

Executive Summary

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Agricultural Policy in Maharashtra: A Policy Matrix

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1 Introduction:

The agricultural sector of India has grown up considerably since independence. Upto mid-sixties, owing to various constraints, not only low value crops were dominating in the cropping pattern but production and productivity of crops were also very low. The situation has totally changed after the introduction of Green Revolution in Indian agriculture, which was introduced during the mid-sixties. While the production of foodgrains has increased from 72.35 million tonnes in 1965-66 to 211.17 million tonnes in 2001-02, a similar kind of trend is also noticed in the production of commercial crops like oilseeds, cotton, sugarcane, etc. Constructive policies/programmes introduced by the central and state governments during different plan periods have been considered as one of the main reasons for the substantial improvement in the production of various agricultural commodities.

While the growth oriented policies introduced by the government have been continuing though with some modifications across plan periods, the overall growth rate of agriculture has decelerated during the nineties as compared to the eighties at all-India level owing to certain constraints. As rightly mentioned in the National Agriculture Policy: 2000, "The pattern of growth of agriculture has, however, brought in its wake, uneven development across regions and crops as also across different sections of farming community and is characterised by low levels of productivity and degradation of natural resources in some areas. Capital inadequacy, lack of infrastructural support and demand side constraints such as controls on movement, storage and sale of agricultural products, etc. have continued to affect the economic viability of agricultural sector". Since agricultural growth plays a crucial role in improving rural employment and reducing rural poverty, the slow growth of agriculture has been a matter of concern among the policy makers in the recent years. In addition to our own domestic constraints, the problems arising out of WTO commitments and the influence of international policies pose a lot of challenges to the agricultural sector of the country than ever before. In view of the new policy changes that are taking place in the domestic and international front, there is a need to make some adjustments in the agriculture policy of the country/state to sustain the growth of

agriculture as well as to face the competition arising out of WTO commitments. Though the National Agriculture Policy: 2000 has underlined what needs to be done to improve the performance of agricultural sector for the country as a whole, not many states have attempted to formulate its own agriculture policy based on its strengths and weaknesses. It is in this context, in this study, an attempt is made to formulate agricultural policy for the state of Maharashtra keeping in view its strength and weaknesses.

2 Issues in Maharashtra's agriculture:

Though Maharashtra is one of the richest states in terms of per capita income, its agricultural performance is not very appreciable. Having accounted for about 12 percent of India's gross cropped area in 2001-02, the contribution of state's agriculture in the agricultural GDP of the country is only about 7.30 percent during the same year, mainly due to predominant cultivation of crops under rainfed condition and low productivity of crops. Keeping in view the importance of agriculture, the government of Maharashtra along with the support of Central government has taken a number of initiatives to improve the performance of agriculture over the years. As a result of initiatives taken by the government, the agricultural sector of Maharashtra has undergone lot of changes. But, still it is lagging behind in many parameters as compared to the national average because of various constraints (see, Table 1). The main problems faced by the agricultural sector of the state are:

- Low irrigation facility
- Low and erratic rainfall pattern
- Cultivation of crops predominantly under rainfed condition
- Improper distribution of irrigation water among different crops
- Predominant cultivation of low value crops
- Low productivity of different crops
- Mono-cropping pattern
- Low progress in Watershed Development Programme
- Wide regional variation in the development of agriculture
- Poor marketing and post harvesting facilities

Most of the problems mentioned above are one way or the other associated with the limited availability of irrigation. Despite giving substantial importance, both in terms of investment and policy input for the development of irrigation, the share of irrigated area to gross cropped area is only about 17 percent as of today. The low irrigation facility has been one of the serious problems of the state. Due to low irrigation facility, not only low value crops are cultivated predominantly in the state but the productivity of most of the crops are also very low as compared to the national average. Cultivation of low value crops coupled with the low productivity of crops reduces the income of the farmers, which adversely affect the standard of living of both farming and non-farming (landless agricultural labourers) rural communities.

Table 1: Agricultural development at a glance in 2000-01: Maharashtra and India

Particulars	Maharashtra	India
Population (2001)		
Total (crore)	9.68	102.53
Rural (crore)	5.57	74.03
Urban (crore)	4.10	28.49
Rural agricultural workers (% to total workers)	81.08	73.34
Share of agriculture and allied sector in GDP/SDP (current prices)	15.41	24.95
Rural Poverty (percent) ^a	23.72	27.09
Rural Literacy rate (percent) ^b	55.52	44.69
Per capita income (Rs.) (NSDP at current prices)	22179	16707
Share of Agriculture and allied activities to Total Plan Expenditure (9 th Plan: 1997-2002)	4.98	4.9
Net Cropped Area (mha)	17.64	141.23 ^a
Gross Cropped Area (mha)	22.26	189.74 ^a
Cropping Intensity (percent)	126.19	134.35 ^a
Normal rainfall (in mm)	1254.1	852
Average size of holdings (ha) ^c	1.87	1.41
Percentage of irrigated area to gross cropped area	16.39	39.22
Percent of groundwater irrigated area to GIA	52.44	43.81 ^d
Input use:		
Fertiliser (kg/ha)	74.01	86.72
HYV coverage	85.17	77.16
Pumpsets (per 000 ha)	106.36	68.24
Tractors (per 000 ha)	7.93	15.29
Area under major crops (percent to GCA):		
Foodgrains	60.13	62.85
Pulses	15.98	10.57
Oilseed	11.50	11.82
Sugarcane	2.67	2.24
Cotton	13.83	4.43
Horticultural crops	3.08 ^e	5.26
Productivity (kg/ha):		
Foodgrains	757	1630
Pulses	460	544
Oilseed	820	810
Sugarcane	83267	68580
Cotton	100	190
Regulated markets (number):		
Total	857	7161
Principal	266	2354
Sub-yard	591	4807
Area covered by each market (in sq. km)	398	529
Population fed by each market (in lakh)	1.02	1.36

Notes: a - 1999-2000; b - 1991; c - 1995-96; d - 1998-99; e - 1997-98.

Sources: GOM (2002a), CMIE (2004), GOI (2003), NIAM (2001) and FAI (2002);

<http://agricoop.nic.in>

The second major issue is related to crop pattern and productivity of crops. Because of low irrigation facility and wide variation in rainfall, farmers are forced to cultivate low value crops (coarse cereals and pulses) predominantly under rainfed condition. About 83 percent of cultivated area is under rainfed condition as of today. Since rainfed crops are generally affected by varied rainfall (moisture stress), productivity of different crops is very low in the state as compared to the all-India average. Mono-cropping pattern (example, sugarcane) followed in certain regions of the state has also affected the productivity of crops, which is another important issue of Maharashtra's agriculture.

The third important issue in Maharashtra's agriculture is poor growth of agriculture, which is the main outcome of low irrigation and productivity of crops. Though significant development has taken place in horticultural sector during the last decade, it has not made any significant impact on the overall growth rate of agriculture. While the share of agricultural sector's contribution to state's income declined from 34 percent in 1960-61 to 16 percent in 2001-02, the growth rate of the agricultural sector (state domestic product) decelerated from 3.70 percent per annum during eighties (1980-81 to 1990-91) to 2.72 percent per annum during nineties (1990-91 to 2001-02). The slow growth of agriculture is a serious issue from the point of view of rural employment and poverty, both of which are heavily dependent on agricultural growth.

The other important issue associated with Maharashtra's agriculture is poor marketing and post-harvesting facilities. Besides the domination of middlemen, it is predominantly traditional and does not have strong network of post-harvest services and infrastructural facilities. As result of this, not only the wastage is substantial but the losses are also enormous for farmers. Concerted efforts are needed to improve the marketing facilities.

In addition to the existing problems, the newer issues arising out of WTO commitments are further expected to pose different kinds of problems to the agricultural sector of the state. How to improve the growth of agriculture with these constraints? What are the areas in which government should focus mainly in the future? Is there any relationship between the policies introduced by the government and development of agriculture? What are the major constraints that limit the growth of agriculture in the state? Whether the government has taken initiatives to face WTO commitments? are some of the important issues which need to be studied thoroughly to make a proper agricultural policy that can be implemented for improving the performance of agricultural sector in the state. Keeping in view the issues raised above, the present study makes an attempt to formulate an agriculture policy for the state of Maharashtra by taking into account the policy inputs followed for the development of agriculture over the last forty years.

3 Objectives:

1. To review the available materials (including policy documents, five year plan documents at the center and at state level, policy statements

made at the state level, etc.) at the state level dealing with policy interventions after the formation of the state.

2. To identify the important constraints and review the efforts made by the State in the past to meet major challenges pertaining to agriculture and allied activities.
3. To record the state's response to the already formulated National Agricultural Policy, that is, to find out precisely how and where the state would like to suitably supplement, modify and re-articulate the National Policy in the local context.
4. To bring out the state's concerns as well as to record the state's views on the changing economic situation due to India's involvement with the WTO.
5. To assemble these views in the form of a meaningful policy requirement matrix, relating problems/issues to action points suggested/recommended.

4 Data and methodology:

This study has been carried out mainly using available secondary level information. The coverage of the study period is from 1960-61 to 2001-02. Data for this study have been mainly compiled from various five year plan documents (both centre and state), various committee and commission reports, Season and Crop Report of Maharashtra State (various issues), Districtwise Agricultural Statistical Information of Maharashtra State, Economic Survey of Maharashtra and India, various documents published by the Ministry of Agriculture, Government of India, New Delhi, <http://agricoop.nic.in>, <http://agri.mah.nic.in>, <http://www.censusindia.net>, etc. Recent data on Maharashtra's agricultural development have been directly compiled from the Commissionerate of Agriculture, Government of Maharashtra, Pune.

In order to understand the performance of the state's agriculture, a thorough analysis has been carried out on irrigation development, input use, cropping pattern, production and productivity of different crops using data from 1960-61 to 2001-02. One of the objectives of the study is to review the initiatives taken by the government during different plan periods to improve the performance of agriculture. For this, a detailed review has been done using the information collected from different five year plan documents, economic survey of the state, etc. A number of constraints which limit the growth of agriculture in the state over the last four decades. While highlighting the major constraints of Maharashtra's agriculture, the measures taken by the government to remove the constraints have also been presented using the information gathered from different plan documents.

5 Organisation of the study:

The study has five chapters. Chapter one, which is an introduction, presents a brief account on experience as well as emergence of agriculture policy in India, the major issues in Maharashtra's agriculture, objectives and methodology of the study. Chapter two deals with agricultural development of the state, wherein plan expenditure on agriculture and irrigation, workforce in agriculture, landholdings, rainfall, irrigation development, inputs use, land use pattern, cropping pattern, horticulture sector, production and productivity of crops and livestock sector of the state have been discussed in detail. Chapter three presents a detailed review on the initiatives (programmes) taken by the state government to improve the performance of agriculture since the third plan period. Important programmes introduced by the government have also been discussed in the same chapter. Chapter four brings out all the major constraints faced by the agricultural sector of Maharashtra. Chapter five presents the agricultural policy for Maharashtra's state including a policy matrix, which provides the strategies to be followed to improve the overall performance of the agricultural sector.

6 Agricultural policy for Maharashtra state:¹

The policies that need to be followed in different areas of agriculture in Maharashtra state are presented below. Detailed policy matrix is presented in Appendix I.

6.1 Investment in agriculture and allied activities:

Adequate investment in agriculture is one of the pre-requisites for increasing as well as sustaining the growth of agriculture. However, the plan expenditure on agriculture and allied activities to the total plan expenditure has declined sharply from 30.87 percent in the third plan (1961-66) to 4.98 percent in the ninth plan period (1997-2000) in Maharashtra. Since the reduction in plan expenditure will affect the research and development activities pertaining to agricultural sector, it will have serious implications on the agricultural growth of Maharashtra in the future. Therefore, the state government (state planning commission) should take necessary steps to increase the plan expenditure on agriculture and allied activities to boost the growth of agriculture in the state.

¹ The study investigated various parameters of agricultural development, reviewed the programmes introduced by the government during different plan periods and also brought out the major constraints that hinder the growth of agriculture in Maharashtra. However, since the ultimate aim of the study is to formulate an agricultural policy for the state of Maharashtra, in this summary report we have presented only the major strategies that need to be followed for improving the performance of agriculture. Needless to mention that the strategies mentioned here are obviously emerging out from the analysis. Readers are advised to refer the main report of the study for detailed discussion on the various aspects of agricultural development in Maharashtra.

6.2 Irrigation development:

Low irrigation facility has been one of the major reasons for the poor performance of the agricultural sector in the state. Though Maharashtra state accounted for about 17 percent of India's total irrigation investment at the end of ninth plan period, its irrigated area to gross cropped area is only 16.38 percent in 2001-02, which is the lowest among the major states in India. In fact, out of 29 districts, 14 districts are having less than 15 percent of irrigation facility in 2000-01. The following strategies need to be followed to increase the irrigation facility in the state. First, adequate funds should be allotted to complete all the on-going projects. If required, no more new projects should be sanctioned till the completion of all the on-going projects. Second, inspite of water scarcity, nearly two-third of irrigation water available in the state is used only by sugarcane crop, which accounts for only 2.60 percent of GCA in the state. This improper use of water can be adjusted by manipulating output price of crops and also by introducing volumetric pricing in canal water supply. Third, more attention should be given to improve minor-surface irrigation system (which have been neglected by the state) wherever possible through renovation and other developmental activities. Fourth, the projected (notional) cropping pattern should be strictly followed in each command area.

To sustain the groundwater irrigation development, the over exploitation of groundwater should be curbed through legal, institutional and technological options. Currently, out of 30 districts, as many as 13 districts are having over 80 percent of irrigated area through groundwater source alone. Drip method of irrigation, which is being increasingly adopted in the state, should be made mandatory in those regions where exploitation of groundwater is higher. To improve the water use efficiency and the overall performance of irrigation sector in the state, adequate steps should be taken to transfer the system control to Water Users' Association, as has been suggested by the National Water Policy.

6.3 Watershed development programmes (WDPs):

Maharashtra state has been implementing WDPs since 1982 to improve the performance of rainfed agriculture. As a result, area treated through WDPs has increased substantially. However, the achievements made (treated area as of March, 2002 was 3.15 mha) in this respect are not very appreciable when compared to the potential area of WDPs, which is about 20.36 mha. The average treated area from 1983 to 2002 comes to only 0.166 mha per year. With this current rate of growth, it may take more than 100 years to treat all the remaining potential area through WDPs. Therefore, keeping in view the importance of rainfed cultivation, necessary steps should be taken to bring all the potential areas under WDPs within 10 to 15 years by allocating more funds for the same. While selecting areas for treatment, priority should be given to those regions which have more drought prone as well as degraded area, as suggested by the 10th Plan Working Group on Watershed Development, Rainfed Farming and Natural Resources Management.

Presently, WDPs have been operated by different department/agencies in the state without coordination by any single agency. This does not allow us to know the overall working conditions of WDPs including utilisation of allocated funds. Therefore, there is a need to develop convergent approach between various departments to operate WDPs more efficiently, both in terms of utilisation of funds and identifying areas for treatment.

6.4 Rainfed cultivation:

Predominant cultivation of crops under rainfed condition is the main feature of Maharashtra's agriculture, as its irrigated area to gross cropped area is only around 17 percent as of today. Though the average rainfall of the state is higher than the national average, about 73 percent of districts (25 districts out of 34) receive normal rainfall less than the state's average. Besides reducing productivity of crops, this low and varied rainfall pattern increases the risk of farmers. In order to improve as well as to sustain the cultivation of rainfed crops, the state should focus more on watershed development programme and rainwater harvesting system. By introducing short-duration varieties as well as more location specific cropping pattern, the performance of rainfed cultivation can be improved and sustained.

6.5 Low value crops:

Though the cropping pattern has been changing in favour of high value crops in the state, this shift is not very impressive as compared to the national level change. During 2000-01, for instance, coarse cereals accounted for over 34 percent of GCA in Maharashtra, whereas the same was only 15 percent of GCA at all-India level. As a result of cultivation of low value crops, farmers' income (per ha) from agriculture is very low in the state. Since limited availability of irrigation is considered to be the main reason for this, greater attention should be given to utilise the available irrigation potential wherever possible. In those regions where utilisable irrigation potential is less, moisture availability can be increased through WDPs.

6.6 Cultivation of pulse and oilseed crops:

Pulses and oilseed crops have been predominantly cultivated (accounted for about 27 percent of GCA in TE 2001-02) in Maharashtra, mainly under rainfed condition. Productivity of these crops is relatively low in the state as compared to the national level average. Considering the importance of these crops, proper attention should be paid to increase the production and productivity of these crops by popularising the use of bio-fertilisers and bio-pesticides. Special efforts should also be made to cultivate these crops under inter-cropping method wherever possible. Proper marketing arrangements should also be made to procure the oilseeds and pulses from the farmers in order to encourage the cultivation of these crops.

6.7 Mono-cropping pattern:

Sugarcane, a water-intensive crop, has been repeatedly cultivated in Western Maharashtra over the last four decades. Pune and Kolhapur divisions together account for nearly 60 percent of state's sugarcane area even today. This mono-cropping not only affected productivity of sugarcane but also deteriorated soil quality and brought certain pests and diseases in this region. Unlimited supply of canal water and continuous support to sugarcane growers by sugar industries appear to be main the reasons for this mono-cropping. Supply of canal water to sugarcane by volumetric pricing may discourage the mono-cropping pattern.

6.8 Use of technological inputs:

There has been a substantial variation in the use of yield increasing inputs (fertilisers, HYVs) across regions in the state, which also acts as one of the constraints for agricultural growth. The use of fertilisers (per ha) is found to be very low in divisions like Konkan, Latur, and Amravati as compared to state's average. Besides this, wide variation in NPK ratio is also seen across regions in the state. While making efforts to improve the use of yield increasing inputs, proper mix of fertilisers should be promoted to sustain the soil fertility, through quality extension network. Clear-cut crop-specific and region-specific programmes/policies would bring desired results in this regard.

6.9 Horticulture development:

A significant growth has been achieved in area under horticultural crops between 1980-81 and 1997-98 in the state. In order to continue the same kind of growth in the coming years, it is essential to (a) diversify the crops to non-traditional area, (b) arrest the declaration recorded in area and productivity of certain crops, and (c) improve the post-harvesting infrastructure facilities.

Despite significant potential in different regions in the state, area under horticulture crops has not picked up in non-traditional areas, including Western Maharashtra. Therefore, required steps should be taken to increase the area under horticulture crops in those areas where sugarcane is predominantly cultivated so that surplus water can be transferred to other crops and other regions as well.

The growth rate of area under grapes, banana and most of the vegetable crops either declined or decelerated during the nineties as compared to the achievements made in the eighties. It is essential to examine why the growth rate of area under certain horticulture crops decelerated during nineties. Similarly, productivity of crops like orange and mango has also declined between 1990-91 and 2001-02 in the state. As the future growth of state's agriculture heavily relies on the performance of horticulture sector, the reduction in productivity is likely to affect the overall growth of the sector. By introducing tissue culture

varieties (wherever possible) and also by replacing new varieties where age-old crops/plants are cultivated, productivity of horticulture crops can be increased. There is also a need to examine the causes for decline of productivity of major horticulture crops, especially in those regions where productivity started declining.

As pointed out by various studies, there is also a need to improve the post harvesting infrastructure facilities (such as cold storage, cold chain, processing, packaging and marketing) to sustain as well as accelerate the present growth of horticulture sector. The state sector will have to play a larger role in establishing infrastructure facilities to promote horticulture sector in the state, as private individual farmers may not be able to create the same due to resource constraints. Involving private sector in marketing and processing activities as well as encouraging contract farming in the cultivation of horticulture crops may help to improve the availability of post harvesting infrastructure facilities.

Table 2: Contribution of Maharashtra state to India's total production of different crops.

Crops	(Percent)			
	1970-71	1980-81	1990-91	1999-2000
Jowar	19.2	42.5	50.9	52.6
Bajra	10.2	14.2	16.1	20.3
Coarse Cereals	8.6	18.8	22.9	21.4
Gram	1.7	3.5	6.7	17.4
Tur	14.4	18.4	17.4	33.3
Total Pulses	5.8	7.8	10.1	16.3
Total Foodgrain	5.0	7.5	6.9	6.0
Sugarcane	11.4	15.3	15.9	18.2
Groundnut	11.3	12.2	13.2	10.4
Soyabean	NA	NA	7.3	23.9
Sunflower	NA	57.1	34.5	26.3
Total Oilseeds	7.8	7.8	10.1	12.4
Cotton	10.1	18.1	19.1	26.6
Onion	NA	27.2	24.8	29.3
Cashewnut	NA	4.2	10.3	25.0

Source: CMIE (2001).

6.10 Productivity of crops:

Though the state's contribution in the total production of different crops is substantial, except in the case of sugarcane and some horticulture crops, productivity of all other crops is very low in Maharashtra as compared to the national average (see, Table 2). Apart from reducing farmers' income, the low productivity of crops pulls down the over all growth rate of state's agriculture. More importantly, the growth rate in productivity of almost all the major crops either decelerated or declined during the second part of green revolution (i.e., 1985-86 to 2000-01). Wide variation in productivity of different crops across districts is also another feature of Maharashtra's agriculture. Since low irrigation facility and variation in rainfall are considered to be the important factors

responsible for low and varied productivity level, major initiatives need to be taken to increase irrigation facility wherever possible. In those areas where irrigation potential is low, watershed development programmes should be promoted. Introduction of drought resistance cum high yielding varieties, promoting balanced use of fertilisers (appropriate ratio of NPK) and a well designed location specific policies/programmes can help to increase the productivity of crops appreciably.

6.11 Marketing infrastructure:

A well-developed marketing infrastructure is essential to reduce post harvest losses and also to ensure better return to farmers. Though Maharashtra state has relatively more number of regulated markets, farmers continue to face lot of difficulties while selling their produce. Domination of middlemen in the market has been continuing due to inadequate marketing facilities. Therefore, as suggested by the National Agricultural Policy: 2000, the weekly markets under the direct control of Panchayat Raj institutions should be promoted and strengthened. Producers markets on the lines of "*Rayatu Bazar*" (as has been followed in Andhra Pradesh and Tamil Nadu) should be promoted across different districts in Maharashtra to reduce the exploitation by middlemen. Importantly, rural road network should also be strengthened to enhance the marketing facilities in the state.

On the whole, it appears from our analysis that, in order to improve the overall performance of agriculture, the government of Maharashtra should focus mainly on three areas: (a) irrigation development, (b) watershed development programme and (c) horticulture development. Once irrigation availability is improved, the other problems such as predominant cultivation of low value crops, wide variation in the use of yield increasing inputs, low productivity of crops, etc., can be solved to a great extent.

Appendix I: Agricultural Policy in Maharashtra: A Policy Matrix

Sr. No	Major Area	Area of concern	Development	
			Strategy	Initiatives Required
1	Plan expenditure on agriculture and allied sectors	Sharp reduction in plan expenditure since the third plan period	Plan expenditure on agriculture and allied activities needs to be increased substantially keeping in view the share of population relying on agriculture.	<p>(a) Planning Commission, Government of Maharashtra should increase the allocation of funds for agriculture and allied activities.</p> <p>(b) Private investment in research and development activities concerning agriculture should be encouraged and promoted.</p>
2	Irrigation development	(a) Low irrigation facility	Irrigation facility needs to be increased by exploiting unutilised potential.	<p>(a) Public investment on irrigation should be increased to complete all the on-going projects.</p> <p>(b) No new projects should be sanctioned till the completion of all the on-going projects.</p> <p>(c) Projected crop pattern in each command area should be strictly followed.</p>
		(b) Improper use of water among different crops	Canal water supply to sugarcane crop should be restricted.	<p>(a) Volumetric pricing of water should be introduced.</p> <p>(b) Appropriate output price for different crops should be announced keeping in view the water availability.</p>
		(c) Over-exploitation of groundwater	Over exploitation of groundwater should be restricted through legal, technological and institutional options.	<p>(a) Electricity supply to agriculture should be regulated (by rationing).</p> <p>(b) Progressive flat-rate tariff policy in electricity supply should be introduced.</p> <p>(c) Micro-irrigation (drip and sprinkler) should be made compulsory in all those areas, where over exploitation of groundwater is very high.</p> <p>(d) New wells should not be allowed in the areas that are classified as "dark" block.</p>

			e) Groundwater users' association (GWUA) should be promoted.
	(d) Less importance for minor surface irrigation	Minor irrigation (surface) system should be restored/strengthened by allocating required funds.	(a) Renovation activities should be carried out to restore the minor surface system. (b) All minor surface systems should be handed over to water users' group under the direct control of village Panchayat.
	(e) Slow progress in forming WUAs	Water users' association should be encouraged in all command areas.	(a) Before handing over the system to WUAs, the system should be restored through an extensive rehabilitation work. (b) WUAs should be legally established and its rights should be clearly demarcated. (c) After handing over the system to users group, the government should not withdraw its support to WUAs at least for five years. (d) Importance of WUAs should be disseminated to the users (farmers).
	(f) Low water use efficiency	Water use efficiency should be increased at least by 10 percent from the existing level.	(a) Micro irrigation should be promoted in canal command areas. (b) Volumetric pricing of water should be introduced. (c) WUAs should be established on a large scale.
	(g) Inadequate coverage of micro-irrigation	All the potential areas suitable for micro-irrigation should be covered within a period of 10 years to reduce water stress.	(a) Specific programmes should be introduced to bring at least 50 percent of sugarcane area under micro irrigation. (b) Cultivation of crops using surface method of irrigation should not be allowed in those areas where exploitation of groundwater is very high. (c) Certain portion of canal water should be allocated only for the use of micro irrigation.

				<p>(d) Credit facility and electricity connection should be given on priority basis to those farmers who are ready to adopt micro irrigation.</p> <p>(e) Sugar Industries should encourage the farmers to cultivate sugarcane under micro irrigation system.</p> <p>(f) Differential rate of subsidy should be introduced for different crops based on water consumption.</p>
3	Watershed development programmes (WDPs)	(a) Slow coverage of area under WDPs	All the potential areas of WDPs should be covered within 10 years period.	<p>(a) All the poverty alleviation and rural development programmes should be connected with WDPs.</p> <p>(b) Required funds should be made available for WDPs. It should be treated as infrastructure development.</p> <p>(c) NGOs with proven record should be encouraged to take up WDPs.</p> <p>(d) Instead of top-down approach, bottom-up approach should be followed while implementing WDPs.</p>
		(b) No coordination among different departments in handling WDPs	Coordination should be established among different departments handling WDPs.	<p>(a) A single agency should be established for monitoring and distribution of projects for different regions.</p> <p>(b) Convergent approach should be followed among different departments implementing WDPs.</p>
		(c) Inequality in the coverage of area under WDPs across regions	Areas for WDPs from different regions should be selected using well framed criteria based on the environment of Maharashtra.	<p>(a) Priority should be given to those areas/regions that have more drought prone area as well as degraded lands.</p>

				<p>(b) Less priority should be given to those areas that have relatively more area under canal (public) irrigation.</p> <p>(c) Regions with higher percentage of rural poverty should also be selected for WDPs on priority basis.</p>
4	Adoption of technological inputs	(a) Low and wide variation in the use of fertilisers	Use of fertilisers should be increased wherever low.	<p>(a) Irrigation availability should be increased.</p> <p>(b) Moisture availability should be increased through watershed development programmes.</p> <p>(c) Fertilisers should be made available in time.</p> <p>(d) Institutional credit facility should be made available to farmers at right time.</p> <p>(e) Extension network should be strengthened.</p> <p>(f) Location specific programmes should be introduced.</p>
		(b) Imbalance in use of NPK	Ideal ratio of NPK (4:2:1) fertilisers must be achieved to sustain the soil fertility.	<p>(a) Importance of P and K nutrients should be disseminated to farmers through quality extension network.</p> <p>(b) Proper pricing of N, P and K nutrients should be introduced with a view to reduce the imbalance in NPK ratio.</p>
5	Crops cultivation	(a) Predominant cultivation of low value crops	Cultivation of high value crops should be promoted using available resources (water and other inputs).	<p>(a) Horticulture crops should be promoted in those regions where coarse cereals are cultivated predominantly.</p> <p>(b) Low-water-intensive cum high value commercial crops should be promoted.</p>

		(b) Predominant cultivation of rainfed crops	Area under rainfed cultivation should be brought down.	(a) Through rain water harvesting system and watershed development programmes considerable area can be brought under cultivation. (b) Proper distribution of water among different crops would help to reduce area under rainfed cultivation.
		(c) Mono-cropping	Mono-cropping (sugarcane) should be discouraged to sustain soil fertility and avoid other associated problems.	(a) Crop rotation should be advocated through quality extension network. (b) Volumetric pricing for canal water should be introduced at least for sugarcane crop.
6	Horticulture development	(a) Less diversification of crops in non-traditional areas	Cultivation of horticulture crops should be encouraged in non-traditional areas.	(a) Age-old crops (trees/plants) should be replaced by new high yielding (better quality) varieties, wherever possible. (b) Tissue culture varieties should be introduced/promoted, wherever possible. (c) More area should be brought under the cultivation of horticulture crops in Western Maharashtra to reduce water stress. (d) Adequate marketing facilities should be created in non-traditional areas.
		(b) Deceleration in area and productivity in certain crops	Measures should be introduced to revert the deceleration of area and productivity of horticulture crops.	(a) Studies need to be carried out to find out the reasons for deceleration. Appropriate action needs to be taken based on the finding of the study. (b) Bio-technology should be introduced wherever possible.
		(c) Inadequate post-harvesting infrastructure facility	Adequate post-harvesting infrastructure facilities should be created to sustain the growth of horticulture sector.	(a) Infrastructure facilities like cold storage, cold chain, processing, packaging and marketing should be created by the state sector.

				<p>(b) Private sector should also be encouraged in this to reduce the post-harvesting losses.</p> <p>(c) Contract farming in horticulture crops should be encouraged.</p>
7	Productivity of crops	(a) Productivity of most of the crops is low as compared to all India average	Productivity needs to be increased at least to the level of all-India average.	<p>(a) On-going irrigation projects should be completed within a specific period.</p> <p>(b) Watershed development programme and rainwater harvesting system should be promoted in a big way to increase productivity.</p> <p>(c) Balanced use of fertilisers (NPK ratio) should be achieved.</p> <p>(d) Through quality extension network, farmers should be advised to use recommended dose of various new technological inputs in crop cultivation.</p>
		(b) Wide variation in productivity of crops across districts	Inter-district variation in productivity of crops should be reduced.	<p>(a) Inter-district variation in irrigation facility should be brought down.</p> <p>(b) Location specific policies/programmes should be introduced in those districts where productivity is low.</p>
8	Marketing facility	Inadequate marketing infrastructure facilities	More emphasis should be given to develop market infrastructure with the aim to reduce post-harvesting losses and to reduce the exploitation by middlemen.	<p>(a) Weekly market under the direct control of Panchayat raj Institution should be promoted.</p> <p>(b) Producers market on the lines of "Ryatu Bazars" should be promoted.</p> <p>(c) Rural road network needs to be strengthened.</p> <p>(d) Information system about the prevailing output prices in different markets should be disseminated by creating a specific website.</p>

Agricultural Policy in Maharashtra: A Policy Matrix

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May 2004

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Foreword

The slow growth of agriculture recorded in the recent years has been a matter of concern among the policy makers, as agricultural growth plays a crucial role in improving rural employment and reducing rural poverty. Besides this, the problems arising out of WTO commitments and the influence of international policies pose a lot of new challenges to the agricultural sector of the country than in the past. In view of the new policy changes that are taking place in the domestic and international arena, there is a need to make some adjustments in the agriculture policy of the country/state to sustain the growth of agriculture as well as to face the competition arising out of WTO commitments. Though the National Agriculture Policy (2000) has underlined what needs to be done to improve the performance of agricultural sector for the country as a whole, not many states have attempted to formulate its own agriculture policy based on its strengths and weaknesses. It is in this context that Dr. A. Narayanamoorthy and Dr. S. S. Kalamkar of our Institute have made an attempt in this study to formulate agricultural policy for the state of Maharashtra, where the performance of agriculture is not appreciable.

Using the secondary data of last 40 years, the study examined various aspects of agricultural development of the state with a view to find out its present status in comparison to the national average. While reviewing the major initiatives taken by the state during different plan periods, the study has underlined some of the important programmes introduced to improve the performance of agriculture. The study also brought out the major constraints that hinder the growth of Maharashtra's agriculture. After having analysed the growth performance of agriculture, the study suggests that the state should focus mainly on irrigation development, watershed development, and horticulture development to improve the performance of agriculture.

The findings and policy matrix of the study are expected to be useful to the policy makers for formulating policies focusing on Maharashtra's agricultural development.

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May 21, 2004

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Introduction

1.1 Introduction:

The agricultural sector of India has grown up considerably since independence. Upto mid-sixties, owing to various constraints, not only low value crops were dominating in the cropping pattern but both production and productivity of crops were also very low. But, the situation has totally changed after the introduction of Green Revolution in Indian agriculture, which was introduced during the mid-sixties. While the production of foodgrains has increased from 72.35 million tonnes in 1965-66 to 211.17 million tonnes in 2001-02, a similar kind of trend is also noticed in the production of commercial crops like oilseeds, cotton, sugarcane, etc. (GOI, 2002). Constructive policies/programmes introduced by the central and state governments during different plan periods have been considered as one of the main reasons for the substantial improvement in the production of various agricultural commodities.

While the growth oriented policies introduced by the government have been continuing though with some modifications across plan periods, the overall growth rate of agriculture has decelerated during the nineties as compared to the eighties at all-India level owing to certain constraints (see, Table 1.1). As rightly mentioned in the National Agriculture Policy (GOI, 2000), "The pattern of growth of agriculture has, however, brought in its wake, uneven development across regions and crops as also across different sections of farming community and is characterised by low levels of productivity and degradation of natural resources in some areas. Capital inadequacy, lack of infrastructural support and demand side constraints such as controls on movement, storage and sale of agricultural products, etc. have continued to affect the economic viability of agricultural sector". Since agricultural growth plays a crucial role in improving rural employment and reducing rural poverty, the slow growth of agriculture has been a matter of concern among the policy makers in the recent years. In addition to our own domestic constraints, the problems arising out of WTO commitments and

Table 1.1: Compound Growth-Rate of Area, Production and Yield of Principle Crops in India (Base: TE 1981-82=100)

A – Area; P – Production; Y – Yield
(Percent per annum)

Crop	1949-50 to 2001-02*			1949-50 to 1964-65			1967-68 to 2001-02*			1980-81 to 1989-90			1990-91 to 1999-2000		
	A	P	Y	A	P	Y	A	P	Y	A	P	Y	A	P	Y
Rice	0.75	2.66	1.90	1.21	3.50	2.25	0.62	2.78	2.20	0.41	3.62	3.19	0.62	1.90	1.27
Wheat	2.08	5.26	3.12	2.69	3.98	1.27	1.38	4.34	2.92	0.46	3.57	3.10	1.67	3.81	2.11
Jowar	-2.78	-1.61	1.48	0.99	2.51	1.49	-1.71	-0.11	1.62	-0.99	0.28	1.29	-3.71	-3.59	0.12
Bajara	-0.27	1.60	1.88	1.08	2.34	1.24	-0.92	1.02	1.96	-1.05	0.03	1.09	-1.58	0.60	2.21
Coarse Cereals	-0.69	0.99	1.57	0.90	2.25	1.23	-1.44	0.54	1.90	-1.34	0.40	1.62	-0.54	1.48	-0.08
Total Cereals	0.41	2.85	2.05	1.25	3.21	1.77	-0.02	2.77	2.32	-0.26	3.03	2.90	-0.08	2.10	1.58
Gram	-0.66	0.06	0.72	1.64	2.66	1.00	-0.58	0.13	0.71	-1.41	-0.81	0.61	1.22	3.31	2.06
Tur	0.94	0.83	-0.10	0.57	-1.34	-1.90	1.21	1.24	0.03	2.30	2.87	0.56	-0.65	0.04	0.69
Other Pulses	0.39	0.91	0.52	2.06	1.28	-0.77	0.07	1.26	1.19	0.02	3.05	3.03	-1.60	-1.39	0.21
Total Pulses	0.10	0.54	0.48	1.72	1.41	-0.18	0.30	0.81	0.74	-0.09	1.52	1.61	-0.61	0.61	0.96
Total foodgrain	0.35	2.48	1.78	1.35	2.82	1.36	0.01	2.51	2.12	-0.23	2.85	2.74	-0.17	1.94	1.52
Sugarcane	1.84	3.05	1.19	3.28	4.26	0.95	1.81	3.07	1.24	1.44	2.70	1.24	1.81	2.78	0.95
Groundnut	0.79	1.61	0.82	4.01	4.34	0.31	0.15	1.23	1.09	1.67	3.76	2.06	-2.25	-1.22	1.06
R & M	2.05	4.19	2.10	2.97	3.35	0.37	2.23	4.87	2.58	1.95	7.28	5.22	1.66	1.95	0.29
Nine Oilseeds	1.40	2.78	1.23	2.53	3.12	0.00	1.63	3.41	1.71	2.47	5.36	2.49	0.66	1.98	1.49
Total Oilseeds	2.78	1.23	1.20	2.67	3.20	0.30	1.31	3.32	1.60	1.51	5.20	2.43	1.14	2.13	1.25
Cotton	0.34	2.47	2.12	2.47	4.55	2.04	0.35	2.57	2.21	-1.25	2.80	4.10	2.36	1.73	-0.61
Total Fibers	0.30	2.31	1.98	2.71	4.56	1.88	0.24	2.44	2.15	-1.50	2.46	3.98	2.16	1.74	-0.46
Non Foodgrains	1.26	2.96	1.36	2.44	3.74	0.89	1.36	3.20	1.68	1.12	3.77	2.31	1.37	2.78	1.04
All Principle Crops	0.57	2.66	1.68	1.58	3.15	1.21	0.34	2.78	1.90	0.10	3.19	2.56	0.25	2.28	1.31

Notes: * - Provisional; Nine oilseeds includes groundnut, castor seed, sesamum, rapeseed & mustered, linseed, niger seed, safflower, sunflower & soyabean; Total oilseeds include nine oilseeds plus cottonseed and coconut.

Source: GOI (2002).

the influence of international policies pose a lot of challenges to the agricultural sector of the country than ever before. In view of the new policy changes that are taking place in the domestic and international front, there is a need to make some adjustments in the agriculture policy of the country/state to sustain the growth of agriculture as well as to face the competition arising out of WTO commitments. Though the National Agriculture Policy (GOI, 2000) has specified what needs to be done to improve the performance of agricultural sector for the country as a whole, not many states have attempted to formulate its own agriculture policy based on its strengths and weaknesses. It is in this context, in this study, an attempt is made to formulate agricultural policy for the state of Maharashtra keeping in view its strength and weaknesses.

1.2 Experience of Agricultural Policy:¹

In the post liberalisation scenario, the agricultural sector is posted at crossroads, where we have to shift from the highly protected regime to a more liberalised competitive regime. The agricultural reforms therefore, have to address the issues emerging in this phase of transition. One can broadly categorise four distinct phases in the development of agricultural sector of the country. The first phase beginning immediately after independence and culminating at 1964 was marked more with the concerns of food security but no significant break through was achieved on the technological front. This phase was influenced both by the indigenous thinking about growth/development strategies (Gandhian perspective) as also by the western process of industry centred growth borrowed from the experiences of the industrialised nations. This phase ended with the droughts of mid-sixties when food security became a prominent issue and acute poverty as well as meeting the famine conditions were among the major concerns for the planning bodies. This was the time when the book by Paddock brothers titled "Famine 1975" came to the stands (Paddock and Paddock, 1968). They argued that America will have to apply classical triage method, like doctors on the battlefield trying to make the best out of minimum resources. It was stated that America will have to decide which countries to save and which to sacrifice. The droughts of mid-

¹ Section 1.2 and 1.3 are heavily drawn from Deshpande and Narayanamoorthy (2002).

60s in a way awakened the country to accept a new technological package and this turned the tables. The era of technological change marked the second phase in the agriculture sector. Food security was achieved in major part of the country and the output growth in agriculture was contributed largely by productivity growth. This was followed by the third phase in which the externalities of the technological changes surfaced. These included the interregional across class inequalities created and perpetuated by localised impact of technological change and other contributing factors. This gave rise to a phase that was marked by highly protective regime with various subsidy schemes, wherein a large number of initiatives were taken for protecting farmers and weaker sections. The gain in the protected regime can be seen in the form of growth pattern and quality of growth. However, this regime has caused a significant drain on the financial resources of the state as well as put natural resources under great stress. It is also argued that this process had a telling effect on the production efficiency and allocative efficiency of the sector. In addition to this, it is being felt that severe environmental concerns emerged during this phase due to unchecked application of the technological inputs and indiscriminate use of water and land. The fourth phase is marked by the transition, wherein the agricultural sector is set to participate actively in the process of liberalisation by shedding the controls and leaving the contours of the protected regime. The sector is thus, confronted with two important challenges. First, the sector has to prepare for significant participation in international trade, and second it has to renegotiate with the changing domestic regime in an unprotected and competitive atmosphere. Now, we are at the threshold of the tenth plan confronted with certain problems and issues both on domestic front as well as on the liberalisation front and therefore, the situation is quite challenging.

1.3 Emergence of Agricultural Policy:

The emergence of agricultural policy in the Indian context can be traced from the official documents beginning from Foodgrains Policy Committee of 1943 (Gregory, 1943). The works of Maitra (1950), Mehta (1957) and Venkatappaiah (1966) are the important documents flagging the milestones in the making of

Agricultural Policy in the first two decades. Even beyond that the Report of the High Power Committee (1990) had made recommendations covering major sectors of agricultural economy. Various policy statements had come during the period 1966 till the Agricultural Policy Document of 2000. These include the initiative taken during the Prime Ministership of Shri V P Singh followed by another initiative. However, none of these could culminate into a full-fledged policy document for agriculture sector. Therefore, the only first authenticated policy document for agriculture sector is the National Agricultural Policy 2000. During the Tenth Plan period it is necessary to keep in view the lessons learnt through this experience. Last five decades witnessed broadly four important policy directions, namely (i) food security, (ii) institutions for agricultural administration, introduction and dissemination of technology, (iii) under-developed regions, classes, farmers and crops (iv) input and technology distribution.

The NRM sector cannot be separated from the agricultural policy perspective. Increasing population pressure on land, indiscriminate use of natural resources, advent of the new technology with little attention paid to sustainable use of natural resources and failure of the policy to recognise the importance of managing these resources have together lead to degradation and misuse of natural resources over the last 50 years. This has not only affected the regions which have directly contributed to growth but also the regions which were lagging in the process of growth. However, the two processes are different. In the first case, it was initiated due to indiscriminate use of technology whereas, in the other it culminated into surpassing the carrying capacity of land. Use of fertilisers, pesticides and water have caused land degradation though this at present is confined only to specific regions. But over the years, it has shown a significant increase. The degradation of forests and scant attention to the maintenance of bio-diversity have also been noticed during the last three decades. Among the immediate points of concern five issues deserve attention, namely, (i) indiscriminate use of fertilisers and pesticides, (ii) management of use of water and its quality, (iii) harvesting energy from natural resources without degrading them (rain water harvesting, wind energy, biomass), (iv) gene banks and careful

monitoring of bio-diversity, (v) careful application of new technologies and western model of development.

The plan documents over the last five decades made it quite clear that policy for agricultural sector is of prime importance to the plan and the steps taken could be seen from the Table 1.2. One expects a significant shift in the strategy during tenth plan. Keeping with this expectation the Approach Paper to the Tenth Plan makes it clear that "First, agricultural development must be viewed as a core element of the Plan since growth in this sector is likely to lead to the widest spread of benefits, especially to the rural poor including agricultural labour. Also, since the majority of women workers are engaged in agriculture, investments in this sector have enormous implications for gender equality and must be designed to have maximal impact on this dimension. The first generation of reforms concentrated on reforms in the industrial economy and reforms in the agricultural sector were neglected. This must change in the Tenth Plan" (Approach Paper to the Tenth Five Year Plan, GOI 2001).

Table 1.2: Agricultural Policy Formulation through Five-Year Plans.

Plan Period	Major Issues and Policy Thrust
First Plan 1951-56	Severe food availability constraints. Maximisation of Agricultural Production. Making Food available to masses. Food distribution network. Nationwide Community Development (CD) Programme Institutions for village development. National Extension and Community Projects Skewed Land Distribution, Inefficiency in Production and thus land reforms - Abolition of intermediaries. Bringing the fallow lands under cultivation and increase in land use efficiency. Tenants to be given the rights to cultivate land.
Second Plan 1956-61	Concern about low land productivity and thrust on irrigated agriculture. Irrigation Development for the rainfed areas. Land Reforms Enactment of laws. Tenancy Reforms & Ceiling on Holdings. Soil conservation as an important programme. Co-operative Development Institutions, National Extension Service Blocks created. Training and Extension work for the technology through Community Development network.
Third Plan 1961-66	Food security concerns continued to dominate. Technological Change and adoption of improved technology to increase land productivity. Cultivable waste land to be brought under cultivation. Bringing the lagging regions under mainstream growth. Area development as an approach for development. Intensive Area Development Programme adopted for selected districts. Extension of non-agricultural activities in Rural areas. An integrated land policy approach. Soil Surveys were taken up.

<p>Fourth Plan 1969-74</p>	<p>Emphasis on food security continued as minimum dietary requirements to be met. Deep concern about Poverty. Regional inequality and correction of regional imbalances. Incentives created for diversion of land towards food crops and enhancing the capacity of such land. Increased emphasis on irrigation and soil conservation in dry-land regions and technological change introduced. Higher cropping intensity was the concern. Emergence of Agri. Price Policy. Concern about domination of large holding sizes and low allocative and technical efficiency. Second phase of land reforms with land ceiling acts and consolidation of holding. Encouragement to co-operatives. Institutional changes in Credit, Agri extension and training.</p>
<p>Fifth Plan 1974-79</p>	<p>Twenty point economic programme. Concern to eradicate poverty intensified. Area Development strategy continued. Drought prone areas attracted attention. Allocation on Drought-prone area development programme, Desert area development programmes, and soil conservation was enhanced. New impetus to dry farming. Problems of land degradation land management in irrigated command areas surfaced. Modernisation of irrigation in selected irrigation command areas.</p>
<p>Sixth Plan 1980-85</p>	<p>Minimum Needs Programme. Providing clean drinking water, elementary education and basic health facilities. Larger attention to unemployment and under-employment. Target group specific programmes for poverty alleviation. IRDP, NREP and RLEGP Programmes were undertaken for employment and income generation. Under-utilisation of land resources. Drought-prone areas continued to attract attention. Further attention for lagging areas on the backdrop of green revolution. Land and water management programme under drought-prone area programme in selected districts.</p>
<p>Seventh Plan 1985-90</p>	<p>Direct attack on poverty, unemployment and regional imbalances continued. Soil erosion and land degradation surfaced as major issues. Larger share of land was going out of cultivation. Soil and Water Conservation was needed for averting land degradation. National Watershed Development Programme, Oilseed and Pulses Development Programmes, Wasteland Development Programmes, and Long term view of land management was initiated.</p>
<p>Eighth Plan 1992-97</p>	<p>Priority for Employment Generation, Strengthening of Infrastructure, Liberalization and Globalisation in Agricultural Sector. Trade Sector Priorities by Generating Surplus of agricultural commodities for exports. Emphasis on Oilseed Sector increased. Agro-climatic regional planning approach was incorporated. Productivity enhancement Schemes. Horticulture Sector to be encouraged. Degradation of land in Irrigated command areas attracted attention. Peoples' participation surfaced as major issue in land management at village level. Emphasis on Watershed Development approach. Soil conservation merged with watershed programmes.</p>
<p>Ninth Plan 1997-2002</p>	<p>Priority to agricultural sector. Generating adequate productive employment through employment assurance. Renewed assault on poverty, Accelerating growth with stable prices, Food and nutritional security for vulnerable sections, Providing basic needs for environmental sustainability, Growth with social justice and equity, Foreign trade to be tailored for accelerating growth, Boost to agricultural research, Development of infrastructure and increasing investment in</p>

	<p>infrastructure, Export oriented growth and Emphasis on Horticultural Crops for exports. Land degradation increased significantly. Integrating Watershed Development Programme across various components. Rethinking on land reforms. Gap between potentials and actual crop yields need to be bridged. Need for a long term policy document. Bringing the under-utilised land under cultivation. Management of waste lands. Maintenance of village commons. Decentralised land management system. <i>Panchayat raj</i> institutions to manage the village lands. Rethinking on land legislation</p>
Tenth Plan 2002-2007	<p>Target 4 percent growth in agricultural sector. Regionally differentiated strategy. Sustainable development of Natural Resources. Utilisation of wastelands and un-utilised/under-utilised lands. Reclamation/development of problems of soils/lands. Rainwater harvesting and conservation for the development of rainfed areas. Development of irrigation, especially minor irrigation. Conservation and utilisation of biological resources. Diversification of high value crops/activities. Increasing cropping intensity. Timely and adequate availability of inputs. Strengthening of marketing, processing/value addition infrastructure. Revamping and modernising the extension systems and encouraging private sector to take up extension services. Bridging the gap between research and farmer's yield. Cost-effectiveness while increasing productivity. Promotion of farming systems approach. Promotion of organic farming and utilisation of organic waste. Development of eastern and northeastern regions, hill and coastal areas. Reforms to introduce proactive policies for the farm sector.</p>

Note: These are not however exhaustive statements but only indicative of the thrust.
Sources: Deshpande and Narayanamoorthy (2002) and GOI (2003).

1.4 Issues in Maharashtra's Agriculture:

Though Maharashtra state occupies relatively better position in terms of contribution to the total production of different commodities at all India level (see, Table 1.3), the agricultural sector of the state has been facing a number of different problems. The main problems faced by the agricultural sector of the state are:

- Low irrigation facility
- Low and erratic rainfall pattern
- Cultivation of crops predominantly under rainfed condition
- Improper distribution of irrigation water among different crops
- Predominant cultivation of low value crops
- Low productivity of different crops
- Mono-cropping pattern
- Low progress in Watershed Development Programme

- Wide regional variation in the development of agriculture
- Poor marketing and post harvesting facilities

Most of the problems mentioned above are one way or the other associated with the limited availability of irrigation. Despite giving substantial importance, both in terms of investment and policy input for the development of irrigation, the share of irrigated area to gross cropped area is only about 17 percent as of today. The low irrigation facility has been one of the serious problems of the state. Due to low irrigation facility, not only low value crops are cultivated predominantly in the state but the productivity of most of the crops are also very low as compared to the national average. Cultivation of low value crops coupled with the low productivity of crops reduce the income of the farmers, which adversely affect the standard of living of both farming and non-farming (landless agricultural labourers) rural communities.

Table 1.3: Contribution of Maharashtra to India's total production of different crops.

Crops	(Percent)			
	1970-71	1980-81	1990-91	1999-2000
Jowar	19.2	42.5	50.9	52.6
Bajra	10.2	14.2	16.1	20.3
Coarse Cereals	8.6	18.8	22.9	21.4
Gram	1.7	3.5	6.7	17.4
Tur	14.4	18.4	17.4	33.3
Total Pulses	5.8	7.8	10.1	16.3
Total Foodgrain	5.0	7.5	6.9	6.0
Sugarcane	11.4	15.3	15.9	18.2
Groundnut	11.3	12.2	13.2	10.4
Soyabean	NA	NA	7.3	23.9
Sunflower	NA	57.1	34.5	26.3
Total Oilseeds	7.8	7.8	10.1	12.4
Cotton	10.1	18.1	19.1	26.6
Onion	NA	27.2	24.8	29.3
Cashewnut	NA	4.2	10.3	25.0

Source: CMIE (2001).

The second major issue is related to crop pattern and productivity of crops. Because of low irrigation facility and wide variation in rainfall, farmers are forced to cultivate low value crops (coarse cereals and pulses) predominantly under rainfed condition. About 83 percent of cultivated area is under rainfed condition as of today. Since rainfed crops are generally affected by varied rainfall (moisture

stress), productivity of different crops is very low in the state as compared to the all India average. Mono-cropping pattern (example, sugarcane) followed in certain regions of the state has also affected the productivity of crops, which is another important issue of Maharashtra's agriculture.

The third important issue in Maharashtra's agriculture is poor growth of agriculture, which is the main outcome of low irrigation and productivity of crops. Though significant development has taken place in horticultural sector during the last decade, it has not made any significant impact on the growth rate of agriculture. While the share of agricultural sector's contribution to state's income declined from 34 percent in 1960-61 to 16 percent in 2001-02, the growth rate of the agricultural sector (state domestic product) decelerated from 3.70 percent per annum during eighties (1980-81 to 1990-91) to 2.72 percent per annum during nineties (1990-91 to 2001-02) (see, Table 1.4). The slow growth of agriculture is a serious issue from the point of view of rural employment and poverty, both of which are heavily dependent on agricultural growth.

The other important issue associated with Maharashtra's agriculture is poor marketing and post-harvesting facilities. Besides the domination of middlemen, it is predominantly traditional and does not have strong network of post-harvest services and infrastructural facilities (Mahendra Dev, 1996). As result of this, not only the wastage is substantial but the losses are also enormous for farmers. Concerted efforts are needed to improve the marketing facilities.

In addition to the existing problems, the newer issues arising out of WTO commitments are further expected to pose different kinds of problems to the agricultural sector of the state. How to improve the growth of agriculture with these constraints? What are the areas in which government should focus mainly in the future? Is there any relationship between the policies introduced by the government and development of agriculture? What are major constraints that limit the growth of agriculture in the state? Whether the government has taken initiatives to face WTO commitments? etc. are some of the important issues which need to be studied thoroughly to make a proper agricultural policy that can be implemented for improving the performance of agricultural sector in the state. Keeping in view the issues raised above, the present study makes an attempt to

Table 1.4: Sectoral growth in NSDP/NNDP in Maharashtra and India (at 1980-81 prices).

(Percent per annum)

Year	Maharashtra						India					
	Agriculture	Agriculture and Allied	Primary	Secondary	Tertiary	NSDP	Agriculture	Agriculture and Allied	Primary	Secondary	Tertiary	NNDP
1980-81 to 1990-91	3.82**	3.67**	3.70**	6.25*	6.92*	5.87*	3.31*	3.09**	3.16*	6.78*	6.55*	5.33*
1990-91 to 2001-02	2.84**	2.56**	2.72**	4.27*	7.63*	5.63*	5.86*	2.79**	2.90*	5.60*	7.87*	5.78*
1980-81 to 2001-02	3.62*	3.41**	3.50*	5.76*	7.94*	6.27*	3.17*	3.02**	3.12*	5.97*	7.02*	5.44*

Notes: * and ** significant at 1 and 5 percent level respectively; NSDP - Net State Domestic Product; NNDP - Net National Domestic Product.
Source: Computed from Economic Survey of Maharashtra (various issues).

formulate an agriculture policy for the state of Maharashtra by taking into account the policy inputs followed for the development of agriculture over the last forty years.

1.5 Objectives:

The specific objectives of the study are:

1. To review the available materials (including policy documents, five year plan documents at the center and at state level, policy statements made at the state level, etc.) at the state level dealing with policy interventions after the formation of the state.
2. To identify the important constraints and review the efforts made by the State in the past to meet major challenges pertaining to agriculture and allied activities.
3. To record the state's response to the already formulated National Agricultural Policy, that is, to find out precisely how and where the state would like to suitably supplement, modify and re-articulate the National Policy in the local context.
4. To bring out the state's concerns as well as to record the state's views on the changing economic situation due to India's involvement with the WTO.
5. To assemble these views in the form of a meaningful policy requirement matrix, relating problems/issues to action points suggested/recommended.

1.6 Data and Methodology:

This study has been carried out mainly using available secondary level information. The coverage of the study period is from 1960-61 to 2001-02. Data for this study have been mainly compiled from various five year plan documents (both centre and state), various committee and commission reports, Season and Crop Report of Maharashtra State (various issues), Districtwise Agricultural Statistical Information of Maharashtra State, Economic Survey of Maharashtra and India, various documents published by the Ministry of Agriculture, Government of India, New Delhi, <http://agricoop.nic.in>, <http://agri.mah.nic.in>, <http://www.censusindia.net>, etc. Recent data on Maharashtra's agricultural

development have been directly compiled from the Commissionerate of Agriculture, Government of Maharashtra, Pune.

In order to understand the performance of the state's agriculture, a thorough analysis has been carried out on irrigation development, input use, cropping pattern, production and productivity of different crops using data from 1960-61 to 2001-02. One of the objectives of the study is to review the initiatives taken by the government during different plan periods to improve the performance of agriculture. For this, a detailed review has been done using the information collected from different five year plan documents, economic survey of the state, etc. A number of constraints limit the growth of agriculture in the state over the last four decades. While highlighting the major constraints of Maharashtra's agriculture, the measures taken by the government to remove the constraints have also been presented using the information gathered from different plan documents.

1.7 Organisation of the Study:

The study has five chapters. Chapter one, which is an introduction, presents a brief account on experience as well as emergence of agriculture policy in India, the major issues in Maharashtra's agriculture, objectives and methodology of the study. Chapter two deals with agricultural development of the state, wherein plan expenditure on agriculture and irrigation, workforce in agriculture, landholdings, rainfall, irrigation development, inputs use, land use pattern, cropping pattern, horticulture sector, production and productivity of crops and livestock sector of the state have been discussed in detail. Chapter three presents a detailed review on the initiatives (programmes) taken by the state government to improve the performance of agriculture since the third plan period. Important programmes introduced by the government have also been discussed in the same chapter. Chapter four brings out all the major constraints faced by the agricultural sector of Maharashtra. Chapter five presents the agricultural policy for Maharashtra's state including a policy matrix, which provides the strategies to be followed to improve the overall performance of the agricultural sector.

Agricultural Development of the State

Maharashtra is one of largest states in India, both in terms of Gross Cropped Area (GCA) and population. While accounting for about nine percent of India's population, the state contributes over 20 percent in India's industrial output and about 13 percent in India's GDP in 2001-02 (GOM, 2003). The state also accounts for about 12 percent in India's Gross Cropped Area (GCA) in 1999-2000. Over the last forty years, the agricultural sector of Maharashtra has undergone lot of changes. In order to formulate a desirable agriculture policy, it is necessary to review the past agricultural development of the state. It is in this context, in this chapter, an attempt is made to review the development of agriculture in different areas in the state. Specifically, we review the plan-wise expenditure on agriculture and irrigation development, changes in rural workforce, land holding pattern, rainfall, irrigation, land use pattern, cropping pattern, input use (HYVs and fertilisers), production and productivity of different crops as well as livestock development in the state. While reviewing the development of different areas in agriculture, we try to underline the important areas in which more attention needs to be given in the future.

2.1 Plan Expenditure on Agriculture and Irrigation:

Investment in agriculture is essential for increasing as well as sustaining the overall growth of agriculture. Public sector investment in agriculture is essential because it stimulates private sector investment, as has been proved by various studies in India (see, Rath 1989; Mishra and Chand 1995; Dhawan 1998). Plan expenditures from three heads namely (a) agriculture and allied activities, (b) rural development, (c) irrigation and flood control generally have a direct bearing on agricultural growth. Table 2.1 presents the sectoral distribution of plan expenditure during different plan periods in Maharashtra. Altogether from third plan to ninth plan period, about Rs. 38150 crore (in current prices) have been

Table 2.1: Sectoral distribution of plan expenditure in the five year plans of Maharashtra state.

(Rs. in Crore)

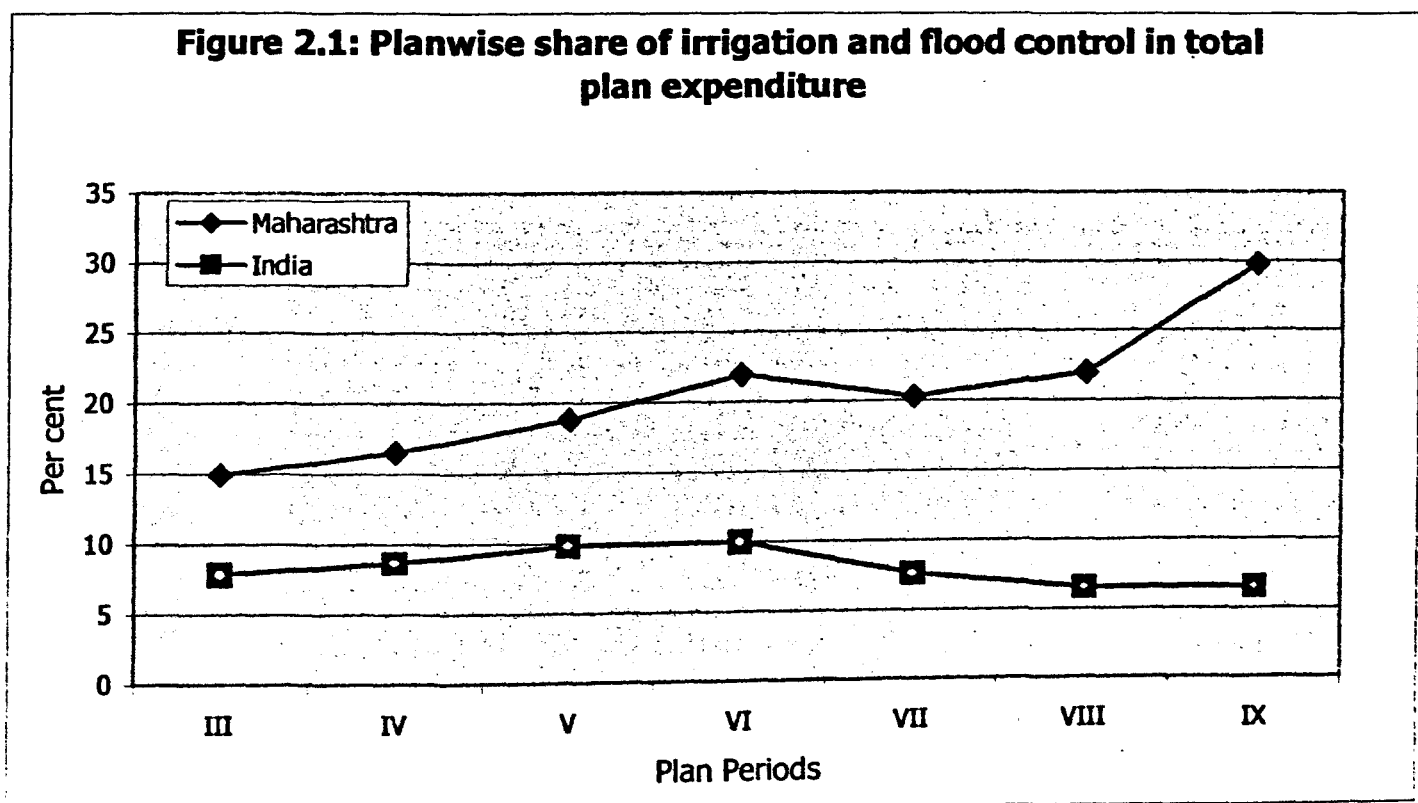
Sr. No	Five Year Plan Schemes	Agriculture and Allied Services	Rural Development	Irrigation and Flood Control	Power Development	Industry and Minerals	Transport and Communication	Others	Total (3 to 9)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1	3 rd Plan (1961-66)	134.21 (30.87)	-- --	64.85 (14.92)	93.91 (21.60)	14.81 (3.41)	37.45 (8.61)	89.50 (20.59)	434.73 (100.00)
2	4 th Plan (1969-74)	221.71 (22.07)	-- --	165.96 (16.52)	283.64 (28.24)	39.62 (3.94)	81.08 (8.07)	212.50 (21.15)	1004.51 (100.00)
3	5 th Plan (1974-79)	343.32 (12.91)	-- --	501.54 (18.85)	910.39 (34.22)	105.69 (3.97)	220.08 (8.27)	579.11 (21.77)	2660.13 (100.00)
4	6 th Plan (1980-85)	393.38 (6.01)	894.94 (13.66)	1437.44 (21.95)	1734.76 (26.49)	255.31 (3.90)	422.81 (6.46)	1410.75 (21.54)	6549.39 (100.00)
5	7 th Plan (1985-90)	614.39 (5.56)	1575.86 (14.27)	2239.53 (20.28)	2835.39 (25.67)	420.25 (3.81)	585.77 (5.30)	2773.31 (25.11)	11044.50 (100.00)
6	8 th Plan (1992-97)	1470.60 (5.71)	2836.44 (11.01)	5668.34 (22.01)	5864.09 (22.77)	941.89 (3.66)	2015.36 (7.83)	6954.94 (27.01)	25751.66 (100.00)
7	9 th Plan (1997-2002)	2247.89 (4.98)	3901.95 (8.65)	13437.69 (29.78)	6881.79 (15.25)	1109.77 (2.46)	4183.55 (9.27)	13362.36 (29.61)	45125.00 (100.00)
	Total (3 rd to 9 th Plan)	5425.5 (5.86)	9209.19 (9.95)	23515.35 (25.40)	18603.97 (20.10)	2887.34 (3.12)	7546.10 (8.15)	25382.47 (27.42)	92569.92 (100.00)

Note: Figures in brackets are percentage to total.

Source: GOM (2002).

spent on the above mentioned three heads. Though these three heads altogether accounted for about 41 percent in the total plan expenditure from third plan to ninth plan period, the share of agriculture and allied services has sharply declined from 30.87 percent in third plan to 4.98 percent in ninth plan in Maharashtra. A similar trend is also noticed at the national level, where the share of agriculture and allied services has declined from 12.7 percent to 4.9 percent during the same period.

Unlike the agriculture and allied services, the plan expenditure in irrigation and flood control has sharply increased from 14.92 percent in third plan to nearly 30 percent in ninth plan in Maharashtra. This is in contrast to the national level picture, where the same share has declined from 7.8 percent to 6.5 percent during this period (see, figure 2.1). Considering the vast rainfed cultivated areas and also the importance of irrigation in agricultural growth, the state government has been giving top priority to exploit the available irrigation potential. This naturally requires more investment and therefore, investment in irrigation and flood control has increased substantially over the plan periods in Maharashtra. One needs to study how far this investment in irrigation has translated into irrigated area in the state. On the whole, unlike the national level picture, the total share of investment in agriculture and irrigation development has been increasing across different plan periods in the state.



2.2 Workforce in Agriculture:

Before analysing the development of various aspects of agriculture, let us understand the workforce involved in agriculture in the state. An analysis on the workforce would not only reveal the share of rural population relying on agriculture for livelihood but also help in making a proper agriculture policy for any state. Table 2.2 presents the distribution of rural workforce for Maharashtra as well as for India as a whole. It is evident from the table that despite achieving significant development in industrial sector in the state, the workforce (cultivators plus agricultural labourers) directly relying on agriculture has come down only marginally (by 1.93 percent points) between 1981 and 2001. This reduction is relatively lower as compared to the reduction observed at the all India level.

Table 2.2: Rural workforce distribution: Maharashtra and India.

Particulars	Maharashtra			India		
	1981	1991	2001	1981	1991	2001
Cultivators*	47.87	46.26	41.69	51.10	48.39	40.14
Agricultural Labourers*	35.14	36.61	39.39	29.88	31.64	33.20
Household Industry Workers*	2.22	1.47	2.09	3.08	2.16	3.77
Other Workers*	14.78	15.66	17.83	15.94	17.80	22.90
Total Rural Main Workers (million)	17.42	21.38	22.75	176.43	222.90	229.67
Total Rural Main + Marginal workers (million)	19.65	24.03	28.11	197.31	249.03	310.66
Total Rural Population (million)	40.79	48.38	55.73	507.61	622.82	740.26

Note: * - 1981 and 1991 figures are percentage to total main workers and data pertaining to 2001 are percent to total workers (main plus marginal).

Sources: GOI (1981 and 1991) and www.censusindia.net

The relatively higher share of workforce still relying on agriculture in the state is mainly because of lower growth in non-farm rural employment opportunities (Narayanamoorthy, et al., 2002; Visaria, 1995). As one of the main factors responsible for the growth of non-farm rural employment is agricultural development, the predominant rainfed agriculture followed in Maharashtra would

not have stimulated the non-farm rural employment opportunities (see, Mahendra Dev, 1990; Fisher et al., 1997; Hazell and Haggblade, 1991). On the whole, the analysis reveals that the rural workforce relying directly on agriculture is still (in 2001) about 80 percent in the state. Therefore, while formulating policy for agriculture, adequate attention needs to be given to shift the workforce from agricultural to non-agricultural sector so as to improve the living condition of the rural workforce.

2.3 Land holding Pattern:

Land holding pattern of Maharashtra state is somewhat different from the all-India level. Though the proportion of marginal and small holdings has been increasing both at the state and the national level, the share of these groups in the total number of holdings is relatively lower in Maharashtra as compared to all-India level (see, Table 2.3). For instance, during 1990-91, marginal and small holdings accounted for about 63 percent of the total holdings in Maharashtra, whereas the same group accounted for nearly 78 percent at the all-India level. This means that marginal and small farmers are relatively lower in Maharashtra as compared to the all-India level. An interesting fact emerging from Table 2.3 is that there is a sharp reduction in large holdings in Maharashtra (from 10.38 percent in 1970-71 to 1.80 percent in 1990-91) as compared to the trend observed at the all-India level, where the same declined only from 3.93 percent to 1.59 percent during this period. Because of relatively lower number of marginal and small holdings in Maharashtra, the average size of operational holdings is found to be higher in the state as compared to the same at the all-India level.

2.4 Rainfall:

Monsoon rain plays a critical role in the agricultural development of the state, as over 83 percent of cropped area is cultivated under rainfed condition as of today. Maharashtra receives rainfall mainly through south-west monsoon, which starts during the first week of June and ends in October. Though the average rainfall of the state is relatively higher as compared to many states in India, its timeliness and spread across months as well as across different regions are not very much favourable. While the normal rainfall of the Konkan

Table 2.3: Size classwise percentage distribution of number of operational holdings and area operated in Maharashtra and India.

Size Class	Maharashtra						India					
	Distribution of number of holdings			Distribution of area operated			Distribution of number of holdings			Distribution of area operated		
	1970-71	1980-81	1990-91	1970-71	1980-81	1990-91	1970-71	1980-81	1990-91	1970-71	1980-81	1990-91
Marginal (Below 1.0 ha)	25.09	28.06	34.58	2.73	4.56	7.73	50.62	56.39	58.99	8.97	12.05	14.87
Small (1.00-1.99 ha)	17.74	22.45	28.80	6.06	10.92	19.04	19.05	18.08	18.97	11.89	14.15	17.34
Semi Medium (2.00-3.99 ha)	21.96	24.57	22.45	14.78	22.55	28.10	15.15	14.01	13.21	18.50	21.15	23.16
Medium (4.00 -9.99 ha)	24.83	20.28	12.37	36.44	39.55	32.77	11.25	9.08	7.25	29.75	29.63	27.20
Large (10.00 & above)	10.38	4.64	1.80	39.99	22.41	12.37	3.93	2.44	1.59	30.88	23.02	17.45
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Average Size	-	-	-	4.28	3.11	2.21	-	-	-	2.30	1.84	1.57

Sources: GOM (2003) and CMIE (2001).

division (about 2900 mm) is about 135 percent higher than the average normal rainfall of the state (1254 mm), the same is less by about 40 percent in Aurangabad division. Moreover, except 10 districts of the total 34 districts in the state, the normal rainfall of all other districts is less than the state's average normal rainfall (see, Table 2.4). This clearly shows how widely rainfall varies across regions in the state.

Table 2.4: Districtwise rainfall pattern in Maharashtra.

Districts	Normal Rainfall	from 1991 to 2001 (mm)			
		Average Rainfall	C.V. (%)	Minimum	Maximum
Thane	2497.5	2257.2	11.1	1964.7	2696.1
Raigad(Kolaba)	3366.9	3152.7	14.2	2344.6	3964.1
Ratnagiri	3379.9	3443.6	13.8	2713.7	4273.8
Sindhudurg	3027.6	3250.9	14.5	2667.7	4180.4
Nasik	998.2	961.3	13.4	784.1	1127.9
Dhule	771.3	688.4	27.7	405.3	968.6
Nandurbar	771.3	709.1	20.3	559.3	846.1
Jalgaon	744.7	726.4	20.4	559.5	1065.3
Ahmednagar	577.0	660.9	38.7	373.6	1181.5
Pune	1171.2	1017.2	24.9	640.0	1375.7
Solapur	607.2	688.8	29.9	470.7	1150.7
Satara	814.4	1381.6	20.2	1045.5	1867.9
Sangli	658.8	733.9	14.7	564.7	864.2
Kolhapur	1828.6	1930.8	12.7	1580.3	2286.0
Aurangabad	758.0	726.7	18.4	436.1	895.8
Jalna	752.7	788.6	18.8	608.6	1151.6
Beed	731.6	740.7	30.4	405.7	1231.1
Latur	965.5	821.3	26.0	473.2	1219.7
Osmanabad	799.1	748.7	28.5	476.3	1159.7
Nanded	967.5	888.7	11.5	717.3	1023.1
Parbhani	903.4	915.1	21.6	605.8	1320.7
Hingoli	903.4	1044.0	17.6	859.5	1226.8
Buldhana	806.2	752.9	21.2	506.4	1103.7
Akola	842.6	802.4	18.6	583.1	1034.0
Washim	842.6	1060.7	17.2	850.6	1176.6
Amaravati	873.2	818.3	17.7	586.0	973.8
Yavatmal	1007.6	826.6	12.8	600.2	976.4
Wardha	1070.6	923.5	15.0	654.8	1116.8
Nagpur	1199.2	1007.6	13.1	821.0	1151.3
Bhandara	1426.3	1281.7	16.2	825.6	1512.9
Gondia	1426.3	1266.8	10.3	1167.0	1414.1
Chandrapur	1376.7	1138.6	15.5	781.1	1363.0
Gadchiroli	1433.3	1411.6	14.3	1083.5	1760.1
Maharashtra State	1254.1	1217.1	9.8	1081.1	1454.0

Note: N.A. - Not Available

Source: GOM (various issues of *Agricultural Statistical Information of Maharashtra State*).

Apart from variation in the normal rainfall across districts, it also widely varies across *talukas* within a district/region. This not only discourages the farmers to adopt the required quantity of various yield increasing inputs but ultimately results in lower productivity most of the time. In view of the limited water potential as well as increasing demand for water from different sectors, the only option available before the policy makers is to implement sustainable rain water harvesting systems at a rapid pace through watershed development programme.

2.5 Irrigation Development:

Though the aspect of irrigation development is generally dealt within the Water Policy, we are of the opinion that comprehensive agriculture policy for any state cannot be formulated without considering irrigation development. Therefore, we have reviewed the development of irrigation before getting into cropping pattern, etc.

Considering the predominant nature of rainfed cultivation and wide variation in the rate of rainfall across regions, a significant emphasis has been given for the development of irrigation in the state by the policy makers since independence. Area under irrigation (GCA) increased from 1.24 mha in TE 1962-63 to 3.66 mha in TE 2000-01 in Maharashtra, an increase of about 2.89 percent per annum (see, Table 2.5). However, the utilisation percentage of irrigation is very low in the state. As of June 2000, about 4.769 million hectares of irrigation potential has been created in the state. Of this, only about 34.7 percent (1.654 mha) has been utilised. This is very low as compared to the utilisation percentage of the national level, which was about 89.45 percent at the end of Eighth Plan. Inadequate availability of funds for developing hardware aspects of irrigation such as construction of main canals and distribution systems are often cited as the main reasons for low percentage of utilisation.

In terms of investment on irrigation, Maharashtra state stands on the upper side of the ladder. Up to ninth plan period, for which we have comparable data, altogether Rs. 236.22 billion (In current prices) has been spent only on irrigation development. This accounted for over 17.36 percent of the country's

total investment on irrigation, which is about Rs. 1360.65 billion, excluding investment on CADA and flood control. As a result of large investment on irrigation, Maharashtra state accounts for about 34 percent (1229 dams) of the total number of large dams constructed in the country, as per the latest information available from CWC (2002).

Another important issue pertaining to irrigation is the relationship between investment on irrigation and area created from each plan period. We could see hardly any relationship between investment and area created across plan periods. During the sixth plan period, the state has spent Rs. 11.87 billion on MMI and created about 0.507 mha, by spending only about Rs. 23416/ha. But this has changed during seventh and eighth plan periods. With an investment of Rs. 23.92 billion during eighth plan period, the state could create only about 0.283 mha from MMI source. This means that the average investment required to create one hectare of irrigation increased to Rs. 84505 during eighth plan period. Incompletion of projects in time due to paucity of funds is identified as the main reason for poor cost efficiency (see, Gulati et al, 1994; Abbie et al, 1982; Deshpande and Narayanamoorthy, 2001).

Despite having largest number of dams and also storage (second highest in the country) capacity of 22.10 cubic km from the completed projects, in terms of achievements, the proportion of cultivated area under irrigation is only about 17 percent of gross cropped area (GCA) as of today, which is one of the lowest among the states in the country. One of the important reasons for the less proportion of irrigated area is that two-third of water available in the state is used only for sugarcane, which accounts for less than three percent of gross irrigated area in the state. Thus, it is clear that irrigation water is not used judiciously in the state.

Besides the problem of low development of irrigation, the created irrigation potential is also not equally distributed across regions in the state (see, Table 2.6). Data show that four divisions namely Pune, Kolhapur, Aurangabad and Nagpur together accounted for about 74.23 percent (0.780 m ha) of total surface irrigated area of the state during TE 2001-02. However, the distribution of area

Table 2.5: Trends in Irrigated Area - Maharashtra and India

Period	SIA		WIA		NIA		GIA	
	Maha	India	Maha	India	Maha	India	Maha	India
TE 1962-63	0.48 (44.04)	17.64 (69.29)	0.61 (55.96)	7.43 (29.64)	1.09 (100)	25.07 (100)	1.24	28.63
TE 1972-73	0.58 (43.61)	19.12 (60.70)	0.75 (56.39)	12.38 (39.28)	1.33 (100)	31.49 (100)	1.55	38.56
TE 1982-83	0.79 (41.36)	21.38 (53.49)	1.12 (58.64)	18.59 (46.51)	1.91 (100)	39.97 (100)	2.44	51.01
TE 1992-93	0.97 (36.06)	23.18 (46.93)	1.71 (63.94)	25.88 (53.08)	2.69 (100)	49.39 (100)	3.28	65.22
TE 2000-01	1.05 (35.35)	23.89* (42.87)	1.92 (64.65)	31.84* (57.13)	2.97 (100)	55.73* (100)	3.66	73.93*

Notes: * - relates to TE 1998-99; SIA – surface irrigated area; WIA – well irrigated area.:

Figures in brackets are percentages to net irrigated area (NIA).

Sources: GOI (various issues); GOM (various issues of *Season and Crop Report of Maharashtra State and Districtwise Agricultural Statistical Information of Maharashtra State*); FAI (2002).

Table 2.6: Division-wise trends in area under irrigation in Maharashtra.

(in '000 ha)

Division	Surface Irrigation		Well Irrigation		Net Irrigation		Gross Irrigation	
	TE 1962-63	TE 2001-02	TE 1962-63	TE 2001-02	TE 1962-63	TE 2001-02	TE 1962-63	TE 2001-02
Konkan	10.97 (2.28)	25.43 (2.42)	9.77 (1.59)	27.40 (1.43)	20.77 (1.90)	52.83 (1.78)	21.37 (1.72)	63.73 (1.74)
Nasik	29.30 (6.10)	108.13 (10.30)	84.33 (13.77)	302.43 (15.76)	113.77 (10.41)	410.57 (13.83)	147.33 (11.84)	511.20 (13.97)
Pune	121.47 (25.28)	246.23 (23.45)	233.30 (38.09)	479.60 (25.00)	354.90 (32.47)	725.83 (24.45)	413.27 (33.22)	886.00 (24.22)
Kolhapur	75.80 (15.78)	158.33 (15.08)	87.17 (14.23)	249.50 (13.00)	162.97 (14.91)	407.83 (13.74)	194.37 (15.63)	495.90 (13.55)
A'bad	5.93 (1.23)	139.77 (13.31)	85.67 (13.98)	310.17 (16.17)	91.63 (8.38)	449.93 (15.16)	107.47 (8.64)	554.03 (15.14)
Latur	12.53 (2.61)	89.30 (8.50)	63.13 (10.31)	184.47 (9.62)	67.47 (6.17)	273.77 (9.22)	75.57 (6.08)	348.33 (9.52)
Amravati	0.53 (0.11)	47.73 (4.55)	25.97 (4.24)	129.00 (6.72)	26.57 (2.43)	176.73 (5.95)	26.63 (2.14)	225.03 (6.15)
Nagpur	231.87 (48.26)	235.17 (22.39)	23.27 (3.80)	235.93 (12.30)	255.23 (23.35)	471.10 (15.87)	257.50 (20.70)	574.60 (15.70)
State	480.50 (100.00)	1050.10 (100.00)	612.57 (100.00)	1918.50 (100.00)	1093.10 (100.00)	2968.60 (100.00)	1243.87 (100.00)	3658.83 (100.00)

Sources: GOM (various issues of *Season and Crop Report of Maharashtra State and Districtwise Agricultural Statistical Information of Maharashtra State*).

under well irrigation across divisions is relatively better than surface source of irrigation. Except Konkan, Amravati and Latur divisions, the share of well irrigated area to total (net) well irrigated area is varied from about 12 percent to 25 percent in other divisions. Interestingly, the share of surface irrigated area is found to be higher in those areas where the share of well irrigated area is also higher, except Nashik and Nagpur divisions. As irrigation is one of the important factors which determine the income generating capacity of the rural population and also involves a large amount of public investment, the allocation of resources for irrigation development needs to be linked with the percentage of utilisation of irrigation potential across regions in the future.

One of the significant developments in Maharashtra's irrigation is the impressive growth in micro-irrigation (drip and sprinkler). Keeping in view the water balance of the state, government of Maharashtra has been promoting drip method of irrigation since 1986 through subsidy programmes. The area under drip method of irrigation (DMI) has increased from a mere 236 ha in 1986-87 to about 217 thousand hectares in 2001-02, an increase of about 57 percent per annum. As of 1997-98, for which we have statewide data, Maharashtra State alone accounted for over 50 percent of India's total drip irrigated area. Studies carried out in different crops using field survey data suggest that not only the investment on drip irrigation is economically viable but it also saves substantial amount of water (see, Table 2.7). Since DMI is highly suitable for almost all horticultural crops and the state also has lot of potential for the same crops, area under DMI can be increased by many fold by extending the promotional schemes currently followed by the state for another one decade or so. On the whole, despite having some positive development in DMI, the irrigation sector of the state has been facing serious problems which need to be addressed immediately to improve the performance of agriculture.

2.6 Coverage of HYVs:

One of the indicators of level of adoption of technology in agriculture is the use of HYVs in different crops. Though the use of HYVs is positively correlated with the availability of irrigation, farmers have been using the same even under rainfed condition because of the government's subsidy programmes and effective

Table 2.7: Advantages from Drip Method of Irrigation over Flood Method of Irrigation: Results of Field Study.

Particulars	Banana ^a (Jalgaon)	Grapes ^a (Nashik)	Sugarcane ^b	
			Pune	Ahmednagar
Cost Saving (Rs/ha)	1300 (2.47)	13400 (9.07)	5843 (11.78)	7250 (15.26)
Water Saving (HP hours/ha)	3246 (29.15)	1968 (37.28)	1194 (40.69)	1632 (47.63)
Electricity Saving (Kwh/ha)	2430 (29.15)	1470 (37.28)	896 (40.69)	1224 (47.64)
Productivity Gains (Quintal/ha)	153.19 (29.00)	38.96 (19.00)	24.52 (20.99)	27.32 (25.27)
Net Present Worth (Rs/ha)*				
With Subsidy	257635	551220	206692	166619
Without subsidy	247753	540241	190025	149766
B-C Ratio*				
With subsidy	2.36	1.80	2.16	2.02
Without subsidy	2.23	1.77	1.98	1.83

Notes: a – data relate to the year 1993-94; b – data relate to the year 1998-99. Figures in brackets are saving in percent over FMI.

* - BC ratio and NPW are computed using discounted (at 15 percent) cash flow technique.

Sources: Narayanamoorthy (1996, 1997 and 2001).

Table 2.8: Area under HYVs in Maharashtra and India.

(Percent)

Year	Maharashtra						India					
	Paddy	Jowar	Bajra	Maize	Wheat	Total Cereals	Paddy	Jowar	Bajra	Maize	Wheat	Total Cereals*
TE 1970-71	13.29	7.92	17.06	17.61	18.69	11.04	11.21	3.76	10.44	7.46	31.69	11.91
TE 1980-81	60.24	27.65	28.28	83.00	81.32	36.81	42.56	19.82	28.33	24.55	70.10	38.91
TE 1990-91	75.11	61.23	72.76	91.23	86.95	65.57	62.36	45.77	51.46	41.82	85.59	59.89
TE 2000-01 ^a	93.46	91.43	93.08	98.51	90.39	88.36	75.00	83.03	70.18	58.77	88.46	76.00

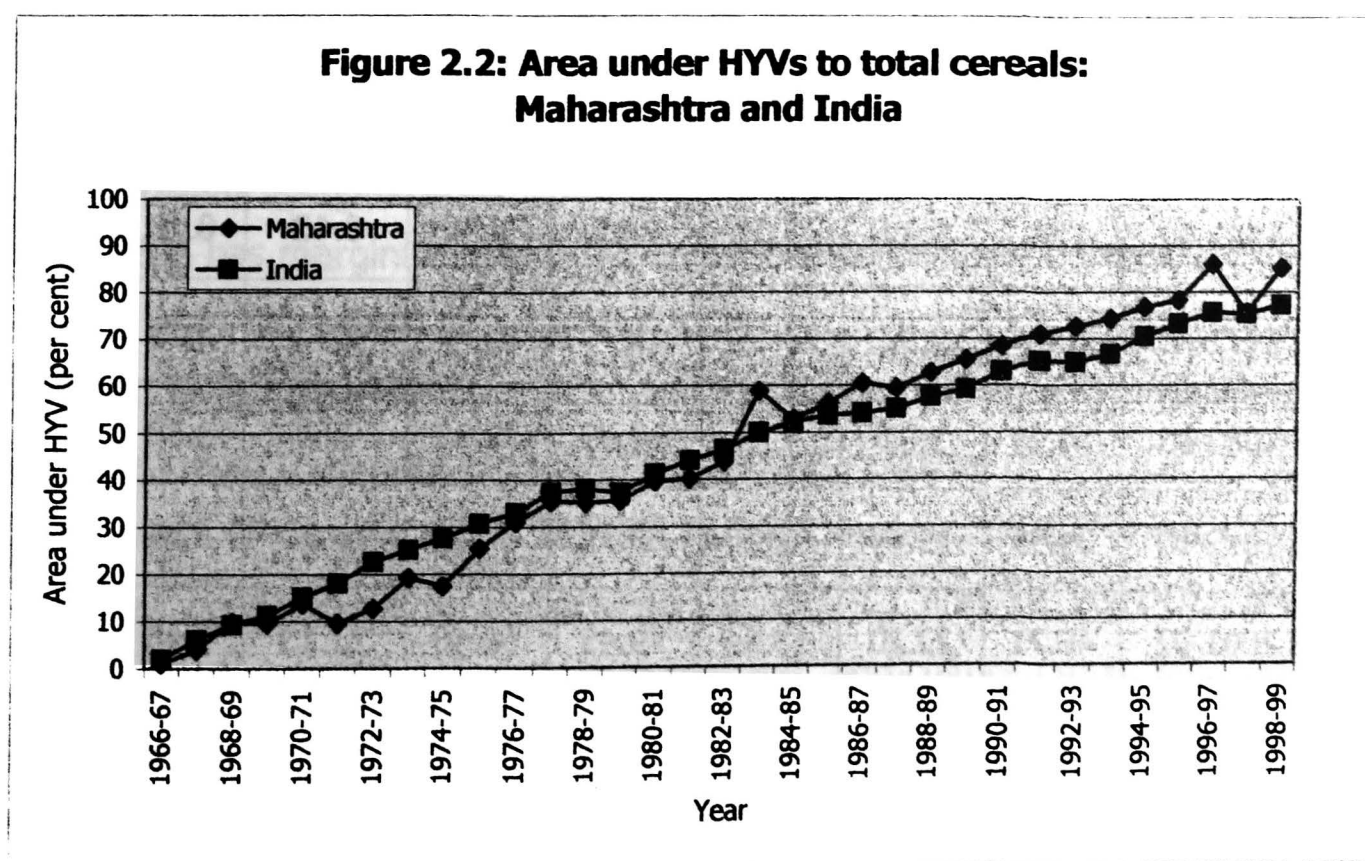
Notes: Figures are percentage to total area under the crop; * - 1990-91 onwards total area under cereals includes ragi for India.

a - India figures relate to TE 1998-99

Sources: GOM (2003); FAI (2003).

extension network. While HYVs have been used for different crops including non-foodgrain crops, data on the coverage of HYVs for non-foodgrains are seldom available even at the micro level. This does not allow us to find out the extent of adoption of HYVs in various crops, especially in non-foodgrain crops.

Table 2.8 presents the coverage of HYVs in major cereal crops for Maharashtra state and all-India. It is evident from the table that despite having low irrigation facility and wide variation in rainfall across different regions in Maharashtra, the percentage coverage of HYVs in cereal crops is found to be relatively higher in the state as compared to the national level average, especially since mid-eighties (see, Figure 2.2). This shows that farmers belonging to Maharashtra are fully aware of the importance of HYVs in crop cultivation. However, relatively higher coverage of HYVs in cereal crops does not reflect in the productivity of the crops, which is a major concern of the agricultural sector of Maharashtra (productivity of different crops is discussed separately in the same chapter). This is mainly because of predominant cultivation of HYVs under rainfed condition, where moisture stress often affects the yield of crops substantially. By introducing drought resistance cum high yielding varieties in different crops, productivity of crops can be increased to a larger extent.



2.7 Fertiliser Consumption:

Consumption of fertiliser of any state is mainly determined by factors such as availability of irrigation as well as area under paddy and wheat (NCAER, 1991; Vaidyanathan, 1994). While irrigation availability encourages the farmers to use higher amount of fertilisers for any given crop, paddy and wheat generally consume relatively higher amount of fertilisers. Despite having poor irrigation facility and less area under paddy and wheat, the consumption of fertilisers in the state is not very low as compared to the national level average (see, Table 2.9). While the consumption of fertilisers increased from 1.62 kg/ha in 1960-61 to 75.47 kg/ha in 2001-02 in Maharashtra, the same has increased from 1.93 kg/ha to 87.56 kg/ha at all India level during the same period (see, Figure 2.3). However, the consumption of K (Potash) is found to be relatively higher in the state as compared to the national average. There are two main reasons why the consumption of fertilisers is not very low as compared to the national average. First, sugarcane is intensively cultivated in the state, which consumes higher amount of fertilisers than many other crops. Second, high value horticultural crops such as grapes, banana, vegetables, etc, are also cultivated intensively in the state, which also require higher amount of fertilisers.

Table 2.9: Per hectare fertiliser consumption in Maharashtra and India.

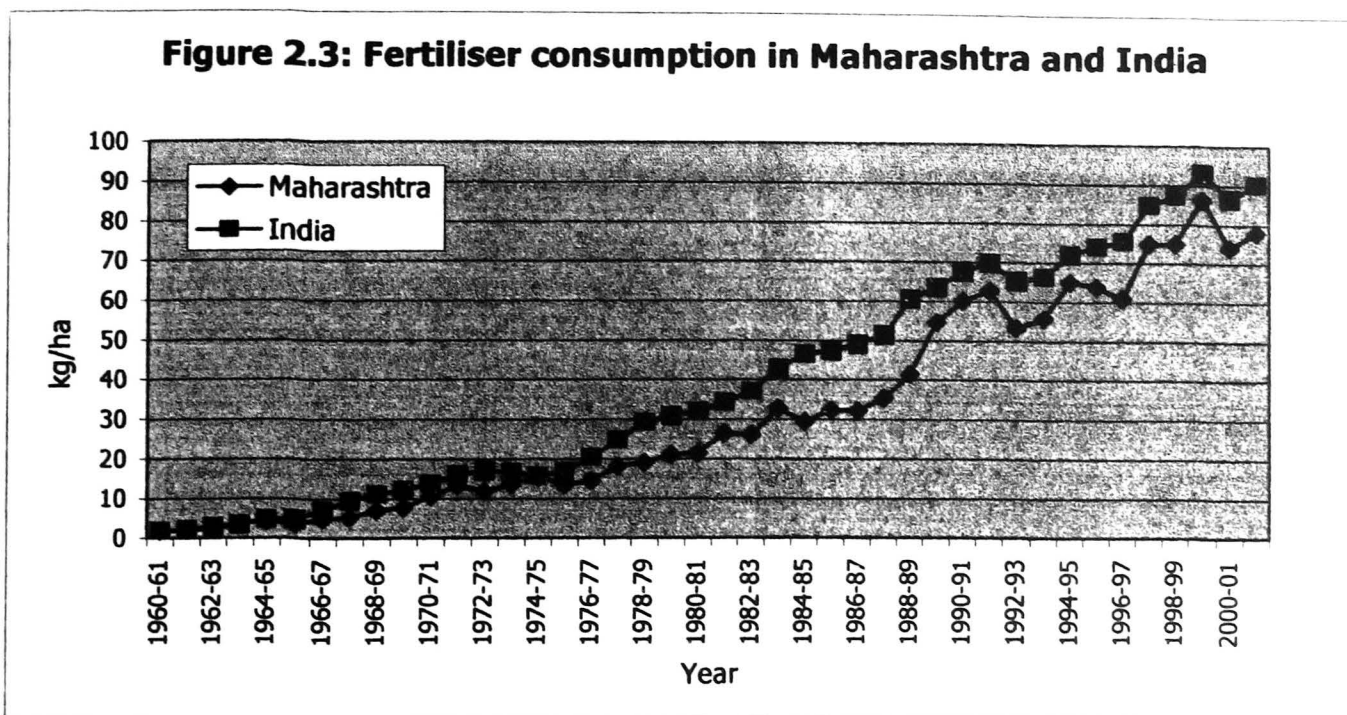
(kg/ha)

Period	Maharashtra				India			
	N	P	K	Total	N	P	K	Total
TE 1962-63	1.58	0.39	0.08	2.05	1.71	0.42	0.20	2.33
TE 1972-73	6.61	2.92	2.38	11.90	10.38	3.41	1.79	15.58
TE 1982-83	14.90	5.62	4.13	24.65	22.93	7.61	3.88	34.42
TE 1992-93	34.95	15.44	8.38	58.77	44.20	16.95	6.45	67.60
TE 2001-02	46.71	22.20	10.54	79.45	58.40	23.13	8.48	90.00

Sources: FAI (2002); GOM (2003) and GOI (2003); <http://agricoop.nic.in>

Recent research indicates that it is not only the amount of use of fertiliser which is important for increasing the productivity of crops but the method of

application (proper mix of NPK) and the time of application are also important. Due to less awareness as well as resource constraints, farmers are not able to apply fertilisers in time with proper mix. With the proper institutional credit support along with quality extension network, these constraints can be removed.



2.8 Land Use Pattern:

Land use pattern explains how effectively land resources are utilised for different purposes in a state. Development in irrigation and growth in population are the two important factors, which mostly decide the land use pattern of any state. Table 2.10 presents the detailed land use pattern of the state. Since crops are cultivated predominantly under rainfed condition in Maharashtra, net sown area (NSA) has marginally (by 1.07 percent points) declined between TE 1962-63 and TE 2001-02, which is somewhat different from the trend emerging at the national level. Despite having limited availability of irrigation facility, area cultivated more than once increased from about 5 percent of the GCA in TE 1962-63 to over 20 percent in TE 2001-02. In fact, area cultivated more than once increased nearly three times between TE 1982-83 and TE 2001-02. Intensive cultivation of annual crops such as sugarcane, horticulture crops, etc., could be the main reasons for this sharp increase. While there is no significant change in area under fallow, lands under cultivable waste as well as permanent pastures and grazing and land used for non-agricultural purpose has increased from about

7.06 lakh hectares in TE 1962-63 to 13.06 lakh hectares in TE 2001-02, an increase of about 85 percent. Urban agglomeration and continuous expansion of industrial sector could be the reasons for the substantial increase in land used for non-agricultural purpose. Despite a severe scarcity for land resources, altogether about 4.80 mha of lands are available in the form of cultivable waste, permanent pastures, land under tree crops and grooves, current as well as other follows. With a proper wasteland development programme, these lands can be brought under productive use, which may help to reduce the rural poverty in the state.

2.9 Cropping Pattern:

One of the important factors, which determine the cropping pattern is availability of irrigation. Owing to limited availability of irrigation, which is only around 17 percent of GCA as of today, rainfed crops have been predominantly cultivated in Maharashtra, as reported in Table 2.11. However, the cropping pattern of the state has changed considerably over the last 40 years. Area under cereal crops declined by nearly 12 percent points between TE 1962-63 (55.60 percent) and TE 2001-02 (59.44 percent) mainly because of substantial reduction in area under jowar, which is the important foodgrain crop of Maharashtra. Though the productivity of pulse crops has been lower in the state, the total area under pulse crops has increased from 12.60 percent in TE 1962-63 to 15.75 percent in TE 2001-02. As the alternative crops suitable to rainfed condition are not available, farmers continue to cultivate pulse crops predominantly in the state.

Oilseed crops such as groundnut, soyabean, etc., have also been cultivated predominantly in the state. Despite a significant reduction in area under groundnut, area under the total oilseed crops increased marginally (increased from 10.11 percent to 11.43 percent) between TE 1962-63 and TE 2001-02. This is mainly because of impressive increase in area under soyabean since early 1990s. Since both pulses and oilseeds are mainly cultivated under rainfed condition and also the state has enormous potential for cultivating these crops, the policy makers should give top priority for promoting the cultivation of these crops.

Table 2.10: Land utilisation pattern in Maharashtra.

Particular	(Area in '00 ha)				
	TE 1962-63	TE 1972-73	TE 1982-83	TE 1992-93	TE 2001-02
Reported area for LUS	307760 (100.00)	307583 (100.00)	307583 (100.00)	307583 (100.00)	307583 (100.00)
Forest	54213 (17.62)	53947 (17.54)	53291 (17.33)	51356 (16.70)	52959 (17.22)
Barren and Unculturable Land	17983 (5.84)	17866 (5.81)	17372 (5.65)	16159 (5.25)	17053 (5.54)
Land Under non Agricultural Use	7058 (2.29)	8810 (2.86)	10480 (3.41)	11477 (3.73)	13061 (4.25)
Cultivable waste Land	9233 (3.00)	13598 (4.42)	9924 (3.23)	9601 (3.12)	9024 (2.93)
Permanent Pastures and Grazing Land	14230 (4.62)	16557 (5.38)	15639 (5.08)	11476 (3.73)	13106 (4.26)
Land Under Misc. tree crops and grooves	1826 (0.59)	2049 (0.67)	2120 (0.69)	2905 (0.94)	2317 (0.75)
Current Fallow	11618 (3.78)	16282 (5.29)	6870 (2.23)	12067 (3.92)	11882 (3.86)
Other Fallow	11717 (3.81)	9225 (3.00)	12390 (4.03)	10942 (3.56)	11692 (3.80)
Net Area Sown	179890 (58.45)	169213 (55.01)	179498 (58.36)	181599 (59.04)	176489 (57.38)
Area Sown more than once	9793 (3.18)	10225 (3.32)	16726 (5.44)	29005 (9.43)	46805 (15.22)
Total Cropped Area	189689 (61.64)	179440 (58.34)	196224 (63.80)	210605 (68.47)	223294 (72.60)

Note: Figures in brackets are percentage to reported area.

Sources: GOM (various issues of *Season and Crop Report of Maharashtra State*); GOM (2003).

Table 2.11: Cropping pattern of Maharashtra state: TE 1962-63 to TE 2000-02.

(Area in '00 ha)

Crops	TE 1962-63		TE 1972-73		TE 1982-83		TE 1992-93		TE 2001-02	
	Area	% to GCA	Area	% to GCA	Area	% to GCA	Area	% to GCA	Area	% to GCA
Rice	13204	6.96	13393	7.46	14700	7.49	15805	7.50	15153	6.79
Wheat	8984	4.74	8334	4.64	10127	5.16	7319	3.48	8597	3.85
Jowar	62048	32.71	57379	31.98	65071	33.16	58961	28.00	51407	23.02
Bajra	16683	8.80	15935	8.88	15862	8.08	19234	9.13	16450	7.37
Maize	278	0.15	394	0.22	625	0.32	1297	0.62	8750	3.92
Total Cereals	105465	55.60	99067	55.21	110152	56.14	105733	50.20	97570	43.70
Gram	3929	2.07	3343	1.86	4013	2.04	5647	2.68	3770	1.69
Mung	4077	2.15	4338	2.42	5351	2.73	7540	3.58	6592*	2.95
Tur	5455	2.88	5442	3.03	6461	3.29	10100	4.80	10513	4.71
Udid	4352	2.29	4579	2.55	4344	2.21	4381	2.08	5298*	2.37
Total Pulses	23901	12.60	23242	12.95	26649	13.58	32414	15.39	35167	15.75
Total Foodgrains	129229	68.13	122309	68.16	136801	69.72	138153	65.60	132737	59.44
Groundnut	11155	5.88	8520	4.75	6610	3.37	7539	3.58	4867	2.18
Soybean	--	--	--	--	--	--	2729	1.30	11370	5.09
Sunflower	--	--	--	--	502	0.26	4436	2.11	3000	1.34
Total Oilseeds	19168	10.11	17220	9.60	16685	8.50	25657	12.18	25523	11.43
Cotton	26181	13.80	26075	14.53	25814	13.16	26849	12.75	31453	14.09
Sugarcane	1484	0.78	2010	1.12	3591	1.83	5542	2.63	5872	2.63
Fruits	708	0.37	936	0.52	1353	0.69	2562	1.22	3790*	1.70
Vegetables	802	0.42	1056	0.59	1455	0.74	2510	1.19	2633*	1.18
Other Crops	12110	6.38	9834	5.48	10525	5.36	9332	4.43	21285	9.53
GCA	189683	100.00	179440	100.00	196224	100.00	210605	100.00	223294	100.00

Notes: * relates to TE 1997-98.

Sources: GOM (2003, various issues of *Season and Crop Report of Maharashtra State*); GOM (various issues of *Economic Survey of Maharashtra*).

Cotton is another important crop predominantly cultivated under rainfed condition in the state. In spite of facing problems such as severe pest attack, increased cost of cultivation, low productivity and profitability, area under cotton has marginally increased between TE 1962-63 and TE 2001-02. This only shows that there is a tremendous potential for expanding the cultivation of cotton in the state. Measures such as introduction of pest resistance varieties (Bt cotton, etc.), improved cultivation practices, quality extension network and proper marketing network may help to improve the cultivation of cotton crop in the state.

Despite severe water scarcity in the state, area under sugarcane has increased nearly four times between TE 1962-63 (1.48 lakh ha) and TE 2001-02 (5.87 lakh ha) in the state. The share of sugarcane area in GCA has also increased from just 0.78 percent to 2.63 percent during this period. Though net returns per unit of water generated by sugarcane is very low when compared to most of the foodgrain crops (Rath and Mitra, 1989), estimates show that this crop alone consumes nearly two-third of irrigation water available in the state (World Bank, 2002). Continued support of the sugar industries (through state government) encourages the farmers to cultivate this water intensive crop. Keeping in view the water balance of the state, strict rules need to be enacted to discourage the cultivation of sugarcane under flood or conventional method of irrigation.

2.10 Growth in Horticultural Crops:

One of the significant changes that have taken place in the cropping pattern of the state especially in recent years is development in horticultural crops. Area under fruit and vegetable crops has increased by about 4.25 times (from 1.51 lakh ha to 6.42 lakh ha) over the last 40 years. That is, area under fruits and vegetables accounted for only about 0.79 percent in TE 1962-63, but the same increased to nearly 3 percent in TE 2001-02 (see, Table 2.11).

Within the group of fruits and vegetables, some significant changes have taken place over the years (see, Table 2.12). While the share of area under grapes, mango and cashewnut has increased, the share of orange and guava has declined. Similar kind of changes are noticed in vegetable crops as well.

Table 2.12: Cropwise area under horticultural crops in Maharashtra: TE 1962-63 to TE 1997-98.

Particulars	TE 1962-63		TE 1972-73		TE 1982-83		TE 1992-93		TE 1997-98	
	Area	% to total	Area	% to total	Area	% to total	Area	% to total	Area	% to total
Fruit Crops										
Grapes	12	0.79	17	0.87	37	1.32	196	3.83	264	4.07
Banana	242	16.02	324	16.25	543	19.34	807	15.78	694	10.69
Mango	114	7.56	116	5.83	148	5.26	377	7.37	722	11.13
Sweet Orange	62	4.08	74	3.73	32	1.14	68	1.33	157	2.41
Mandrain Orange	126	8.35	177	8.87	275	9.80	483	9.45	157	2.41
Gauva	43	2.84	42	2.10	54	1.91	68	1.34	82	1.26
Cashewnuts	40	2.67	122	6.14	179	6.37	269	5.26	464	7.15
Total Fruits	708	46.89	806	40.48	1187	42.27	2338	45.73	3326	51.27
Total Fruits and Dry Fruits	708	46.89	936	47.00	1353	48.19	2562	50.11	3790	58.42
Vegetable Crops										
Potato	151	9.98	109	5.45	130	4.62	155	3.03	148	2.29
Onion	243	16.09	440	22.07	604	21.51	873	17.08	983	15.15
Cabbage	23	1.54	25	1.27	40	1.44	81	1.58	99	1.53
Brinjal	94	6.21	121	6.07	168	5.98	305	5.97	340	5.24
Tomato	51	3.38	76	3.83	144	5.14	282	5.51	318	4.91
Bhendi	33	2.21	36	1.81	48	1.71	87	1.71	94	1.44
Total Vegetables	802	53.11	1056	53.00	1455	51.81	2510	49.09	2633	40.58
Total Fruits & Vegetables	1510	100.00	1992	100.00	2808	100.00	5072	99.20	6423	99.00
Flowers	--	--	--	--	--	--	41	0.80	65	1.00
All Total	1510	100.00	1992	100.00	2808	100.00	5113	100.00	6488	100.00

Source: GOM (various issues of *Season and Crop Report of Maharashtra State*).

However, the absolute area of all the fruits and vegetable crops has increased over the last forty years, barring potato (see, Tables 2.13 and 2.14). Suitable agro-climatic conditions, relatively higher profit from these crops, government support through EGS and other programmes, involvement of corporates in production and marketing of these crops, etc., are the main reasons for the substantial increase in area under horticulture crops in the state. Suitable infrastructure including marketing facilities would help further to exploit the enormous potential of horticultural crops in the state.

Table 2.13: Growth in area under fruit and vegetable crops in Maharashtra state.

Crops	(Percent per annum)	
	1960-61 to 1980-81	1980-81 to 1997-98
Fruits		
Grape	3.17 ^a	14.5 ^a
Banana	4.14 ^a	2.4 ^a
Mango	0.98 ^a	11.4 ^a
Sweet Orange	-2.91 ^a	9.87 ^a
Mandrin Orange	3.57 ^a	6.87 ^a
Gauva	1.27 ^a	3.14 ^a
Cashewnut	1.82 ^b	6.82 ^a
Total Fruits	2.2 ^a	7.2 ^a
Total fruits & dry fruits	3.29 ^a	7.15 ^a
Vegetables		
Potato	-1.91 ^a	1.1 ^a
Onion	4.2 ^a	3.44 ^a
Cabbage	1.49 ^a	6.0 ^a
Brinjal	2.67 ^a	4.57 ^a
Tomato	5.28 ^a	5.49 ^a
Bhendi	1.94 ^a	4.23 ^a
Total vegetable	2.74 ^a	4.14 ^a

Note: a - significant at 1 percent level and b - significant at 10 percent level

Source: Computed from *Season and Crop Reports of Maharashtra State* (various years).

2.11 Production and Productivity of Crops:

Production of various crops has increased many fold in the state over the last forty years (see, Table 2.14). But the productivity of different crops is relatively lower in the state as compared to the all-India average, which is the major problem of Maharashtra's agriculture (see, Figure 2.4). As can be seen from Table 2.15, barring a few crops, productivity of all other crops is significantly lower in Maharashtra as compared to the all-India average. As mentioned earlier,

cultivation of crops predominantly under rainfed condition is observed as the main reason by various studies (Sawant, et al., 1999; Dev, 1987; Mitra, 1990). Data presented in Table 2.15 also clearly indicate the low coverage of Irrigation in different crops in the state as compared to the national level average. Crops such as jowar, groundnut and sugarcane have higher coverage of Irrigation in Maharashtra and therefore, the productivity of these crops is relatively higher in the state. Productivity of important crops such as gram, tur, cotton, etc., is very low in the state as compared to many states in India mainly due to poor irrigation availability (GOI, 2002).

Table 2.14: Production of important crops in Maharashtra.

(Production '00' tonnes)

Crops	TE 1972-73	TE 1982-83	TE 1992-93	TE 2001-02
Rice	12711	22309	22840	23799
Jowar	15842	46686	53453	41967
Wheat	3955	8369	7789	11537
Bajra	4377	6459	12682	10173
Total Cereals	38946	87158	101444	94307
Tur	2263	3645	4565	7663
Mung	626	1301	3142	2773*
Udid	846	1163	2077	2616*
Gram	891	1411	2875	4671
Total Pulses	5635	9354	14113	19084
Foodgrains	44581	96512	115557	113391
Groundnuts	4328	5267	7590	5112
Safflower	1067	3996	4212	1451
Total Oilseeds	4381	10050	15757	23312
Sugarcane	150617	292520	352411	492830
Cotton	9135	14149	16407	25305

Note: * figures relate to TE 1997-98.

Sources: GOM (various issues of *Season and Crop Report of Maharashtra state*) and GOM (2003)

Farmers' income cannot be increased unless the productivity of crops is increased significantly. While it may not be possible to provide irrigation for the whole cropped area because of limited availability of irrigation potential in the state, moisture availability can be improved in the rainfed areas through rain water harvesting system and watershed development programmes. Needless to mention that watershed development programme under operation in different parts of the state has already made significant impact on productivity of crops by increasing the water availability. By expanding the watershed development

programme in all potential areas in the state, not only the productivity of crops can be increased but the rural poverty can also be reduced in a sustained manner through agricultural growth.

Table 2.15: Crop productivity of Maharashtra and India.

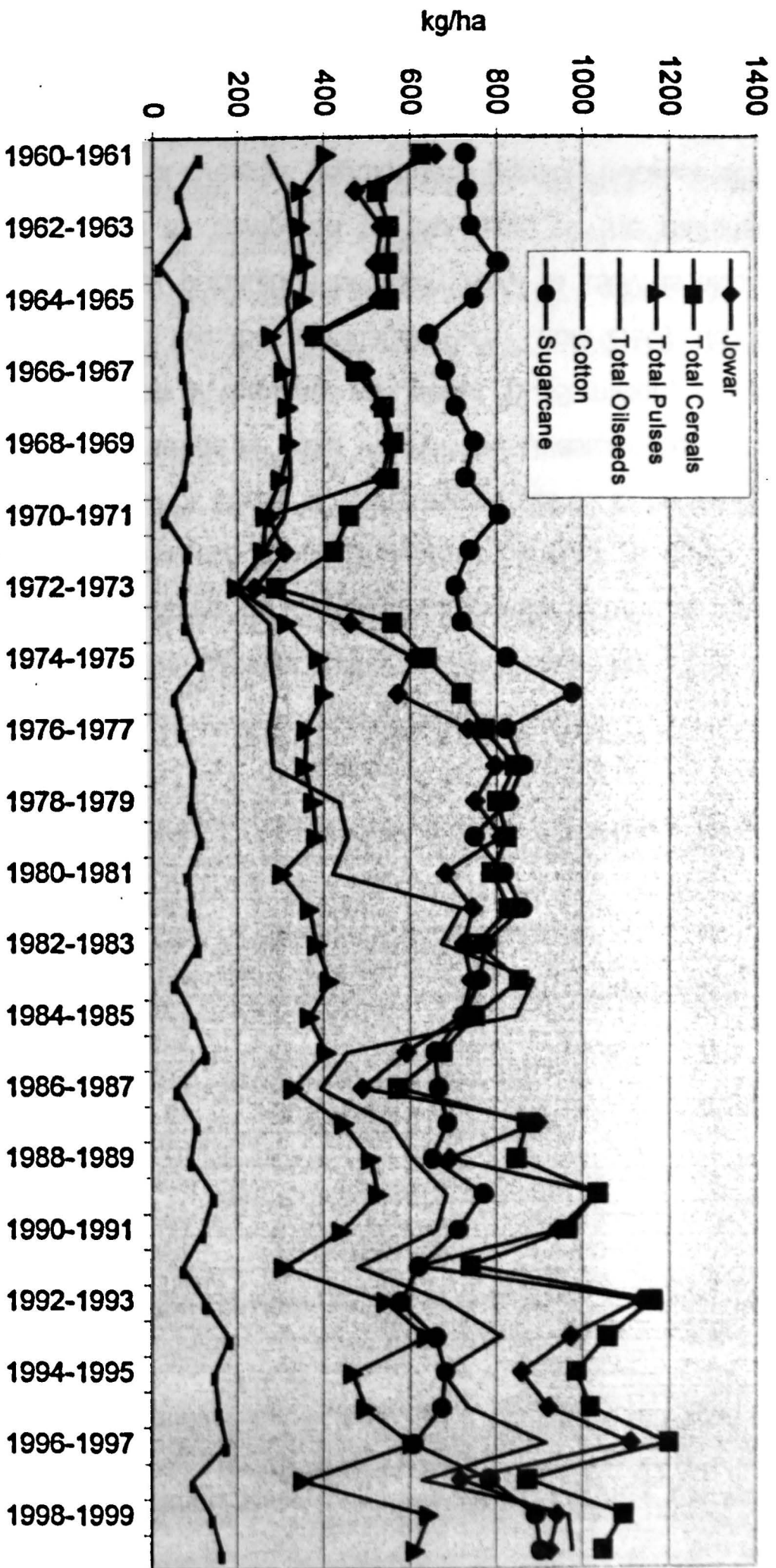
Crops	Productivity (Kg/ha) 2001-02		Coverage of Irrigation (Percent) 1999-2000	
	Maharashtra	India	Maharashtra	India
Rice	1751	2086	27.6	53.9
Wheat	1388	2770	79.9	87.2
Jowar	761	785	9.0	7.7
Bajra	594	875	4.2	8.3
Maize	1804	2018	18.8	22.9
Total Pulses	555	609	28.0	16.1
Tur	757	681	1.7	4.4
Gram	594	865	34.8	29.1
Foodgrains	874	1739	14.3	43.9
Total Oilseed	943	913	8.8	25.2
Groundnut	1147	1125	26.7	19.0
Soybean	1254	941	1.3	1.6
Sunflower	482	606	18.2	23.3
Cotton	147	149	4.1	35.2
Sugarcane	78097	68154	100.0	92.0

Source: <http://agricoop.nic.in>

2.12 Livestock Sector:

The livestock sector (animal husbandry and poultry) is one of the important allied activities of agriculture. By providing substantial income to rural households especially in the areas where agricultural growth is poor, it helps to reduce the rural poverty. The livestock sector of Maharashtra seems to be relatively stronger as compared to many states in India. As per the Livestock Census of 1997, the total livestock population of the state was about 35.39 million, which is about 10 percent of the country's livestock population (see, Table 2.16). Not only this, the growth rate of livestock population between 1972 to 1997 is also found to be higher in Maharashtra as compared to the same at the national level. This continued high growth of livestock population is possibly because of the following reasons. First, crop income is generally low in Maharashtra due to predominant rainfed cultivation, which may have stimulated the farmers to concentrate on allied activities. Second, the milk cooperatives are well developed in the state, which

**Figure 2.4: Productivity of major crops in Maharashtra:
1960-61 to 1998-99**



Note: Sugarcane productivity is in quintal/ha

Table 2.16: Livestock Population of Maharashtra and India.

(Figures in million)

Particulars	Maharashtra					India				
	1972	1982	1992	1997	ACGR	1972	1982	1992	1997	ACGR
Cattle	14.71	16.16	17.44	18.07	0.83	178.30	192.40	204.58	197.7	0.41
Buffalo	3.30	3.97	5.45	6.07	2.47	57.40	69.80	84.21	88.8	1.76
Total Bovine	18.01	20.13	22.89	24.14	1.18	235.70	262.20	288.79	286.5	0.78
Sheep	2.13	2.67	3.07	3.37	1.85	40.00	48.80	50.78	56.8	1.41
Goat	5.91	7.71	9.94	11.43	2.67	67.50	95.20	115.28	120.8	2.36
Pigs	0.20	0.30	0.38	0.57	4.28	6.90	10.10	12.79	13.6	2.75
Equine	0.11	0.11	0.11	0.11	0.00	1.98	2.03	1.98	1.3	-1.67
Camels	Neg.	Neg.	Neg.	Neg.	--	1.10	1.10	1.03	0.9	-0.80
Total Livestock	26.36	30.92	36.39	39.64	1.65	353.40	419.55	470.86	479.9	1.23
Poultry	12.22	19.85	32.19	35.39	4.35	138.50	207.70	307.07	352.0	3.80

Notes: Annual Compound Growth Rate is 1997 over 1972; Neg.-Negligible

Sources: GOM (2002- *Sixteenth all India Livestock and Farm Equipment Census: 1997 - Maharashtra state*) and [http:// agricoop.nic.in](http://agricoop.nic.in)

Table 2.17: Livestock production of Maharashtra and India.

Species	Maharashtra				India			
	1987-88	1991-92	2001-02	ACGR	1987-88	1991-92	2001-02	ACGR
Milk Production (^{'000} tonnes)	2470	4100	6024	3.92	45600	58100	84570	3.75
Fish Production (⁰⁰⁰ tonnes)	NA	NA	414	--	1756	2442	5986	9.38
Eggs Production (Lakh nos.)	NA	22600	32488	3.70	NA	230400	340340	3.98
Meat Production (^{'000} tonnes)	159	151	216	2.21	993	3421	3895*	10.25
Wool Production (^{'000} kgs)	NA	1488	1643	1.00	NA	40100	50709	2.38

Notes: * - relates to 1999-2000; ACGR (Annual Compound Growth Rates) refers to 2001-02 over 1991-92.

Source: GOM (2002, *Sixteenth all India Livestock and Farm Equipment Census: 1997 - Maharashtra state*),

must have helped the farmers to have more number of bovine stock. Third, supportive programmes introduced by the state government to improve the livestock economy may have also yielded good response from the rural community

The increased livestock population in the state has also been translated into the production of livestock products (see, Table 2.17). While the production of milk increased from 41 million tonnes in 1991-92 to 60.24 million tonnes in 2001-02, the production of eggs increased from 2260 million to about 3249 million during the same period in the state. A significant increase is also noticed in the production of meat as well as in wool in the state. The growth rate of Maharashtra state in the production of main livestock products like milk and eggs is also matching with the growth rate of the same products at the national level. The continued improvement in the livestock sector shows that there is a considerable potential for the livestock related activities in the state.

On the whole, our review on the development of agriculture in Maharashtra state shows that despite substantial improvement over the last four decades, the performance of the state is relatively poor in different parameters of agriculture as compared to the national level average. Limited availability of irrigation is one of the main factors responsible for the poor performance of agriculture in Maharashtra.

Major Initiatives Taken for Agricultural Development in the State

3.0 Introduction:

In order to improve the performance of Maharashtra's agricultural sector, a number of initiatives (strategies/programmes) have been introduced by the state and central governments during different plan periods. In this chapter, while highlighting the various programmes introduced in different plan periods, we try to assess whether the programmes have been introduced keeping in view the changing nature of agricultural economy in the state. This chapter is divided into two sections. Section one briefly highlights the various programmes introduced in different plan periods and the changes that have been taken place in it since third five year plan¹. Section two presents some of the important programmes introduced by the government in detail. Data/information compiled from various five year plan documents of Maharashtra state, Economic Survey of Maharashtra, Districtwise Agricultural Statistical Information of Maharashtra State and <http://agri.mah.nic.in> have been mainly utilised for preparing this chapter.

3.1 Programmes introduced during Plan Periods:

A number of different programmes have been introduced through various plan periods by the state keeping in view the importance of agriculture. In Table 3.1, we have summarised the various programmes introduced during different plan periods. As can be seen from the table, there has been a substantial change in the programmes that have been introduced during plan periods. Between third and fifth five year plan periods, special importance had been given for the research and infrastructural development including irrigation. Also importance had been given for the development of foodgrain crops. This was done because of the following two reasons. First, since basic infrastructural facilities are needed for accelerating as well as sustaining the growth of agriculture, a deliberate attempt

¹ A separate development plan exclusively for Maharashtra state started in 1961 with the third five year plan, after the reorganisation of Bombay state into two as Gujarat and Maharashtra in 1960.

has been made by the planners to develop basic infrastructural facilities during the initial plan periods. Second, achieving self-sufficiency in food production was one of the major objectives of the planners during the sixties and seventies and therefore, importance was also given for those programmes that could increase foodgrain production in the state.

Table 3.1: Schemes/ Programmes implemented during different Plan Periods in Maharashtra State.

Plan Period	Schemes/ Programmes
Third Five Year Plan	<p>A. Agricultural Production Schemes</p> <ul style="list-style-type: none"> • Expansion of Research on Rice • Intensification and Co-ordination of Research on Wheat • Expansion of Research on Millets and Pulses • Expansion of Research on Cotton • Expansion of Research on Sugarcane • Expansion of Research on Oilseeds • Research on Horticultural Crops • Expansion of Research on Soils • Expansion of Research on Agricultural Entomology • Expansion of Research on Plant Pathology • Expansion of Research on Agricultural Economics • Establishment of Research Sub-sections at the Extension Wings in the Colleges of Agriculture at Poona and Nagpur • Strengthening and upgrading of the Agricultural Statistical Section • Model Agronomic Experiments on rice, irrigated wheat and cotton. • Schemes for experiments in sprinkler irrigation at the Agricultural College, Poona • Establishment of a Research cum testing centre for Bullock driven and manually operated agricultural implements • Research on Vegetables, Turmeric and Betelvine • Trial cum Demonstration Farms • Simple manurial trials in cultivators' field • Expansion of Agricultural Colleges • Training of departmental Officers • Extension Training of Gramsevakas and Gramsevikas • Propagation of Improved Agricultural Implements • Co-ordination Cotton Extension Scheme • Development of Sugarcane • Integrated Oilseeds Development Scheme • Development of Tobacco Cultivation • Horticultural Development in the Konkan Region of Maharashtra • Pilot Scheme for Land Development-cum-Cashewnut plantation for Ratnagiri District. • General Horticultural Development in Maharashtra State (except Konkan) • Development of Local Manurial Resources • Scheme for expansion of Plant protection services in Maharashtra State • Scheme for Intensive Cultivation of Foodcrops in selected areas • Propagation of Improved Agronomic Practices • Establishment of Taluka Seed Multiplication Farms • Strengthening of the Administrative Staff of the Department of Agriculture • Intensive Agricultural District Programme <p>B. Land Development Schemes</p> <ul style="list-style-type: none"> • Consolidation of Holdings • Land development with the help of bulldozer • Tractor Ploughing • Maintenance of Divisional Workshops <p>C. Soil Conservation Schemes</p> <ul style="list-style-type: none"> • Scheme for Contour bunding, Nala bunding and Contour trenching • Pilot Scheme for contour bunding with loan assistance from LDB

- Scheme for Terracing of Lands
- Scheme for conservation of heavy soils into double cropped area.
- Expansion of Dry farming methods
- Training in Soil Conservation
- Reclamation of Khar and Khajan Lands

D. Minor Irrigation Schemes

- Construction of Irrigation Wells
- Installation of Pumping sets
- Financial assistance to Land Development Banks towards interest subsidy
- Improvement of irrigation wells by boring
- Air Compressor drilling and blasting operations
- Co-operative Lift Irrigation
- Minor Irrigation Works

E. Warehousing and Marketing

- Development of Agricultural Marketing
- Marketing Survey and Research
- Co-ordinated market News Service
- State Warehousing Corporation
- Development of grading

F. Irrigation Projects - (80 Projects)

- Spillover works - 49 Projects
- New Schemes- 27 Projects
- Common Schemes - 4 Projects

Fourth Five Year Plan All schemes related to production of foodgrains, oilseed, cotton and sugarcane were allowed to continued. In this plan,

- Major and minor irrigation works
- Community well
- Construction of new wells
- Renovation of new wells
- Pumpsets on wells and rivers
- Cooperative lift irrigation
- Soil Conservation and Terracing
- Khar and Khajan lands
- Chemical Fertiliser and Local manurial resources
- Dry farming development programme
- Intensive Agricultural Development Programme
- Plant Protection Programme
- Intensive Cultivation of Foodcrops
- Oilseed Development Programme
- Cotton Development Programme
- Sugarcane Development Programme
- Land development Scheme for Small Holders
- Horticultural Development Programme
- Settlement of Landless labours
- Agricultural Research and Education
- Reclamation of permanent fallow
- Reclamation of ravine lands
- Reclamation of saline and alkaline lands

Fifth Five Year Plan

- Agricultural Education and Research
- Land reforms
- Multiplication and Distribution of seeds
- Development of Taluka Seed Development Farms
- Manures and Fertilisers
- Plant Protection Programme
- Intensive Cultivation Blocks
- Soil Testing Services
- Soil Conservation and Ayacut Development
- Resettlement of Landless Agricultural Workers on Forest Lands
- Development of Horticulture
- Cotton Development Programme
- Sugarcane Development Programme
- Oilseeds Development Programme

Sixth Five Year Plan

- Extension and Farmers training
- Agricultural Engineering Programme
- Soil and Water Conservation
- Special Area Programme for Rural Development
- Community Development Programme
- Special Programme for increasing production of pulses
- Special Programme for increasing production of oilseeds
- Horticultural Development Programme
- Cotton development Programme
- Sugarcane Development Programme
- Agricultural Research and Education
- Agricultural Information and publicity
- Soil and Water Conservation, Soil Survey and Testing
- Creation of Multi-disciplinary Cell in the Directorate of Agriculture for Planning and implementation of Integrated programme for watershed development
- Pasture Seed Programme
- Land Development through Soil Conservation
- Afforestation for Soil Conservation
- Development of Khar and Khajan Lands
- Development of Land under Ayacut Development
- Dry land Development Projects
- Land reforms
- Regulation of Markets Agricultural Produce Market Committees

Seventh Five Year Plan

- Back up of Agriculture Inputs and Services (Seed and Fertiliser)
- Plant Protection Campaigns
- Oilseeds and Pulses development Programme
- Sugarcane Development Programme
- Improved farm implements and appliances
- Sprinkler and Drip Irrigation Development Programme
- Crop Insurance Programme
- Scheme to improve the economic condition of weaker sections
- Scheme to assist tribal families to bring them above the poverty line including assistance for sugarcane plantation
- Special Component Plan
- Agricultural Research and Education
- Soil and Water Conservation
- Ayacut Development
- Afforestation for Soil Conservation
- Reclamation of Khar and Khajan Lands
- Horticultural Development
- Land reforms
- Ware Housing and Marketing
- Development of Agricultural Marketing

Ninth Five Year Plan

- Multiplication and Distribution of Seeds Expansion of Seed Testing Laboratories
- Development of Agricultural Farms/Taluka Seed Farms
- Intensive Cotton Development Programme
- Cotton Development Programme in Vidarbha
- National Oilseed Production Programme (CSP)
- Special Programme for Oilseed Production
- Special Programme for Oilseed Production in Marathawada region
- Special Production Programme of Soyabean in Vidarbha
- Scheme on sustainable development of Sugarcane based cropping system (SDBACS)
- Special Production Programme of Sugarcane in Vidarbha
- Plant Protection Insecticides testing laboratories
- Agriculture Engineering Sprinkler and Drip Irrigation for Sugarcane
- Comprehensive Crop Insurance Scheme
- Small and Marginal Farmers Assistance to Tribal Farm Families
- National Pulses Production/Development Programme
- Special Programme of Pulses Production for Marathawada
- Special Foodgrains Production Programme (Rice)
- Integrated Programme for Cereals Development (CSP)
- Soil Survey Organisation

**Tenth Five
Year Plan**

- Technology Mission for Integrated Nutrient Management
- Setting up of Agri-Polyclinic
- Promotion of Agricultural Mechanization- Distribution of small tractors
- World Agricultural Census
- Women in Agriculture
- Tribal Area Sub Plan
- Special Component Plan
- Soil and Water Conservation
- Watershed Development Programmes
- National Watershed Development Programme for Rainfed Areas
- Khar Land Development
- Afforestation for soil Conservation
- Horticultural Development
- Agriculture Education and Research
- Multiplication and Distribution of Seeds
- Intensive Cotton Development Programme
- National Oilseed Production Programme (CSP)
- Special Programme for Oilseed Production
- Scheme on sustainable development of Sugarcane based cropping system (CSP)
- Special Production Programme of Sugarcane in Vidarbha (CSP)
- Special Foodgrains Production Programme (Rice)
- Integrated Programme for Cereals Development (CSP)
- Accelerated Development of Maize (CSP)
- Development of Cereals and Sugarcane
- Sprinkler and Drip irrigation for Horticulture and other Crops (CSP)
- Strengthening of Agriculture training institute (100% CSP)
- Mobility for the Effective Implementation of the Extension Machinery (100% CSP)
- Study Tours of Farmers (CSP)
- Agricultural extension through agri. Exhibition
- Strengthening of Soil Survey and Soil testing Laboratories
- Strengthening of Agri-Polyclinic (CSP)
- Use of information Technology in Agriculture (CSP)
- Seed Production Programmes in selected Village (CSP)
- Hybrid Paddy and Basmati Development Programmes
- Strengthening of Taluka Seed Farms
- Strengthening of Fertilisers and Insecticides Testing Laboratories
- Production and Marketing of Bio-Pesticides
- Production of Vermi-Culture
- Opening of Agricultural Input Distribution Centres in Inaccessible Hilly and Tribal areas
- Crop Insurance Scheme (NAIS)
- Timely Reporting of Agricultural Intelligence Statistics and Improvement of Crop Statistics
- Assistance to Tribal Farm Families
- Assistance to Scheduled Caste/Nav Budhists Farm families
- Soil Survey Organisation
- Setting up of Agro-Polyclinics and Agri-clinics
- Promotion for Agricultural Mechanization-Distribution of Small Tractors (CSP)
- Horticultural Development Schemes
- Soil and Water Conservation
- Watershed Development Programmes
- Khar Land development
- Afforestation for soil conservation

Source: GOM (various five year plan documents).

The programmes introduced in the recent plan periods, especially after sixth plan, are somewhat more specific than the earlier plan periods. Programmes focusing on the upliftment of tribal and other economically weaker sections of the farming community have been introduced between seventh and tenth plan periods. Similarly, considering the limited availability of water resources in the

state, watershed development programmes, users' participation in irrigation management and micro-irrigation (sprinkler and drip) have been introduced after sixth plan period to conserve as well as to improve the water use efficiency in the state. Keeping in view the changing nature of agriculture as well as demand from farmers, programmes focusing on agri-polyclinic, testing laboratories for fertilisers and insecticides, production and marketing of bio-pesticides as well as production of vermiculture have also been introduced during ninth and tenth plan periods. This in a way suggests that the initiatives taken by the planners/government to improve the growth of agriculture have been changing over the years according to the changing nature of agriculture.

While observing changes in the initiatives taken by the government across different plan periods, we could hardly see any special programmes focusing on marketing facilities. As the exploitation by middlemen is large in agriculture, a strong integrated marketing system by the farmers' cooperatives should be encouraged, as suggested by the Kolhe Committee on Agriculture Marketing (GOM, 1991).

Though the focus of the planners has been changing over the years depending upon the requirements as well as changing nature of agriculture in the state, the importance given to thrust areas has been continuing over the years. For instance, the thrust areas of the state are irrigation development, watershed development programmes, soil conservation programmes, horticultural development, special programmes for improving the production of pulses, oilseeds, sugarcane, cotton, etc. Programmes supporting these areas/crops have been noticed in all the plan periods that we reviewed for this study. In fact, well before the introduction of watershed development programmes (NWDPPRA, etc.) by the central government at the national level, government of Maharashtra has introduced programmes to promote contour bunding, nala bunding and contour trenching in the third plan itself. The draft agriculture policy prepared by the state government has also highlighted the thrust areas to be focused in the future (see, Box 3.1). All this seems to suggest that the planners at the state level have introduced the policies/programmes as per the requirements of the state and in

some cases, much before the initiatives were taken at the country level (example, watershed development programme, micro-irrigation, etc).

Box 3.1: Highlights of Maharashtra's Agriculture Policy

The Agriculture Policy adopted by the State Government aims at the following:

- Development of the sector on a sustainable basis by using the available resources economically, efficiently and in an environmentally sound manner with a view to increase farmers' income and production.
- To envelop the needs of vulnerable sections, generate both skilled and unskilled employment and make a positive intervention towards poverty alleviation.
- To promote agriculture development on commercial and industrial lines.
- To prepare plan of action for full exploitation of the limited water resources.
- To improve the working of Agricultural Universities.
- To promote farm and infrastructural facilities for post harvest management, storage, transport, marketing and export to ensure that farmers will get due price for their produce.
- To improve the systems relating Agricultural Produce Market Committees.

Source: GOM (2003).

3.2 Important Initiatives taken by the Government:

Over the years, a number of different programmes have been introduced by the state government to increase the agricultural growth as well as to improve the welfare of the farming community. The tenth five year plan document of Maharashtra has also highlighted some of the important strategies that need to be followed for increasing the production of agricultural commodities (see, Box 3.2). Of the various programmes introduced by the government, some are considered to be very important, which need special mention. Therefore, the highlights of the important programmes are discussed in detail in this section.

3.2.1 Irrigation Development:

As mentioned earlier, unlike many states in India, the proportion of irrigated area to gross cropped area is very low in Maharashtra (only about 17 percent as of today). Considering the importance of irrigation, major initiatives have been taken to increase the area under irrigation since third plan in the state. Initiatives were not only taken to increase the area under surface irrigation (major and medium projects) but also minor irrigation including co-operative lift irrigation development. From third to ninth plan, altogether Rs. 23515.35 crore (planwise

expenditure on irrigation development is presented in Table 2.1 In Chapter II) has been spent exclusively for irrigation development by the state. As a result of continuous initiatives taken by the government, area under irrigation has increased from 1.24 mha in TE 1962-63 to 3.66 mha in TE 2001-02, an increase of 2.81 percent per annum. In terms of share of irrigated area to cropped area, it increased from 6.48 percent in 1960-61 to 16.38 percent in 2001-02 (GOM, 2003). Though the percentage of irrigated area to gross cropped area of the state is well below the national average, the growth rate of irrigated area (GIA) between 1960-61 and 2000-01 was found to be marginally higher (3.05 percent per annum) in the state as compared to the national average, where it increased by 2.65 percent per annum.

Box 3.2: Strategy for Agricultural Production during 10th Plan Period

The strategy for increasing agricultural production in the state will have following salient features;

- Since 1993-94 the *kharif* jowar production and productivity reached a new height. The production has become surplus. To maintain the pace between requirement and production, some area from this crop will be diverted to other crops viz. soyabean and pulses.
- Since the soybean crop is gaining popularity in the state, it is decided to increase area under this crop. As part of this strategy, soybean crop will be advocated as a preceeding to pre-seasonal and suru cultivation of sugarcane and as inter crop with cotton and tur.
- To increase the production of pulses and oilseeds, emphasis will be given on popularization of use of bio-fertilisers and use of bio-pesticides and diverting area from crop viz. cereals, cotton, wheat, etc. Special efforts will be made to bring more and more area under intercropping of pulses and oilseeds in cotton, jowar, and bajra.
- The low productivity of paddy in eastern Vidarbha has been a point of concern. The state government therefore, decided to lay more emphasis on increasing paddy productivity in this area by resorting massive production and use of blue green algae and green manuring.
- Considering scarce water resources, the State Government has attached highest priority to promote micro irrigation concept in the state. The encouraging response of drip and sprinkler irrigation system for horticultural crops, sugarcane and oilseeds led the State Government to formulate massive programme of drip irrigation through state resources.
- Productivity of cotton is also a matter of concern to the state government. The low productivity of this crop is mainly due to rainfed area, which is 97 percent, heavy incidence of boll-worm and lack of plant.

Source: GOM (2003).

Table 3.2: Details of various Irrigation Development Corporations established by the State Government

Sr. No	Name of Corporation with the month of Establishment	Number of Irrigation Projects Incorporated	Total funds required (Rs. crore)	Govt.'s share capital upto 2001-02\$\$ (Rs. crore)	Funds to be raised through debentures (Rs. crore)	Funds raised through debentures upto 2001-02 (Rs. crore)	Funds to be raised during 2002-03 (Rs. crore)	Targeted irrigation potential (lakh hectares)
1.	Maharashtra Krishna Valley Development Corporation (January, 1996)	23* 50** 324@ 12+	9564	3500 (i) 1425 (ii) 1759 (iii)	8160	5463	414	10.85
2.	Vidarbha Irrigation Development Corporation (March, 1997)	14* 27** 55@	7607	2245 (i) 265 (ii) 437 (iii)	5901	1472	812	11.00
3.	Tapi Irrigation Development Corporation (March, 1997)	8* 37** 115@ 10+	5197	1400 (i) 102 (ii) 148 (iii)	3275	1054	153	5.23
4.	Konkan Irrigation Development Corporation (December, 1997)	1* 4** 33@	937	273 (i) 49 (ii) 63 (iii)	617	398	154	1.09
5.	Godavari -Marathwada Irrigation Development Corporation (August, 1988)	13* 24** 237@	3266	1300 (i) 241 (ii) 218 (iii)	2600	1390	581	5.61

Notes: * - Major; ** - Medium; @ - Minor; + - Lift Irrigation Scheme; \$ - Share capital paid upto the end of 2001-02; \$\$ - this amount has been paid by Government to concerned Corporations. I - Total, ii - Upto 2001-02\$, iii - Interest on debentures

Source: GOM (2003, *Economic Survey of Maharashtra State: 2002-03*).

Further, deviating from the traditional practice, the government of Maharashtra has also established Five Irrigation Development Corporations (IDCs) to accelerate the completion of the irrigation projects. The Five IDCs are: (i) Maharashtra Krishna Valley Development Corporation, (ii) Godavari-Marathawada Irrigation Development Corporation, (iii) Vidarbha Irrigation Development Corporation, (iv) Tapi Irrigation Development Corporation and (v) Konkan Irrigation Development Corporation. These corporations have mobilized a total funds of Rs. 9777 crore through open market upto March 2002 and plan to raise an amount of Rs. 2114 crore during 2002-03. While nobody knows the economic viability of these investments, the targeted irrigation potential through these five IDCs is estimated to be about 3.38 mha (for details see, Table 3.2).

3.2.2 Micro Irrigation Development:

Micro-irrigation includes drip and sprinkler methods of irrigation. Since water is supplied directly to the root zone of the crops under drip method of irrigation, water losses occurring through evaporation and distribution are completely reduced under this method. As a result, micro irrigation technology not only increases water use efficiency but also productivity of crops by reducing moisture stress for crops. Keeping in view the water balance of the state, initiatives have been taken during seventh plan itself to cultivate the crops under micro irrigation system. Much before the initiatives taken by the central government, Maharashtra state government introduced a state sponsored programme in 1986 with a substantial subsidy component to promote micro-irrigation (see, Narayanamoorthy, 1996, 1997, 2001, 2003). As a result of these initiatives, farmers belonging to different regions of Maharashtra have been cultivating many crops (mainly horticulture crops) under drip method over the last 15 years in the state. Promising results noticed by the farmers through drip method of irrigation encouraged them to expand the area under this new irrigation technology in the state. At the end of March 2002, the total area brought under drip method of irrigation was 2,17,447 ha and 87,874 ha under sprinkler method of irrigation. Importantly, Maharashtra state alone accounts for over 50 percent of India's total drip irrigated area during 1997-98, for which we

have statewise comparable data. To promote drip and sprinkler irrigation, an amount of Rs. 432 crore (Rs. 332 crore for drip irrigation and Rs. 100 crore for sprinkler) have been distributed to the cultivators in the form subsidy by the government (GOM, 2003). By restructuring the existing subsidy programmes of micro-irrigation, all the potential areas available in the state can be brought under this new method of irrigation within a limited period of time.

3.2.3 Water Users' Association (WUAs):

Involving farmers in water management activities have been proved to be very useful for both the farmers and government in different countries (see, Easter 2000; Vermillion, 1997). The National Water Policy (1987 and 2002) also emphasized the importance of farmers in systems management. Realising the importance of farmers' participation, the government of Maharashtra has taken initiatives since 1992 to form WUAs by explaining its advantage. As a result of continuous efforts by the irrigation department, about 2472 WUAs have been functioning/registered/proposed at different levels, which cover an area of 7,97,587 ha as of December 2003. Besides this, the NGOs promoted *Pani Panchayat* has been working reasonably well in many drought prone and water scarce areas in Pune district (see, Deshpande and Reddy, 1990; Thakur and Pattnaik, 2002). In order to promote users participation in irrigation management in an effective manner, the state government has also introduced "Maharashtra Farmers' Management of Irrigation System Act-2003"² by giving required legal standing.

3.2.4 Watershed Development Programmes:

Considering the predominant cultivation of crops under rainfed condition, the state government introduced schemes for promoting counter bunding, nala bunding and counter trenching during third plan itself, much before the introduction of Watershed Development Programmes (WDPs) at the national level. Though WDPs were introduced on a large scale in India during the seventh plan period (1985-86), it was introduced by the state government under

² This is approved by the state cabinet and will be placed before the state legislative.

Employment Guarantee Scheme (EGS) in 1982 itself, which was known as "Comprehensive Watershed Development Programme" (COWDEP). The centrally sponsored NWDPRAs were introduced for the first time during 1986 in Maharashtra. Currently, WDPs are being operated under 16 different budget heads supported by central and state schemes (see, Table 3.3). Of this, 10 budget heads are operated under state schemes. Between 1992-93 and 2002-2003, a total amount of Rs. 26005.48 million has been spent on WDPs. This has also been reflected in the achievement of area treated through WDPs as well. As of March 2002, about 8322 micro watershed projects have been completed and 18391 projects are under different stages of completion. In terms of area treated under WDPs, Maharashtra's share was about 11.45 percent in the total area covered at the country level, which is about 27.5 mha at the end of ninth plan period (GOI, 2001).

Table 3.3: Budget head-wise expenditure incurred for WDPs in Maharashtra

Budget Head	1992-93	2002-03	Total*
1. EGS	1045.05	1839.81	9122.78
2. 100 days Prog.	0.00	0.00	151.12
3. D.P.D.C (Plan)	137.74	52.02	1533.97
4. Backlog (Plan)	77.62	318.79	1832.15
5.C.D. B.	0.00	98.58	185.47
6. D. P.D.C (TSP)	24.95	18.34	1138.49
7. Backlog (TSP)	15.91	10.89	59.65
8. Jalsandharan	195.08	3.11	1728.96
9. World Bank	20.41	0.00	33.39
10. Other	21.38	366.19	1321.78
Total State schemes	1538.13	2707.75	17107.76
1. J.R.Y	35.41	0.04	1511.63
2. E.A.S	0.00	214.66	1834.93
3. NWDPRAs	209.92	68.70	2543.47
4. Western Ghat	41.65	100.47	788.21
5. R.V.P	2.54	160.69	831.02
6.D.P.A.P	56.24	176.29	1388.46
Total Central schemes	345.76	720.85	8897.71
Total State & Central	1883.89	3428.59	26005.48

Note: * - from 1992-93 to 2002-03.

Source: DSC&WD, (2003).

3.2.5 Horticulture Development Programme:

Horticulture crops have been cultivated traditionally in the state and therefore, special attention has been given for the development of horticulture crops since third plan. Programme has been implemented to promote horticulture crops by establishing nurseries to supply genuine and quality plants of various fruit crops to farmers alongwith subsidy. The horticulture development programme got a new fillip during 1990-91, when the same was linked with Employment Guarantee Scheme (EGS), which aims to accelerate the horticulture development activities by speedy coverage of new areas under fruits and vegetables. Fifteen fruits crops (mango, cashew, bor, coconut, chicku, guava, mosambi, tamrind, etc.) as well as spices, medicinal and aromatic plants are covered under this scheme. While all the farmers are eligible to become beneficiaries of this scheme, the minimum area to avail the subsidy per beneficiary is fixed as 0.20 ha and maximum of 2.00 ha. Under this scheme, for a period of three years, farmers belonging to the weakers sections (small/marginal/SC/ST/NTs) would get 100 percent subsidy on labour and material cost and the other farmers would get 100 percent subsidy on labour cost and 75 percent on material cost. As of November 2002, the total area brought under this scheme was 10.14 lakh hectares and the number of farmers benefited was 13.52 lakh (GOM, 2003). The impact of EGS linked horticulture development programme has been mainly seen in crops like mango, cashewnut and orange, as the area of these three crops increased by 17.42 percent per annum between 1990-91 (1.23 lakh ha) and 2001-02 (7.71 lakh ha). Relatively higher amount of profit and continuous demand for horticulture crops helped the farmers to positively respond to the promotional schemes introduced by the state government.

3.2.6 Initiatives in the Field of Bio-Technology:

Importance of bio-technology in increasing the production of agricultural commodities has been very well recognised in the recent years. In crops like banana (tissue culture) and cotton (Bt cotton), the state has already made significant progress in terms of adoption. Recognising the important role to be

played by bio-technology in agriculture in future, the government of Maharashtra has announced its "Bio-Technology Policy: 2001" in January, 2002. The main objectives of this policy are:

- Making available to the cultivators various crop varieties which are high yielding, bio-technologically improved to resist famine and pests and having capacity to sustain in the present climate.
- Deciding definitions of bio-technological products.
- Giving incentive for establishing centres of excellence for research and development in bio-technology.
- Government's participation through share in the bio-technological products.
- Making efficient and multipurpose centres providing skilled manpower to the bio-technological industries.
- For extensive propaganda of the importance and benefits of bio-technology, to formulate new system of cooperation among the scientists, entrepreneurs, extension machinery, cultivators and consumers and to encourage the media research centres in agricultural universities to undertake specific projects, etc.

3.2.7 Initiatives taken towards WTO Commitments:

One of the important issues that has been under discussion since early 1990s is how to meet the problems and constraints arising out of India's WTO commitments. Many fear and also argue that unrestricted import of certain agricultural commodities, due to WTO commitments, would adversely affect the domestic prices of agricultural commodities and thereby reduce the farm income. Keeping in view the possible impact of WTO commitments on agriculture and to protect the interest of domestic farmers, the state has identified some thrust areas, which are presented below:

- Creation of awareness among the farmers and also every section of the economy regarding the opportunities available and the challenge posed due to the World Trade Agreements and globalisation of the world economy. The information about WTO is being disseminated by

Agricultural Departments through various publications, website, workshops and seminars.

- Necessity of increasing productivity with quality to face the competition arising out of WTO commitments.
- Promoting post harvest technology to reduce wastage and improve the quality of various crops. Post harvest infrastructures right from grading to cold storage, cold chain, processing, packaging and marketing are needed to be strengthened.

In addition to these initiatives, some strategies have also been formulated for the tenth five year plan period to face the constraints and problems expected to emerge due to WTO commitments, which are presented in Box 3.3.

Box 3.3: Strategies to be adopted in view of WTO Commitments

The state has made tremendous progress in horticulture after the implementation of EGS linked horticultural scheme. Though the production has increased, the facility for processing, marketing and export of agricultural produce are the need of the time. To face the constraints emerging with the implementation of WTO, the strategy for the Tenth Five Year plan will be as under:

1. To adopt measures to face the constraints arising with WTO.
2. Use of bio-technology and information technology in agriculture development.
3. With the implementation of new technology and WTO development of human resources and revision in various legal act and rules wherever necessary.
4. Integrated and sustainable use of natural resources (water and forest), reduce the cost of cultivation and increase productivity, production, use of bio-technology and support for agri-processing.

Source: GOM (2003).

Apart from the above mentioned developmental programmes, a number of crop specific programmes have also been implemented in different plan periods by the state with the support of central assistance. Some of the important crop specific programmes are National Pulses Development Programme, National Oilseed Production Programme, Intensive Cotton Development Programme, Schemes on Sustainable Development of sugarcane based cropping system, etc.

On the whole, our review on the initiatives taken by the state government for the development of agriculture suggests that the government has been taking conscious efforts keeping in view the changing nature of agriculture as well as recent development in agriculture, both at the state as well as at the country level. However, one does not clearly know how the programmes have been implemented at the field level and what kind of benefits these programmes have brought to the farming community living in different regions in the state. Evaluation studies focusing on each scheme can only bring out the real impact of various schemes on farming community.

Major Constraints in Maharashtra's Agriculture

4.1 Introduction:

So far, we have studied the development of agriculture as well as the major initiatives taken by the government during different plan periods to improve the performance of agriculture in the state. Despite various initiatives taken by the government to accelerate the growth of agriculture, the performance of agricultural sector in the state is not very impressive as compared to many states in India, owing to many constraints. The contribution of agricultural sector to the state's income has gone down from about 34 percent in 1960-61 to 16 percent in 2001-02 partly because of poor agricultural growth. But, on the other hand, the percentage of population relying on agriculture has declined only marginally between 1960-61 and 2000-01. There are a number of factors which limit the growth of agriculture over the years in the state. While it is difficult to discuss each and every factor that affects the growth of agriculture, we try to highlight the major constraints faced by the agricultural sector of Maharashtra in this chapter.

4.2 Wide Variation in Rainfall:

As mentioned earlier, over 83 percent of cropped area is cultivated under rainfed condition in the state. Therefore, monsoon rain plays a critical role in the development of agriculture. Though the average rainfall of the state is higher than the national average, nearly one-third area of the state falls under rain-shadow region where the rain is scanty as well as erratic (GOM, 2003e). About 25 districts out of 34 receive normal rainfall less than the state's average (see, Table 4.1). Not only this, the variation in rainfall across different blocks within the district as well as across different years is also found to be higher (see, Figure 4.1). This wide variation in rainfall acts as one of the major constraints in state's agriculture. An analysis shows that the productivity of agricultural commodities goes down sharply whenever there is a reduction in rainfall (Figure 4.2). This is because of the fact that foodgrains and other crops are cultivated predominantly

in those districts which receive relatively less-normal rainfall. As providing assured irrigation facility for all those districts which have low rainfall is very difficult because of limited irrigation potential, proper rainwater harvesting programmes (watershed development programme, etc.) would help to improve the productivity of crops and thereby the overall performance of agriculture.

Table 4.1: Districtwise average normal rainfall, soil index and percentage of irrigation.

Districts	Normal Rainfall (mm)	Average rainfall 1991-2001 (mm)	CV	Soil Index	Percentage of GIA to GCA		
					1980-81	1990-91	2000-01
Low Rainfall Districts (below state's average)							
Ahmednagar	577.0	660.9	38.7	61.20	22.1	25.1	22.5
Solapur	607.2	688.8	29.9	57.60	13.7	18.9	22.8
Sangli	658.8	733.9	14.7	54.40	15.1	17.1	21.3
Beed	731.6	740.7	30.4	54.40	14.6	22.0	27.2
Jalgaon	744.7	726.4	20.4	61.20	14.9	16.6	13.3
Jalna	752.7	788.6	18.8	NA	--	12.4	14.9
Aurangabad	758.0	726.7	18.4	54.40	12.9	14.5	18.5
Dhule	771.3	688.4	27.7	61.20	11.8	13.4	12.9
Nandurbar	771.3	709.1	20.3	NA	--	--	--
Osmanabad	799.1	748.7	28.5	54.40	8.5	20.6	16.4
Buldhana	806.2	752.9	21.2	57.60	5.2	5.3	6.0
Satara	814.4	1381.6	20.2	57.60	19.5	23.8	31.8
Akola	842.6	802.4	18.6	72.70	3.1	3.0	2.9
Washim	842.6	1060.7	17.2	NA	--	--	--
Amaravati	873.2	818.3	17.7	72.20	5.9	6.6	7.7
Parbhani	903.4	915.1	21.6	54.40	7.4	11.9	8.4
Hingoli	903.4	1044.0	17.6	NA	--	--	--
Latur	965.5	821.3	26.0	NA	--	14.2	5.5
Nanded	967.5	888.7	11.5	54.40	6.0	11.0	9.1
Nasik	998.2	961.3	13.4	61.20	14.8	20.3	23.8
Yavatmal	1007.6	826.6	12.8	64.80	3.4	5.9	6.5
Wardha	1070.6	923.5	15.0	72.70	5.5	6.1	8.3
Pune	1171.2	1017.2	24.9	61.20	18.3	19.1	25.6
Nagpur	1199.2	1007.6	13.1	64.80	10.4	12.4	22.8
High Rainfall District (above state's average)							
Chandrapur	1376.7	1138.6	15.5	56.60	18.1	15.7	21.6
Bhandara	1426.3	1281.7	16.2	64.80	36.1	38.9	55.8
Gondia	1426.3	1266.8	10.3	NA	--	--	--
Gadchiroli	1433.3	1411.6	14.3	NA	--	23.4	32.1
Kolhapur	1828.6	1930.8	12.7	57.60	16.0	20.6	16.9
G. Bombay	2340.4	NA	NA	NA	13.8	0.0	--
Thane	2497.5	2257.2	11.1	57.60	1.6	1.9	6.3
Sindhudurg	3027.6	3250.9	14.5	NA	--	18.2	19.9
Raigad (Kolaba)	3366.9	3152.7	14.2	72.70	5.1	5.6	5.9
Ratnagiri	3379.9	3443.6	13.8	72.20	4.8	1.0	1.0
Maha. State	1254.1	1217.1	9.8	-	12.3	15.2	16.4

Notes: NA - Not Available; C.V.- Coefficient of Variation.

Sources: GOM (various issues of *Districtwise Agricultural Statistical Information of Maharashtra State*); Sawant, et al. (1999).

Figure 4.1 : Districtwise rainfall in Maharashtra

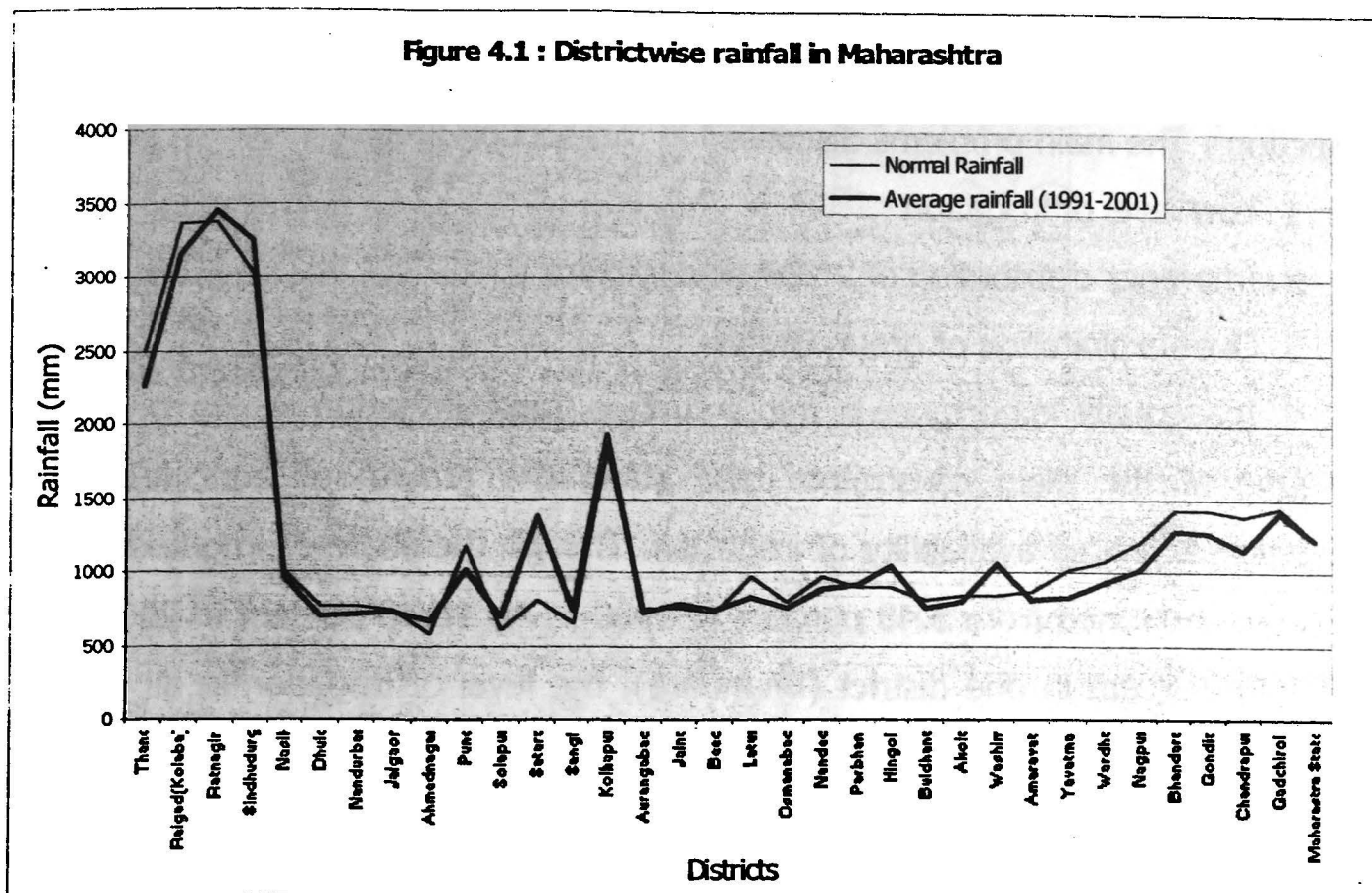
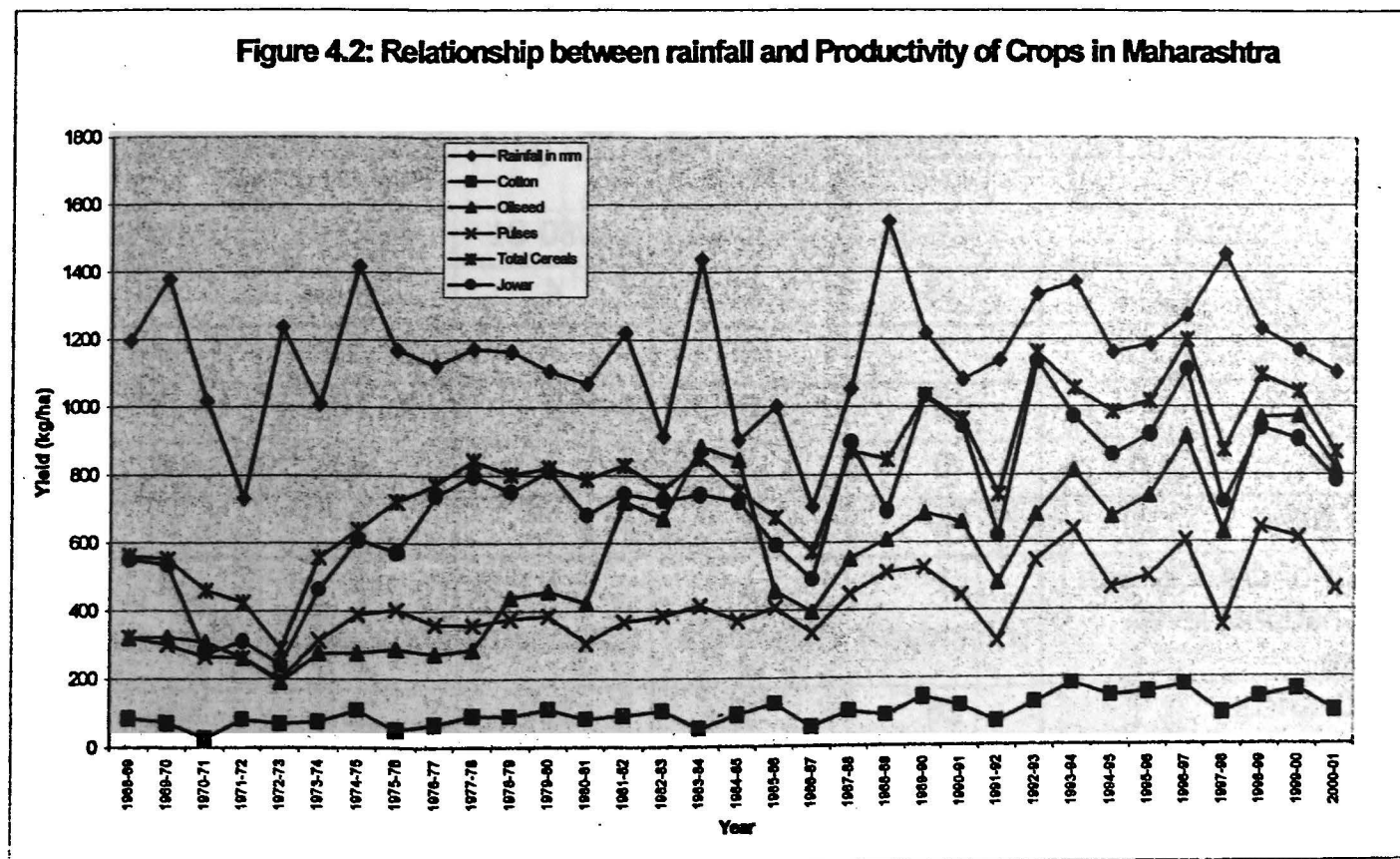


Figure 4.2: Relationship between rainfall and Productivity of Crops in Maharashtra



4.2 Constraints relating to Irrigation:

The irrigation sector of Maharashtra State has been facing various problems including financial problems over the last many years. Since our focus

here is to bring out the main constraints that limit the growth of agriculture, the problems associated with financial matters of irrigation sector are not discussed in this section¹. The main problems discussed in this section are:

1. Low level of irrigation
2. Improper distribution of water across crops
3. Over exploitation of groundwater
4. Inadequate importance to minor surface (tank) irrigation

One of the main constraints that affect the growth of agriculture in Maharashtra is limited availability of irrigation. Though the share of irrigated area to GCA has increased from 6.48 percent in 1960-61 to 16.38 percent in 2001-02 in the state, except in one district (Bhandara), the level of irrigation in all other districts is well below the national average even in 2000-01 (see, Tables 4.2 and 4.3). In fact, the percentage of irrigation is less than 15 percent in 14 out of 29 districts in 2000-01. This kind of situation is seldom seen in any of the states in India. The low level of irrigation as well as the erratic rainfall pattern often discourages the farmers to take up intensive cultivation in many regions in the state.

Table 4.2: Districts having different level of irrigation (GIA/GCA) in Maharashtra.

Level of irrigation	1960-61	1970-71	1980-81	1990-91	2000-01
Less than 5%	13	11	4	4	2
5-10 %	7	4	7	5	9
10-15 %	5	8	8	7	3
15-20 %	0	2	5	6	4
Above 20%	1	1	2	8	11
Number of districts with above national level average	1 (Bhandara)	1 (Bhandara)	1 (Bhandara)	1 (Bhandara)	1 (Bhandara)
Total Districts	26	26	26	29	29

Source: GOM (various issues of *Season and Crop Report of Maharashtra State*)

¹ The financial problems of Maharashtra's irrigation sector have been discussed elaborately in Mahendra Dev, (1996); Deshpande and Narayanamoorthy, (2001) and Narayanamoorthy and Kalamkar, (2004).

Table 4.3: Districts having Irrigation (GIA/GCA) above and below the state average.

Group	1970-71	1980-81	1990-91	2000-01
Above State Average	Nasik, Dhule, Jalgaon, Ahmednagar, Pune, Solapur, Satara, Sangli, Kolhapur, Bhandara, Chandrapur. (11)	Nasik, Jalgaon, Ahmednagar, Pune, Solapur, Satara, Sangli, Kolhapur, Aurangabad, Beed, Bhandara, Chandrapur. (12)	Sindhudurg, Nasik, Jalgaon, Ahmednagar, Pune, Solapur, Satara, Sangli, Kolhapur, Beed, Osmanabad, Bhandara, Chandrapur, Gadchiroli. (14)	Sindhudurg, Nasik Ahmednagar, Pune, Solapur, Satara Sangli, Kolhapur, Aurangabad, Beed, Nagpur, Bhandara, Chandrapur, Gadchiroli. (14)
Below State Average	Thane, Raigad(Kolaba), Ratnagiri, Aurangabad, Beed, Osmanabad, Nanded, Parbhani, Buldhana, Akola, Amaravati, Yavatmal, Wardha, Nagpur. (14)	Thane, Raigad(Kolaba), Ratnagiri, Dhule, Osmanabad, Nanded, Parbhani, Buldhana, Akola, Amaravati, Yavatmal, Wardha, Nagpur. (13)	Thane, Raigad(Kolaba), Ratnagiri, Dhule, Aurangabad, Jalna, Latur, Nanded, Parbhani, Buldhana, Akola, Amaravati, Yavatmal, Wardha, Nagpur. (15)	Thane, Raigad(Kolaba), Ratnagiri, Dhule, Jalgaon, Jalna, Latur, Osmanabad, Nanded, Parbhani, Buldhana, Akola, Amaravati, Yavatmal, Wardha. (15)
State Average	8.38 (25)	12.30 (25)	15.18 (29)	16.42 (29)

Note: Figure in brackets are number of districts.

Sources: GOM (various issues of *Season and Crop Report of Maharashtra State and Districtwise Agricultural Statistical Information of Maharashtra State*).

In spite of limited availability of irrigation, the available irrigation water is not distributed properly across different crops, which is another important issue of Maharashtra's irrigation sector. Out of the total irrigated area of 3.55 million hectares available during TE 2000-01, foodgrain crops such as paddy, wheat, jowar and bajra together accounted for only 45.89 percent, while sugarcane alone accounted for over 18 percent. Pulses and oilseeds are the important crops in Maharashtra accounting about 28.33 percent of GCA in TE 2000-01, but these two crops together accounted for only about 14.50 percent of irrigated area during the same period (see, Table 4.4). Though the net returns per unit water generated by sugarcane is very low when compared to most of the foodgrain crops (see, Table 4.5), some estimates show that nearly two-third of irrigation water available in the state is used only by sugarcane, which accounts for only around 2.60 percent of gross cropped area (World Bank, 2002). Irrigated sugarcane area accounted for over 18 percent of GIA in the state, which is very high when compared to the national average of about 5 percent during 2001-02. Despite severe water scarcity in the state, area under sugarcane increased at the rate of over 2.62 percent per annum between TE 1992-93 and TE 2001-02. Recent data also indicate that the major share of additional irrigated area created in the state is still used for cultivating sugarcane crop. The predominant use of water for cultivating sugarcane crop limits the intensive cultivation of foodgrain and other crops in the state.

Over exploitation of groundwater is another important issue associated with the irrigation development of Maharashtra State. As per CWC (2002) data, though the state has utilised only 30 percent of its groundwater irrigation potential (25.47 BCM per year), there has been a substantial increase in the exploitation of groundwater in the recent years mainly due to increase in number of wells, electrification of pumpsets as well as intensive cultivation of irrigated crops like sugarcane, banana, etc. District-wise data show that except six districts (mainly from the division of Konkan and Nagpur), the share of groundwater irrigated area to net (total) irrigated area is varied from 58 to 98 percent. Importantly, out of 30 districts presented in Table 4.6, as many as 13 districts are having over 80 percent of irrigation through groundwater alone. This clearly

Table 4.4: Cropwise share in GCA and GIA in Maharashtra.

(Triennium ending averages)

Crops	Gross Cropped Area					Gross Irrigated Area				
	1962-63	1972-73	1982-83	1992-93	2000-01	1962-63	1972-73	1982-83	1992-93	2000-01
Paddy	6.96	7.47	7.49	7.50	6.82	22.12	21.00	16.35	12.50	9.73
Wheat	4.74	4.64	5.16	3.47	4.26	11.29	17.65	21.25	15.96	19.58
Jowar	32.64	31.98	33.16	27.99	22.73	2.65	16.51	18.41	14.37	11.67
Bajara	8.80	8.88	8.08	9.13	7.99	0.14	2.88	2.14	2.20	3.32
Total Cereals	55.60	55.21	56.14	50.20	44.48	59.58	59.27	59.32	46.24	45.89*
Total Pulses	12.53	12.95	13.58	15.39	16.11	3.44	3.41	4.19	6.95	7.38*
Cotton	13.80	14.53	13.16	12.75	14.39	3.86	4.46	4.35	2.78	2.06
Sugarcane	0.78	1.12	1.83	2.63	2.59	11.91	12.94	14.62	16.91	18.12
Total Oilseeds	10.11	9.60	8.50	12.18	12.22	1.61	2.07	3.64	9.57	7.18*
Others	7.18	6.59	6.79	6.85	10.22	19.60	17.85	13.88	17.55	19.90*
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Note: * - relates to TE 1997-98

Sources: GOM (various issues of *Season and Crop Report of Maharashtra State* and *Districtwise Agricultural Statistical Information of Maharashtra State*)

suggests how intensively groundwater is used for cultivating crops in the state. The continued exploitation of groundwater has led to failure of wells in certain parts of the state as the aquifer in hard rocks have limited quantity of stored water (Pathak et al., 1999). Unless steps are taken to reduce the exploitation of groundwater through legal, institutional and technological options, this will have serious implications on the future growth of agriculture in the state.

Table 4.5: Irrigation water requirement of crops at distributory head and the net value of product per unit of water used (1978-79)

Name of the crop	Water requirement (acre inch)	Area that can be irrigated per Mcft. Of water (acres)	Net profit per acre (Rs.)	Net value of produce per Mcft. (Rs.)
Sugarcane (Adsali)	175	1.55	1515	2348
Sugarcane (Suru)	136	2.00	1195	2390
Bajra (HYV- Kharif)	20	13.80	441	6086
Bajra (Local)	20	13.80	251	3464
Groundnut (HYV - Kharif)	24	11.50	525	6038
Groundnut (Local - Kharif)	24	11.50	340	3910
Cotton (HYV - Kharif)	24	11.50	649	7463
Maize (Local kharif)	20	13.80	435	6003
Hybrid Jowar (Kh.)	15	18.40	485	8924
Jowar (Local- Rabi)	22	12.50	317	3962
Jowar (Hy - Rabi)	22	12.50	485	6063
Wheat (HYV)	30	9.20	492	4526
Wheat (Local)	30	9.20	243	2235
Onion (Rabi)	36	7.65	1060	8109
Gram (Local)	18	15.30	290	4437
Onion (Hot weather)	42	6.55	1060	6943
Maize (Hot weather)	36	7.65	435	3328
Cotton L.S. (Hot weather)	42	6.55	760	4978
Groundnut (Hot weather)	36	7.65	485	3710

Source: Rath and Mitra (1989).

Table 4.6: Districtwise share of groundwater irrigated area to net irrigated area.

Districts	1960-61	1970-71	1980-81	1990-91	1997-98
Thane	92.86	100.00	90.00	49.18	98.80
Raigad	53.33	422.22	21.00	19.80	31.40
Ratnagiri	33.86	35.90	26.21	37.50	80.00
Sindhudurg	--	--	--	15.89	6.09
Nasik	61.33	69.45	74.12	92.45	92.37
Dhule	63.12	74.65	72.70	79.34	86.17
Jalgaon	95.26	79.06	88.51	94.65	92.92
Ahmednagar	65.78	72.36	66.44	67.71	74.84
Pune	55.02	49.95	47.29	45.27	60.37
Solapur	76.98	76.40	69.24	75.75	77.07
Satara	43.34	52.04	54.47	58.32	61.19
Sangli	86.77	76.54	72.67	73.14	72.44
Kolhapur	30.63	25.21	29.60	36.59	44.51
Aurangabad	100.00	89.60	77.67	79.91	87.34
Jalna	--	--	--	86.46	81.84
Beed	88.71	69.21	77.44	56.68	65.94
Latur	--	--	--	97.75	88.37
Osmanabad	94.06	89.71	72.76	73.24	80.69
Nanded	85.54	60.95	38.60	65.82	73.03
Parbhani	100.00	63.69	63.30	51.19	58.60
Buldhana	98.40	91.07	87.50	77.57	94.94
Akola	96.97	91.36	81.73	74.88	81.85
Amravati	100.00	98.59	96.41	97.94	97.00
Yavatmal	93.33	84.85	61.97	49.12	87.57
Wardha	96.00	91.11	88.95	63.89	79.77
Nagpur	51.82	56.13	56.78	64.14	50.98
Bhandara	1.44	2.62	5.96	13.85	14.32
Chandrapur	1.13	1.57	2.95	4.11	13.26
Gadchiroli	--	--	--	3.66	7.64
Maharashtra State	55.52	57.01	57.51	62.60	66.56

Source: GOM (various issues of *Districtwise Agricultural Statistical Information of Maharashtra state*).

4.3 Cultivation of Low Value Crops:

One of the important reasons for the limited growth of agriculture in Maharashtra state is the predominant cultivation of low value crops. Though the cropping pattern has been shifting in favour of high value crops in the state in the recent years as compared to seventies and eighties, this shift is not very impressive as compared to the same at the national level (see, Table 4.7). For instance, coarse cereals (which are mainly low value crops) accounted for only

Table 4.7: Share of area under low value crops in GCA: Maharashtra and India.

(Percent)

Crops	Maharashtra				India			
	1970-71	1980-81	1990-91	2000-01	1970-71	1980-81	1990-91	2000-01
Coarse Cereals	43.56	43.04	39.67	34.04	27.72	24.20	19.55	15.71
Total Pulses	13.70	13.82	14.90	16.02	13.60	13.01	13.28	10.57
Oilseeds	9.25	8.78	13.04	11.52	10.04	10.20	13.00	11.81
Cotton	14.68	12.98	12.45	13.86	4.59	4.53	4.01	4.43
Total	81.18	78.63	80.06	75.44	55.94	51.94	49.84	42.52
GCA (million ha)	18.7	19.6	21.9	22.2	165.8	172.6	185.7	192.6

Sources: GOM (various issues of *Season and Crop report of Maharashtra State and Districtwise Agricultural Statistical Information of Maharashtra State*); <http://agricoop.nic.in>

about 15 percent of GCA at all India level during 2000-01, but the same accounted for over 34 percent in Maharashtra. Similarly, the share of area under pulses has declined about 3 percent points at all India level between 1970-71 and 2000-01, but the same has increased by about 2.30 percent points in Maharashtra during the same period. Area under oilseeds and cotton² is also substantially higher in Maharashtra (a total of 25.38 percent of GCA in 2000-01) as compared to all India average (16.24 percent). The main reason for the predominant utilisation of low value crops in Maharashtra is the limited availability of irrigation. Therefore, greater attention needs to be given to accelerate the availability of irrigation and moisture (through watershed development programme) to shift the crop pattern in favour high value crops.

4.4 Variation in Input Use:

Substantial variation in the use of inputs (irrigation, fertilisers and HYVs) across different regions in the state is also one of the constraints for agricultural growth. As can be seen from Tables 4.8 and 4.9, the use of both fertilisers and HYVs significantly varies across regions in Maharashtra. The use of fertilisers is found to be very low in divisions like Konkan, Latur and Amravati as compared to the state's average. Poor irrigation facility coupled with the cultivation of low value crops are the main reasons for the low use of yield increasing inputs like fertilisers. Besides low use of fertilisers, improper application of fertilisers (N P K ratio) also affects the productivity of crops and thereby the growth of agriculture (see, Table 4.10). While making efforts to improve the use of yield increasing inputs through increased irrigation facility and moisture availability, proper use (mix) of fertilisers should be promoted through quality extension network.

² We are aware of the fact that oilseeds and cotton are generally treated as high value commercial crops. However, since these crops are cultivated predominantly under rainfed condition and also the productivity of these crops are very low in Maharashtra, we have considered them as low value crops for the purpose of analysis.

Table 4.8: Divisionwise variation in Input use in Maharashtra.

Division	Irrigation (%GIA/GCA)		Fertilisers (kg/ha)		HYVs* (percent)	
	1980-81	2000-01	1980-81	2000-01	1982-83	2000-01
Konkan	3.95	7.13	25.6	53.8	48.3	77.5
Nasik	13.96	16.45	37.5	86.9	59.2	83.7
Pune	18.04	23.49	19.9	76.6	11.8	88.1
Kolhapur	16.97	23.21	57.6	106.5	33.3	83.3
Aurangabad	13.54	20.51	11.20	66.9	42.8	84.6
Latur	7.48	9.62	9.27	68.7	48.4	86.4
Amravati	4.34	5.71	17.57	57.6	61.9	99.0
Nagpur	17.42	27.29	18.00	75.3	45.3	98.6
Maharashtra	12.30	16.42	21.4	73.8	40.2	87.8

Note: * - Percentage of area under HYVs (Paddy + Wheat + Bajra +Jowar) to area under total cereals.

Sources: GOM (various issues of *Season and Crop Report of Maharashtra State and Districtwise Agricultural Statistical Information of Maharashtra State*).

Table 4.9: Divisionwise share of GCA and Fertilisers Consumption in Maharashtra.

(Percent)

Divisions	GCA			Fertiliser Consumption		
	1980-81	1990-91	2000-01	1980-81	1990-91	2000-01
Konkan	4.38	4.32	4.01	4.72	2.73	2.95
Nasik	13.65	13.03	13.95	24.20	20.18	16.88
Pune	18.52	17.96	16.93	14.74	18.86	17.59
Kolhapur	8.98	8.40	9.59	20.90	18.96	13.80
Aurangabad	11.13	12.66	12.12	8.49	5.80	10.83
Latur	15.98	16.04	16.26	4.53	10.79	14.48
Amravati	16.19	16.97	17.69	13.09	13.91	13.62
Nagpur	11.19	10.62	9.45	9.34	8.77	9.85
Maharashtra	100.00	100.00	100.00	100.00	100.00	100.00

Sources: GOM (various issues of *Season and Crop Report of Maharashtra State* and *Districtwise Agricultural Statistical Information of Maharashtra State*).

Table 4.10: Divisionwise NPK ratio In Maharashtra.

Divisions	1980-81	1985-86	1989-90	1995-96	2000-01
Kokan	6.82:1.46:1	4.89:1.26:1	5.85:2.21:1	8.16:1.37:1	7.88:1.48:1
Nasik	3.96:1.21:1	3.61:1.47:1	3.27:1.51:1	4.82:1.59:1	3.57:1.47:1
Pune	3.89:1.43:1	3.69:1.34:1	4.19:1.90:1	5.58:1.94:1	3.56:1.62:1
Kolhapur	3.30:1.30:1	3.34:1.12:1	2.37:1.16:1	3.22:1.10:1	2.57:1.08:1
Aurangabad	4.47:1.49:1	4.55:1.72:1	4.83:2.15:1	4.27:1.94:1	5.50:2.58:1
Latur	5.08:1.54:1	4.57:1.77:1	4.30:2.16:1	4.98:2.59:1	4.36:2.20:1
Amravati	4.33:1.67:1	3.49:1.33:1	6.34:3.30:1	6.89:3.05:1	6.36:3.74:1
Nagpur	4.76:1.69:1	4.85:1.76:1	5.55:2.90:1	8.91:3.13:1	6.36:3.22:1
Maharashtra	4.08:1.39:1	3.83:1.41:1	3.88:1.85:1	5.04:19.3:1	4.14:1.92:1

Source: GOM (various issues of *Districtwise Agricultural Statistical Information of Maharashtra State*).

4.5 Mono-Cropping Pattern:

Predominant practice of mono-cropping pattern is also one of the problems of Maharashtra's agriculture. Sugarcane has been cultivated repeatedly in Western Maharashtra over the last four decades. Pune and Kolhapur divisions together account for nearly 60 percent of sugarcane area even today (see, Table 4.11). As a result of this undesirable practice, not only the soil fertility has deteriorated over the years but the productivity has also stagnated or declined due to certain pests and diseases associated with mono-cropping pattern. Unlimited supply of canal water for cultivating sugarcane crop and the support by the sugar industries for cultivating sugarcane are the two main reasons for the prevalence of mono-cropping pattern in the state. By introducing volumetric pricing for canal water, cultivation of sugarcane may be discouraged in those areas where the productivity is stagnating or has started declining.

Table 4.11: Divisionwise share of sugarcane in Maharashtra.

Division	1960-61	1970-71	1980-81	1990-91	2000-01
Kokan	0.13	0.16	0.09	0.04	--
Nasik	11.22	9.41	13.48	12.94	8.95
Pune	39.02	40.26	35.92	30.21	30.42
Kolhapur	32.69	37.52	31.82	26.89	29.19
Aurangabad	7.91	4.81	8.37	13.39	11.53
Latur	6.51	5.89	8.81	13.03	16.52
Amravati	1.82	1.50	1.19	2.82	2.61
Nagpur	0.70	0.47	0.31	0.69	1.11
Maharashtra	100.00	100.00	100.00	100.00	100.00
Total Area ('00 ha)	1555	1935	3190	5356	5933

Sources: GOM (various issues of *Season and Crop Report of Maharashtra State and Districtwise Agricultural Statistical Information of Maharashtra State*).

4.6 Slow Progress in Watershed Development Programme:

With an aim to increase the production of crops in rainfed areas and to prevent the deterioration of natural resources, the government of Maharashtra started implementing watershed development programmes (WDPs) extensively

much before the introduction of centrally sponsored National Watershed Development Project for Rainfed Areas (NWDPR). No doubt, as a result of concerted effort, area treated through WDPs has increased substantially in the state. However, the progress and achievements made in this respect are not very appreciable when compared to its potential area. According to the estimate of Directorate of Soil Conservation and Watershed Management (DSC & WM), the total potential area available for WDPs is about 20.36 mha (see, Table 4.12). Of this total area, only about 3.15 mha have been treated upto March 2002. This means that only 15.47 percent of potential area has been treated through WDPs since 1983, the year in which the state started implementing WDPs. The average treated area from 1983 to 2002 comes to only 0.166 mha per year. With this current rate of growth, it may take more than 100 years to treat all the remaining potential area, which is about 17.21 mha (potential area of 20.36 mha minus treated area of 3.15 mha as of March 2002).

Table 4.12: Divisionwise development of micro-watersheds in Maharashtra.

Division	PWA (mha)	Number of Watersheds			TWA (mha)
		Started	COM	OGG	
Konkan	1.69	2041	421	1620	0.214
Nasik	2.63	3590	1611	1979	0.510
Pune	3.42	6865	770	6095	0.231
Kolhapur	1.73	1900	487	1413	0.237
Aurangabad	2.36	2563	1186	1377	0.344
Latur	2.85	3473	1954	1519	0.853
Amaravati	3.36	3917	1236	2681	0.377
Nagpur	2.32	2364	657	1707	0.387
Maharashtra	20.36	26713	8322	18391	3.154

Notes: PWA- Potential Watershed Area, COM -completed; OGG-ongoing TWA- Treated watershed area.

Source: DSC&WD, (2003).

Besides slow progress of WDPs, adequate importance has also not been given for those areas/regions, which has relatively more rainfed areas and less normal rainfall (see, Table 4.13). For instance, about 94 percent of area in Amravati division is rainfed, but only 12 percent of its area has been treated through WDPs upto 2001-02. This needs to be avoided and priority should be given to those regions which have more drought prone as well as degraded area,

as suggested by the 10th Plan Working Group on Watershed Development, Rainfed Farming and Natural Resource Management (GOI, 2001a).

Table 4.13: Divisionwise inequality index of watershed development: 2001-02.

Division	PWA (%)	RFA (%)	TARFA (%)	NRF (mm)
Konkan	8.30	93.66	27.91	2923
Nasik	12.94	83.11	24.94	838
Pune	16.78	77.09	9.53	785
Kolhapur	8.49	74.76	19.87	1101
Aurangabad	11.58	78.02	21.52	747
Latur	13.98	88.90	37.58	909
Amaravati	16.52	94.11	12.91	882
Nagpur	11.41	75.29	27.23	1301
Maharashtra	100.00	83.11	21.54	1290

Notes: PWA – potential watershed area; RFA - percent of rainfed area to total net sown area; TARFA - treated watershed area to rainfed area; NRF - Normal rainfall.

Sources: GOM (various years of *Season and Crop Report of Maharashtra State*); DSC&WM (2003).

Since Maharashtra State has over 83 percent of cropped area under rainfed condition and the rainfall is also low and varied in majority of the districts, highest priority needs to be given to treat all the potential area through watershed development programme as early as possible. Studies have shown that watershed development programme has made significant impact on production and productivity of crops besides changing the cropping pattern in favour of high value crops in different regions in India (see, Table 4.14)³. The future performance of agriculture in Maharashtra will heavily depend on the extent of coverage of watershed programme because of its limited irrigation facility.

³ Impact of watershed development programme on cropping pattern, moisture availability, productivity of crops, etc. in different regions of Maharashtra can be seen from Deshpande and Reddy (1991); Deshpande and Rajasekaran (1997); Deshpande and Narayanamoorthy (1999); Kulkarni et al., (1999), Narayanamoorthy and Kshirsagar (2000).

Table 4.14: Economic impact of watershed technology – Review of studies.

	Study/ Year	Region	Activity	Crops	Impact			
					Yield (Percent)	Net Income (Percent)	B-c Ratio	
1)	Ram Mohan Rao et al (1967)	Maharashtra	Contour bunding	Jowar (R)	+25	-	-	
				Bajra	+25	-	-	
		Tamil Nadu		Jowar (R)	+36	-	-	
				Bajra	+25	-	-	
2)	Lal Gupta et al (1970)	Varanasi (UP)	Soil conservation	All crops	+112	215	4.6	
3)	Joshi and Seckler (1981)	Chandigarh	Raw water harvesting	All crops	-	Rs.1.812 /ha	-	
4)	Sarin and Ryan (1983)	Andhra Pradesh	Integrated watershed	All crops	-	+4-300	-	
		Solapur (Maharashtra)		-do-	Sorghum	-	+517	-
				-do-	Castor	-	+600	-
				-do-	Sorghum	+300	-	-
5)	Walker et al (1981)	Mahboob Nagar (AP)	-do-	All crops	+203	-	1.37	
		Medak (AP)	-do-	All crops	+130%	-	3.81	
		Medak (AP)	-do-	All crops	+52%	-	3.02	
		Akola (Maharashtra)	-do-	All crops	+28%	-	1.08	
		Gulgarga (Karnataka)	-do-	All crops	+52%	-	1.03	
6)	Ghodke (1981)	Tadapally (AP)	-do-	All crops	-	+71	-	
				Sorghum	-	-45	-	
				Pulses	-	+1000	-	
				Pigeon Pea	-	+960	-	
				Fodder	-	+230	-	
				-	-	-	-	
7)	Gupta and Mohan (1982)	Rajasthan	Tree plantation	Trees	-	RS. 1640/ha	-	
8)	Tejwani and Babu (1982)	Farm pond	Farm pond	Jowar	-	-	-	
9)	Reddy and Kanwar (1985)	Andhra Pradesh	Agro forestry	-	-	-	1.45	
				Silvi-agri	-	-	-	1.30
				Silvi-pastoral	-	-	-	2.25
10)	Agnihotri (1985)	Shivalik Hills	Vegetative cover	All crops	64 q/ha to 85 q/ha	-	-	
11)	Government of Punjab (1986)	Punjab	Soil conservation	All crops	-	+84#	-	
				Maiz	-13	-	-	
				Paddy	-30	-	-	
				Wheat	+16	-	-	
				Potato	+4	-	-	
12)	Itnai and Narayan (1987)	Bijapur (Karnataka)	Farm pond	Jowar	-	+Rs. 1300/ha	0.95	
				Sunflower	-	+Rs. 1800/ha	1.11	
13)	Pant (1989)	Madhya Pradesh	Integrated watershed	Sorghum	+127	-	-	
				Wheat	+111	-	-	
14)	Deshpande and Reddy (1990)	Maharashtra	Integrated watershed	Paddy	+18	-	-	
				Ragi	+34	-	-	
				Pulses	+7	-	-	
				Bajra	+46	-	-	
				Wheat	+11	-	-	
				Jowar	-2	-	-	
				Sunflower	+64	-	-	
				-	-	-	-	
15)	Rao (1990)	Andhra Pradesh	Integrated watershed	Paddy (K)	+54	+13	-	
				Paddy (R)	135	-	-	
				Sorghum	+17	-	-	
				Pigeon Pea	+7	-	-	
				Castor	+6	-	-	
16)	Singh (1991)	Karnataka	Integrated watershed	All crops	-	Rs. 1970/ha	-	
17)	Singh et al (1991)	Punjab	Integrated watershed	Forestry	-	-	2.74	
				Animal husbandry	-	-	1.74	
				Soil conservation	-	Gross margin 0.90	-	
				Horticulture	-	RS. 825-2780	7.05	
				All components	-	-	0.95	
				-	-	-	-	
18)	Mahnot et al (1992)	Rajasthan	Integrated watershed	Maize	+21	-	1.03	
				Wheat	+20	-	-	
				Oilseed	+52	-	8.37	
19)	Singh et al (1993)	Kandl (Punjab)	Integrated watershed	Maiz	+5-14 q/ha	-	1.72	
				Paddy	+5-13 q/ha	-	(avg)	
				Blackgram	+4-6 q/ha	-	-	
				Wheat	+8-22 q/ha	-	-	
				Gram	+4-9 q/ha	-	-	
				Mustard	0-8 q/ha	-	-	
				-	-	-	-	
20)	Singh et al (1995)	Udaipur (Rajasthan)	Integrated watershed	Maize	+2 q/ha	+Rs. 1100	-	
				Paddy	+2 q/ha	Per year	1.76	
				Jowar	+2 q/ha	-	(avg)	
				Blackgram	+4 q/ha	-	-	
				Wheat	+2 q/ha	-	-	
				-	-	-	-	
21)	Nalatawadmath et al (1997)	Bellary (Karnataka)	Integrated watershed	Bajra	+16 q/ha	+50	1.75	
				Jowar	+13 q/ha	-	(avg)	
				Sun flower	+22 q/ha	-	-	
22)	Joshi and Bantilan (1997)	ICRISAT Asian Centre	Integrated watershed	Chickpea	-	+40	-	

Source: Reddy (2000).

4.7 Constraints in Horticulture Development:

Though significant growth has taken place in area under horticultural crops in the state between 1980-81 and 1997-98, the horticulture sector is not free from problems. The major problems that are expected to limit the growth of horticultural sector in Maharashtra are:

- Less diversification of crops in non-traditional regions
- Deceleration in area and productivity of certain crops
- Poor post harvesting infrastructure facilities

Despite significant potential for horticulture crops in different regions in Maharashtra, the growth in area under horticulture crops in non-traditional districts is not very impressive as of today. For instance, horticulture crops have been traditionally and also predominantly cultivated in districts like Ratnagiri, Nasik, Jalgaon, Ahmednagar, Pune, Solapur, Satara, Amravati and Nagpur. These nine districts accounted for over 57 percent of the total area under horticulture crops in the state during TE 1966-67 and these same districts have also accounted for almost the same share (nearly 56 percent) in 1997-98 as well (see, Table 4.15). Importantly, the share of area under horticulture crops has marginally declined between TE 1966-67 and TE 1997-98 (by over 2 percent points) in Western Maharashtra⁴, where water is heavily used for cultivating sugarcane. As mentioned earlier, since the limited availability of irrigation water is the main constraint for agricultural growth in the state, required steps need to be taken to increase the area under horticulture crops in those areas where sugarcane is cultivated predominantly so that the surplus water arising due to the cultivation of horticulture crops can be transferred to other regions or for other crops.

Though lot of euphoria has been created in the state quoting that linking of EGS with horticulture development programme has made significant improvement in the growth of area under horticulture crops, our growth analysis does not completely support this (see, Table 4.16). While the growth rate of area under

⁴ Western Maharashtra includes Ahmednagar, Pune, Solapur, Satara, Sangli and Kolhapur.

grapes and banana either declined or decelerated during the period 1992-93 to 1997-98 as compared to eighties (1982-83 to 1992-93), the same is found to be

Table 4.15: Districtwise share of horticultural crops.

Districts	TE 1966-67	TE 1976-77	TE 1986-87	TE 1997-98
Mumbai	0.40	0.19	0.00	0.00
Thane	2.09	2.33	1.72	1.98
Raigad	1.41	1.08	0.76	1.46
Ratnagiri	7.32	9.79	3.39	6.90
Sindhudurg	0.00	0.00	5.45	6.64
Nasik	12.17	12.56	9.99	12.20
Dhule	1.99	2.37	2.30	1.35
Jalgaon	13.04	17.31	13.52	7.92
Ahmednagar	5.89	4.01	3.33	4.88
Pune	10.22	10.49	11.69	10.01
Solapur	3.81	3.75	2.94	4.63
Satara	5.28	2.44	3.61	3.95
Sangli	1.89	1.14	1.35	1.62
Kolhapur	1.60	1.16	0.93	1.49
Aurangabad	4.69	3.13	1.47	1.57
Jalna	0.00	0.00	1.10	1.44
Beed	1.57	1.08	5.91	4.17
Latur	0.00	0.00	0.38	1.51
Osmanabad	2.78	2.57	1.83	1.29
Nanded	2.21	2.04	1.55	1.32
Parbhani	2.26	2.31	2.39	1.33
Buldhana	1.06	1.36	1.46	0.85
Akola	1.27	1.11	1.32	0.99
Amaravati	3.24	4.64	7.50	7.35
Yavatmal	1.48	1.44	1.13	2.03
Wardha	1.89	2.03	1.98	1.28
Nagpur	7.37	6.51	8.35	6.90
Bhandara	2.05	2.15	1.69	1.80
Chandrapur	1.03	1.03	0.76	0.95
Gadchiroli	0.00	0.00	0.21	0.19
Maharashtra	100.00	100.00	100.00	100.00
Total Area under Horticulture Crops (F+V) in '00 ha	1777	2336	3256	6423

Sources: GOM (various issues of *Season and Crop Report of Maharashtra State and Districtwise Agricultural Statistical Information of Maharashtra State*).

Table 4.16: Growth rate in area under fruit and vegetable crops in Maharashtra State.

Crops	(Percent per annum)			
	1960-61 to 1972-73	1972-73 to 1982-83	1982-83 to 1992-93	1992-93 to 1997-98
Fruits				
Grape	3.43	9.04 ^b	18.57 ^b	2.79
Banana	3.49 ^b	5.67 ^b	5.01 ^b	-5.22 [*]
Mango	0.23	1.56	11.22 ^b	12.62 ^b
Sweet Orange	2.31 ^b	-10.52 ^b	10.26 ^b	22.22 ^a
Mandrin Orange	2.99 ^b	4.36 ^b	6.05 ^b	11.17 ^a
Gauva	-0.12	1.98 ^a	2.91 ^a	3.66
Cashewnut	0.95	4.72 ^b	5.85 ^b	10.53 ^a
Total Fruits	1.78 ^b	3.79 ^b	7.98 ^b	6.90 ^b
Total fruits & dry fruits	3.01 ^b	3.92 ^b	7.95 ^b	7.27 ^b
Vegetables				
Potato	-3.67 ^b	4.35 ^b	2.15 ^a	-1.59 ^a
Onion	4.45 ^b	4.24 ^b	5.05 ^b	4.06 ^a
Cabbage	0.56	6.07 ^b	6.48 ^b	4.69
Brinjal	2.72 ^b	3.55 ^b	5.79 ^b	3.40
Tomato	3.82 ^b	5.90 ^b	7.50 ^b	2.58
Bhendi	0.50	1.58	6.27 ^b	3.92
Total Vegetables	2.59 ^b	3.93 ^b	6.53 ^b	2.48

Note: a - significant at 5 percent level and b - significant at 1 percent level

Source: Computed from GOM (various issues of *Season and Crop Report of Maharashtra State*).

decelerated in almost all vegetable crops during the nineties as compared to the growth realised during the eighties. As future growth of agriculture in the state is heavily dependent on the performance of horticultural sector because of its natural advantages, it is essential to examine why the growth rate of area under certain horticultural crops decelerated during the nineties.

Another important problem associated with horticulture sector is declining productivity of horticulture crops. Productivity of important horticulture crops namely orange and mango has declined between 1990-91 and 2001-02 (see, Table 4.17). This is not an encouraging sign as far as the horticultural sector of the state is concerned. Reduction in productivity would not only affect the growth of the horticultural sector but would also affect the overall performance of agricultural growth in the state. Therefore, it is essential to examine the causes for declining productivity of major horticulture crops in those regions where productivity started declining.

Table 4.17: Area, production and productivity of major horticultural crops in Maharashtra.

Crops	Item	1990-91	1995-96	1997-98	1998-99	1999-00	2000-01	2001-02
Banana	Area ('00 ha)	290	385	532	587	613	721	721
	Production ('00 tonnes)	16040	22168	31299	34380	36780	43305	43313
	Productivity (kg/ha)	55310	57579	58833	58569	60000	60062	60074
Orange	Area ('00 ha)	300	534	1007	1229	1411	1322	1542
	Production ('00 tonnes)	2290	5578	10778	12953	13233	10776	8331
	Productivity (kg/ha)	7633	10446	10703	10539	9378	8151	5403
Grapes	Area ('00 ha)	150	275	244	262	298	298	324
	Production ('00 tonnes)	2450	6784	5528	6635	7792	7790	9370
	Productivity (kg/ha)	16333	24669	22656	25324	26148	26141	28920
Mango	Area ('00 ha)	776	2659	3249	3507	3764	4035	4095
	Production ('00 tonnes)	2444	3510	4289	4664	5005	5005	5590
	Productivity (kg/ha)	3149	1320	1320	1330	1330	1240	1365
Cashewnuts	Area ('00 ha)	150	199	314	677	1305	1384	1533
	Production ('00 tonnes)	112	161	119	756	955	1015	1252
	Productivity (kg/ha)	747	809	379	1117	732	733	817

Source: GOM (2003).

Inadequate post harvesting infrastructure facility is another important constraint faced by the horticultural sector of Maharashtra. As most of the horticultural crops are easily perishable, post harvesting facilities such as cold storage, cold chain, processing, packaging and marketing are essential to avoid wastage. Studies have also pointed out the necessity of infrastructure facilities to sustain as well as accelerate the present growth of horticultural sector (Chengappa, 2003; Mahendra Dev, 1996). Farmers may not be able to create post-harvesting facilities on their own because it requires a large amount of capital. Therefore, the state will have to play a larger role in establishing infrastructure facilities to promote the horticultural sector in the state. Involving private sector in marketing and processing activities as well as encouraging contract farming in the cultivation of horticultural crops may help to reduce the problems associated with post-harvesting of horticultural crops.

4.8 Low Productivity of Crops:

Low productivity of different crops is one of the major problems of Maharashtra's agriculture. Except sugarcane and some horticulture crops, productivity of all other crops is found to be very low in the state as compared to the national average, as discussed earlier in chapter two (GOI, 2002). Low productivity of crops pulls down the overall growth rate of agriculture in the state, besides reducing farmers' income.

Apart from low productivity of crops, the growth rate of productivity of almost all the major crops either decelerated or declined during the second part of the green revolution period, i.e., 1985-86 to 2000-01 (see, Table 4.18). Importantly, productivity of sugarcane, which is an important irrigated crop in Maharashtra, has declined during the nineties as compared to the earlier decades (see, Table 4.19 and 4.20). Poor irrigation facilities, unfavorable soil and climate condition, variation in rainfall and mono-cropping pattern are some of the major reasons for the deceleration in productivity growth in Maharashtra.

In addition to low productivity and deceleration in the growth rate of productivity, wide variation in productivity of different crops across districts is also an another problem of the state's agriculture (see, Table 4.21). Though wide

Table 4.18: Growth rates of area, production and productivity of major crops in Maharashtra: 1971-86 and 1986-2002.

Crops	1970-71 to 1985-86			1985-86 to 2001-02		
	Area	Production	Productivity	Area	Production	Productivity
Rice	0.92 ^a	3.88 ^b	2.93 ^b	-0.04	1.29	1.33 ^b
Jowar	1.05 ^a	7.4 ^a	6.29 ^a	-1.79 ^a	-0.23	1.59
Wheat	0.44	4.21 ^b	3.76 ^a	0.42	3.6 ^a	3.16 ^a
Bajra	-0.45	1.68	2.14	-0.68	4.08 ^b	4.78 ^a
Total Cereals	0.67 ^a	5.26 ^a	4.56 ^a	-0.98 ^a	1.17	2.18 ^b
Tur	1.09	3.88 ^a	2.76 ^a	1.91 ^a	3.11 ^b	1.17
Gram	1.5	3.57 ^b	2.05 ^b	3.01 ^a	6.11 ^a	3.01 ^a
Total Pulses	0.59	3.51 ^b	2.89 ^a	1.14 ^a	3.15 ^b	1.98 ^b
Foodgrain	0.65 ^b	5.06 ^a	4.38 ^a	-0.49 ^a	1.46	1.97
Groundnuts	-2.41 ^a	0.79	3.27 ^b	-3.25 ^a	-1.41	1.9 ^b
Safflower	1.05	12.9 ^a	11.72 ^a	-4.58 ^a	-8.82 ^a	-4.44 ^b
Total Oilseed	0.03	8.73 ^a	8.71 ^a	0.57	5.16 ^a	4.56 ^a
Sugarcane	4.91 ^a	4.5 ^a	-0.39	3.29 ^a	4.84 ^a	1.5 ^b
Cotton	0.37	4.32 ^b	3.94	1.45 ^a	4.35 ^b	2.86

Note: a - significant at 1 percent level and b - significant at 5 percent level

Sources: Computed from GOM (various issues of *Season and Crop Report of Maharashtra State and Districtwise Agricultural Statistical Information of Maharashtra State*).

Table 4.19: Divisionwise variation in productivity of major crops in Maharashtra.

Division	Year	Total Cereals	Total Pulses	Oilseeds	Cotton	(kg./ha)
						Sugarcane
Konkan	1980-81	1643	254	308	--	82000
	1990-91	1699	467	1108	--	108810
	2000-01	1739	422	915	--	--
Nasik	1980-81	803	371	552	116	98340
	1990-91	1014	550	762	164	95327
	2000-01	671	367	407	112	83657
Pune	1980-81	532	285	542	262	106552
	1990-91	595	390	827	215	88415
	2000-01	541	469	742	285	86840
Kolhapur	1980-81	968	347	806	300	86665
	1990-91	1144	459	1257	293	89332
	2000-01	1066	497	1618	314	92420
Aurangabad	1980-81	666	231	381	106	73590
	1990-91	735	369	472	141	80844
	2000-01	786	372	416	105	74189
Latur	1980-81	608	281	291	79	73665
	1990-91	977	301	523	86	75523
	2000-01	1020	401	527	70	68601
Amravati	1980-81	946	343	363	67	74794
	1990-91	1526	531	568	106	76943
	2000-01	1256	534	796	89	76523
Nagpur	1980-81	941	303	165	69	74875
	1990-91	997	485	515	116	77690
	2000-01	866	593	921	165	69879
Maharashtra State	1980-81	788	304	426	82	91742
	1990-91	964	442	666	117	86400
	2000-01	865	460	820	100	83267

Source: GOM (2003, *Districtwise Agricultural Statistical Information of Maharashtra State, Part II*).

Table 4.20: Sugarcane Productivity across the divisions in Maharashtra.

(kg/ha)

Division	1970-71	1980-81	1990-91	2001-02
Konkan	65666	82000	1088010	N.A.
Nasik	89108	98340	95327	73677
Pune	106371	106552	88415	76578
Kolhapur	77230	86665	89332	93432
Aurangabad	61831	73590	80844	62820
Latur	66481	73665	75523	66127
Amravati	66043	74794	76943	69950
Nagpur	63333	74875	77690	53300
Maharashtra	86531	91742	86400	78070

Note: NA- Not Available.

Source: GOM (2003).

Table 4.21: Gaps in productivity of different crops in Maharashtra.

Crops	1980-81			2001-02		
	Highest	Lowest	Ratio (Highest/Lowest)	Highest	Lowest	Ratio (Highest/Lowest)
Rice	2106 (Kolhapur)	635 (Wardha)	3.32	2733 (Kolhapur)	149 (Osmanabad)	18.34
Jowar	1533 (Kolhapur)	397 (Solapur)	3.86	1701 (Kolhapur)	443 (Gadchiroli)	3.84
Wheat	1585 (Kolhapur)	437 (Chandrapur)	3.62	1953 (Kolhapur)	705 (Gondia)	2.77
Bajra	607 (Dhule)	167 (Kolhapur)	3.64	1090 (Nandurbar)	178 (Sangli)	6.12
Total Cereals	1804 (Thane)	415 (Solapur)	4.34	2511 (Raigad)	512 (Solapur)	4.90
Tur	968 (Kolhapur)	75 (Sangli)	12.91	1268 (Yavatmal)	211 (Solapur)	6.00
Gram	475 (Jalgaon)	140 (Sangli)	3.39	899 (Jalgaon)	411 (Chandrapur)	2.18
Total Pulses	612 (Nasik)	201 (Sangli)	3.04	1006 (Wardha)	304 (Beed)	3.30
Foodgrains	1727 (Thane)	387 (Solapur)	4.46	2322 (Raigad)	506 (Solapur)	4.59
Groundnut	1046 (Ahmednagar)	375 (Buldana)	2.79	2200 (Ratnagiri)	363 (Latur)	6.06
Safflower	671 (Ahmednagar)	167 (Bhandara, Chandrapur)	4.02	768 (Parbhani)	304 (Osmanabad)	2.53
Total Oilseed	1021 (Kolhapur)	105 (Chandrapur)	9.72	1847 (Kolhapur)	183 (Gondia)	10.09
Sugarcane	107397 (Pune)	69545 (Beed)	1.54	99608 (Sangli)	37000 (Bhandara)	2.69
Cotton (lint)	359 (Satara)	55 (Osmanabad)	6.53	333 (Pune)	64 (Osmanabad)	5.20

Note: Districts which recorded lowest and highest yield are given in brackets.

Source: GOM (2003).

Table 4.22: Districts having below the state average in productivity, irrigation, HYV coverage and fertiliser consumption in TE 2000-01.

Foodgrains Productivity (887 Kg/ha)	Irrigation (16.40 %)	HYV coverage (Total Cereals 86.0% and Cotton 96.15%)	Fertiliser consumption (78.5 kg/ha)	Rainfall (1163.3 mm)
Nasik, Dhule, Nandurbar, Ahmednagar, Pune, Solapur, Aurangabad, Jalna, Beed, Osmanabad, Parbhani, Washim, Nagpur, Chandrapur	Thane, Raigad, Ratnagiri, Dhule, Jalgaon, Jalna, Latur, Nanded, Parbhani, Buldhana, Akola, Amravati, Yavatmal, Wardha	Total Cereals: Thane, Raigad, Ratnagiri, Sindhudurg, Nasik, Nandurbar, Pune Solapur, Sangli, Kolhapur, Aurangabad, Jalna, Osmanabad, Hingoli, Washim, Gondia, Gadchiroli Cotton: Dhule, Aurangabad, Beed, Latur, Buldhana, Akola, Amravati, Yavatmal, Wardha, Nagpur, Chandrapur	Thane, Raigad, Ratnagiri, Sindhudurg, Nandurbar, Aurangabad, Jalna, Beed, Osmanabad, Parbhani, Hingoli, Buldhana, Akola, Washim, Amravati, Yavatmal, Nagpur, Chandrapur	Nasik, Dhule, Nandurbar, Jalgaon, Ahmednagar, Pune, Solapur, Sangli, Aurangabad, Jalna, Beed, Latur, Osmanabad, Nanded, Parbhani, Hingoli, Buldhana, Akola, Washim, Amravati, Yavatmal, Wardha, Nagpur

Note: Figures in brackets are state's average; Irrigation - % GIA to GCA; HYV coverage - Percentage HYV area to cropped area under total cereals.
Source: GOM (2003).

variation is found in almost all crops, highest variation is seen in crops like paddy, bajra, tur, groundnut, total oilseeds and cotton. Available data also suggest that the gap in crop productivity among different districts is widened over the last 20 years in Maharashtra. A large number of districts still come under the group of very low level of productivity due to low rainfall and limited access to irrigation (see, Table 4.22). Though various policy measures have been introduced to improve the productivity of various crops, not much improvement has taken place in productivity over the last four decades in certain important crops. Therefore, in order to increase the productivity of crops in short span of time, more location specific policies/programmes need to be introduced, especially in those districts that have very low productivity in different crops.

Table 4.23: Statewise level of spread of regulated markets.

State	Population in 1991 (Lakhs)	Area sq. km	No. of Regulated Markets	Density per 1000 sq. km	Area covered by each Market (in sq.km)	Population fed by each market (in lakh)
Andhra Pradesh	663.05	275	586	2.06	484	1.17
Assam	222.95	79	32	0.41	2469	6.97
Bihar	863.39	174	798	4.59	218	1.08
Gujarat	411.74	196	341	1.74	574	1.22
Haryana	163.18	44	257	5.84	171	0.63
Himachal Pradesh	51.11	56	52	0.93	1077	0.98
Karnataka	448.17	192	397	2.07	484	1.13
Kerala	290.11	39	4	0.1	9750	72.53
Madhya Pradesh	661.36	443	532	1.2	833	1.24
Maharashtra	787.07	308	773	2.51	398	1.02
Orissa	315.12	156	130	0.83	1200	2.42
Punjab	201.91	50	662	13.24	76	0.31
Rajasthan	438.81	342	379	1.11	902	1.16
Tamil Nadu	556.38	130	276	2.12	471	2.02
Uttar Pradesh	1387.6	294	635	2.16	463	2.19
West Bengal	679.83	89	337	3.79	264	2.02
INDIA	8439.31	3287.3	6217	1.89	529	1.36

Source: NIAM (2001).

4.9 Marketing Problems:

In addition to the above-mentioned problems, farmers of Maharashtra state have been facing inadequate marketing and post-harvesting facilities over the last several years. Though the level of spread of regulated markets is

relatively better in Maharashtra, it could not solve the marketing problems faced by the farmers (Table 4.23). Due to inadequate marketing facility, the exploitation by middlemen from the farmers and post-harvest losses to farmers have been continuing. As mentioned in the National Agriculture Policy: 2000 (GOI, 2000), the weekly markets under the direct control of Panchyat raj institutions should be encouraged and strengthened. Producers markets on the lines of "Ryatu Bazars" (as has been followed in Andhra Pradesh and Tamil Nadu) should be promoted across different districts in Maharashtra to reduce the exploitation by middlemen from farmers.

On the whole, it is clear from the above discussion that the agricultural sector of Maharashtra has been facing a number of different problems over the last many years. It appears that among the various problems, limited availability of irrigation is one of the major problems, which hinder the growth of agriculture in the state.

Agricultural Policy for Maharashtra State

5.1 Introduction:

As mentioned in the earlier chapters, though Maharashtra is one of the richest states in terms of per capita income, its agricultural performance is not very appreciable. Having accounted for about 12 percent of India's gross cropped area (in 2001-02), the contribution of state's agriculture in the agricultural GDP of the country is only about 7.30 percent in 2001-02, mainly due to predominant cultivation of crops under rainfed condition. Keeping in view the importance of agriculture, the government of Maharashtra over the years has taken a number of initiatives to improve the performance of agriculture. As a result of initiatives taken by the government, the agricultural sector of Maharashtra has undergone lot of changes. But, still it is lagging behind in many parameters as compared to the national average (see, Table 5.1). Therefore, there is a need to make changes in the existing policies followed in the state to strengthen the agricultural sector in view of the recent changes in domestic and international front. It is in this context, in this chapter, we present the strategies that need to be followed to improve the overall performance of the state's agriculture in the future.

5.2 Investment in agriculture and allied activities:

Adequate investment in agriculture is one of the pre-requisites for increasing as well as sustaining the growth of agriculture. However, the plan expenditure on agriculture and allied activities to total plan expenditure has declined sharply from 30.87 percent in the third plan (1961-66) to 4.98 percent in the ninth plan period (1997-2000) in Maharashtra. Since the reduction in plan expenditure will affect the research and development activities pertaining to agricultural sector, it will have serious implications on the agricultural growth of Maharashtra in the future. Therefore, the state government (state planning commission) should take necessary steps to increase the plan expenditure on agriculture and allied activities to boost the growth of agriculture in the state.

Table 5.1: Agricultural development at a glance in 2000-01: Maharashtra and India

Particulars	Maharashtra	India
Population (2001)		
Total (crore)	9.68	102.53
Rural (crore)	5.57	74.03
Urban (crore)	4.10	28.49
Rural agricultural workers (% to total workers)	81.08	73.34
Share of agriculture and allied sector in GDP/SDP (current prices)	15.41	24.95
Rural Poverty (percent) ^a	23.72	27.09
Rural Literacy rate (percent) ^b	55.52	44.69
Per capita income (Rs.) (NSDP at current prices)	22179	16707
Share of Agriculture and allied activities to Total Plan Expenditure (9 th Plan: 1997-2002)	4.98	4.9
Net Cropped Area (mha)	17.64	141.23 ^a
Gross Cropped Area (mha)	22.26	189.74 ^a
Cropping Intensity (percent)	126.19	134.35 ^a
Normal rainfall (in mm)	1254.1	852
Average size of holdings (ha) ^c	1.87	1.41
Percentage of irrigated area to gross cropped area	16.39	39.22
Percent of groundwater irrigated area to GIA	52.44	43.81 ^d
Input use:		
Fertiliser (kg/ha)	74.01	86.72
HYV coverage	85.17	77.16
Pumpsets (per 000 ha)	106.36	68.24
Tractors (per 000 ha)	7.93	15.29
Area under major crops (percent to GCA):		
Foodgrains	60.13	62.85
Pulses	15.98	10.57
Oilseeds	11.50	11.82
Sugarcane	2.67	2.24
Cotton	13.83	4.43
Horticultural crops	3.08 ^e	5.26
Productivity (kg/ha):		
Foodgrains	757	1630
Pulses	460	544
Oilseeds	820	810
Sugarcane	83267	68580
Cotton	100	190
Regulated markets (number):		
Total	857	7161
Principal	266	2354
Sub-yard	591	4807
Area covered by each market (in sq. km)	398	529
Population fed by each market (in lakh)	1.02	1.36

Notes: a - 1999-2000; b - 1991; c - 1995-96; d - 1998-99; e - 1997-98.

Sources: GOM (2002a), CMIE (2004), GOI (2003), NIAM (2001) and FAI (2002);

<http://agricoop.nic.in>

5.3 Irrigation Development:

Low irrigation facility has been one of the main reasons for the poor performance of the agricultural sector in the state. Though Maharashtra state accounted for about 17 percent of India's total irrigation investment at the end of ninth plan period, its irrigated area to gross cropped area is only 16.38 percent in 2001-02, which is the lowest among the major states in India. In fact, out of 29 districts, 14 districts are having less than 15 percent of irrigation facility in 2000-01. The following four strategies can be followed to increase the irrigation facility in the state. First, adequate funds should be allotted to complete all the on-going projects. If required, no more new projects should be sanctioned till the completion of all the on-going projects. Second, inspite of water scarcity, nearly two-third of irrigation water available in the state is used only by sugarcane crop, which accounts for only 2.60 percent of GCA in the state (World Bank, 2002). This improper use of water can be adjusted by manipulating output price of crops and also by introducing volumetric pricing in canal water supply. Third, more attention should be given to improve minor-surface irrigation system (which have been neglected by the state) wherever possible through renovation and other developmental activities. Four, the projected (notional) cropping pattern should be strictly followed in each command area.

To sustain the groundwater irrigation development, the over exploitation of groundwater should be curbed through legal, institutional and technological options. Currently, out of 30 districts, as many as 13 districts are having over 80 percent of irrigated area only through groundwater source. Drip method of irrigation, which is being increasingly adopted in the state, should be made mandatory in those regions where exploitation of groundwater is higher. To improve the water use efficiency and the overall performance of irrigation sector in the state, adequate steps should be taken to transfer the system control to Water Users' Association, as has been suggested by the National Water Policy (GOI, 1987; 2002).

5.4 Watershed Development Programmes (WDPs):

Maharashtra state has been implementing WDPs since 1982 to improve the performance of rainfed agriculture. As a result, area treated through WDPs has increased substantially. However, the achievements made (treated area as of March, 2002 was 3.15 mha) in this respect are not very appreciable when compared to the potential area of WDPs, which is about 20.36 mha. The average treated area from 1983 to 2002 comes to only 0.166 mha per year. With this current rate of growth, it may take more than 100 years to treat all the remaining potential area through WDPs. Therefore, keeping in view the importance of rainfed cultivation, necessary steps should be taken to bring all the potential areas under WDPs within 10 to 15 years by allocating more funds for the same. While selecting areas for treatment, priority should be given to those regions which have more drought prone as well as degraded area, as suggested by the 10th Plan Working Group on Watershed Development, Rainfed Farming and Natural Resources Management (GOI, 2001).

Presently, WDPs have been operated by different department/agencies in the state without coordination by any single agency. This does not allow us to know the overall working conditions of WDPs including utilisation of allocated funds. Therefore, there is a need to develop convergent approach between various departments to operate WDPs more efficiently, both in terms of utilisation of funds and identifying areas for treatment.

5.5 Rainfed cultivation:

Predominant cultivation of crops under rainfed condition is the main feature of Maharashtra's agriculture, as its irrigated area to gross cropped area is only around 17 percent as of today. Though the average rainfall of the state is higher than the national average, about 73 percent of districts (25 districts out of 34) receive normal rainfall less than the state's average. Besides reducing productivity of crops, this low and varied rainfall pattern increases the risk of farmers. In order to improve as well as to sustain the cultivation of rainfed crops, the state should focus more on watershed development programme and rainwater harvesting system. By introducing short-duration varieties as well as

more location specific cropping pattern, the performance of rainfed cultivation can be improved and sustained.

5.6 Low value crops:

Though the cropping pattern has been changing in favour of high value crops in the state, this shift is not very impressive as compared to the national level change. During 2000-01, for instance, coarse cereals accounted for over 34 percent of GCA in Maharashtra, whereas the same was only 15 percent of GCA at all India level. As a result of cultivation of low value crops, farmers' income (per ha) from agriculture is very low in the state (see, Sawant, et al., 1999). Since limited availability of irrigation is considered to be the main reason for this, greater attention should be given to utilise the available irrigation potential wherever possible. In those regions where utilisable irrigation potential is less, moisture availability can be increased through WDPs.

5.7 Cultivation of Pulses and Oilseed Crops:

Pulses and oilseed crops have been predominantly cultivated (accounted for about 27 percent of GCA in TE 2001-02) in Maharashtra, mainly under rainfed condition. Productivity of these crops is relatively low in the state as compared to the national level average. Considering the importance of these crops, proper attention should be paid to increase the production and productivity of these crops by popularising the use of bio-fertilisers and bio-pesticides. Special efforts should also be made to cultivate these crops under inter-cropping method wherever possible. Proper marketing arrangements should also be made to procure the oilseeds and pulses from the farmers in order to encourage the cultivation of these crops.

5.8 Mono-cropping pattern:

Sugarcane, a water-intensive crop, has been repeatedly cultivated in Western Maharashtra over the last four decades. Pune and Kolhapur divisions together account for nearly 60 percent of state's sugarcane area even today. This mono-cropping not only affected productivity of sugarcane but also deteriorated

soil quality and brought certain pests and diseases in this region. Unlimited supply of canal water and continuous support to sugarcane growers by sugar industries appear to be main the reasons for this mono-cropping. Supply of canal water to sugarcane by volumetric pricing may discourage the mono-cropping pattern.

5.9 Use of technological inputs:

There has been a substantial variation in the use of yield increasing inputs (fertilisers, HYVs) across regions in the state, which also acts as one of the constraints for agricultural growth. The use of fertilisers (per ha) is found to be very low in divisions like Konkan, Latur, and Amravati as compared to state's average. Besides this, wide variation in NPK ratio is also seen across regions in the state. While making efforts to improve the use of yield increasing inputs, proper mix of fertilisers should be promoted to sustain the soil fertility, through quality extension network. Clear-cut crop-specific and region-specific programmes/policies would bring desired results in this regard.

5.10 Horticulture Development:

A significant growth has been achieved in area under horticultural crops between 1980-81 and 1997-98 in the state. In order to continue the same kind of growth in the coming years, it is essential to (a) diversify the crops to non-traditional area, (b) arrest the declaration in area and productivity of certain crops, and (c) improve the post-harvesting infrastructure facilities.

Despite significant potential in different regions in the state, area under horticulture crops has not picked up in non-traditional areas, including Western Maharashtra. Therefore, required steps should be taken to increase the area under horticulture crops in those areas where sugarcane is predominantly cultivated so that surplus water can be transferred to other crops and other regions as well.

The growth rate of area under grapes, banana and most of the vegetable crops either declined or decelerated during the nineties as compared to the achievements made in the eighties. It is essential to examine why the growth rate of area under certain horticulture crops decelerated during nineties. Similarly,

productivity of crops like orange and mango has also declined between 1990-91 and 2001-02 in the state (GOM, 2003). As the future growth of the state's agriculture heavily relies on the performance of horticulture sector, the reduction in productivity is likely to affect the overall growth of the sector. By introducing tissue culture varieties (wherever possible) and also by replanting new varieties where age-old crops/plants are cultivated, productivity of horticulture crops can be increased. There is also a need to examine the causes for decline of productivity of major horticulture crops, especially in those regions where productivity started declining.

As pointed out by studies, there is also a need to improve the post harvesting infrastructure facilities (such as cold storage, cold chain, processing, packaging and marketing) to sustain as well as accelerate the present growth of horticulture sector. The state sector will have to play a larger role in establishing infrastructure facilities to promote horticulture sector in the state, as private individual farmers may not be able to create the same due to resource constraints. Involving private sector in marketing and processing activities as well as encouraging contract farming in the cultivation of horticulture crops may help to improve the availability of post harvesting infrastructure facilities.

5.11 Productivity of crops:

Except sugarcane and some horticulture crops, productivity of all other crops is very low in Maharashtra as compared to the national average. Apart from reducing farmers' income, the low productivity of crops pulls down the overall growth rate of state's agriculture. More importantly, the growth rate of productivity of almost all major crops either decelerated or declined during the second part of green revolution (i.e., 1985-86 to 2000-01). Wide variation in productivity of different crops across districts is also another feature of Maharashtra's agriculture. Since low irrigation facility and variation in rainfall are considered to be the important factors responsible for low and varied productivity level, major initiatives need to be taken to increase irrigation facility wherever possible. In those areas where irrigation potential is low, watershed development programmes should be promoted. Introduction of drought resistance cum high

yielding varieties, promoting balanced use of fertilisers (appropriate ratio of NPK) and well designed location specific policies/programmes can help to increase the productivity of crops appreciably.

5.12 Marketing infrastructure:

A well-developed marketing infrastructure is essential to reduce post harvest losses and also to ensure better return to the farmers. Though Maharashtra state has relatively more number of regulated markets, farmers continue to face lot of difficulties while selling their produce. Exploitation by middlemen from the farmers have been continuing due to inadequate marketing facilities. Therefore, as suggested by the National Agricultural Policy: 2000 (GOI, 2000), the weekly markets under the direct control of Panchayat Raj institutions should be promoted and strengthened. Producers markets on the lines of "Rayatu Bazar" (as has been followed in Andhra Pradesh and Tamil Nadu) should be promoted across different districts in Maharashtra to reduce the exploitation by middlemen from the farmers. Importantly, rural road network should also be strengthened to enhance the marketing facilities in the state.

On the whole, it appears from our analysis that, in order to improve the overall performance of agriculture, the government of Maharashtra should focus mainly on three areas: (a) irrigation development, (b) watershed development programme and (c) horticulture development programme. Once irrigation availability is improved, the other problems such as predominant cultivation of low value crops, wide variation in the use of yield increasing inputs, low productivity of crops, etc., can be solved to a great extent.

Table 5.2: Agricultural policy in Maharashtra: a policy matrix

Sr. No	Major Area	Area of concern	Development	
			Strategy	Initiatives Required
1	Plan expenditure on agriculture and allied sectors	Sharp reduction in plan expenditure since the third plan period	Plan expenditure on agriculture and allied activities needs to be increased substantially keeping in view the share of population relying on agriculture.	<p>(a) Planning Commission, Government of Maharashtra should increase the allocation of funds for agriculture and allied activities.</p> <p>(b) Private investment in research and development activities concerning agriculture should be encouraged and promoted.</p>
2	Irrigation development	(a) Low irrigation facility	Irrigation facility needs to be increased by exploiting unutilised potential.	<p>(a) Public investment on irrigation should be increased to complete all the on-going projects.</p> <p>(b) No new projects should be sanctioned till the completion of all the on-going projects.</p> <p>(c) Projected crop pattern in each command area should be strictly followed.</p>
		(b) Improper use of water among different crops	Canal water supply to sugarcane crop should be restricted.	<p>(a) Volumetric pricing of water should be introduced.</p> <p>(b) Appropriate output price for different crops should be announced keeping in view the water availability.</p>
		(c) Over-exploitation of groundwater	Over exploitation of groundwater should be restricted through legal, technological and institutional options.	<p>(a) Electricity supply to agriculture should be regulated (by rationing).</p> <p>(b) Progressive flat-rate tariff policy in electricity supply should be introduced.</p> <p>(c) Micro-irrigation (drip and sprinkler) should be made compulsory in all those areas, where over exploitation of groundwater is very high.</p> <p>(d) New wells should not be allowed in the areas that are classified as "dark" block.</p>

			e) Groundwater users' association (GWUA) should be promoted.
	(d) Less importance for minor surface irrigation	Minor Irrigation (surface) system should be restored/strengthened by allocating required funds.	(a) Renovation activities should be carried out to restore the minor surface system. (b) All minor surface systems should be handed over to water users' group under the direct control of village Panchayat.
	(e) Slow progress in forming WUAs	Water users' association should be encouraged in all command areas.	(a) Before handing over the system to WUAs, the system should be restored through an extensive rehabilitation work. (b) WUAs should be legally established and its rights should be clearly demarcated. (c) After handing over the system to users group, the government should not withdraw its support to WUAs at least for five years. (d) Importance of WUAs should be disseminated to the users (farmers).
	(f) Low water use efficiency	Water use efficiency should be increased at least by 10 percent from the existing level.	(a) Micro Irrigation should be promoted in canal command areas. (b) Volumetric pricing of water should be introduced. (c) WUAs should be established on a large scale.
	(g) Inadequate coverage of micro-irrigation	All the potential areas suitable for micro-Irrigation should be covered within a period of 10 years to reduce water stress.	(a) Specific programmes should be introduced to bring at least 50 percent of sugarcane area under micro Irrigation. (b) Cultivation of crops using surface method of irrigation should not be allowed in those areas where exploitation of groundwater is very high. (c) Certain portion of canal water should be allocated only for the use of micro irrigation.

				<p>(d) Credit facility and electricity connection should be given on priority basis to those farmers who are ready to adopt micro irrigation.</p> <p>(e) Sugar industries should encourage the farmers to cultivate sugarcane under micro irrigation system.</p> <p>(f) Differential rate of subsidy should be introduced for different crops based on water consumption.</p>
3	Watershed development programmes (WDPs)	(a) Slow coverage of area under WDPs	All the potential areas of WDPs should be covered within 10 years period.	<p>(a) All the poverty alleviation and rural development programmes should be connected with WDPs.</p> <p>(b) Required funds should be made available for WDPs. It should be treated as infrastructure development.</p> <p>(c) NGOs with proven record should be encouraged to take up WDPs.</p> <p>(d) Instead of top-down approach, bottom-up approach should be followed while implementing WDPs.</p>
		(b) No coordination among different departments in handling WDPs	Coordination should be established among different departments handling WDPs.	<p>(a) A single agency should be established for monitoring and distribution of projects for different regions.</p> <p>(b) Convergent approach should be followed among different departments implementing WDPs.</p>
		(c) Inequality in the coverage of area under WDPs across regions	Areas for WDPs from different regions should be selected using well framed criteria based on the environment of Maharashtra.	<p>(a) Priority should be given to those areas/regions that have more drought prone area as well as degraded lands.</p>

				<p>(b) Less priority should be given to those areas that have relatively more area under canal (public) irrigation.</p> <p>(c) Regions with higher percentage of rural poverty should also be selected for WDPs on priority basis.</p>
4	Adoption of technological inputs	(a) Low and wide variation in the use of fertilisers	Use of fertilisers should be increased wherever low.	<p>(a) Irrigation availability should be increased.</p> <p>(b) Moisture availability should be increased through watershed development programmes.</p> <p>(c) Fertilisers should be made available in time.</p> <p>(d) Institutional credit facility should be made available to farmers at right time.</p> <p>(e) Extension network should be strengthened.</p> <p>(f) Location specific programmes should be introduced.</p>
		(b) Imbalance in use of NPK	Ideal ratio of NPK (4:2:1) fertilisers must be achieved to sustain the soil fertility.	<p>(a) Importance of P and K nutrients should be disseminated to farmers through quality extension network.</p> <p>(b) Proper pricing of N, P and K nutrients should be introduced with a view to reduce the imbalance in NPK ratio.</p>
5	Crops cultivation	(a) Predominant cultivation of low value crops	Cultivation of high value crops should be promoted using available resources (water and other inputs).	<p>(a) Horticulture crops should be promoted in those regions where coarse cereals are cultivated predominantly.</p> <p>(b) Low-water-intensive cum high value commercial crops should be promoted.</p>

		(b) Predominant cultivation of rainfed crops	Area under rainfed cultivation should be brought down.	(a) Through rain water harvesting system and watershed development programmes considerable area can be brought under cultivation. (b) Proper distribution of water among different crops would help to reduce area under rainfed cultivation.
		(c) Mono-cropping	Mono-cropping (sugarcane) should be discouraged to sustain soil fertility and avoid other associated problems.	(a) Crop rotation should be advocated through quality extension network. (b) Volumetric pricing for canal water should be introduced at least for sugarcane crop.
6	Horticulture development	(a) Less diversification of crops in non-traditional areas	Cultivation of horticulture crops should be encouraged in non-traditional areas.	(a) Age-old crops (trees/plants) should be replaced by new high yielding (better quality) varieties, wherever possible. (b) Tissue culture varieties should be introduced/promoted, wherever possible. (c) More area should be brought under the cultivation of horticulture crops in Western Maharashtra to reduce water stress. (d) Adequate marketing facilities should be created in non-traditional areas.
		(b) Deceleration in area and productivity in certain crops	Measures should be introduced to revert the deceleration of area and productivity of horticulture crops.	(a) Studies need to be carried out to find out the reasons for deceleration. Appropriate action needs to be taken based on the finding of the study. (b) Bio-technology should be introduced wherever possible.
		(c) Inadequate post-harvesting infrastructure facility	Adequate post-harvesting infrastructure facilities should be created to sustain the growth of horticulture sector.	(a) Infrastructure facilities like cold storage, cold chain, processing, packaging and marketing should be created by the state sector.

				<p>(b) Private sector should also be encouraged in this to reduce the post-harvesting losses.</p> <p>(c) Contract farming in horticulture crops should be encouraged.</p>
7	Productivity of crops	(a) Productivity of most of the crops is low as compared to all India average	Productivity needs to be increased at least to the level of all India average.	<p>(a) On-going irrigation projects should be completed within a specific period.</p> <p>(b) Watershed development programme and rainwater harvesting system should be promoted in a big way to increase productivity.</p> <p>(c) Balanced use of fertilisers (NPK ratio) should be achieved.</p> <p>(d) Through quality extension network, farmers should be advised to use recommended dose of various new technological inputs in crop cultivation.</p>
		(b) Wide variation in productivity of crops across districts	Inter-district variation in productivity of crops should be reduced.	<p>(a) Inter-district variation in irrigation facility should be brought down.</p> <p>(b) Location specific policies/programmes should be introduced in those districts where productivity is low.</p>
8	Marketing facility	Inadequate marketing infrastructure facilities	More emphasis should be given to develop market infrastructure with the aim to reduce post-harvesting losses and to reduce the exploitation by middlemen.	<p>(a) Weekly market under the direct control of Panchayat raj institution should be promoted.</p> <p>(b) Producers market on the lines of "Ryatu Bazars" should be promoted.</p> <p>(c) Rural road network needs to be strengthened.</p> <p>(d) Information system about the prevailing output prices in different markets should be disseminated by creating a specific website.</p>

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Annexure I

Comments received from Agricultural Development and Rural Transformation Unit, Institute for Social and Economic Change, Bangalore – 560 072.

1. Title of the draft report examined:

"Agriculture Policy in Maharashtra: A Policy Matrix"

2. Date of receipt of the draft report: 5th of April, 2004

3. Date of despatch of the comments: 7th of May, 2004

4. Comments on the objectives of the study:

The study has more or less covered all the objectives and has given the required policy matrix at the end, which is quite useful for the purpose of consolidation.

5. Comments on the methodology:

The authors have followed the methodology given in the design of the study and therefore the study has come up very well.

6. Comments on presentation and getup etc.:

The presentation and get up are as per requirement.

7. Overall view on acceptability of report:

The report is acceptable after copy editing and correcting some of the presentation errors.

Annexure II

Action taken by the authors based on the comments received from the Coordinator of the study

As suggested by the Coordinator of the study, we have edited the report.

A. Narayanamoorthy

S. S. Kalamkar

May 21, 2004