		
a. block plantation	lakh	59.09
b. Avenue planting	lakh	2.44
c. fodder farms	lakh	3.71
d. free distribution to farmers	lakh	23.70
e. Gully stabilisation protection of soil conservation strcturs	lakh	82.03

(c) Horticultural Sector

1. Silvi-Horti Plantation		
Govt/ community lands		
a. No of locations	nos	63.00
b. Area	ha	776.68
c. No of plants	lakh	7.14
2. Orchard-Horti on Private lands		
a. No of farmers	nos	4262.00
b. Area	ha	2955.00
c. No of plants	nos	302102

(d) Other

3. Water storage structures		
a. no of water storage structure	nos	901.00
b. no of plants planted	nos	15147.00
4. Schools involved in Plantation		
a. No of schools	nos	54.00
b. No of plants	nos	4180.00
5. Bund Planting		
a. No of farmers	nos	1009.00
b. No of seedlings/grafts	lakh	5.19
6. Planting Material Produced		
a. Seedlings	lakh	19.39
b. Grafts	lakh	2.97
7. Maintainance continued from previus years		
a. Silvi-Horti plantaing	ha	2184.80
b. orchard horticulture	ha	4549.21
c. Seedlings in the nursery	lakh	16.37
d. Grafts in the nursery	lakh	2.19
8. Other items		
a. Financial	lakh	142.71
b. foodgrains distributed	M.Ts.	531.69
c. Employment generated	lakh	8.29

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**Appendix II(B) : Achievement under Watershed Development  
Programme of Maharashtra : 1988-89**

Items of work		Achievement
1 No of watershed	nos	26533
2 No of watershed under taken for development	nos	16198
3 Cotour bunds	ha	56015
4 Land leveling	ha	859218
5 Terracing	ha	11413
6 Land development and horticulture	ha	5919
7 Dry land development	ha	21583
8 Broad beds and furrows	nos	16
9 Land grading and shaping	ha	13327
10 Farm ponds	nos	726
11 Rehabilitation of old works		
a) contour bunds	ha	16400
b) Nallabunding	nos	11
12 Contour and graded bunding	ha	814569
13 Nallabunding		
New	nos	1644
Old	nos	3519
14 Nala Training		
New	nos	157
Old	nos	207

**Appendix III(A) : Districtwise Arable and Non Arable area  
under Watershed Development Programme of  
Karnataka (In Hectares)**

District	Total Area	Arable land	Non Arable land
Bangalore	29803	16482	13321
Kolar	43794	23333	19961
Tumkur	24363	15836	8527
Chitradurga	29000	25435	3565
Shimoga	34500	24500	10000
Mysore	35935	29274	6661
Mandya	33526	20710	12816
Kodagu	13500	7336	1164
Dakshina kannada	30152	13130	17014
Hassan	34986	19776	15212
Chikmagalur	23600	14558	9042
Belagaum	40439	35269	5170
Dharwar	25203	19829	5374
Bijapur	28016	26010	2006
Uttar kannada	238075	5853	18022
Gulbarga	35000	26720	8280
Raichur	42860	41747	1113
Bellary	39010	27103	11907
Bidar	27785	17271	10514

Source :

R.L.E.G.P. "Watershed Development programme of Rainfeed Agriculture Project V, 1989-94 DLDB, Govt of Karnataka, 1990

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**Appendix III(B) : Districtwise Estimates of Arable and Non  
Arable land in Maharashtra, 1988-89**  
(In '00 ha)

District	Geographical Area	Arable land	Non Arable land
Bombay sub	380	62	13
Thane	9337	2676	686
Raigad	6869	1885	1197
Ratnangiri	8185	2317	3223
Sindhudurg	5039	1068	2420
Nasik	15633	8995	1053
Dhule	14380	7361	5586
Jalgaon	11640	8111	343
A'nagar	17020	11421	1849
Pune	15620	9946	872
Solapur	15010	11174	2131
Satara	10582	5771	1081
Sangli	8610	5806	1338
Kolhapur	7763	4026	1064
A'bad	10077	7121	993
Jalna	7726	5567	1489
Parbhani	10972	8320	1460
Beed	11169	8163	1755
Nanded	10331	7346	1024
O'bad	7352	5633	1298
Latur	6675	5788	1104
Buldhana	9671	6835	581
Akola	10560	8112	382
Amravati	12217	7191	552
Yeovatmal	13519	8458	923
Wardha	6289	4295	393
Nagpur	9864	5482	629
Bhandara	9279	3570	546
Chandrapur	10918	4722	745
Gadchiorli	14916	1916	427

Source : Land Utilisation Statistics, Directorate of  
Agriculture, Govt of Maharashtra, Pune, 411 001

## Appendix

### FODDER TREE SPECIES SUITABLE FOR DIFFERENT STATES.

- Saline/alkaline Soils** : *A. nilotica*, *Azadirachta indica*, *Albizia procera*, *Leucaena leucocephala*, *Prosopis cineraria* *Dalbergia sissoo*.
- Ravine Land.** : *Acacia catechu*, *Dalbergia sissoo* (for gully slopes and humps) *Acacia nilotica*, *Azadirachta indica* *Albizia* spp. (for saline and alkali patches), *Dendrocalamus strictus* *Gmelina arborea* (gully beds), *Pongamia pinnata*, *Ailanthus excelsa* *Prosopis chilensis*, *Leucaena leucocephala*, *Bauhinia* spp. *Morigna oleifera*, *Morus alba*. Grasses : *Cynodon dactylon* *C. Plectostaachyus*, *Botheriochloa pertusa* *pennisetum purpureum*, *Panicum antidotale*.
- Waterlogged sites** : *Anthocephalus chinesis*, *Syzygium cuminii*, *Salix* spp., *Terminalia arjuna*, *Barringtonia acutangula*, *Lagerstroemia speciosa*, *Dalbergia sissoo*, *Bombax ceiba*, *Pongamia Pinnata*, *Trewia nudiflora*, *Acacia catechu*, *A. Auriculiformis*, *A. nilotica*, *Bischofia Jayanica*.
- Sand dunes.** : A) Rainfall zone 15 to 30 cm.  
*Acacia tortilis*, *Acacia senegal*, *A. nilotica*, *Prosopis chilensis* *P. Cineraria*, *Ziziphus* spp. Grasses: *Lasiurus indicus*, *Cenchrus ciliaris* *C. setigerus*.
- B) Rainfall zone 40 cm. and above.  
*Albizia lebbeck*, *A. procera* *Azadirachta indica*, *Ailanthus excelsa*. *Dalbergia sissoo*, *parkinsonia aculeata*, Grasses : *Cenchrus ciliaris*, *C. setigerus*, *Panicum antidotale*.
- Cold Dessert** : *Populus euphratica*, *P. ciliata*, *P. alba*, *Salix fragilis*, *S. alba*.

Lateritic and  
Laterite soils.

- : Dendrocalamus longispatus, D.  
strictus, Acacia auriculiformis  
Bambusa arundinacea, Madhuca longif-  
olia, Pterocarpus marsupium, shorea  
robustta, Bombax ceiba, Adina cordi-  
folia, Schleicheria, oleosa, Hardwic-  
kia binata, Gmelina arborea, Dalber-  
gia sissoo, D. latifolia Ougeini  
oojeinensis Anogeisus latifolia,  
Holoptelea integrifolia, Albizia  
lebeck, Xylia xylocarpa, Tactona  
gradis, Grass: Eulalipsis binata.

Skeletal Soils

- : Albizia lebeckc, A.amara, Cassia  
siamea, Hardwickia binata, Acacia  
nilotica ssp.indica, A.leucophloea  
A.ferruginea, A.catechu, Dalbergia  
sissoo, D.latifolia, Tamarindus  
indica, Ailanthus excelsa, Prosopis  
spp. Azadirachta indica, ponghamia  
pinnata.

Source

- : Report of Committee on fodder and  
grasses NWDB (1986).

## TREE SPECIES SUITABLE FOR DIFFERENT TYPES OF SOILS

### Sites

### Suitable species.

- Saline/alkaline Soils** : *Acacia nilotica*, *A. auriculiformis*, *Azadirachta indica*, *Prosopis chilensis*, *P. cineraria*, *Casuarina equisetifolia*, *Albizia procera*, *Tamarix aphylla*, *Leucaena leucoccephala*, *Eucalyptus hybrid*, *Parkinsonia aculeata* and *Dalbergia sissoo*.
- Ravine land** : *Acacia catechu*, *Dalbergia sissoo* (for gully slopes and humps) *Acacia nilotica*, *Azadirachta indica*, *Albizia* spp (for saline and alkali patches), *Dendrocalamus strictus*, *Gmlina arborea* (gully beds) : *Eucalyptus hybrid*, *Pongamia pinnata*, *Ailanthus excels*, *Prosopis chilensis*, *Leucaena leucocephala*, *Gliricidia maculata*, *Bauhinia* spp., *Moringa Oleifera*, *Morus alba*, *Broussonetia papyrifera*. Grasses which have been found effective for planting on sloped fall are *Cynodon dactylon*, *C. plectostachyus*, *S. Bothriochloa pertusa* and for check dams *Pennisetum purpureum* *Panicum antidotale*.
- Waterlogged sites.** : *Eucalyptus robusta*, *Eltereticornis*, *Anthocephalus chinensis*, *Syzygium cumini*, *Salix* spp., *Terminalia arjuna*, *Acacia nilotica*, *A. catechu*.  
*A. auriculiformis*, *Barringtonia acutangula*, *Lagerstroemia*, *Syzygium cumini*, *Salix* spp., *speciosa*, *Dalbergia sissoo*, *Bombax ceiba*, *Pongamia pinnata*, *Trewia nidiflora*, *Millingtonia hortensis*, *Taxodium distichum* have been tried with success in bell area of West Bengal. *lagerstroemia speciosa* & *Bischofia javanica*.
- Sand dunes.** : *Prosopis chilensis*, *P. cineraria*, *Acacia tortilis*, *A. senegal*, *A. nilotica*, *A. aneura*, *Albizia lebbekc*, *A. procera*, *Azadirachta indica*, *Eucalyptus camaldulensis*, *Balanities aegyptiaca*, *Capparis decidua*, *Salvadora oleoides*, *Tecomella undulata*, *Dalbergia sissoo*, *Tamnarix aphylla*, *Parkinsonia aculeata*, *Ailanthus excelsa*.

Coastal sands .

: Casuarina equisetifolia, Anacardium occidentale, Borassus spp. and Eucalyptus spp.

Source

: Report of Committee on fodder and grasses, NWDB (1986).

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**REFERENCES :**

Adams, W.M. (1990), Green Development: Environment and Sustainability in the Third World, Routledge, London.

Awasthi, Ramesh and Panmand, DK (1989), Ralegan Shindi An In-depth Study (Marathi), Samajik Arogya Samshodhan Samstha, Bombay.

Bali, J.S. (1989), "Soil and water conservation" ARPU Technical paper No. 3, Agro-Climatic Regional Planning Unit, Ahmedabad.

Barrow, Chris (1987), Water Resources and Agricultural Development in the Tropics, Longmans, New York.

Bromley, Daniel W and Michael M Cernea (1989), "The Management of Common Property Resources : Some conceptual and Operational Fallacies", Discussion Paper No 57, The world Bank, Washington DC.

Bromley d and E Szarleta (1986), "Resources and People : An Economic Persoective", in K A Dahlberg and J W Bennett (eds), Natural Resources and People : Conceptual issues in interdisciplinory, Boulder, Westview.

Caldwell, Bruce (1982), Beyond Positivism-Economic Methodology in the Twentieth Century, Allen and Unwin, London.

Cohen, John M and Norman T Uphoff (1980), "Participation's Place in Rural Development: Seeking clarity through

Specificity". World Development, Vol. 8. pp 213-235

Deshpande RS, M.G.Chandrakanth and H. Chandrashekhar (1986), Ex-Post Evaluation of Dug. Well Investments in Hard Rock Areas of Karnataka, Research Report, Institute for Social and Economic Change, Bangalore

Deshpande RS and K.S Ramakrishna (1987), Impact of Krishna Raja Sagar Project on Farm Economy, Research Report, Institute for Social and Economic change, Bangalore.

Deshpande, R.S. Reddy V.R. and P.K. Borse (1991), "Resurrection of Institutionalism: A Trade-off between Social and Farm Forestry", unpublished paper.

Gadgil, Madhav (1985), "Social Restraints on Resource Utilisation: The Indian Experience", in McNeely J.A. and David Pitt (eds), Culture and Conservation: The Human Dimension in Environmental Planning, Croom-Helm, London.

Gadgil Madhav and Vartak V D (1976), "Sacred Groves of Western Ghats of India", Economic Botany, Vol.30.

Grandwoh, J and R Greenberg (1988), Saving the Tropical Forests, Earthscan, London.

Gupta, Anil K (1986), "How common are Commons?", Economic Times, June, 23rd

Hardin G, (1986), "The Tragedy of Commons", Science, Vol.162

Hegde, N.G. (1987), Handbook of Wastelands Development, BAIF, Pune.

Ives, J and DC Pitt, (eds) (1988), Deforestation: Social Dynamics in Watersheds and Mountain Ecosystems, Routledge, London.

Jodha, N.S, (1990) , "Rural common property Resources: contributions and crisis", EPW Vol.25 (26)

Karnataka Govt of (1990), Chitravati Watershed: A Report, Project Officer, District Watershed Development Programme Chikballapur.

Laconte and Haines, YY (ed) (1982), Water Resources and Land Use Planning: A System Approach, Martinus Nijhoff, The Hague

Miller, L and R Hamblin (1963), "Interdependence, Differential Rewarding and Productivity:", American Sociological Review, Vol.28, pp 768-778

Mitchell, Terence, R (1982), People in Organisation, McGraw Hill, London.

Nadkarni MV, (1989), "Use and Management of common Lands Towards an Environmentally Sound Strategy", in Cecil Saldhana (ed), Karnataka: State of Environment Report IV, Bangalore.

Nadkarni MV (1985) " Deforestation in India", Economic Times, 23rd & 24th January

Nadkarni MV with Pasha SA & Prabhakar LS (1989), Political Economy of Forest use and Management, Sage, New Delhi.

Rao, CH Hanumantha (1988), "Agricultural Development and Ecological Degradation-An Analytical Framework", EPW, Dec.24-



Sankhala, KS and Peter Jackson (1985), "People Trees and Antelopes in the Indian Desert", In McNeely and Pitt (eds), Op cit.

Soderbaum, Peter (1990), "Neo-classical and Institutional Approaches to Environmental Economics", Journal of Economic Issues, Vol.24 (20), June.

Stable, Michael (1990), "Constraints to Environmental Rehabilitation through Peoples' Participation in the Northern Ethiopian Highlands", Discussion paper No. 13, UNRISD, Geneva,

Sumner, William G.(1906), Folkways: A study of the Sociological Importance of Usages, Manners, Customs, Mosres and Morals, Ginn and Co. London

Wantrup S.V. Ciriacy (1968), Resource conservation: Economics and Policies, University of California, Berkeley.