Mapping Out Vibrant Agricultural Communities In The Aizawl District

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Abstract
Agriculture, however, continues to be the backbone of the Indian Economy. Significance of agriculture (though it contributes only 21 % to India's GDP) in the country's economic, social, and political fabric goes well beyond this indicator. The rural areas are still home to some 72 % of the India's 1.25 billion people, many who are poor. Most of the rural poor depend on rain-fed agriculture and fragile forests for their livelihoods. The sharp rise in food grain production during India's Green Revolution of the 1970s enabled the country to achieve self-sufficiency in food grains and stave off the threat of famine and food shortage. Agricultural intensification in the 1970s to 1980s also saw an increased demand for rural labour that raised rural wages and, together with declining food prices, reduced rural poverty. Agricultural growth since 1990s reduced rural poverty to 26.3 % by 1999-2000. Since then, however, the slowdown in agricultural growth has become a major cause for concern. India's rice yields are one-third of China's and about half of the yield in Vietnam and Indonesia. Except for sugarcane, potato and tea, the same is true for most other agricultural commodities. This requires a redefinition of agricultural efficiency at least in national context.

Keywords: Agriculture, Economy, Forest, Growth, Efficiency, Poverty, Production, Intensification, etc

It may also be noted that India under changing dispensations since 1970s has successfully embarked upon a course of increased production. Initially, the objective of the so-called Green Revolution had been to combat the chronic shortage of food for ever increasing population in the country. Green Revolution technology despite its capital-intensive nature probably emancipated if not all but certainly a section of the farming community and resource rich regions from dependence on the vagaries of the monsoon that still determines production and the productivity for majority of the Indian farmers and who traditionally have been tied to the age-old primitive technology. Still combining with new approach, it freed India from dependence on international food market. After attaining self-sufficiency in food and with surplus production Indian farming entered an era of agribusiness both at national and international levels. It broke the shackles of traditionally export oriented tea, coffee, jute and cotton farming practices. The period marking the unleashing of globalization and economic liberalization under the directives of World Trade Organization and International Monetary bodies ushered in an era of surplus production at least for some selected crops. Introduction of genetically modified crops and patented seeds despite their capital-intensive nature have helped India to produce more crops enabling the country to trade in them and meet its international obligations. This also is found to be encouraging a system of monoculture against the natural efficiency of farmlands. Under prevailing conditions, thus, a miniscule number of big and well-to do farmers are privileged and production is found to be increasing. However, the country has failed to develop corresponding infrastructure. It is reported that over 176.83 million tons of grain rot annually due to lack of storage facility and proper distribution system (Order of the Hon'ble Supreme Court on Report on the Excess Food grains in the go downs of the Food Corporation of India and the State Civil Supplies Corporations- WRIT PETITION (Civil) NO.196 of 2001: August 10,2010). It, thus, appears that the quest for better agricultural efficiency equated with enhancement of production and productivity under present circumstances at least at national level is rhetoric to please a certain politically and economically powerful group within and beyond the country and who seem to be thriving on spreading the myth of shortage of food for future population. They seem to neglect the empirical evidence that almost half of the total food produced globally is not available to the needy.

Physiography:
Aizawl district is situated in the northern central part of Mizoram, between 24º25'48.8'' and 23º18'27.5'' N latitudes and 92º37'31.8'' and 93º11'38.4'' E longitudes. The total geographical area of Aizawl district is 3576.31.km^2 and accounts for 16.99 % of the total geographical area of the state. The total population of the district according to 2011 Census is 404,054 and the literacy percentage is as high as 98.50 % (2011 Census). Aizawl is the state capital of Mizoram as well as the district headquarters. Aizawl district is bounded on the east by Champhai district and Manipur state, on the west by Mamit district and Kolasib district, on the north by Assam state and on the south by Serchhip district.
The district is characterized by hilly rugged terrain. The hill ranges run from north to south direction are separated by several rivers in between. The ridges show serrated tops, which are highly dissected and separated by intervening 'V' shaped valleys. The hillside slopes are generally steep to very steep occupying maximum areas and the escarpments are common. It is found that the eastern aspects are generally gentler than the western aspects, and that the altitude of hills gradually increases towards the east. (Physical Map Figure 5.7). The geomorphology of the district is characterized mostly by mountain ranges, ridges running in N – S direction in parallel series. The mountain and ridges are separated from one

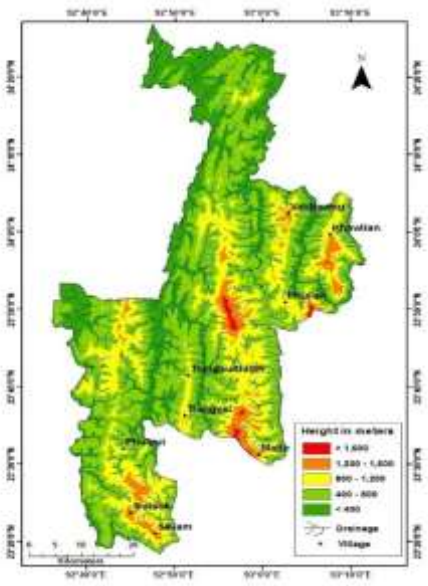
another by narrow and deep river valleys. The flood plain constitutes the lowest coverage of 1.73 km^2 (0.05 %) of the total area which is found along the major rivers. The unavailability of plain area has created a problem for cultivation and only a small patch of land along the river is utilized for the cultivation of rice. Hills of the eastern part are larger in areal extends as well as steeper than the western and central part of the district. The district is divided into five major geomorphic units as under:

Table showing Aizawl District: Geomorphological Unit

Sl.No	Geomorphic Unit	Area(in km^2)	%
1	High Structured Hill	180.21	5.04
2	Medium Structured Hill	830.37	23.22
3	Low Structured Hill	2530.93	70.77
4	Valley Fill	33.07	0.92
5	Flood Plain	1.73	0.05
Total		**3576.31**	**100.00**

Source: Natural Resources Atlas of Mizoram by MIRSAC, Science, Technology & Environment Wing Planning Department, Aizawl, Mizoram

Aizawl District Physical Map



Geology:

Two main ranges represent the district which runs almost N-S direction, one comprises of Aizawl range and the other runs from Khumtung to Darlawn. The hills are all structural hills and there is an intervening valley in the middle along Tuirial River. The Northeastern area of the district is represented at places by round topped partially eroded hills and interspread with valley fills. This area is at a much lower altitude and represented by folded and faulted, weathered sandstone, shale and in some places, conglomerate belonging to the tertiary, while older and younger alluvial overlie these rocks. The geological Survey of India divided the study area into two geological formations as Middle Bhuban and Upper Bhuban formations. This formation is folded into almost N – S trending anti-clines and synclines and is affected by longitudinal, oblique and transverse faults of varying magnitudes. The study area is divided into five groups as follows:

Table showing Aizawl District: Geological Features

Sl.No	Rock Types	Area(in km^2)	%
1	Sandstone	1686.98	47.17
2	Siltstone-Shale	1856.97	51.92
3	Limestone	1.47	0.04
4	Clayey Sand	25.52	0.71
5	Gravel, Sand & Silt	5.36	0.15
Total		**3576.31**	**100.00**

Source: Natural Resources Atlas of Mizoram by MIRSAC, Science, Technology & Environment Wing Planning Department, Aizawl, Mizoram

Hydrography:
Natural channels for surface flowage- the streams have been a natural source of water for human consumption, agricultural use and transportation. Running water uses, control and conservation greatly depend on the physical-climatic conditions of the regions they traverse.

Climate:
The district has a pleasant climate owing to its tropical location, vegetation and its relief rugged in nature. Due to the showers of monsoon, the district is generally cool even in summer and the winter is also not very cold. The cold seasons starts from the beginning of December to the first half of February. In winter the temperature varies from 8 ° C to 24 ° C and in the summer, it is between 18°C to 32 ° C. The area experienced heavy rainfall from May to September that has a direct impact on vegetation.

Rainfall:
As mentioned earlier, the entire state of Mizoram is under the influence of S – W Monsoon, Aizawl district also receives adequate amount of rainfall during monsoon season mainly from S – W monsoon. Normally, heavy rainfall starts from the second / third week of May, and it ends in the early part of October. Average rainfall of Aizawl district from the year 2009 – 2013 is 2116 mm per annum, June, July and August are the rainiest months while December, January and February are the driest months.

Table showing Aizawl District: Average Monthly Rainfall

Name of the-District	Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Aizawl	2009	0.0	1.3	26.7	152.4	169.6	219.5	279.0	426.2	223.5	168.5	9.5	0.0
	2010	0.0	6.5	134.0	247.8	286.8	409.6	280.0	500.4	388.7	151.3	7.9	39.0
	2011	13.9	0.5	80.9	109.7	294.3	297.3	257.1	335.4	293.5	86.5	0.0	0.8
	2012	15.8	25.2	42.0	345.3	242.2	437.7	255.2	473.7	407.5	135.2	86.7	-
	2013	-	2.75	8.9	84.2	423.5	225	271.7	444.5	379.5	375.7	-	-

Source: Economic & Statistic Department, Aizawl.

Drainage:
Aizawl district is drained by four major rivers, all of them are north flowing viz Tlawng, Tuirial, Tuirini, Tuivawl and Tuivai rivers. Western parts of the district are drained by Tlawng River, which is also the longest river in the state. It forms the district boundary line with Mamit district in the west.

Table showing Aizawl District: Drainage System

Sl.No	Drainage System	Description
1	Tlawng Drainage System	Tlawng river is one of the most important and the longest river in Mizoram. It originates from Zopui tlang near near Lunglei town and its flows in northward direction. Important tributaries are Tut River, Lau lui,Changte lui,Serlui A,Khuang lui, Selin lui, Thingva lui, Arbawh lui, Hmawngva lui, Chite lui, Kaikuang lui, Khawiva lui, saiphai lui, Dialdawk lui, Reiek lui, Tuisen lui and Tuichhun lui,etc. The drainage system is elongated in north to south direction showing angulated;dendritic to sub-dendritic drainage patterns and even sub-parallel drainage system.
2	Tuirial Drainage System	The river originates from north Chawilung hill and flows in northward direction. Important tributaries are Tuirivung,Tuinghaleng,Chite lui, Tuirini, Chengkawl lui,Lungdai lui and Hachhek lui,etc. The drainage patterns found in this system are Dendritic to sub-dendritic patterns.
3	Tuivawl Drainage System	This river originates from Rullam tlang at a height of 1590m above sea level near Ruallam village and it flows in a northward direction. Its main tributaries are Tuichhiahlian lui,Tuituai lui, Siktui lui,Saichal lui,Thang lui,Puantawm lui,etc. Dendritic to sub- dendritic drainage patterns are found in this system.
4	Tuivai Drainage System	It originates from Manipur state in the northeast of Mizoram and it forms a state boundary line between the two states for a considerable length. First, it flows northward and take U-turn and flows southward. Then, again take an U-turn near Daido village and flows in northward direction. Tuiphal,Rundung,Sumlung lui,etc are important tributaries. These tributaries highlighted dendritic to sub- dendritic patterns.

Source : Natural Resources Atlas of Mizoram by MIRSAC, Science, Technology & Environment Wing Planning Department, Aizawl, Mizoram

Groundwater Potential:
Regarding the ground water potential zone, the district may be said to have worse endowments when compared to other parts of the state. The use of ground water for agricultural purposes in the district is almost non-existent. The district has almost 48 % of the total area of moderate to very good water potential where poor zone has cover more than 52 % of the total geographical area.

Table showing Aizawl District: Distribution of Ground Water Potential

Sl.No	Potential zones	Area(in sq km)	%
1	Very good	109.14	3.05
2	Good	593.55	16.60
3	Moderate	1005.20	28.11
4	Poor	1868.42	52.24
Total		**3576.31**	**100.00**

Source: Natural Resources Atlas of Mizoram by MIRSAC, Science, Technology & Environment Wing Planning Department, Aizawl, Mizoram

(1) Very Good : This zone covers valley fill, Flood plains and low-lying areas which are located within proximity of water bodies, where there will be continual recharge. It also includes the intersection of the structural units such as lineaments and faults, with valley fill and flood plains. Lithologically, this zone comprises areas where unconsolidated sand is deposited. Locally, this zone covers the flood plains of Tlawng, Tuirial and Barak rivers. Settlement areas such as Sairang, Zohmun, etc are included within this. This zone also covers the plains of Tuirini, Tuivawl and Tuivai rivers. It also covers the plains of minor rivers such as Changte Lui, Lau lui, Zilngai Lui and Tuimang lui.
(2) Good: All the remaining geological structures fall under the good potential zone. It mainly covers the plains of Tlawng River, parts of Tuivai and Tuirial synclines. Among the rock types exposed in the study area, sandstones are generally capable of storing and transmitting water through their interstices and pore spaces present in between the grains and are considered to be suitable aquifer. It mainly covers the plains of Tlawng River, parts of Tuivai and Tuirial synclines.
(3) Moderate: Topographically, it covers kindly sloping flat surface of the hill. The moderate zone falls inside the poor water bearing rock formation such as silty shale that are, in turn, characterized by the presence of secondary structure in them.
(4) Poor: The poor zone is mainly distributed in the elevated areas. It is mainly distributed along the ridges and high structural hills. This zone is predominantly high in terms of areal extend and covers large part of the district.

Soil:
Soil is the product of interaction between parent materials, climate and biotic factors as modified by terrain conditions and the duration over which the interaction has been going on. Any variation in the intensity of any of these influencing factors results into different kinds of soil. Generally, sandstone, shale and the derived soils are mostly red and yellow loamy are found. Soils in the valley are alluvial and colluvial origin. The soils developed on different landforms consist of Entisols, Inceptisols and Ultisols order of soil classification. Based on rainfall and humidity, the soil moisture regime is classified as UDIC. The soils contain high amount of organic carbon and are therefore high in Nitrogen, low in Phosphorous and Potash content. As a result, most of the soils in the hill sides are suited for agro-forestry and the narrow valleys are suited for agriculture development.

Natural Vegetation:
The primary forest found in Aizawl district is mainly dominated by wet evergreen forest. Semi- evergreen forests consisting of evergreen species associated with deciduous species are also found here and there. The primary and secondary forest within this district consist of the following main species – Dipterocarpus turbinatus, Dipterocarpus retusus, Schima Wallichii, Artocarpus chaplasa, Amoor wallichii, Magnifera indica, Terminalia myriocarp, Michelia champaca, albizzia procera, Dubanga grandifolia, Aporusa octandra, Derris robusta, Erythrin arborescens, Rhus spp, Albizzia chinensis, Bauhinia variegata, sygygium cumini, Adina cordifolia, Lagerstroemia parviflora, Parkia timorian ficus sps, Bombax insigne, Toona ciliata, Callicarpa arborea, Cordia sps, Macaranga denticulate, Gmelina sps,etc. The secondary forest or old abandoned jhum in the lower altitude are mostly dominated by moist decidous bamboo forest in which the bamboo species are Melacona bambusoides, Bambusa tulda, Dendrocalamus hamiltonii,etc.

Landuse/ Land Cover:
Land use is the human use of land. Land use involves the management and modification of natural environment or wilderness into built environment such as settlements and semi- natural habitats such as arable fields, pasture and managed woods. The term land use not only implies the use of land for cultivation, pastoralism, forestry, etc but it also includes the various related aspects and factors which direct and regulate the process of rich utilization in a region. The existing pattern of land used in a region is an outcome of the interplay of man's activities under a set of physical and cultural circumstances (Tiwari; 1988: 91). The study area has been divided into six major categories. Out of the total geographical area of 3576.31 km^2, forest has the largest coverage of 80.27 %, shifting cultivation has the coverage of 16.6 %, built-up

land has 1.36 %, Scrub land (0.99 %), water body (0.04 %) and agriculture land consisting of plantation and kharif land is negligible (0.38 %). The landuse / land cover of the district has been classified as follows:

(1) Built-Up Land:

Built-up land is an area of human habitation, developed due to non- agricultural use and that has a cover of buildings, transport and communications, utilities in association with water, vegetation and vacant lands. Aizawl District includes one city i.e Aizawl city, three notified towns namely Sairang, Darlawn and Saitual and 98 villages. 1.36 % 48.28 km^2.

(2) Agriculture Land or Shifting Cultivation:

These are lands primarily used for farming and for production of food, fibred and other commercial horticultural crops. It includes land under crops (irrigated and un-irrigated, plantations, etc) covering 16.92 % of the total area (607.57 km^2)

(3) Forest:

This includes natural forests, which are not disturbed by any biotic factors like shifting cultivation and other human activities. The crown density of this class is very thick. Sub-tropical forest, evergreen and semi- evergreen forests covers major portion of the area which is 80.27 % (2870.79 km^2)

(4) Scrub land:

These lands are generally prone to deterioration due to erosion. They generally occupy topographically high locations, excluding hilly/ mountainous terrain. They possess sparse vegetation with thin soil cover and this land accounts for 0.99 % of the total area (35.38 km^2)

(5) Water body: This category comprises areas with surface water, either impounded in the form of ponds, lakes or flowing as streams and rivers, etc and accounting for 0.40 % of the total area (14.29 km^2).

Table showing Aizawl District: Landuse/Land Cover

Landuse/Land cover	**Area (in km^2)**	**%**
Built-Up land	48.28	1.36
Agriculture land	14.16	0.32
Shifting Cultivation	593.41	16.6
Forest	2870.79	80.27
Scrub land	35.38	0.99
Water body	14.29	0.40
Total Geographical Area	**3576.31**	**100**

Source: Natural Resources Atlas of Mizoram by MIRSAC, Science, Technology & Environment Wing Planning Department, Aizawl, Mizoram.

POPULATION CHARACTERISTISTICS OF AIZAWL DISTRICT:

Population Growth:

In 2011 Census, the district has a population of 404,054 persons which contained 201,072 male populations and 202,982 female populations. Aizawl district is the only district in Mizoram were female populations out number male populations. Decadal Growth of Population is 24.07 %. As much as 312,837 persons live in the urban area while 91,217 persons live in rural area. Among the inhabitants of urban area 154,244 are males and 158,593 are females. In the rural area, the district has 46,828 male populations and 44,389 female populations.

Population Distribution:

Knowing that the district is bounded by hilly terrain, the landscape is not so much suitable for contented and weighty concentration of population in one locality and because the consistent system of occupation continues to be the basis for a large section of the society. The distribution of population between rural and urban areas is 22.57 % and 77.42 % respectively. More than 75 % of the populations are living in urban areas which indicate that the district is highly urbanized.

Population Density:

The district is the highest populated district in Mizoram. According to 2011 census, the district accounted 404,054 persons which has a density of 113 persons per Km^2. The population density is reasonably high due to its urbanized centre and the state capital existence in the district which offers a profession and attracted several populations from outside the district hoping to have a high standard of living.

Population Composition:

Out of 404054 persons in the district, the male population accounts for 201,072 which is 49.76 % whereas the female population is 202,982, accounting 50.23 %.

Age and Sex Composition:

In studying the population characteristics of any area, age and sex composition examination has played a very important economically and socially. Sex ratio of the district is 1009 which is higher than the state average.

Literacy:

Literacy level among the people is an important indicator of the quality of population of a country or state or district. Aizawl district has a literacy percentage of 98.50 % which is higher than the state average and stood in 2^{th} rank in the state. Literacy percentage of male population is 99.01 % whereas percentage of female literacy is 98.00 %.

INFRASTRUCTURE OF AIZAWL DISTRICT:

Road:

The district has a good road network and the whole length of the district is passing through by good road networks. The availability of good road network which pave the way for easy transportation with the neighbouring states and exchange of goods. There are several Agriculture/ Horticulture link roads in the district which provide transportation of the products from interior part of the district.

Health:

For getting a good production, the workers should first be healthy enough to work, and health plays an important role not only in agricultural but also in other way of activity. The no. of births recorded in the district for the year 2010 is 8603 persons (out of 25,755 births in the state) whereas the deaths recorded is 2107(out of 5367 deaths recorded in the state).

Power Supply:

104 villages have been electrified as on 1st April 2012. Village electrification is important for storing and protecting the surplus product from agriculture and any other farm outputs. Accessibility of power supply is high-quality that may be because of being in the state capital district.

Efficiency based on Slope:

Based based on sample studies of three R.D. Blocks and equally distributed nine villages of the district an attempt has been made to correlate the efficiency level of agricultural with slope categories the following equation has been done to prove slope as one of the determining factors on efficiency.

Computing the data on Statistical Package for Social Sciences (SPSS), we found 76.3 % of the efficiency can be explained which is adequate to show the relationship of the two variables in getting the concrete condition of the study area. The percentage hold for the explanations of the two variable relations is strong enough to prove slope as the determining factor on the efficiency.

The value of $p<0.002$ representing that over all the regression model statistically significantly predicts the product variable and in this light, we can presume that slope has play a responsible role in efficiency. The above table suggests that there is a relationship between slope and efficiency.

It can be explained that a high degree of correlation existed between slope and efficiency. The value (0.293-0.010=0.283) 0.283 is the expected value of the efficiency when the values of slope equal zero. It is proved that slope and efficiency have a infinite relation with 99 % significance level.

By looking the above equation, we noticed that slope impact on efficiency in the study area. When the slope degree reduces at same time the agricultural production raise and this proved the slope has an impact on efficiency. The village found in the lower slope degree has produced higher production and the efficiency of the agricultural product depends on which slope category it exists. The following table represents how slope influence efficiency of the study area which will later be show in a Scatter plot to make the picture more clearly.

Table showing Aizawl District : Distribution of Agricultural Land on different Slope Categories and Agricultural Efficiency of the villages

Slope in ^{0}	Sailam	Vanbawng	Tlungvel	Phulpui	Phullen	Thingsulthliah	Sialsuk	Maite	Khawlian
0-10	5	7	3	-	8	15	9	12	16
10-20	17	17	22	15	14	8	10	13	8
20-30	3	-	-	6	3	2	6	-	1
30-40	-	-	-	4	-	-	-	-	-
>40	-	-	-	-	-	-	-	-	-
Efficiency	0.12	0.16	0.13	0.11	0.15	0.20	0.15	0.21	0.22

Based on field study (2013)

It appears from the above table that the settlements having larger proportion of agricultural lands on slopes lower than 20^0 have relatively high efficiency than the cultivated lands above 20^0 .

Fig showingPercentile Distribution of Slope

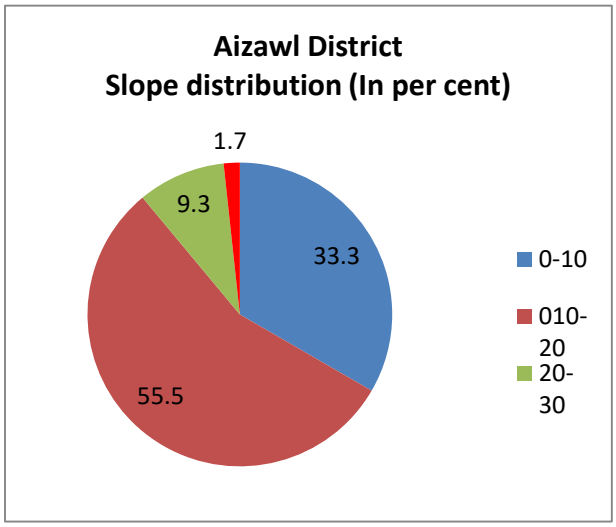


Fig showing Relationship of Production with Slope Categories

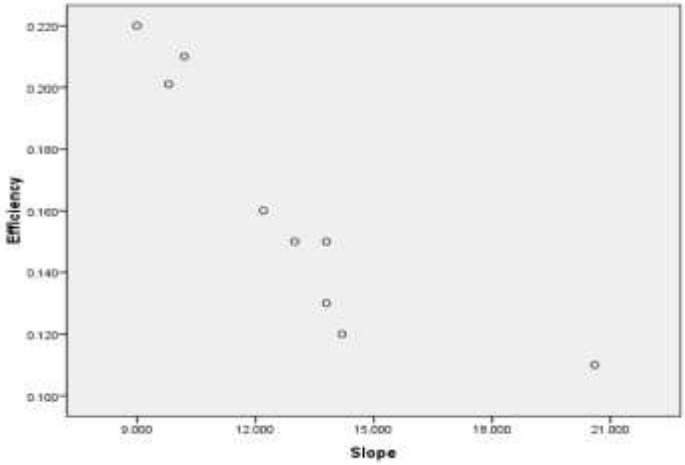


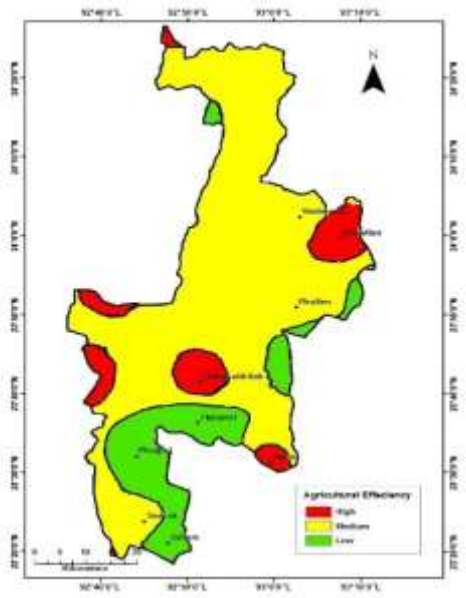
Table showing Aizawl District: Agricultural Efficiency

Agricultural Efficiency	Villages
High	Thingsulthliah, Maite , Khawlian
Medium	Vanbawng, Phullen, Sialsuk
Low	Sailam, Phulpui,Tlungvel

Table showing Aizawl District :Area hold by Efficiency based on Slope

Categories	**%**	**Area in km ^{2}**
High	16.29	582.78
Medium	73.66	2634.08
Low	10.04	359.13
TOTAL	**100**	**3575.99**

Map showing Agricultural Efficiency based on Slope



Efficiency Based on Input/Output Ratio. :
The input output ratio has been calculated and the minimum ratio is found in Khawlian village where as the maximum ratio is found in Sialsuk village. The village is said to be efficient when it production is large with less input. The following table show the input output ratio with agricultural efficiency of Aizawl district.

Table showing Aizawl District: Input and Output Ratio with Efficiency

Villages	Input	Output	Ratio	Efficiency
Sailam	915730	1314400	0.69	0.12
Vanbawng	1467000	2069480	0.70	0.16
Tlungvel	1586537	2122280	0.74	0.13
Phulpui	932730	1324200	0.70	0.11
Phullen	1251879	1711280	0.73	0.15
Thingsulthliah	1553400	2714680	0.57	0.20
Sialsuk	1610800	2137240	0.75	0.15
Maite	855640	1498520	0.57	0.21
Khawlian	702450	1283600	0.54	0.22

From the above table it is apparent that input has nothing to do with agricultural efficiency. Here, we found the value of only 4 % which is very low to construct any explanation on the variable. This indicates that there is no relationship existed between agricultural efficiency and inputs. Here we found the “Sig” value i.e. 0.58 which proved that it is not statistically significant. High input is not high agricultural efficiency is proved by 99 % significance level.

It explains here a degree of correlation existed between input and agricultural efficiency; this equation will make it clear as 0.033 -0.189 = -0.156. The value -0.156 is the expected value of the agricultural efficiency when the value of input equal zero. This shows that input and agricultural efficiency has no connection which is statistically proved from the equation.

It appears from above equation that those villages which have a high input do not have a high efficiency. A high input definitely gives the high production but that do not count as a high efficiency. The villages which are grouped in a high category of agricultural efficiency has a lower inputs where as the villages grouped into a low category has a high inputs but still having a low agricultural efficiency. The higher input with higher production is not a higher efficiency of agricultural production. The efficiency is higher production with fewer inputs. The above equation exposed that efficiency has no relation with inputs. **The following figure** will make it clear how efficiency and inputs do not have a relationship.

FIG showing Relationship of Efficiency with Input/Output Ratio

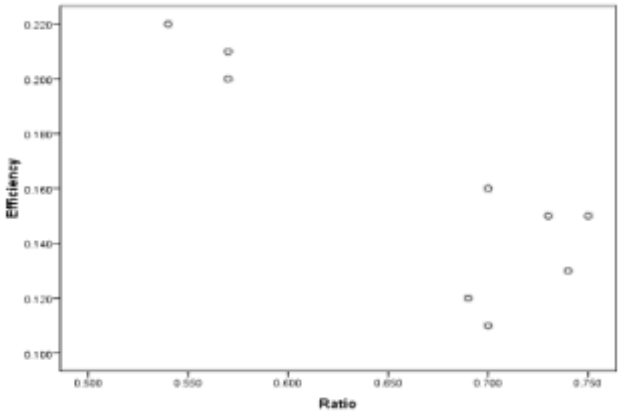


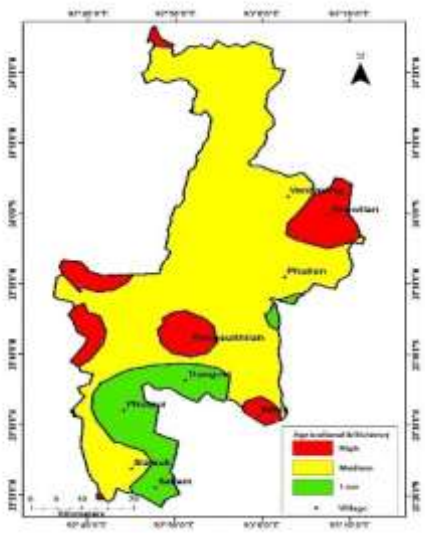
Table showing Aizawl District: Agricultural Efficiency

Agricultural Efficiency	Villages
High	Thingsulthliah, Maite , Khawlian
Medium	Vanbawng, Phullen, Sialsuk
Low	Sailam, Phulpui,Tlungvel

Table showing Aizawl District: Area hold by Efficiency based on Input

Categories	**%**	**Area in km^2**
High	13.13	469.60
Medium	71.86	2570.04
Low	14.99	536.34
TOTAL	**100**	**3575.98**

FIG showing Agricultural Efficiency
(based on Input / Output Ratio)



Societal issues (and agricultural efficiency is one such) observes (Lichtfouse (2009:11) cannot be resolved separately and individually in "which an individual problem is solved by an individual solution. Such an approach does not work anymore for two reasons, at least. First, all systems, mechanisms, and activities are closely intertwined. For instance, food production is closely linked to health, climate change, transportation, market, finance, and politics. Therefore, applying a remedy to only one element of this system will not work because the remedy will induce negative impacts on other elements in the end. Only solutions that consider the whole system and its connections will have a chance to succeed now". It may well be understood by a study conducted in respect of rice cultivation in India and particularly with reference

to the state of Kerala, a major rice growing state in the country. Suchitra (2015:106-109) observes that increasing use of high yielding varieties of seeds (success of which depends largely on chemical inputs (fertilizers and pesticides) supported by corresponding input of water and labour) though is believed to have increased the rice yield by leaps and bounds from 668 kg/ha in 1950 to roughly 2468 kg/ha in 2013-14 India is showing signs of exhaustion". Bhalla (2014:6-7) also acknowledges the fact that by the early 1980s, the possibilities of extending net sown area were beginning to get exhausted. Since then Net area sown and cultivated area have been contracting because there was a substantial increase in area under non-agricultural uses which could not be compensated for by reductions in barren land, land under miscellaneous tree crops and culturable wasteland. In this process, while some good quality land was lost to non-agricultural uses, cultivation was extended, increasingly, to poorer quality land. As a result, the nation, it is reported, has lost about 1.25million hectares of rice lands only between 2011-12 and 2013-14 due to monetary non-viability of the crop under relative inefficiency of land as under obtained environmental condition and pushed by government policies. It may not be out of place to refer to Radhkrishna (2009) who identified two 'dimensions' of agricultural distress - an 'agricultural development crisis, (reflected in low growth, declining profitability of agriculture), and an agrarian crisis (reflected in growing landlessness and casualisation of labour in agriculture, unchecked proliferation of small and marginal holdings, fragmentation of land holdings, and widening gap between rural and urban areas') all reflecting on the national efficiency of agriculture. A study in Kerala, a major rice growing state, suggests that about 76 % of the rice land has been diverted to different land uses in last 40 years. It is estimated that of about 875000 ha area under rice cultivation in 1970 only about 208000 ha are available for rice cultivation in the state. Major cause of depletion of rice land is attributed to mismatch between output and rising costs of input showing low or no profitability despite higher yield per unit cultivated land. Such an outcome requires a systematic study of the components that impact as well as are impacted upon by agricultural practices and ongoing quest for their enhanced efficiency. There seems to be disproportionately a deliberate attempt on the part of the propagators of enhanced productivity to emphasize the need to enhance production/productivity to meet the requirements of the ever-increasing population. They seem to overlook that on global as well as national level the total food grain production is about three times more than the present requirements. The problem being cited is not about availability of food, it is about the expansion of agro-based industries and diversion of crops for meeting the energy needs as highlighted in introductory chapter. Besides, proponents equating efficiency with productivity/ production tend to deliberately overlook the environmental consequences of economically more profitable large-scale monoculture. They also seem to avoid the fact that large areas under different agro-climatic regions (an essential component in the evaluation of natural efficiency of agriculture) are being diverted for non- agricultural use year after year to meet the requirement of industries and process of urbanization. Both misleadingly advocated to be bringing about development against numerous studies and World Development Reports that such expansions have been aiding concentration of wealth and econo-political power against the expansion of common men's wellbeing.

Considering the case of Mizoram from obtained conditions, thus, raises questions about the understanding and definition of agricultural efficiency in the state.

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