

RESEARCH ARTICLE



Performance of Western Maharashtra in Sustainable Livelihood Security Index

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Received: 07.09.2021

Accepted: 01.12.2021

Published: 02.02.2022

Citation: Deshmukh MS, Nanaware DR, Kumbhar AD (2021) Performance of Western Maharashtra in Sustainable Livelihood Security Index. Indian Journal of Economics and Development, Vol. 9, Article ID: IJED-2021-124, Pages: 9. Doi: <https://doi.org/10.17485/IJED/v9.2021.124>

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Funding: Indian Council of Social Science Research (ICSSR), New Delhi for providing the financial support to major research project titled as "An Analysis of Sustainable Livelihood Security in Western Maharashtra."

Competing Interests: None

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Published By Indian Society for Education and Environment ([iSee](https://www.isee.in/))

ISSN

Print: 2320-9828

Electronic: 2320-9836

Abstract

Abstract: This analytical study focuses on the measurement of agricultural sustainability and rural livelihood by using the Sustainable Livelihood Security Index (SLSI) approach in the western Maharashtra region during the period 2020-21. It is purely based on primary data, which was collected from identified 90 villages of 18 tehsils in 4 districts of western Maharashtra. The SLSI calculation covers three main domains viz. social equity, economic efficiency, and ecological security and its different 14 indicators. The study highlighted that Satara district has the highest SLSI (0.566) which ranked 1st and Kolhapur district has the lowest SLSI (0.468) among four selected districts from western Maharashtra. Overall progress of western Maharashtra in SLSI was 0.519, which is under the medium SLSI category during the study period. **Objectives:** To make a detailed examination and measurement of Sustainable Livelihood Security Index (SLSI) of selected districts in the western Maharashtra region of Maharashtra state. **Method/Statistical Analysis:** The present study is analytical and covered four selected districts of western Maharashtra Region in India to estimate the SLSI during 2020-21. The methodology has covered three main domains such as social equity, economic efficiency, and ecological security along with its different sub-indicators. It is based on both primary and secondary data. However, it mostly depends on the primary data and field observations from the sample tehsils of the study area. The sampling procedure based on the cluster sampling methods 18 out of 45 tehsils (Sangli 4 out of 10, Satara 4 out of 11, Solapur 5 out of 12, and Kolhapur 5 out of 12) from the western Maharashtra (which includes one central and other tehsils from the border in respective districts) covering 816 households from 90 identified villages through proportionate sampling method in the selected district in the western Maharashtra region of Maharashtra state. The Sustainable Livelihood Security Index (SLSI) covers its three main dimensions like ecological security, economic efficiency, and social equity and its different sub-indicators. The possible proxy variables have been used to calculate the index. **Findings:** This study observed that Satara district has the highest SLSI i.e., 0.566, ranked 1st, and Kolhapur district has the lowest SLSI i.e., 0.468,

among four selected districts in the study area. The Sustainable Livelihood Security Index (SLSI) of the selected district of western Maharashtra was 0.519 during the study period. Hence the overall position of western Maharashtra in SLSI was observed under the medium category. While Solapur district SEI was (0.429) fall under the low development category, to bridge the social inequality, the districts planning commission may adopt policies related to spreading of quality education, better health services, and adequate rural infrastructure for socio-economic development of the region. As per as the Sustainable Livelihood Security Index (SLSI) is concerned Kolhapur, Sangli, and Solapur districts of western Maharashtra need to pay urgent attention to better performance in sustainability. **Novelty:** This study is pioneering in area and attempt is made to the measurement of agricultural sustainability and rural livelihood based on different indicators and aspects i.e., ecological, economic, and social at the grassroots level and mostly drought-affected areas in the western Maharashtra region.

Keywords: Sustainable Livelihood Security Index; Social Equity; Economic Efficiency; Ecological Security

1 Introduction

Western Maharashtra is one among the six administrative divisions of Maharashtra state in India. It is a prosperous region and is famous for its Sugar production factories. Farmers in the region are economically well off due to productive land, good irrigation facilities. In the region, Sangli District has large number of Sugar factories and Sugar processing plants as well. The western Maharashtra is considered as a highly developed area of India because its annual income is higher than the average GDP of the country.^(1,2)

The concept of Sustainable Livelihood Security Index (SLSI) as livelihood choices which are ecologically secure, economically efficient and socially equitable.^(3,4) Sustainable development can be described as development that meets the needs of the present without compromising the ability of future generations to meet their needs^(5,6) Franken Berger's point of view the Livelihood security can be defined as adequate and viable access to income and other resources to empower people to meet their basic wants.⁽⁷⁾ Sustainable development is the supervisory principle for achieving human development goals, at the same time sustaining the ability of natural systems to provide the natural resources and ecosystem services upon which the economy and society depend. The desired outcome is a state of society in which living standard and resource use continue to meet human needs without undermining the integrity and stability of the natural system.^(8,9) The main aim of present research paper is to examine and estimate the progress of Sustainable Livelihood Security Index (SLSI) in rural areas in selected district of western Maharashtra.

2 Research Methodology and Database

The present research paper is analytical in nature and it is based on both primary and secondary data. However, mostly it depends on the primary data and field observations which was collected from the sample tehsils of study area. The Sustainable Livelihood Security Index (SLSI) covers its three main dimensions like ecological security, economic efficiency, and social equity and its different sub-indicators.^(4,10) The possible proxy variables have been used to calculate the index. The sampling procedure based on the cluster sampling methods 18 out of 45 tehsils (Sangli 4 out of 10,

Satara 4 out of 11, Solapur 5 out of 12, and Kolhapur 5 out of 12) from the western Maharashtra region were selected (which includes 1 central and other tehsils from border of respective districts) covering 816 households from 90 identified villages through proportionate sampling method in the selected districts in the western Maharashtra region of Maharashtra state. This study is limited to selected study area from western Maharashtra.



Fig 1. Sustainable Livelihood Security Index (SLSI) framework and Estimation Procedure

Table 1. Components and -indicators of SLSI

Components	Criterion	Sub-Indicators	Type*	Weightage
Ecological Security (4) 1/3	Ecological Balance	Area Under Crop	+ve	1/4
	Ecological degradation	Total Population	-ve	1/4
	Pressure on Natural Resources	Total Livestock	-ve	1/4
	Land Use, Soil Fertility	Cropping Intensity	+ve	1/4
Economic Efficiency (5) 1/3	Food Security	Food grain Production	+ve	1/5
	Agriculture Output	Per Capita Income	+ve	1/5
	Income of farmers	Sugarcane Cultivation	+ve	1/5
	Source of Rural Likelihood	Milk Production	+ve	1/5
	Assured Water Supply	Irrigated Area	+ve	1/5
Social Equity (5) 1/3	Educational Status	Female Literacy rate	+ve	1/5
	Gender Equity	Sex ratio	+ve	1/5
	Health Services	Health Facility	+ve	1/5
	Social Equity	Gender Gap in Literacy	-ve	1/5
	Living Standard	BPL Population	-ve	1/5

*Note: - +ve: Positive, -ve: Negative

The Sustainable Livelihood Security Index (SLSI) is a matrix of different components, it estimated through three core dimensions like ecological security, economic efficiency, and social equity covered approximately 14 sub-indicators which were categorized into positive and negative sense. The SLSI is a composite index, which is created by taking the arithmetic mean of its component indices i.e., Ecological Security Index, Economic Efficiency Index, and Social Equity Index. The value of SLSI vary between 0 and 1, value close to 0 specifies low level of sustainability and value close to 1 denotes a high level of sustainability. The SLSI construction exercise using 3 main domain and its 14 sub-indicators take equal weightage to all domains and indicators.⁽¹¹⁾ The exhaustive process of creating SLSI is given below

$$SLSI_{ijk} = \frac{X_{ijk} - \text{Min}_{xi j}}{\text{Max}_{xi j} - \text{Min}_{xi j}} \tag{1}$$

Whereas,

- i= variables (1, 2, 3 ... i)
- j = components (1, 2, 3, .. j)
- k = blocks (1, 2, 3... k)

$$SLSI_{jk} = \frac{\sum_{i=1}^I SLSI_{ijk}}{I} \tag{2}$$

3 Results and Discussion

The present section of the research paper focuses on the different dimensions of Sustainable Livelihood Security Index. Discussions and analysis of Sustainable Livelihood Security Index (SLSI) of selected districts of western Maharashtra were examined through major dimensions like ESI, EEI and ESI.

Table 2. District-wise Ecological Security Indicators in Western Maharashtra

Dimension		Ecological Security Indicators			
Criterion		Ecological Balance	Ecological degradation	Pressure on Natural Resources	Land Use, Soil Fertility
Sub-Indicators		Area Under Crop	Total Population	Total Livestock	Cropping Intensity
Type		+ve	-ve	-ve	+ve
Sr. No.	Dis-trict/Values	in Acre	in Number	in Number	in Number
1	Sangli	880	904	727	2
2	Satara	644	1086	578	2
3	Solapur	1114	911	788	2
4	Kolhapur	380	975	400	3
Western Maharashtra		3018	3876	2493	2

Source: Field Survey/2020-21

Table 2 indicates the ecological security indicators which were used for measuring Ecological Security Index of rural areas in the selected districts of the Western Maharashtra. The Solapur district has highest area under crop (i.e., 1114 acers) followed by Sangli (880 acers), Satara (644 acers) and Kolhapur (380 acers) during 2020-21. Taken together the western Maharashtra region has noted 3018 acres. The total population size of Satara district was 1086 which highest and Sangli have counted 904 persons, which was the lowest compared to the selected district. Looking as district-wise total livestock, the Solapur district has recorded highest 788 and Kolhapur district has 400 which was lowest. Total livestock of western Maharashtra region has counted 2493 from selected district. The cropping intensity of all selected districts in western Maharashtra is 2 times during study period.

Table 3. District-wise Ecological Security Indicators in Western Maharashtra

Dimension		Ecological Security Indicators			
Criterion		Ecological Balance	Ecological degradation	Pressure on Natural Resources	Land Use, Soil Fertility
Sub-Indicators		Area Under Crop	Total Population	Total Livestock	Cropping Intensity
Type		+ve	-ve	-ve	+ve
Sr. No.	Dis-trict/Values	in Acre	in Number	in Number	in Number
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2	Satara	644	1086	578	2
3	Solapur	1114	911	788	2
4	Kolhapur	380	975	400	3
Western Maharashtra		3018	3876	2493	2

Source: Field Survey/2020-21 (Note: qt- Quintal, Lit- Litter)

Table 3 shows that the economic efficiency indicators which were used for computing the Economic Efficiency Index of rural areas in the selected four districts in the western Maharashtra. Speaking about food-grain production in the selected district, Kolhapur district has 1795 qt. it was highest and Sangli has 839 qt. which was lowest as compared to the selected districts. Total food-grain production of the western Maharashtra was 4722 qt. Considering per capita income, Kolhapur district has ₹117105 which was highest and Satara district has ₹66589 it was lowest during the study period. Moreover, western Maharashtra has ₹88712 per capita income. The area of sugarcane cultivation in the selected district, Kolhapur has the highest i.e., 261 acres and Satara has lowest i.e., 98 acres from the selected area. The western Maharashtra region has 742 acres of sugarcane cultivation area from the selected district. Seeing about milk production and irrigated area from the selected districts, Solapur district has highest milk production 3561 lit/day and 477 acres irrigated area. On the other hand, Kolhapur district has lowest milk production 1547 lit/day, and 243 acres under irrigation. Looking at milk production it has 10627 lit/day and area under irrigation western Maharashtra was around 1539 acres during study period in western Maharashtra.

Table 4. District-wise Social Equity Indicators in Western Maharashtra

Dimension		Social Equity Indicators				
Criterion		Educational Status	Gender Equity	Health Services	Social Equity	Living Standard
Sub-Indicators		Female Literacy rate	Sex ratio	Heath Facility	Gender Gap in Literacy	BPL Population
Type		+ve	+ve	+ve	-ve	-ve
Sr. No.	District/Values	in %	Numbers	in %	in %	in %
1	Sangli	83.6	826	82.6	4.8	54.4
2	Satara	80.7	797	49.3	11.1	19.4
3	Solapur	80.2	762	51.4	3.4	92.3
4	Kolhapur	72.6	831	79.5	15.4	32.5
	Western Maharashtra	79.2	804	65.7	8.7	49.7

Source: Field Survey/2020-21

Table 4 observed that the social equity indicators were used for assessing the Social Equity Index of rural areas in the selected districts in the western Maharashtra. Sangli district has the highest female literacy rate 83.6% followed by Satara and Solapur district noted nearly close to 80.7% and 80.2% respectively. The female literacy rate of the western Maharashtra region was 79.2% during the study period. Looking at district-wise Sex ratio, Sangli has 826 which was the highest and Solapur has 762 it was lowest. While the status of overall sex ratio of western Maharashtra has been noted 804. The gender gap literacy rate of the, Kolhapur district was 15.4% which was highest followed by Satara noted 11.1%, and is ranked second. Solapur district has the lowest gender gap in literacy rate i.e., 3.4% as compared to the selected districts. Similarly, the gender gap in literacy rate of the overall western Maharashtra region was 8.7%. The share of population under below poverty line in Solapur district was 92.3% which was highest and Kolhapur district has 32.5% it was lowest as compared to selected district. The population under below poverty line in western Maharashtra noted nearly 49.7% during the study period.

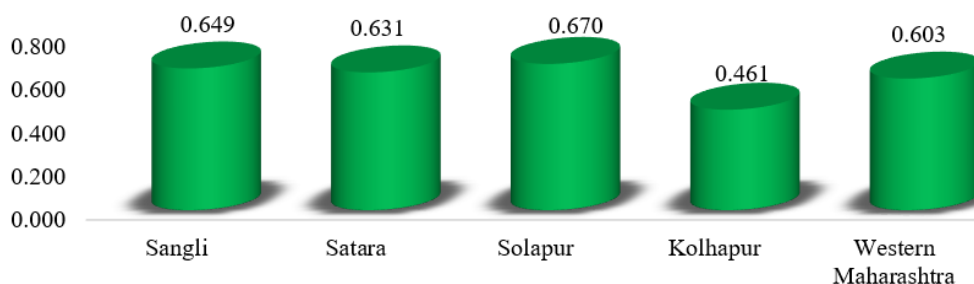


Fig 2. District-wise Ecological Security Index of Western Maharashtra

Table 5 and Figure 2 explains the assessment of the Ecological Security Index (ESI) and its different component indices from the selected districts in the western Maharashtra. ESI is one of the significant dimensions of SLSI, which estimated by

Table 5. District-wise Ecological Security Index & Its Component Indices in Western Maharashtra

Dimension		Ecological Security Indices				Ecological Security Index (ESI)	Rank
Criterion	Ecological Balance	Ecological degradation	Pressure on Natural Resources	Land Use, Soil Fertility			
Sub-Indicators	Area Under Crop	Total Population	Total Livestock	Cropping Intensity			
Type	+ve	-ve	-ve	+ve			
Sr. No.	District	Index Value					
1	Sangli	0.533	0.515	0.550	1.000	0.649	2
2	Satara	0.543	0.490	0.492	1.000	0.631	3
3	Solapur	0.682	0.357	0.641	1.000	0.670	1
4	Kolhapur	0.433	0.588	0.422	0.400	0.461	4
Western Maharashtra		0.548	0.488	0.526	0.850	0.603	-

Source: Authors calculation from table- 02

its four positive and negative indicators. The ESI of Solapur district was 0.670, which was the highest and ranked 1st also in high development category, followed by Sangli and Satara district noted 0.649 and 0.631 respectively, both observed under the high category. While Kolhapur district has the lowest ESI value of 0.461 which were under the low category and ranked 4th as compared selected district. Looking at the overall improvement in ESI of the western Maharashtra has calculated at 0.603, which was under the medium category. Accordingly estimated ESI except for Kolhapur, all other districts along with the western Maharashtra performed well during the study period.

Table 6. Selected District-wise Economic Efficiency Index & Its Component Indices in Western Maharashtra

Dimension		Economic Efficiency Indices					Economic Efficiency Index (EEI)	Rank
Criterion	Food Security	Agriculture Output	Income of farms	Source of Rural Likelihood	Assured Water Supply			
Sub-Indicators	Food grain Production	Per Capita Income	Sugarcane Cultivation	Milk Production	Irrigated Area			
Type	+ve	+ve	+ve	+ve	+ve			
Sr. No.	District	Index Value						
1	Sangli	0.332	0.510	0.365	0.379	0.380	0.393	4
2	Satara	0.481	0.449	0.584	0.569	0.512	0.519	1
3	Solapur	0.498	0.480	0.336	0.371	0.451	0.427	2
4	Kolhapur	0.472	0.248	0.443	0.463	0.394	0.404	3
Western Maharashtra		0.446	0.422	0.432	0.446	0.434	0.436	-

Source: Authors calculation from table- 03

Table 6 & Figure 3 illustrates the district-wise Economic Efficiency Index (EEI) and its different component indices of selected districts in western Maharashtra. Economic Efficiency is the second vital domain for measuring SLSI, it has been calculated through its five basic indicators which all considered as positive. The EEI of Satara district was estimated 0.519, which was highest and fall under the medium category. Similarly, EEI of Solapur and Kolhapur district were 0.427 and 0.404 respectively, both observed under the low category. While the Sangli district has lowest EEI i.e., 0.393 it falls under the low category and ranked 4th as compared to the selected district. Talking about overall enhancement in EEI of the western Maharashtra (0.436) which was under the low category during the study period. Briefly, the estimated EEI of selected districts with the western Maharashtra states that except Satara, all other districts including western Maharashtra region have performed poorly, during the study period.

Table 7 & Figure 4 reveals that the district-wise Social Equity Index (SEI) and its various component indices of the selected districts in western Maharashtra. Social Equity Index is a third crucial dimension for measuring the Sustainable Livelihood Security Index, it was calculated by its five basic indicators which were grouped into three positive and two negative indicators. Observing SEI of the selected district, Sangli district has highest ESI 0.554, which was observed under medium development

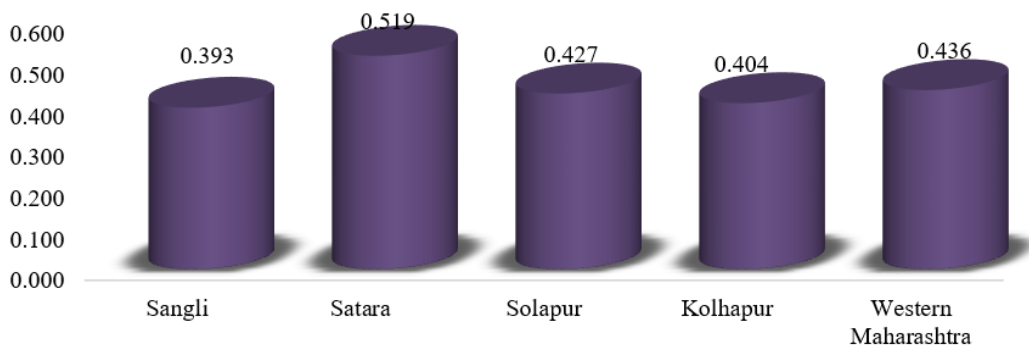


Fig 3. District-wise Economic Efficiency Index in Western Maharashtra

Table 7. District-wise Social Equity Index & Its Component Indices in Western Maharashtra

Dimension		Social Equity Indices					Social Equity Index (SEI)	Rank
Criterion		Educational Status	Gender Equity	Health Services	Social Equity	Living Standard		
Sub-Indicators		Female Literacy rate	Sex ratio	Health Facility	Gender Gap in Literacy	BPL Population		
Type		+ve	+ve	+ve	-ve	-ve		
Sr. No.	District	Index Value						
1	Sangli	0.748	0.516	0.512	0.496	0.497	0.554	1
2	Satara	0.594	0.656	0.417	0.613	0.455	0.547	2
3	Solapur	0.415	0.361	0.562	0.338	0.470	0.429	4
4	Kolhapur	0.657	0.528	0.615	0.442	0.458	0.540	3
Western Maharashtra		0.604	0.515	0.527	0.472	0.470	0.517	-

Source: Authors calculation from table- 04

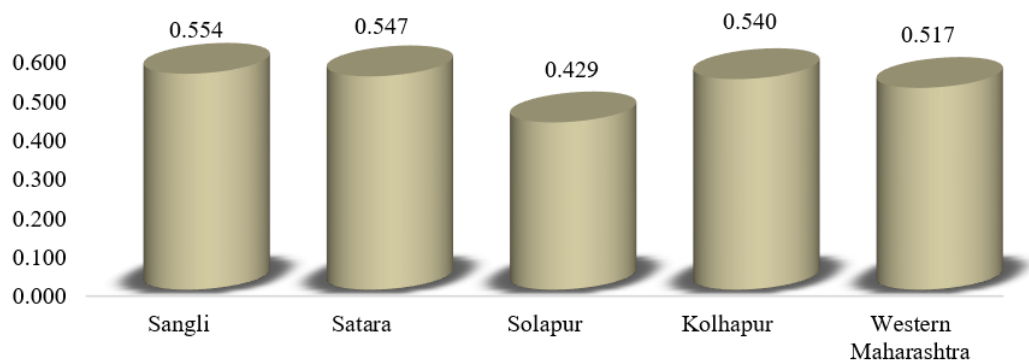


Fig 4. District-wise Social Equity Index of Western Maharashtra

category and ranked 1st among four selected districts during the study period. Whereas Solapur district has SEI 0.429 and fall under the low development category. The SEI of Satara and Kolhapur has noted 0.547 and 0.540 respectively, both were under the category of medium development. Looking at the overall ESI of western Maharashtra region i.e., 0.517 it falls under medium development category during study period. Shortly, based on estimated ESI, Solapur district has performed poorly, however Sangli, Satara and Kolhapur have performed moderately in the western Maharashtra during study period 2020-21.

Table 8. District -wise Sustainable Livelihood Security Index (SLSI) in W estern Maharashtra

Sr. No.	District	SLSI	Rank
1	Sangli	0.532	2
2	Satara	0.566	1
3	Solapur	0.509	3
4	Kolhapur	0.468	4
Western Maha-rashtra		0.519	-

Source: Authors Calculation from table-5 to 7

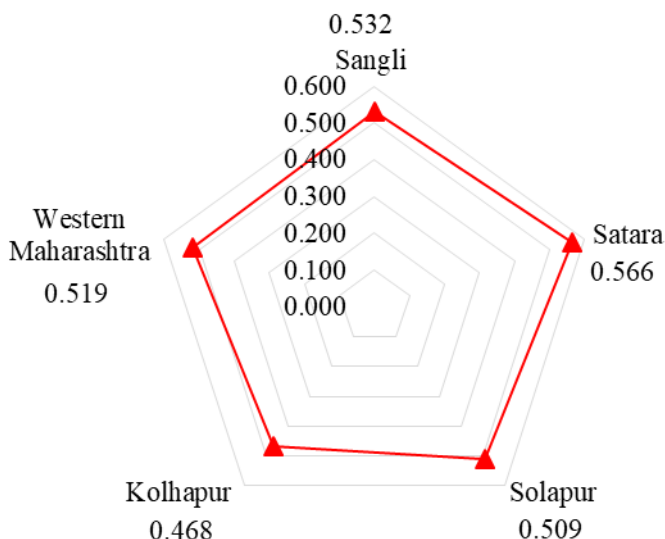


Fig 5. District -wise Sustainable Livelihood Security Index (SLSI) in Rural Area in Western Maharashtra

Table 8 & Figure 5 shows that the selected district-wise progress of Sustainable Livelihood Security Index (SLSI) in the rural area of western Maharashtra. Sustainable Livelihood Security Index (SLSI) of Kolhapur district was the lowest 0.468, which fall under the low development category among all selected districts. SLSI of Satara district was 0.566, which fall under the medium development category and ranked 1st during the study period, followed by Sangli (0.532) and Solapur (0.509). The western Maharashtra has performed moderately in SLSI during the study period.

4 Conclusion

This present study, deals with the measurement of sustainability, which is one of principal issue in the world development agenda. The measurement of sustainability and rural livelihood is based on different indicators and aspects i.e., ecological, economic, and social at the grassroots level and mostly drought-affected areas in the western Maharashtra. Sustainability analysis of districts that must improve on the different components of livelihood security i.e., ESI, EEI, SEI, and its composite index SLSI. Kolhapur district has the lowest ESI (0.461) which falls under the low SLSI category. For ecological security, Kolhapur must need immediate attention towards the environment; there is a need to increase the green cover area controlling pollution, preventing excessive population, etc. Sangli district was lowest in EEI (0.393) it falls under the low SLSI category. Sangli district required more attention to improve economic efficiency. It may include modernization of agriculture by

the increasing area under irrigation resulting increase in agricultural output, appropriate use of fertilizers, etc. However, Solapur district SEI was (0.429) fall under the low development category, to bridge the social inequality, the districts planning commission may adopt policies related to spreading of quality education, better health services, and adequate rural infrastructure for socio-economic development of the region. As per as the Sustainable Livelihood Security Index (SLSI) is concerned Kolhapur, Sangli, and Solapur districts of western Maharashtra need to pay urgent attention for better performance in sustainability.

Acknowledgment

The authors are thankful to Indian Council of Social Science Research (ICSSR), New Delhi for providing the financial support to major research project titled as “An Analysis of Sustainable Livelihood Security in Western Maharashtra.”

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