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REGION WISE IRRIGATION REQUIREMENTS FOR AGRICULTURE: A CASE STUDY OF MOHOL TAHSIL IN SOLAPUR DISTRICT

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Abstract

Irrigation is essential for successful agriculture particularly in the area, where rainfall is inadequate uncertain, and unpredictable. Irrigation is identified as a decisive factor in Indian agriculture due to high variability and inadequacy of rainfall. Irrigation is necessary in traditional agriculture to overcome droughts scarcity of rainfall. Irrigation constitutes one of the most effective technical means of the raising agricultural production in the developing countries. So the main aim of this research paper is, to analyze, region wise relative requirement of water for agriculture at village level. Regionalization of study area has been done on the basis of decadal population growth and density of population per square km. Thus, ultimately evolved the nine micro regions. Further it works out that "Index of Irrigation Requirement" (Ir.). There are 104 villages included in Mohol tahsil. Out of them 47 villages having very low (Ir. < 0.15) requirement of water for agriculture, whereas 29 villages shows low (Ir. 0.15 – 0.30), 11 denotes medium (Ir. 0.30 – 0.45), 18 are high (Ir. 0.45 – 0.60) and 9 villages observed very high (Ir. 0.60 >) requirement of water for agriculture.

Key Words: Irrigation, Mapping, Drought prone area, Plateau, Agriculture

INTRODUCTION

Water is a basic requirement of human being and is also the basis of all types of development. Water resource are the important for human being for agriculture, industrial, household, recreational and environmental purpose Irrigation constitutes one of the most effective technical means of the raising agricultural production in the develop ping countries. Where irrigation by gravity is possible, much work of installing facilities can be carried out by manual labour, through there is an obvious economic advantages, even in countries with very low wage level, in using technical aids in the constructional and earth moving works where the water necessary. In rain shadow area like Mohol tahsil of Solapur district experienced deficiency of water resources for agriculture and even for drinking purpose. So, a systematically region wise study of requirement of water is needed at micro level or say village level. The majority of man's uses require fresh water. It is also predicted that conflicts between various societies, villages, states, and nations arise due to water resources.

STUDY AREA

Mohol tahsil is located at eastern part of Solapur district in the state of Maharashtra. Mohol is surrounded by N.Solapur to the east. Madha tahisl to the North. Pandharpur tahisl to the west. Mangalwedha tahisl to the south-west, S.Solapur tahisl to the south- east. The study region cover 1408.40 hectors land and having population in 104 villages in 252526 as per 2011 Census. Mohol tahsil is located at the eastern part of Solapur district. It is too hot in summer. Mohol summer highest day temperature is in between 35°C to 43°C.

Average temperatures of January is 26 ° C , February is 27 ° C , March is 31 ° C , April is 33 ° C , May is 35 ° C .Physiography, rainfall, soil, temperature, and drainage influences on

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agricultural landause pattern in this tahsil. Rainfall varies between 200 to 600 mms from east to west entire tahsil. The underline basalt on disintegration and decomposition brought varieties agencies had yielded three kinds of soils viz. Deep black, medium deep & shallow soils. Tahsil is provided with Neera and Man left bank canals. Similarly Sina and Bhogawati are two seasonal rivers at north side of the tahsil The tahsil is divided in to 104 villages are as 51 Kharip and 49 villages are as Rabbi season.Including Eight centers of Revenue circle i.e. Penur, Shetphal, Begampur, Narkhed and Anagar.. Some villages are mostly unirrigated. The variation in amount of rainfall & type of soil exerts influence on the cropping pattern of the study region. The major crops namely cereals, cash crops, pulses, oil seeds, cash crops, fruit crops, vegetables; flower and fodder crops are cultivated in Mohol tahsil.

The topography soil and availability of water have significant effect on the population density and distribution. There are 104 inhabited revenue villages; all grouped into Eight zilha perished circles (ZP circles). The Administrative headquarter of the tahsil is at Mohol which is rural in character. Study area is as rural in character, situated in rain shadow zone , poor soil, undulating hilly area. Main occupation is agriculture but there is no sufficiently available water source for irrigation. As per 2011, only 20.56 percent cultivated area have been irrigated. There is low possibility in development of agriculture.

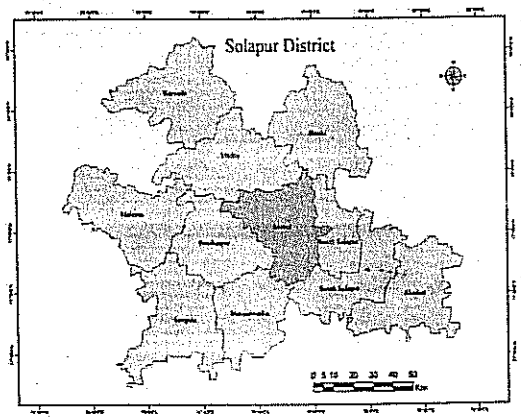

Fig.1

OBJECTIVES:

The main objective of this research paper is to light throw on region wise requirement of water resource for agriculture in Mohol tahsil of Solapur District.

Data Base Methodology

The present research paper is entirely based on secondary source of data. The required data has been collected from the District Census Handbook, Solapur-2011.The information regarding physiography, drainage etc. obtained from SOI toposheets and gazetteers. Regionalisation of study area has been carried out on the basis of decadal growth of population

and density per sq. km. Thus the study area identified as low (dg. <15%), moderate (dg.15.01-30%) and high (dg.30> %) growth regions. Further each growth region has been divided into three sub-regions according to the density of population < 100, 100-200 and

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200> persons per sq. km. for the tahsil. Thus study area is evolved into the nine micro regions.

There are one hundred four villages in Mohol tahsil. Out of them fifty four villages includes in low growth region, twenty four in moderate and twenty six in high growth region. Further, the formula adopted for the 'Index of Irrigation Requirement' (Ir.) for agriculture in each village is as given below.

Ir = Density of population per 100 hectares to TGA of that village
Annual Rainfall X Irrigation intensity or % of area under irrigation to TGA.

Need of Irrigation in Solapur District

There are imbalances in need of irrigation in Solapur district. The need irrigation in Solapur District is 6.16. The highest need of irrigation is observed in Madha tahsil (13.08) and lowest in North Solapur Tahsil (01.38). This coefficient of need irrigation is divided in to three groups.

Table No 1: Requirement of water Resource in Solapur District

Need of irrigation	Number of tahsil	Name of tahsil
High (Above 10)	06	Mangalwedha, South Solapur, Karmala, Madha, Mohol, Pandharpur.
Modrate (5 to 10)	04	Barshi, Sangola, Akkalkot, Malshiras
Low (Below 5)	01	North Solapur

Source: Compiled by Researcher

On the basis of index values of each villages of irrigation requirement, the study area have classified into five major groups as shown in the table no.2.

TABLE NO. 2 Classification of Villages According To Irrigation Requirement

Sr.No	Index of irrigation requirement (ir)	Total Villages	Requirement of water for agriculture
1	Less than 0.15	47	Very Low
2	0.15 – 0.30	29	Low
3	0.30 – 0.45	14	Moderate
4	0.45 – 0.60	8	High
5	More than 0.60	6	Very high

Source: Computed by Authors.

Mohol tahsil which circles like Penur ,Shetphal, Begumpur, Anagar and Narkhedand depend upon the socio-economic and physical conditions are the effect of land use and cropping pattern .With the use of agricultural equipment ,new technologies and are total cropping pattern of the tahsil get totally changed.(Nimase A.G. & Dr. Lokhande T.N. (Nov-2013).

Table no. 2 clearly reveals that number of villages consisted in each growth region with level of requirement of water. It is investigated that 47 villages need very low requirement of water, 29 villages need low, and 14 need moderate, 8 needs high and 6 villages show need to very high requirement of water for agriculture. Detailed Information regarding these five categories is as below.

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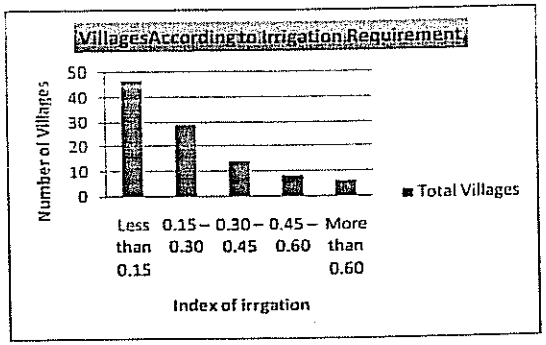

1. Villages having very low requirement of water:

There are forty seven Villages they need to be very low requirement of water are due to either low density of population on one hand and high proportion of irrigated area on the other hand. It is investigated from the obtained data that there are fourty seven villages need very low requirement of water. Out of them thirty four (50%) villages having low density ranges between 11 to 188 per hundred hectares to TGA and proportion of irrigated area ranges between 2.23 % to 28.06 % to cultivated area. Whereas, there are thirty four (50%) villages having high proportion of irrigated area ranges between 30.24 %to 96.37 % and density ranges 111 to 337 per hundred hectares to TGA. Villages of this category actually observed that index of irrigation requirement values having ranges between 0.02 to 0.15. Lowest index value of about 0.02 has been of Yewati and Penur, whereas it is highest of about 0.15 for Narkhed and savaleshwar kh. Other villages like, Morvanchi, Miri kh, kothale (each 0.03); kamati,Lamboti, Kolegaon (each 0.04 Sarole, Begampur, Kurul,Degaon, and Khandali, Ashti (0.05) having very low requirement

Table No. 3: Region Wise Irrigation Requirements for Agriculture

Growth region	Number of villages included in each growth region and in each level of Ir					
	Very Low	Low	Moderate	High	Very high	Total villages
1	06	02	01	01	02	12
2	12	06	08	01	01	28
3	05	03	00	04	02	14
Low	23	11	09	06	05	54
4	04	06	02	00	00	12
5	05	00	01	01	00	07
6	03	01	00	00	01	05
Moderate	12	07	03	01	001	24
7	05	04	01	00	00	10
8	03	05	00	00	00	08
9	04	02	01	01	00	08
High	12	11	02	01	00	26
Total	47	29	14	08	06	104

Source: Computed by Authors.

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of water for agriculture. Comparatively above, high index of requirement in this category shows in villages like sarole, wadwal and Yewati with warkute , Waluj, Taratgaon Harya, Kasare (each 0.14); Penur, Padali Pophali, Konheri, jamgaon, Nandgaon,Baburdi, Dhotre kh. , Diskal, Waghunde Bk., and Papari (each 0.13) etc. In short, very low requirement of water have due to either low density or high proportion of irrigation whereas, very high requirement of water have due to either high density or very low proportion of irrigation

2. Villages having low requirement of water:

There are twenty nine villages they need to be low requirement of water.In this category of villages having low density of population ranges between 40 to 258 and area under irrigation between 4.15% to 28.4%. Ranges between 0.10 to 0.27 indexes value of irrigation is observed in this category. Village Ghorpadi shows as lowest 0.10 values and 0.27 as highest value found in Malikpeth and Takali. Other villages like that Warkute, Bk.Singoli Yenaki, wadval (0.16.);Khavani, Kamatibk.(0.17); Pokharapur, Devadi, Gotewadi Kurul, (0.18)Sultanpur,WadgaonSavtal(0.19)Bopale, Bitale, Ankoli (0.20);Ashti ichgaon (0.22); Lamantanda, watwate, pawarwdi, waluj (0.23); Pimpri jalsen, Mohol, Tikhol(0.25) and they shown comfortably availability of water resources. It is observed from table no. 2 that there are twenty six villages need low requirement of water for agriculture.

3. Villages having Moderate requirement of water:

There are eleven villages they need to be moderate requirement i.e. 0.31 to 0.44 index value of irrigation requirement of water. It is 0.31 have lowest value of irrigation requirement observed in villages like Palaspur, Nandur Pathar, Siddheshwarwadi, Loni Haveli, etc. Whereas, it is 0.44 have highest value of IR found in Bhalwani of this moderate category. Other villages show IR, as follows: Korawali, Kurul, lamboti-0.33, Kharkhatane-0.34, Mangaoli-0.36 Kinhi-0.37, Pasalewadi 0.40, Hivare, Katewadi-0.42, Nandgaon etc. included in this category in ascending order.

4. Villages having high requirement of water:

Villages About eight villages facing a problem of high deficiency of water for agriculture. Index values of IR found in ranges 0.46 to 0.60. Here 0.46 is the lowest value of IR. found in villages like Dadapur, Degaon, Bahire, and Punewadi and 0.66 has a highest value observed in village Garkhindi. Others are as follows: Chikhali and Ghatane -0.48, Nalbandwadi and Adhegaon -0.50, Siddewadi -0.55, Wagholiwadi-0.59 etc. shows that high requirement of water.

5. Villages having very high requirement of water:

There are nine villages they need to be moderate requirement Villages having very high requirement of water are either high density of population on one hand and very low proportion of irrigated area on the other hand. It is investigated from the obtained data that, there are twelve villages need very high requirement of water. In this category, villages show index value of IR. As follows: Hiradwadi-1.40 Galandwadi-1.32, Diksal-0.95,Bairagwadi-0.92,Aundhi-0.86 Gatewadi-0.84 Ajansond-0.82, Devadi, Hiware and Tambole-0.80 etc. They are facing very high deficiency of water for agriculture.

CONCLUSION

1. Moderate requirement of water experienced in that villages which are situated either remotely from Main River or on plateau or on table land.
2. High and very high requirement of water are either high density of population on one hand and very low proportion of irrigated area on the other hand.
3. Mohol tahsil which circles like Penur ,Shetphal, Begumpur, Anagar and Narkhedand depend upon the socio-economic and physical conditions are the effect of land use and cropping pattern With the use of agricultural equipment ,new technologies and are total cropping pattern of the tahsil get totally changed.

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4. Further, it is also concluded that basically there are very low amount of rainfall and there is no big perennial river across the tahsil. Therefore, there is no available adequate and permanently source of water for irrigation to the development of agriculture.
5. Villages situated nearer to canal irrigation, river basin and other minor rivers or odha etc. have experienced very low and low requirement of water due to availability of water.

SUGGESTIONS:

There is urgent need in Mohol tahsil to management and planning of utilization of water on one hand and conservation and protection of water resources to other hand. It is found that villages having moderate, high and very high requirement of water, and where low area under irrigation these villages can improve their irrigation Facilities through the below suggested measures.

1. Rules, regulation and charges on irrigation water should be restructured.
1. Small works such as tanks, Bandhara, and dug wells, lakesconstruction constitute the most important source of irrigation. So that attention may have to give towards construction of percolation tanks, and check dams on a watershed basis.
2. Today, it is experienced that farm ponds are useful for irrigation. Therefore, attention may have to given towards construction of these type of ponds at maximum numbers through the financial assistance by government wherever possible.
3. Attention may have given towards contour trenching, bench terraces, plantation of trees and grasses on slopes wherever suitable physical sites and operate programmes like various types of water harvesting etc.
4. People participation should be give vital importance.
5. Repairing of canals to avoid seepage essential.
6. It has been realized that amelioration of this drought prone tahsil can only carried out effectively by transfer of water from adjacent more richly endowed basins i. e. Yeoti basin to the all over area of Mohol tahsil in Solapur district. Some of the villages it is only possible actually with the help of lift irrigation due to high altitude

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GEOGRAPHICAL INVESTIGATION OF IRRIGATION CONVENIENCES IN SOLAPUR DISTRICT OF MAHARASHTRA

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Abstract

Agricultural activities in the Solapur district are still dependent on the vagaries of monsoon. Water is a basic requirement of human being and is also the basis of all types of development. Irrigation constitutes one of the most effective technical means of the raising agricultural production in the developing countries. Irrigation s identified as a decisive factor in Indian agriculture due to high variability and nadequacy of rainfall. Irrigation is essential for successful agriculture particularly n the area, where rainfall is inadequate uncertain, and unpredictable. Irrigation is necessary in traditional agriculture to overcome droughts scarcity of rainfall. rrigation constitutes one of the most effective technical means of the raising agricultural production in the developing countries. So the present research, 'light hrow on need of irrigational facilities in Solapur District of Maharashtra.' Solapur listrict is located in drought prone area of Maharashtra state. For the present study, the secondary data are used which is collected from socio-economic abstract of Solapur district. The statistical equation (Mustafha R.R. – 1984 and More K.S.) is used to find out the need of irrigation in study area. Such type of tudy represents real situation of irrigation and need of irrigation in Solapur district ind helps to planners, agricultural scientists and research scholars.

Keywords – agriculture productivity, Rainfall inadequacy, coefficient of index.

NTRODUCTION

Agricultural activities in the Solapur istrict are still dependent on the agaries of monsoon. Irrigation aims t making good the deficiencies of ainfall thereby bringing more land nder the plough which otherwise emains uncultivated for want of vater and also increasing the double-cropped area. Water resources are the important for human being for agriculture, industrial, household, recreational and environmental purpose. Irrigation constitutes one of the most effective technical means of the raising agricultural production in the develop ping countries. Irrigation constitutes one of the most effective technical means of the raising agricultural production in the developing countries. Where irrigation by gravity is possible, much work of installing facilities can be carried out by manual labour, through there is an obvious economic advantages, even in countries with very low wage level, in using technical aids in the constructional and earth moving works where the water necessary. Cannot be brought to the land to be irrigated slowly by the force of gravity, it is necessary use pumping installation. There is still a very large potential field for development by means of this system. It is identified as a decisive factor in Indian agriculture due to high variability and inadequacy of rainfall. Irrigation is essential for successful agriculture particularly in the area, where rainfall is inadequate uncertain, and unpredictable. Irrigation is necessary in traditional agriculture to overcome droughts scarcity of rainfall. In brief, the object of irrigation is to augment farm produce. Irrigation thus occupies an important place in the development of agriculture. Naturally irrigation facilities of permanent nature are necessary to reach any measure of stability in the agricultural production. At present the main sources of water-supply in the district are wells, *bandharas*, tanks and canals. Lift irrigation from rivers and wells through the installation of electric pumping sets and oil-engines has also benefited agriculture in the district.

OBJECTIVES

The main objective of this paper is to test out the position of irrigation Conveniences in Solapur district.

DATA BASE AND METHODOLOGY

Basically the entire research paper is based on secondary data. The secondary data and information have been taken from the Director, District Irrigation Department of Solapur, District Superintendent Agricultural office, Solapur Socio-economic review and district statistical abstract of Solapur district. For the present investigation, District is selected as in general and tahsils in particular. More K. S. and Mustafa R. R. (1984) suggested simple statistical method which is used to compute the need of irrigation in Solapur District in present study. In order to assess the need of irrigation, the following formula has been adopted.

$$NI = \frac{Rp \times Ca}{Ar}$$

Where,
NI = Need of irrigation
Rp = Percentage of rural population in a areal unit
Ca = Percentage of cultivated area in a areal unit
Ar = Average annual rainfall

STUDY AREA

Solapur district of state Maharashtra (India) has been taken as the study area. It is situated on the south east fringe of Maharashtra state. It lies between17^0 10' to 18^0 32' north latitude and 74^0 42' to 76^0 15' east longitude. The district is bounded on the north by Ahmednagar and Osmanabad districts, on the east by Gulbarga districts (Karnataka state), on the south by Sangali and Bijapur (Karnataka state) and on the west by Satara and Pune districts. It comprises about 14895 sq. kms along with eleven tahsil out of which 338.8 sq.km is urban (2.28%) and 14505.8 sq.kms. (97.72%) is rural area. The maximum temperature of the district is 40.1^0 C while minimum is 16.1^0 C respectively. (Socio-economic Abstract of Solapur District 2011-12). The total population of Solapur district is 4317756 (2011) out of total population 68.17 per cent population lives in rural area and 31.83 per cent population lives in urban area. Density and literacy of population of Solapur district is 290 persons per sq.km and 71.2 percent respectively.

Analysis

Irrigation constitutes one of the most effective technical means of the raising agricultural production in the developing countries. Irrigation is the most important factor in farming according to the Agriculture Department and Irrigation Officers. Irrigation has played an important role in transforming the crop cultivation and better yield .There are various any other type of irrigation such as in their well irrigation, rivers, tanks and canal etc. But there are additional factors such as their location, their topography, geological aspect and height, hilled area depending on various elements. In the region under study mainly two types of irrigation are practiced namely well and canal irrigation.

Irrigation in Solapur District

There are imbalances in irrigation development in Solapur district. They are natural as well as created imbalance. The natural imbalances are caused due to the relative advantages and disadvantages of regions with respect to irrigation sources. The total irrigated area is 257790 hectors in 2000/01 year among them 74.53 percent by well and 25.47 percent by other surface irrigation sources. The share of irrigation area to net sown area is more in Sangola (15.90%) in the district and followed by Pandharpur (14.92%) by these irrigation sources. In Solapur District, seven medium project are used and they irrigated 185462 hectors area in 2008/09.The minor irrigation project and tanks (750) are also used for irrigation and they cover 35800-hector area cover. According to District Agricultural office, the crop-irrigated area is 259476hectors in 2000/01. For them 232467 hectors,(89.60%) area is

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under food crops and reaming area is under no food crops.

Irrigation Types in Solapur District:-

There are imbalances in irrigation development in solapur district due to the natural as well as created imbalance in irrigation sourcess. The natural imbalances are caused due to the relative advantages and disadvantages of regions with respect to irrigation sources. These natural differences in regions can described as regional disparities. The sources of irrigation in solapur district is classify as fallows,

Wells irrigation

The main source of irrigation in the Districts Lake, tanks, river, cannel and wells. The distribution of wells is different according to the taluka. In the district 75 per cent of the area from total irrigated is from the wells. The Pandharpur and Mohol talukas are the two highly irrigated by the wells. Pandharpur 85.5 per cent of the area from the cultivated land is irrigated by the wells and 11818 wells are available in the talukas. In Malshiras 82.9 per cent area is irrigated by the wells. 4824 wells are available to the irrigated. Most of talukas are the medium, irrigated land by wells. Akkalkot, S.Solapur, Madha, Sangola, Mohol are the medium wells irrigated land. N.Solapur, Mangalwedha are the low irrigated land.. There is the low number of wells. In this way the distribution of wells irrigation is different taluka. The total no. of wells in district are 65364 in the district. It is main source of irrigation in the district.

Tube wells irrigation

Tube wells are the most important source of water in solapur district, in purpose of irrigation. Tube wells are the type of irrigation method to similar to wells irrigation. The distribution of Tube wells is different according to the taluka. In the district few areas from total irrigated is from the tube wells. The highest number of tube wells found in Pandharpur, Malshiras, Mohol, Mangalwedha. i.e. above 1300tube wells. There are Sangola, Madha, Karamala talukas are include in such category therefore number of tube wells are above 1000 to 1300 respectively. Barshi, N.Solapur, S. Solapur, involved in this category. i.e. 390 to 943 tube **Canal irrigation**

Tank and canal irrigation is very important in agriculture of Solapur District. It is wealth their district all district mainly two rivers are wells occurs in these talukas respectively. District enjoys this facility from Nira Right Bank Canal system seasonally.

Lift Irrigation Scheme:-

Water is lifted from the rivers, wells, tanks etc., and used for irrigation purpose. The co-operative lift irrigation societies, therefore, have been formed as an alternative to provide irrigation facilities. This has helped in bringing larger area under irrigation, reduce the cost of irrigation

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per acre, raise more than one crop a year and make farming more profitable. The Solapur Zilla Parishad has taken up 23 lift irrigation schemes in the district. With the two big rivers, viz. Bhima and Sina,

Need of Irrigation in Solapur District

There are imbalances in need of irrigation in Solapur district. The need irrigation in Solapur District is 1.16. The highest need of irrigation is observed in Madha tahsil (13.08) and lowest in North Solapur Tahsil (01.38). This coefficient of need irrigation is divided in to three groups.

High need of irrigation:

The Standard of tahsil above 10 is called high need of irrigation in study region. The seven tahsils of study region are required high need of irrigation. These tahsils are Karmala, Madha, Mohol, Pandharpur, Malshiras, Mangalwedha and South Solapur. It is suggested that the natural environment area unfavorable for agriculture which means that it is essential to provide irrigation facilities for better agriculture.

Moderate need of irrigation

The moderate need of irrigation is observed in three tahsil i.e. Sangola, Barshi and Akkalkot. The average rainfall in Sangola and Akkalkot is low but the agriculture area is low due to huge fallow land compare to other tahsil of district.

Low need of irrigation

The low need of irrigation is observed in North Solapur. It is happen due to the very few population lived in rural area. The district head quarter Solapur is located in this tahsil, that's why the need of irrigation is low according to this formula.

Existing irrigated area in Solapur District:-

The Solapur district is located drought prone area, therefore irrigated area is low. After the development of Ujani dam, Nira – Siana canal and Kolhapur pattern dam, the irrigated area increased. The high irrigated area is observed in Malshiras tahsil (75.02 percent to NSA) and lowest area is in North Solapur (12.16 percent to NSA). The existing irrigated area is show in following table.

High Irrigated Area

High proportion of irrigation is observed in Malshiras (76.08%) taluka, where canal and well irrigation has been developed during the last two decades. This has been followed by Mangalwedha (64.24%) and Pandharpur (60.81%). Bhima River lies in their area. Nira right & left canal and Ujani canal provide more water in this area.

Moderate Irrigated Area

Relatively moderate land under irrigation between 25 to 50 percent is found in Karmala and Barshi tahsil. The small water tanks and wells are

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playing more important role in this area..

Low Irrigated Area

Relatively low land under irrigation below 25 percent is found in Madha, South Solapur, Sangola, Mohol and Akkalkot tahsils of the study region.

RESULT AND SUGGESTION

There is urgent need in Solapur district to management and planning of utilization of water on one hand and conservation and protection of water resources to other hand. The research paper analyses that the high need of irrigation in study area is in seven tahsil. It is clear that it is essential to provide irrigation facilities for agriculture. It is also observed that the actual low irrigation area is observed in six tahsils. So it is necessary to achieve the growth of irrigation is the district. The irrigation situation of Solapur district is not satisfactory come to Maharashtra state. The total irrigated area is 7.47 percent to State irrigated area in 2008/09 among them 74.53 percent by well and 25.47 percent by other surface irrigation sources. The irrigation growth is very slowly in the district. Distribution of wells, tube wells, lakes, and project shows distinct disparity in the district.

Few suggestions have to be suggested to individual level, institutional level and administrative level. They are – Watershed development program should be scientifically planned. Drip irrigation, sprinkler irrigation like measures should be adopted by the people. To encourage people give incentives in proportion. Use media for propaganda of irrigation management. Raise funds on local levels to complete small watershed programs. Rain harvesting is essential measure in drought prone areas. Repairing of canals to avoid seepage essential. Give incentives to proper propaganda of irrigation management. Carried out research work to achieve innovative technology and methods of water management. Projects should be planned at micro level as poor peasant will be the major beneficiaries. Think globally act locally, to achieve sustainable water management. People participation should be give vital importance. The fund can rise through strong co-operative sector of the district. Administration should take care of completion of uncompleted projects in the district. Set local level committees to look after the progression of small project in the area. Such committees should be co-ordinate with CEO and collect orate of the district. Rules, regulation and charges on irrigation water should be restructured.

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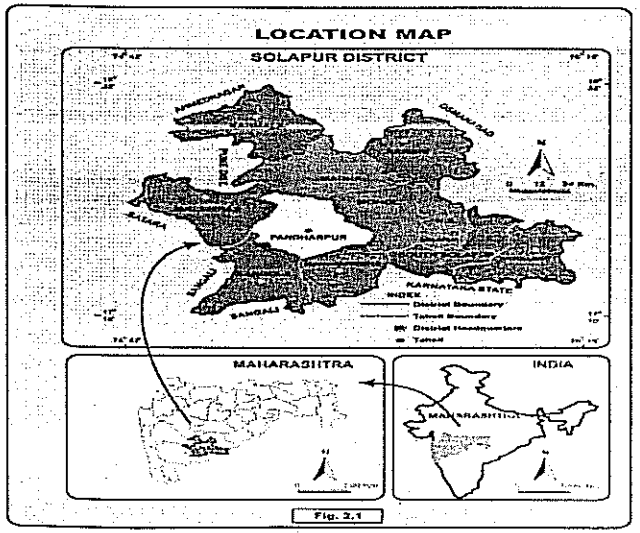

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Table No 1
Solapur District: Requirement of water Resource (2011)

Sr.No	Need of irrigation	Standard	Number of tahsil	Name of tahsil
1	High	Above 10	06	Mangalwedha, South Solapur, Karmala, Madha, Mohol, Pandharpur.
2	Modrate	5 to 10	04	Barshi, Sangola, Akkalkot, Malshiras
3	Low	Below 5	01	North Solapur

Source: Compiled by Researcher

Table No- 2
Solapur District: Existing Irrigated Area (2011)

Sr.No	Irrigated area	Percentage to total Net Swon Area	Number of tahsil	Name of tahsil
1	High	above 50 % to NSA)	03	Malshiras,Mangalwedha Pandharpur
2	Moderate	(25 to 50 % to NSA)	02	Barshi, Karmala
3	Low	(below 25 % to NSA)	06	Mohol, South Solapur, Madha,Akkalkot, Sangola N.Solapur

NSA – Net Swon Area, Source; Complied by Researcher

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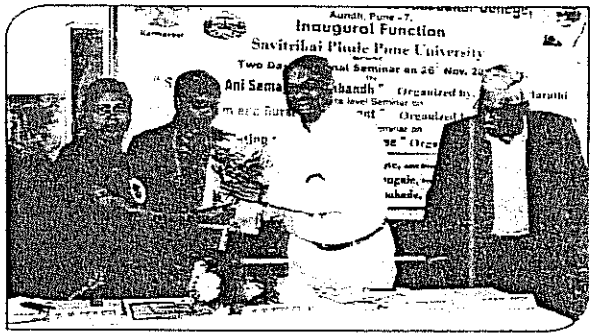

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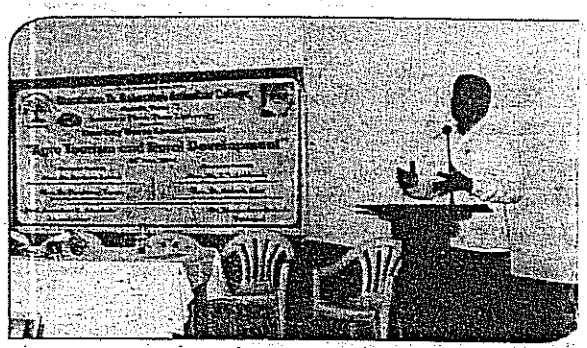

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Potential and Constraint for Agro-Tourism Development in Rural Maharashtra

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ABSTRACT

Tourism is a socio-economic phenomenon which has become the world largest and fastest growing industry. It is one of the most significant social force in the world. Almost every on the earth is affected by tourism. Agro –tourism is increasingly recognized as an important strategy that can contribute to agricultural development through diversification of farming activities and providing opportunities to rest, relax, enjoy and study bout farming for the visitors. The paper describes a system dynamics model developed for dynamic analysis of agro-tourism for the agricultural sector in different sources of employment and their potential and problems.

Today the concept of traditional tourism has been changed into Agro-Tourism. Promotion of tourism would bring many direct and indirect benefits to the people. But, there are some problems in the process of the development of such centres. Hence, the government in the Maharashtra for the rural development and increase income these of the farers. The farmers should also try to establish their co-operative society for the development of agro-tourism centres. Agro-tourism is business conducted by farmers for the enjoyment or education of the public, to promote the products of the farm the enjoyment or education of the public, to promote the products of the farm and to generate additional farm income. Maharashtra has super potential for development of agro-tourism centres.

Key Words: *Agro-Tourism, Employment, Economy, Potential*

Introduction

Geography is fundamental to the study of tourism, because tourism is geographical in nature. Several countries have transformed their economies by developing their tourism potential. Tourism has great capacity to generate large scale employment and additional income sources to the skilled and unskilled. Tourism is now well recognized as an engine of growth in the various economies in the world.

Agro-tourism is the practice of attracting travelers or visitors to an area or areas used primary for agricultural purposes. Today the concept of traditional tourism has been changed.

Some new areas of the tourism have been emerged like Agro-Tourism. Promotion of tourism would bring many direct and indirect benefits to the people. Agro-tourism is an innovative agricultural activity related to tourism and agriculture both. It has a great capacity to create additional source of income and employment opportunities to the farmers. Maharashtra is one of the major tourist centers in the India and there is large scope and great potential to develop agro-tourism.

Objectives

The Specific objectives of this research paper is following

1. To examine the importance of agro-tourism development in Rural Maharashtra.
2. To detect the problems of agro-tourism and suggest recommendations for to establishment of agro-tourism.

Importance of the Study

Agriculture is a most important occupation in the India including in the Maharashtra. But, today it has becomes unprofitable due the irregular monsoon, prices fluctuations of Agro-products and some internal weakness of the agriculture sector. Hence, there is need to do some innovative activities in the agriculture, which will help to farmers, rural peoples. Urban population is increasing day by day in the Maharashtra, today the urban people's world is restricted in the closed door flats, offices, clubs, television, video games, spicy fast food, computer, internet, and so on. They can see nature only on television or screen of the computers. More over some people living in the cities do not have relatives in villages and they never visited or stayed in village. These peoples want enjoy rural life but there is problem of such type of facilities. Hence, it is opportunity to the farmers for development of the agro-tourism centres and serves him and creates additional income source.

Database and Methodology

The study is based on secondary data. The scope of the study is limited to examine the benefits and applicability of agro-tourism business in Maharashtra. The study includes their benefits and problems. As well as it includes appropriate framework regarding to establish the agro-tourism centres in the Maharashtra. The present study was conducted on the agro-tourism is based on secondary data. The data has been furnished from the related articles, research papers, different journals document of the government of India. Some data has furnished from the

websites of the government of India and Maharashtra, as well as ministry of agriculture. Some ideas have been taken from the Tourism Development Corporation of Maharashtra.

Concept of Agro-Tourism

Agro-tourism is a commercial enterprise that combines agriculture and tourism on a working farm, rich or other agribusiness operation. A term 'Agro-Tourism' is a new face of tourism. An agro-tourism is farm based business that is open to the public. These specialized agro-tourism destinations generally offer things to see, things to do, and produce or gifts to buy, and are open to the public. Agro-tourism is defined as "Travel that combines agricultural or rural settings with products of agricultural operations–all within a tourism experience". According to Mr. Pandurang Tavare (ATDC, Pune) "Agro Tourism is that Agri-Business activity, when a native farmers or person of the area offers tours to their agriculture economic voices farm to allow a person to view them growing, harvesting, and processing locally grown foods, such as coconuts, pineapple, sugar cane, corn, or any agriculture produce the person would not encounter in their city or home country. Often the farmers would provide a home-stay opportunity and education".

Eco-Tourism and Agro-Tourism are closely related to each other. Eco-Tourism provides by the tour companies but, in the agro-tourism farmers offer tours to their agriculture farm and providing entertainment, education and fun-filled experiences for the urban peoples. Moreover, this activity brings visitors closer to nature and rural activities in which they can participate, be entertained and feel the pleasure. Agro-tourism is a way of sustainable tourist development and multi-activity in rural areas through which the visitor has the opportunity to get aware with agricultural areas, agricultural occupations, local products, traditional food and the daily life of the rural people, as well as the cultural elements and traditions.

Requirements of Agro-Tourism Centres

It is an essential activity to develop an agro-tourism in their farm. The farmer farmers must have basic infrastructure and facilities in their farm as follows:

Infrastructure

- A well or lake or swimming tank for fishing, swimming and accommodation facilities at same place or alliance with nearest hotels.
- Farmhouse, which has the rural look and feel comfortable along with all minimum required facilities.

- Rich resources in agriculture namely water and plants at the place.
- Cooking equipments for cooking food, if tourist have interested.
- Emergency medical care's with first aid box.
- Bullock cart, cattle shade, telephone facilities etc.

Who Can Start Agro-Tourism Centres

The individual farmer, agricultural co-operatives institute, Non-Government organizations, Agricultural Universities, and agricultural colleges may start their centres. Even Grampanchayats can start such centres in their operational areas with the help of villagers and farmers. The individual farmer can also start agro-tourism who have minimum two hector land, farm house, water resource and is interested to entertain the tourists.

Facilities Should Provide

•Offer an opportunity to part icipate in the rural games to the tourist

•Provide information them about the culture, dress, arts, crafts, festivals, rural traditions and also give possible demonstration of some arts.

•Offer bullock cart for riding and horse riding, buffalo ride in the Water, fishing facility in your pounds or nearest lake.

•Offer authentic rural Indian / Maharashtra food for breakfast, lunch and dinner.

•Farmers should offer to see and participate in the agricultural activities.

•Offer fruits, corns, groundnuts, sugarcane and other agro-products as per availability.

•Show local birds, animals and waterfalls etc and give authentic information about them.

•Must provide safety to tourists' with the support of alliance hospitals.

•Arrange folk dance programme, She kotifolk songs bhajan, kirtana, lezim dance, dhangari gaja,etc.

•Available some agro-product to purchase to the tourist

Location for the Agro-Tourism Centre

The place of agro-tourism centre must need easy accessible by roads and railways. Location is most important factor for success in the agro-tourism. The location of the centre must easy to arrive and have a good natural background. Urban tourists are interested into enjoying the

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nature and rural life. So, farmers should develop their centre in the rural areas only which have a beautiful natural background to attract urban tourist in your farm. Tourists want to enjoy some historical and natural tourist places along with the agro-tourism. Hence, the centre should be developed near of these tourist places. It is more beneficial to both tourist and farmers. The places which are already tourist centres like Mahbaleswara, Panchgani, Nashik, Jotiba, Narshinghvadi, Pandharpur, Akkalkot, Konkan etc. These are the better places for the development of agro-tourism. Other than these places farmer can develop their centres in any affordable places.

Benefits of Agro-Tourism Centres

Agro-Tourism has the potential to change the economic face of traditional agriculture. Agro-Tourism is diversifying the farm and adding value to produce already produced on farms. Agro-tourism for a new generation is appearing on the more intensive manner. The benefits of agro-tourism development are manifold. It would bring many direct and indirect benefits to the farmers and rural people. Some of the benefits are following:

•Benefits to the urban peoples, they can understand about the rural life and know about the agricultural activities.

•It support for rural and agricultural development process.

•Help to the reduce burden on the other traditional tourist centres.

•Employment opportunities to the farmers including farm family members and youth.

•Additional income source for the farmers to protest against income fluctuation.

•Cultural transformation between urban and rural peoples including social moral values.

•Farmers can improve their standard of living due to the contacts with urban peoples.

Agro-Tourism Potential in Maharashtra

Maharashtra has diversified agro-centres because it is the result of climatic diversifications .Maharashtra is the third largest state of India, both in area and population. It is located on the west coast of India with a 720 km long coastline along the green Konkan region. Nestled in the Western Ghats and the Sahyadri mountain range are several hill stations and water reservoirs with semi-evergreen and deciduous forests. Although, Maharashtra has a total 22368

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thousand hacter area under the agriculture and 36122 thosaunds of livestock (cow, baffelows, goats etc.). Principal crops include rice, Jowar, Bajra, wheat, pulses, turmeric, onions, cotton, sugarcane and several oil seeds including groundnut, sunflower and soyabean. The state has huge areas, under fruit cultivation of which mangoes, bananas, grapes, and oranges etc. Maharashtra is blessed with a rich and diversified cultural heritage. There are many tourist centres in Maharashtra which are the supporting natural environment for the agro-tourism centres in Maharashtra. The state has several communities belonging to different religions, and a number of festivities colours the culture of Maharashtra with the spirit of exuberance. Some of the popular festivals that are celebrated in Maharashtra are Diwali, Ganesh Chaturthi, Gudhi Padwa, Dasara, Nag Panchami, Gokul Ashtmi, Narali Pournima, Pola, Makar Sankranti, Banganga Festival and Holi etc. More than 4.11 (43 percent of total) core populations is living the urban areas of the Maharashtra, which will can becomes a customers' of the agro-tourist centres are located in the rural areas. Other than nature and culture there is an enough road and rail connectivity in urban rural areas to travel in rural Maharashtra. Maharashtra abounds in numerous tourist attractions ranging from ancient cave temples, unspoiled beaches, ancient forts and monuments, forests and wildlife, unique hill stations, pilgrimage, centres, and a rich tradition of festivals, art and culture. About 25 more such locations have been identified in Maharashtra as rural agro-tourist destinations. Thus all the districts of Maharashtra have a tourism potential. Some following notable factors are helpful to the agro-tourism in Maharashtra.

•There are an increasing number of tourists preferring non-urban tourist spots

•Maharashtra has diverse Agro-climatic conditions, diverse crops, people, deserts, mountains, which provide scope for promotion of all season, multi-location agro-tourism.

•Some of the popular folk dances in rural Maharashtra are Lavni, Dhangari Gaja, Povadas, Koli dance and Tamasha and Dindi are the religious folk dances. Culture of Maharashtra is very glorious with a great variety. It gives a unique identity to the rural Maharashtra.

•Tourist places are already exist to support Agro-Tourism

•Green house cultivation of long stem cut flowers, vegetables, fruits etc.

State has 13 lakh hact. area under horticulture Maharashtra now is a major horticulture state.

•Maharashtra is already established as one of the top tourist destination in the world

•Maharashtra has major producer of fruit, spices, medicinal and aromatic plant allowed under horticulture in India.

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•Good communication and transport facilities

Role of ATDC

'ATDC stand for agriculture tourism Development Corporation –is promoting to agriculture tourism for achieving income, employment and economic stability in rural areas. Help boosting a range of activities, services and amenities, provided by farmers and rural people to attract urban tourists to their area thus providing opportunity to urban people to get back to the rural roots". ATDC is now providing following facilities to the farmers of Maharashtra;

•Conduct seminars and conferences on agro tourism business Conduct lectures of the successful National and International Farmers in agro tourism business.

•Provide sales and marketing support.

•Arrange National as well as International Agro Tourism Center study tours.

•Prepare Agro Tourism project report and business plan of the each applicant agriculture farm.

•Help facilitate the financial support from Nationalize Banks, Institutes and Government Agencies to built Agro and Rural Tourism facilities and infrastructure like accommodation, sanitation, approach road etc.

•Conduct Agro Tourism Business Training Program.

•Conduct and coordinate tours from urban areas to the farms.

Problems of the Agro-Tourism in Maharashtra

In last fifteen years of 20th centaury the term agro-tourism appeared in international literature. Agro-Tourism is a style of vocation that is normally spent on farms. It is also referred as 'Entertainment Farming'. Today in the Maharashtra has a greater potential of thedevelopment of the agro-tourism centres due to the good natural and climatic conditions. But there are some Constraints and disturbances in the process of agro-tourism development in the state. Major challenges and problems are follows;

•Lake of perfect knowledge about the agro-tourism

•Weak communication skill and lake of commercial approach of the small farmers

•Ignorance of the farmers regarding to the type of activities

•Presence of unorganized sector in the Agro-Tourism industry.

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•Ensuring hygiene and basic requirements considering urban visitors

•148 of the 355 Taluka in the state are consistently drought prone.

•Lakhs of farmers have small size holding, low quality land and little or no access to credit or irrigation. Have to negotiate with consistent drought.

•Lake of capital to develop basic infrastructure for the agro-tourism.

Some Techniques for Success in Agro-Tourism

For the better success in the agro-tourism we should follow the following things;

•Develop our website and update time to time for attract foreign tourist

•Take their feedback and comments about the service and suggestions to more development and modification.

•Develop a good relationship with the tourist for future business and chain publicity.

•Develop different agro-tour packages of for different type of tourist and their expectations.

•Preserve address book and comments of the visited tourists for future tourism business

•Behave sincerely with the tourists and participate with them/him.

•Small farmers can develop their agro-\tourism centres on the basis of cooperative society.

•Give a wide publicity of your tourism centre by new papers, television etc Use all possible advertisement means.

•Develop contacts with the schools, colleges, NGOs, clubs, unions, organizations etc.

•Train your staff or family members for reception and hospitality.

•Understand about the customer's wants and their expectations and serve.

•Charge optimum rent and charges for the facilities/services on the commercial base.

•Do the artificially use local resources for the entertain/ serve to tourist.

Conclusion

Maharashtra is not the bustle of industrial and agricultural activity or the frenzied pursuit of wealth and progress alone. It is very much a part of the everyday scene anywhere in the state, signs of its great religious, cultural, historical and martial heritage. Maharashtra has a great potential to the development of agro-tourism, because of natural conditions and different types of agro products as well as variety of rural traditions, festivals. More than 45 percent of population

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is live in the urban areas and they want enjoy rural life and to know about the rural life. It is a good opportunity to develop an agro-tourism business in Maharashtra. But there is a problem of low awareness about this business in the farmer and problem of the finance and proper view in the farmers of the Maharashtra. Hence, the agriculture departments of the districts', Agriculture Universities should try to give orientation about it and provide some innovative ideas regarding to the Agro-Tourism. Bank should provide optimum financial help for the agro-tourism activities in the Maharashtra. Union of the agro-tourism service providers is also another need of these farmers which helps to the agricultural tourism network in the India including Maharashtra. The government should try to provide optimum financial aids to the agro-tourism activities in the Maharashtra by the grants and institutional finance.

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IMPACT ASSESSMENT OF IRRIGATION ON CROP DIVERSIFICATION IN SOLAPUR DISTRICT OF SOME SELECTED VILLAGES: A GEOGRAPHICAL ANALYSIS

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Abstract:

The present research paper has been made an attempt in to analyses an impact of irrigation on crop diversification in Solapur district of some selected sample villages. This study is based on primary data collected from questionnaire and personal interview methods. The physical, climatologically, socio-economic, technological, organizational factors, and farmer's attitude, etc. determinants closely influenced on the crop diversification pattern in study region, but in the study area irrigation is an important determinant affected on the crop diversification. The collected data regarding area under different crops has been computed with the help of Bhatia's and Jasbir Singh's crop diversification technique. It has observed that the more variations in the crop diversification in village to village in study area. In the study area the crop diversification index of Bhatia's method ranging from 15.29 to 39.5 i.e. highest crop diversification in Katfalvillage and lowest inMundhewadivillage and by the Jasbir Singh's method the highest diversification in Chincoli village in Sangola tehsil and lowest in BhandiShegaon village in Pandharpur tehsil. In short the higher the irrigated areas lower the crop diversification and vice versa. Present study gives an idea of realsituation of cropping patternin village level and helps to minimize the village level inequalities and helpful for proper planning of the agricultural practices to the farmers. Also helps to planners, agricultural scientists and research scholars.

Key words:*Irrigation, crop diversification,climatologically, socio-economic, technological*

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Requirement of Water Resources for Agriculture in Drought Prone Area of Mohol Tahsil in Solapur District: A Geographical Review

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Abstract

Draught is one of the short term events. There is no operational practice to forecast the draught. One of the suggestions is to update mapping of draught prone areas developmental planning. Statistical analysis is very important in such planning.

The main aim of this research paper is, to analyze, region wise relative requirement of water for agriculture at village level. Regionalization of study area has been done on the basis of decadal population growth and density of population per square km. Thus, ultimately evolved the nine micro regions. Further it work out that "Index of Irrigation Requirement"(Ir.). There are 104 villages included in Mohol tahsil. Out of them 47 villages having very low (Ir. < 0.15) requirement of water for agriculture, whereas 29 villages shows low (Ir. 0.15 – 0.30), 11 denotes medium (Ir. 0.30 – 0.45), 18 are high (Ir. 0.45 – 0.60) and 9 villages observed very high (Ir. 0.60 >) requirement of water for agriculture.

Key Words: Draught, Mapping, Index of irrigation requirement (Ir.), Drought prone area, Plateau, Table land etc.

INTRODUCTION :

Water is a natural resource. It is a basic requirement of human being and is also the basis of all types of development. It is a transparent fluid which forms the streams, lakes, oceans and rain is the major constitute of the fluids of living things. Water is a so we can say it is a life. Water resource are the important for human being for agriculture, industrial, household, recreational and environmental purpose The majority of man's uses require fresh water. It is also predicted that conflicts between various societies, villages, states, and nations arise due to water resources. In rain shadow area like Mohol tahsil of Solapur district experienced deficiency of water resources for agriculture and even for drinking purpose. So, a systematically region wise study of requirement of water is needed at micro level or say village level.

STUDY AREA :

Mohol tahsil is located at eastern part of Solapur district in the state of Maharashtra. Mohol is surrounded by N.Solapur to the east. Madha tahisl to the North. Pandharpur tahisl to the west. Mangalwedha tahisl to the south-west, S.Solapur tahisl to the south- east. The study region cover 1408.40 hectors land and having population in 104 villages in 252526 as per 2011 Census. Mohol tahsil is located at the eastern part of Solapur district. It is too Hot in summer. Mohol summer highest day temperature is in

between 35 ° C to 43° C . Average temperatures of January is 26 ° C , February is 27 ° C , March is 31 ° C , April is 33 ° C , May is 35 ° C .Physiography, rainfall, soil, temperature, and drainage influences on agricultural landause pattern in this tahsil. Rainfall varies between 200 to 600 mms from east to west entire tahsil. The underline basalt on disintegration and decomposition brought varieties agencies had yielded three kinds of soils viz. Deep black, medium deep & shallow soils. Tahsil is provided with Neera and Man left bank canals. Similarly Sina and Bhogawati are two seasonal rivers at north side of the tahsil The tahsil is divided in to 104 villages are as 51 Kharip and 49 villages are as Rabbi season.Including Eight centers of Revenue circle i.e. Penur, Shetphal, Begampur, Narkhed and Anagar. The rainfall is mainly due to rain shadow area in terms of amount of annual rainfall average receives low rainfall 60 to 65 millimeters, in north, south and eastern part of Tahsil but western part of major villages are totally drought prone area. Therefore these villages are mostly unirrigated. The variation in amount of rainfall & type of soil exerts influence on the cropping pattern of the study region. The major crops namely cereals, cash crops, pulses, oil seeds, cash crops, fruit crops, vegetables; flower and fodder crops are cultivated in Mohol tahsil.

The topography soil and availability of water have significant effect on the population density and distribution. There are 104 inhabited revenue villages, all grouped into Eight zilha perished circles (zpcircles). The Administrative headquarter of the tahsil is at Mohol which is rural in character. Study area is as rural in character, situated in rain shadow zone , poor soil, undulating hilly area. Main occupation is agriculture but there is no sufficiently available water source for irrigation. As per 2011, only 20.56 percent cultivated area have been irrigated. There is low possibility in development of agriculture.

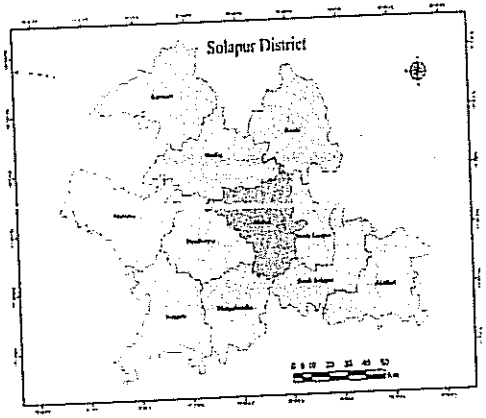

Fig.1

OBJECTIVES :The main objective of this research paper is to light throw on requirement of water for agriculture ont he basis of density of population per 100 hectare, amount of rainfall and percentage of area under irrigation to cultivated land.

Data Base Methodology

The present research paper is entirely based on secondary source of data. The required data has been collected from the District Census Handbook, Solapur-2011.The information regarding physiography, drainage etc. obtained from SOI toposheets and gazetteers. Regionalisation of study area has been carried out on the basis of decadal growth of population
and density per sq. km. Thus the study area identified as low (dg.<15%), moderate(dg.15.01-30%) and high (dg.30>%) growth regions. Further each growth region has been divided into three sub-regions according to the density of population < 100, 100-200 and 200> persons per sq. km. for the tahsil. Thus study area is evolved into the nine micro regions.

There are one hundred four villages in Mohol tahsil. Out of them fifty four villages includes in low growth region, twenty four in moderate and twenty six in high growth region. Further, the formula adopted for the 'Index of Irrigation Requirement' (Ir.) for agriculture in each village is as given below.

Ir = Density of population per 100 hectares to TGA of that village
Annual Rainfall X Irrigation intensity or % of area under irrigation to TGA.

On the basis of index values of each villages of irrigation requirement, the study area have classified into five major groups as shown in the table no.1.

TABLE NO. 1

Classification of Villages According To Irrigation Requirement

Sr.No	Index of irrigation requirement (ir)	Total Villages	Requirement of water for agriculture
1	Less than 0.15	47	Very Low
2	0.15 – 0.30	29	Low
3	0.30 – 0.45	11	Moderate
4	0.45 – 0.60	8	High
5	More than 0.60	9	Very high

Source: Computed by Authors.

Mohol tahsil which circles like Penur, Shetphal, Begumpur, Anagar and Narkhedand depend upon the socio-economic and physical conditions are the effect of land use and cropping pattern .With the use of agricultural equipment ,new technologies and are total cropping pattern of the tahsil get totally changed.(Nimase A.G. & Dr. Lokhande T.N. (Nov-2013).

Table no. 2 clearly reveals that number of villages consisted in each growth region with level of requirement of water. It is investigated that 68 villages need very low requirement of water, 26 villages need low, 15 need moderate, 10 needs high and 12 villages show need to very high requirement of waterfor agriculture. Detailed Information regarding these five categories is as below.

1. Villages having very low requirement of water:

There are forty seven Villages they need to be very low requirement of water are due to either low density of population on one hand and high proportion of irrigated area on the other hand. It is investigated from the obtained data that there are fourty seven villages need very low requirement of water. Out of them thirty four (50%) villages having low density ranges between 11 to 188 per hundred hectares to TGA and proportion of irrigated area ranges between 2.23 % to 28.06 % to cultivated area. Whereas, there are thirty four (50%) villages having high proportion of irrigated area ranges between 30.24 %to 96.37 % and density ranges 111 to 337 per hundred hectares to TGA. Villages of this category actually observed that index of irrigation requirement values having ranges between 0.02 to 0.15. Lowest index value of about 0.02 has been of Yewati and Penur, whereas it is highest of about 0.15 for Narkhed and savaleshwar kh. Other villages like, Morvanchi, Miri kh., kothale (each 0.03); kamati,Lamboti, Kolegaon (each 0.04 Sarole, Begampur, Kurul,Degaon, and Khandali, Ashti (0.05) having very low requirement

Table No. 2 : Region Wise Irrigation Requirements For Agriculture

Growth region	Number of villages included in each growth region and in each level of Ir					
	Very Low	Low	Moderate	High	Very high	Total villages
1	06	02	01	01	02	12
2	12	06	08	01	01	28
3	05	03	00	04	02	14
Low	23	11	09	06	05	54
4	04	06	02	00	00	12
5	05	00	01	01	00	07
6	03	01	00	00	01	05
Moderate	12	07	03	01	001	24
7	05	04	01	00	00	10
8	03	05	00	00	00	08
9	04	02	01	01	00	08
High	12	11	02	01	00	26
Total	47	29	14	08	06	104

Source: Computed by Authors.

Water for agriculture.Comparatively above, high index of requirement in this category shows in villages like sarole, wadwal and Yewati with warkute , Waluj, Taratgaon Harya, Kasare (each 0.14); Penur, Padali Pophali, Konheri, jamgaon, Nandgaon,Baburdi, Dhotre kh. , Diskal, Waghunde Bk., and Papari (each 0.13)etc. In short, very low requirement of water have due to either low density or high proportion of irrigation whereas, very high requirement of water have due to either high density or very low proportion of irrigation

2. Villages having low requirement of water:

There are twenty nine villages they need to be low requirement of water.In this category of villages having low density of population ranges between 40 to 258 and area under irrigation between 4.15% to 28.4%. Ranges between 0.10 to 0.27 indexes value of irrigation is observed in this category. Village Ghorpadi shows as lowest 0.10 values and 0.27 as highest value found in Malikpeth and Takali. Other villages like that Warkute, Bk.Singoli Yenaki, wadval (0.16.);Khavani, Kamatibk.(0.17); Pokharapur, Devadi, Gotewadi Kurul, (0.18)Sultanpur,WadgaonSavtal(0.19)Bopale, Bitale, Ankoli (0.20);Ashti ichgaon (0.22); Lamantanda, watwate, pawarwdi, waluj (0.23); Pimpri jalsen, Mohol, Tikhol(0.25) and they shown comfortably availability of water resources. These group of villages situated undulating hilly area of some extent. It is observed from table no. 2 that there are twenty six villages need low requirement of water for agriculture.

3. Villages having Moderate requirement of water:

There are eleven villages they need to be moderate requirement i.e. 0.31 to 0.44 index value of irrigation requirement of water. It is 0.31 have lowest value of irrigation requirement observed in villages like Palaspur, Nandur Pathar, Siddheshwarwadi, Loni Haveli, Mhasobazap etc. Whereas, it is 0.44 have highest value of IR found in Bhalwani of this moderate category. Other villages shows IR, as follows: Korawali, lamboti-0.33, Kharkhatane-0.34, Mangaoli-0.36 Kinhi-0.37, Pasalewadi 0.40, Hivare, Katewadi-0.42, Nandgaon etc. included in this category in ascending order.

4. Villages having high requirement of water:

Villages About eight villages facing a problem of high deficiency of water for agriculture. Index values of IR found in ranges 0.46 to 0.60. Here 0.46 is the lowest value of IR. found in villages like Dadapur, Degaon, Bahire, and Punewadi and 0.66 has a highest value observed in village Garkhindi. Others are as follows: Chikhali and Ghatane -0.48, Nalbandwadi and Adhegaon -0.50, Siddewadi -0.55, Wagholiwadi-0.59 etc. shows that high requirement of water.

5. Villages having very high requirement of water:

There are nine villages they need to be moderate requirement Villages having very high requirement of water are either high density of population on one hand and very low proportion of irrigated area on the other hand. It is investigated from the obtained data that, there are twelve villages need very high requirement of water. It is observed in these villages that density of population ranges between 56 to 261 and proportion of irrigated area from 2.27 % to 10.65% to cultivated area. Of them, there are seven villages in which density of population is very low (56to88) but area under irrigation is too much low (2.27 %to 6.16%) and five villages shows comparatively high density (110 to 261) and low area under irrigation (2.92% to10.65%). In this category, villages show index value of IR. As follows: Hiradwadi-1.40 Galandwadi-1.32, Diksal-0.95,Bairagwadi-0.92,Aundhi-0.86 Gatewadi-0.84 Ajansond-0.82, Devadi, Hiware and Tambole-0.80 etc. They are facing very high deficiency of water for agriculture.

CONCLUDING REMARKS:

1. Villages situated nearer to canal irrigation, river basin and other minor rivers or odha etc. have experienced very low and low requirement of water due to availability of water.
2. Moderate requirement of water experienced in that villages which are situated either remotely from Main River or on plateau or on table land.
3. High and very high requirement of water are either high density of population on one hand and very low proportion of irrigated area on the other hand.
4. Mohol tahsil which circles like Penur ,Shetphal, Begumpur, Anagar and Narkhedand depend upon the socio-economic and physical conditions are the effect of land use and cropping pattern .With the use of agricultural equipment ,new technologies and are total cropping pattern of the tahsil get totally changed.
5. Further, it is also concluded that basically there are very low amount of rainfall and there is no big perennial river across the tahsil. Therefore, there is no available adequate and permanently source of water for irrigation to the development of agriculture.

SUGGESTIONS:

There is urgent need in Mohol tahsil to management and planning of utilization of water on one hand and conservation and protection of water resources to other hand. It is found that villages having moderate, high and very high requirement of water, and where low area under irrigation these villages can improve their irrigation Facilities through the below suggested measures.

1. Small works such as tanks, bandanas, and dug wells constitute the most important source of irrigation. So that attention may have to give towards construction of percolation tanks, and check dams on a watershed basis.
2. It has been realized that amelioration of this drought prone tahsil can only carried out effectively by transfer of water from adjacent more richly endowed basins i. e. saundane basin to the all over area of Mohol tahsil in Solapur district. Some of the villages it is only possible actually with the help of lift irrigation due to high altitude.
3. Today, it is experienced that farm ponds are useful for irrigation. Therefore, attention may have to given towards construction of these type of ponds at maximum numbers through the financial assistance by government wherever possible.
4. Attention may have given towards contour trenching, bench terraces, plantation of trees andgrasses on slopes wherever suitable physical sites and operate programmes like various types of water harvesting etc.

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Agro-Tourism Development in Rural Maharashtra: Challenges and Disturbances

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ABSTRACT :

Today the concept of traditional tourism has been changed into Agro-Tourism. The paper describes a system dynamics model developed for dynamic analysis of agro-tourism for the agricultural sector in different sources of employment and their potential and problems. Tourism is a socio-economic phenomenon which has become the world largest and fastest growing industry. It is one of the most significant social force in the world. Almost every on the earth is affected by tourism. Agro –tourism is increasingly recognized as an important strategy that can contribute to agricultural development through diversification of farming activities and providing opportunities to rest, relax, enjoy and study bout farming for the visitors.

Promotion of tourism would bring many direct and indirect benefits to the people. But, there are some problems in the process of the development of such centres. Hence, the government in the Maharashtra for the rural development and increase income these of the farers. The farmers should also try to establish their co-operative society for the development of agro-tourism centres. Agro-tourism is business conducted by farmers for the enjoyment or education of the public, to promote the products of the farm the enjoyment or education of the public, to promote the products of the farm and to generate additional farm income. Maharashtra has super potential for development of agro-tourism centres.

Key Words: *Employment, income, Potential, Agro-Tourism,*

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Introduction

Geography is fundamental to the study of tourism, because tourism is geographical in nature. Several countries have transformed their economies by developing their tourism potential. Tourism has great capacity to generate large scale employment and additional income sources to the skilled and unskilled. Tourism is now well recognized as an engine of growth in the various economies in the world.

Agro-tourism is the practice of attracting travelers or visitors to an area or areas used primary for agricultural purposes. Today the concept of traditional tourism has been changed. Some new areas of the tourism have been emerged like Agro-Tourism. Promotion of tourism would bring many direct and indirect benefits to the people. Agro-tourism is an innovative agricultural activity related to tourism and agriculture both. It has a great capacity to create additional source of income and employment opportunities

to the farmers. Maharashtra is one of the major tourist centers in the India and there is large scope and great potential to develop agro-tourism.

Objectives

The Specific objectives of this research paper is following

1. To examine the importance of agro-tourism development in Rural Maharashtra.
2. To detect the problems of agro-tourism and suggest recommendations for to establishment of agro-tourism.

Importance of the Study

Agriculture is a most important occupation in the India including in the Maharashtra. But, today it has becomes unprofitable due the irregular monsoon, prices fluctuations of Agro-products and some internal weakness of the agriculture sector. Hence, there is need to do some innovative activities in the agriculture, which will help to farmers, rural peoples. Urban population is increasing day by day in the Maharashtra, today the urban people's world is restricted in the closed door flats, offices, clubs, television, video games, spicy fast food, computer, internet, and so on. They can see nature only on television or screen of the computers. More over some people living in the cities do not have relatives in villages and they never visited or stayed in village. These peoples want enjoy rural life but there is problem of such type of facilities. Hence, it is opportunity to the farmers for development of the agro-tourism centres and serves him and creates additional income source.

Database and Methodology

The study is based on secondary data. The scope of the study is limited to examine the benefits and applicability of agro-tourism business in Maharashtra. The study includes their benefits and problems. As well as it includes appropriate framework regarding to establish the agro-tourism centres in the Maharashtra. The present study was conducted on the agro-tourism is based on secondary data. The data has been furnished from the related articles, research papers, different journals document of the government of India. Some data has furnished from the websites of the government of India and Maharashtra, as well as ministry of agriculture. Some ideas have been taken from the Tourism Development Corporation of Maharashtra.

Concept of Agro-Tourism

Agro-tourism is a commercial enterprise that combines agriculture and tourism on a working farm, rich or other agribusiness operation. A term 'Agro-Tourism' is a new face of tourism. An agro-tourism is farm based business that is open to the public. These specialized agro-tourism destinations generally offer things to see, things to do, and produce or gifts to buy, and are open to the public. Agro-tourism is defined as "Travel that combines agricultural or rural settings with products of agricultural operations–all within a tourism experience". According to Mr. Pandurang Tavare (ATDC, Pune) "Agro Tourism is that Agri-Business activity, when a native farmers or person of the area offers tours to their agriculture economic voices farm to allow a person to view them growing,

harvesting, and processing locally grown foods, such as coconuts, pineapple, sugar cane, corn, or any agriculture produce the person would not encounter in their city or home country. Often the farmers would provide a home-stay opportunity and education".

Eco-Tourism and Agro-Tourism are closely related to each other. Eco-Tourism provides by the tour companies but, in the agro-tourism farmers offer tours to their agriculture farm and providing entertainment, education and fun-filled experiences for the urban peoples. Moreover, this activity brings visitors closer to nature and rural activities in which they can participate, be entertained and feel the pleasure. Agro-tourism is a way of sustainable tourist development and multi-activity in rural areas through which the visitor has the opportunity to get aware with agricultural areas, agricultural occupations, local products, traditional food and the daily life of the rural people, as well as the cultural elements and traditions.

Requirements of Agro-Tourism Centres

It is an essential activity to develop an agro-tourism in their farm. The farmer farmers must have basic infrastructure and facilities in their farm as follows:

- Infrastructure
- A well or lake or swimming tank for fishing, swimming and accommodation facilities at same place or alliance with nearest hotels.
- Farmhouse, which has the rural look and feel comfortable along with all minimum required facilities.
- Rich resources in agriculture namely water and plants at the place.
- Cooking equipments for cooking food, if tourist have interested.
- Emergency medical care's with first aid box.
- Bullock cart, cattle shade, telephone facilities etc.

Who Can Start Agro-Tourism Centres

The individual farmer, agricultural co-operatives institute, Non-Government organizations, Agricultural Universities, and agricultural colleges may start their centres. Even Grampanchayats can start such centres in their operational areas with the help of villagers and farmers. The individual farmer can also start agro-tourism who have minimum two hector land, farm house, and water resource and is interested to entertain the tourists.

Facilities Should Provide

- Offer an opportunity to part icipate in the rural games to the tourist
- Provide information them about the culture, dress, arts, crafts, festivals, rural traditions and also give possible demonstration of some arts.
- Offer bullock cart for riding and horse riding, buffalo ride in the Water, fishing facility in your pounds or nearest lake.
- Offer authentic rural Indian / Maharashtra food for breakfast, lunch and dinner.
- Farmers should offer to see and participate in the agricultural activities.

- Offer fruits, corns, groundnuts, sugarcane and other agro-products as per availability.
- Show local birds, animals and waterfalls etc and give authentic information about them.
- Must provide safety to tourists' with the support of alliance hospitals.
- Arrange folk dance programme, She kotifolk songs bhajan, kirtana, lezim dance, dhangari gaja,etc.
- Available some agro-product to purchase to the tourist

Location for the Agro-Tourism Centre

The place of agro-tourism centre must need easy accessible by roads and railways. Location is most important factor for success in the agro-tourism. The location of the centre must easy to arrive and have a good natural background. Urban tourists are interested into enjoying the nature and rural life. So, farmers should develop their centre in the rural areas only which have a beautiful natural background to attract urban tourist in your farm. Tourists want to enjoy some historical and natural tourist places along with the agro-tourism. Hence, the centre should be developed near of these tourist places. It is more beneficial to both tourist and farmers. The places which are already tourist centres like Mahbaleswara, Panchgani, Nashik, Jotiba, Narshinghvadi, Pandharpur, Akkalkot, Konkan etc. These are the better places for the development of agro-tourism. Other than these places farmer can develop their centres in any affordable places.

Benefits of Agro-Tourism Centres

Agro-Tourism has the potential to change the economic face of traditional agriculture. Agro-Tourism is diversifying the farm and adding value to produce already produced on farms. Agro-tourism for a new generation is appearing on the more intensive manner. The benefits of agro-tourism development are manifold. It would bring many direct and indirect benefits to the farmers and rural people. Some of the benefits are following:

- Benefits to the urban peoples, they can understand about the rural life and know about the agricultural activities.
- It support for rural and agricultural development process.
- Help to the reduce burden on the other traditional tourist centres.
- Employment opportunities to the farmers including farm family members and youth.
- Additional income source for the farmers to protest against income fluctuation.
- Cultural transformation between urban and rural peoples including social moral values.
- Farmers can improve their standard of living due to the contacts with urban peoples.

Agro-Tourism Potential in Maharashtra

Maharashtra has diversified agro-centres because it is the result of climatic diversifications .Maharashtra is the third largest state of India, both in area and population. It is located on the west coast of India with a 720 km long coastline along the green Konkan region. Nestled in the Western Ghats and the Sahyadri mountain range are

several hill stations and water reservoirs with semi-evergreen and deciduous forests. Although, Maharashtra has a total 22368 thousand hacter area under the agriculture and 36122 thosaunds of livestock (cow, baffelows, goats etc.). Principal crops include rice, Jowar, Bajra, wheat, pulses, turmeric, onions, cotton, sugarcane and several oil seeds including groundnut, sunflower and soyabean. The state has huge areas, under fruit cultivation of which mangoes, bananas, grapes, and oranges etc. Maharashtra is blessed with a rich and diversified cultural heritage. There are many tourist centres in Maharashtra which are the supporting natural environment for the agro-tourism centres in Maharashtra. The state has several communities belonging to different religions, and a number of festivities colours the culture of Maharashtra with the spirit of exuberance. Some of the popular festivals that are celebrated in Maharashtra are Diwali, Ganesh Chaturthi, Gudhi Padwa, Dasara, Nag Panchami, Gokul Ashtmi, Narali Pournima, Pola, Makar Sankranti, Banganga Festival and Holi etc. More than 4.11 (43 percent of total) core populations is living the urban areas of the Maharashtra, which will can becomes a customers' of the agro-tourist centres are located in the rural areas. Other than nature and culture there is an enough road and rail connectivity in urban rural areas to travel in rural Maharashtra. Maharashtra abounds in numerous tourist attractions ranging from ancient cave temples, unspoiled beaches, ancient forts and monuments, forests and wildlife, unique hill stations, pilgrimage, centres, and a rich tradition of festivals, art and culture. About 25 more such locations have been identified in Maharashtra as rural agro-tourist destinations. Thus all the districts of Maharashtra have a tourism potential. Some following notable factors are helpful to the agro-tourism in Maharashtra.

- There are an increasing number of tourists preferring non-urban tourist spots
- Maharashtra has diverse Agro-climatic conditions, diverse crops, people, deserts, mountains, which provide scope for promotion of all season, multi-location agro-tourism.
- Some of the popular folk dances in rural Maharashtra are Lavni, Dhangari Gaja, Povadas, Koli dance and Tamasha and Dindi are the religious folk dances. Culture of Maharashtra is very glorious with a great variety. It gives a unique identity to the rural Maharashtra.
- Tourist places are already exist to support Agro-Tourism
- Green house cultivation of long stem cut flowers, vegetables, fruits etc. State has 13 lakh hact. area under horticulture Maharashtra now is a major horticulture state.
- Maharashtra is already established as one of the top tourist destination in the world
- Maharashtra has major producer of fruit, spices, medicinal and aromatic plant allowed under horticulture in India.
- Good communication and transport facilities

Role of ATDC

ATDC stand for agriculture tourism Development Corporation –is promoting to agriculture tourism for achieving income, employment and economic stability in rural

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areas. Help boosting a range of activities, services and amenities, provided by farmers and rural people to attract urban tourists to their area thus providing opportunity to urban people to get back to the rural roots". ATDC is now providing following facilities to the farmers of Maharashtra;

- Conduct seminars and conferences on agro tourism business Conduct lectures of the successful National and International Farmers in agro tourism business.
- Provide sales and marketing support.
- Arrange National as well as International Agro Tourism Center study tours.
- Prepare Agro Tourism project report and business plan of the each applicant agriculture farm.
- Help facilitate the financial support from Nationalize Banks, Institutes and Government Agencies to built Agro and Rural Tourism facilities and infrastructure like accommodation, sanitation, approach road etc.
- Conduct Agro Tourism Business Training Program.
- Conduct and coordinate tours from urban areas to the farms.

Problems of the Agro-Tourism in Maharashtra

In last fifteen years of 20th centaury the term agro-tourism appeared in international literature. Agro-Tourism is a style of vocation that is normally spent on farms. It is also referred as 'Entertainment Farming'. Today in the Maharashtra has a greater potential of thedevelopment of the agro-tourism centres due to the good natural and climatic conditions. But there are some Constraints and disturbances in the process of agro-tourism development in the state. Major challenges and problems are follows;

- Lake of perfect knowledge about the agro-tourism
- Weak communication skill and lake of commercial approach of the small farmers
- Ignorance of the farmers regarding to the type of activities
- Presence of unorganized sector in the Agro-Tourism industry.
- Ensuring hygiene and basic requirements considering urban visitors
- 148 of the 355 Taluka in the state are consistently drought prone.
- Lakhs of farmers have small size holding, low quality land and litule or no access to credit or irrigation. Have to negotiate with consistent drought.
- Lake of capital to develop basic infrastructure for the agro-tourism.

Some Techniques for Success in Agro-Tourism

For the better success in the agro-tourism we should follow the following things;

- Develop our website and update time to time for attract foreign tourist
- Take their feedback and comments about the service and suggestions to more development and modification.
- Develop a good relationship with the tourist for future business and chain publicity.
- Develop different agro-tour packages of for different type of tourist and their expectations.
- Preserve address book and comments of the visited tourists for future tourism business
- Behave sincerely with the tourists and participate with them/him.

- Small farmers can develop their agro-\tourism centres on the basis of cooperative society.
- Give a wide publicity of your tourism centre by new papers, television etc Use all possible advertisement means.
- Develop contacts with the schools, colleges, NGOs, clubs, unions, organizations etc.
- Train your staff or family members for reception and hospitality.
- Understand about the customer's wants and their expectations and serve.
- Charge optimum rent and charges for the facilities/services on the commercial base.
- Do the artificially use local resources for the entertain/ serve to tourist.

Conclusion:

Maharashtra is not the bustle of industrial and agricultural activity or the frenzied pursuit of wealth and progress alone. It is very much a part of the everyday scene anywhere in the state, signs of its great religious, cultural, historical and martial heritage. Maharashtra has a great potential to the development of agro-tourism, because of natural conditions and different types of agro products as well as variety of rural traditions, festivals. More than 45 percent of population is live in the urban areas and they want enjoy rural life and to know about the rural life. It is a good opportunity to develop an agro-tourism business in Maharashtra. But there is a problem of low awareness about this business in the farmer and problem of the finance and proper view in the farmers of the Maharashtra. Hence, the agriculture departments of the districts', Agriculture Universities should try to give orientation about it and provide some innovative ideas regarding to the Agro-Tourism. Bank should provide optimum financial help for the agro-tourism activities in the Maharashtra. Union of the agro-tourism service providers is also another need of these farmers which helps to the agricultural tourism network in the India including Maharashtra. The government should try to provide optimum financial aids to the agro-tourism activities in the Maharashtra by the grants and institutional finance.

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