



Changes in the Patterns of Crop Diversification in Himachal Pradesh: 1971- 2011

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ABSTRACT

The concept of diversification is very well known to everyone in this modern era of change. Crop diversification means the raising of different crops in the same field. State of Himachal Pradesh is a very good example in the progress of crop diversification where very limited land is available for agriculture. In this background the present paper will analyze the spatio- temporal changes in the patterns of crop diversification. Along with this it will also highlight the factors responsible for these changes. To calculate the extent of crop diversification Gibb's Martin index will be used. This will divide the whole state in three groups ranging from high, medium and less diversified. The results of the discussion show that there is combination of pattern of crop diversification in the state, which is outcome of factors affecting that area.

1. Introduction

The concept of diversification is very well known to everyone in this modern era of change. Crop diversification means the raising of different crops in the same field. On the other hand it is also known as the competition among the different crops rose in a given area. According to Singh (1976) it is an indicator of multiplication of crops, which directly means the competition among the various crops. Crop diversification also shows the areal strength of the crops grown in a region. Singh (2014) in his study said that inadequate infrastructural facilities, lack of quality seeds and saplings, lack of scientific methods of horticulture practices, low quality chemical fertilizers and shortage of skilled labour are responsible for low productivity in the Himalayan region. Therefore there is a dire need to take effective steps to improve the productivity of fruits and vegetables by improving all the shortcomings. As it is evident that the natural resources are shrinking very rapidly due to increased population, the main problem is to use these natural resources to the maximum.

Due to increased population the demand for food is also increasing rapidly, to fulfill these demands crop diversification is the best suitable method. Crop diversification is also a viable solution for the state like Himachal Pradesh, where only 11 percent of land is available for cultivation, which is also decreasing due to secondary activities. This region is also cursed with mountain topography which is a big hurdle in its agricultural growth. Most of the areas of six districts *i.e.* Lahaul- Spiti, Chamba, Shimla, Kinnaur, Kullu, Sirmaur are closed during whole year due to heavy snowfall during winters. The main challenge in front of the farmers in these areas is to use their available time and land to the maximum. On the other hand remaining six districts are suffering from variability in climate, mountain specificities, terrace farming, population increase *etc.* Therefore crop diversification is the best suited method for these farmers to use their land maximum. In the state introduction of apple in three districts namely Kinnaur, Kullu and Shimla in the early fifties is the first milestone laid in the process of crop diversification. Later in sixties and seventies it spread to other districts like Chamba, Lahaul- Spiti, Sirmaur and Solan. After the proliferation of apple in nineties farmers shifted towards vegetables to gain more profit.

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In this background the present paper will analyze the spatio- temporal changes in the patterns of crop diversification in Himachal Pradesh and the factors responsible of these changes.

2. Objectives

The present paper will work on the following objectives: -

1. It will analyze the spatio-temporal changes in the patterns of crop diversification.
2. It will highlight the factors responsible for these changes.

Methodology

In the present paper secondary data will be used. Data related to area of various crops will be taken from the Directorate of Land records. Then the averages and percentages will be calculated. To calculate the degree of diversification Gibb's Martin Index will be used by

applying the following formula:-
$$= \frac{\sum(X^2)}{(\sum X)^2}$$

Where

X= Percentage of total cropped area occupied by each crop in hectares

The value of index has been classified into three groups ranging from high, medium and less diversified. Index will divide all the crops cultivated in the state in groups according to their share in the total cropped area. Increasing and decreasing trend in the share of any crop will give a pattern of crop diversification.

To highlight the change in the patterns of crop diversification all the districts will be divided into three group's which shows positive trend of change, negative trend of change and no change after calculating the index value and then by subtracting the score of 1971 from 2011. After the calculation of the index values, maps will be prepared by using Arc GIS software.

3. Results and Discussion

In a state like Himachal, where there are so many limitations in case of agriculture like short sowing season in most of the areas, bad transportation facility, mountain restrictions, rapid increase of population, small size of land holdings the main task or challenge in front of farmers is to over come these limitations and to maximize their profit from the available land and time also. Therefore diversification of crops is the best way by which profit of the farmers can be maximized. In Himachal, in the early phase of diversification most of districts with good climatic conditions had high degree of diversification but as they continued this process the degree of diversification had reduced. This is because of two reasons either the farmers had adopted the crop specialization method or they got negative results due to diversification. Keeping these two reasons all the districts of Himachal Pradesh will be divided in three categories according to the change in their patterns of diversification *i.e.*

- a) Positive Trend of Change
- b) Negative Trend of Change
- c) Districts with No Change

Table 1. Change in the Patterns of Crop Diversification in Himachal Pradesh (Gibb's Martin Index) 1971- 2011

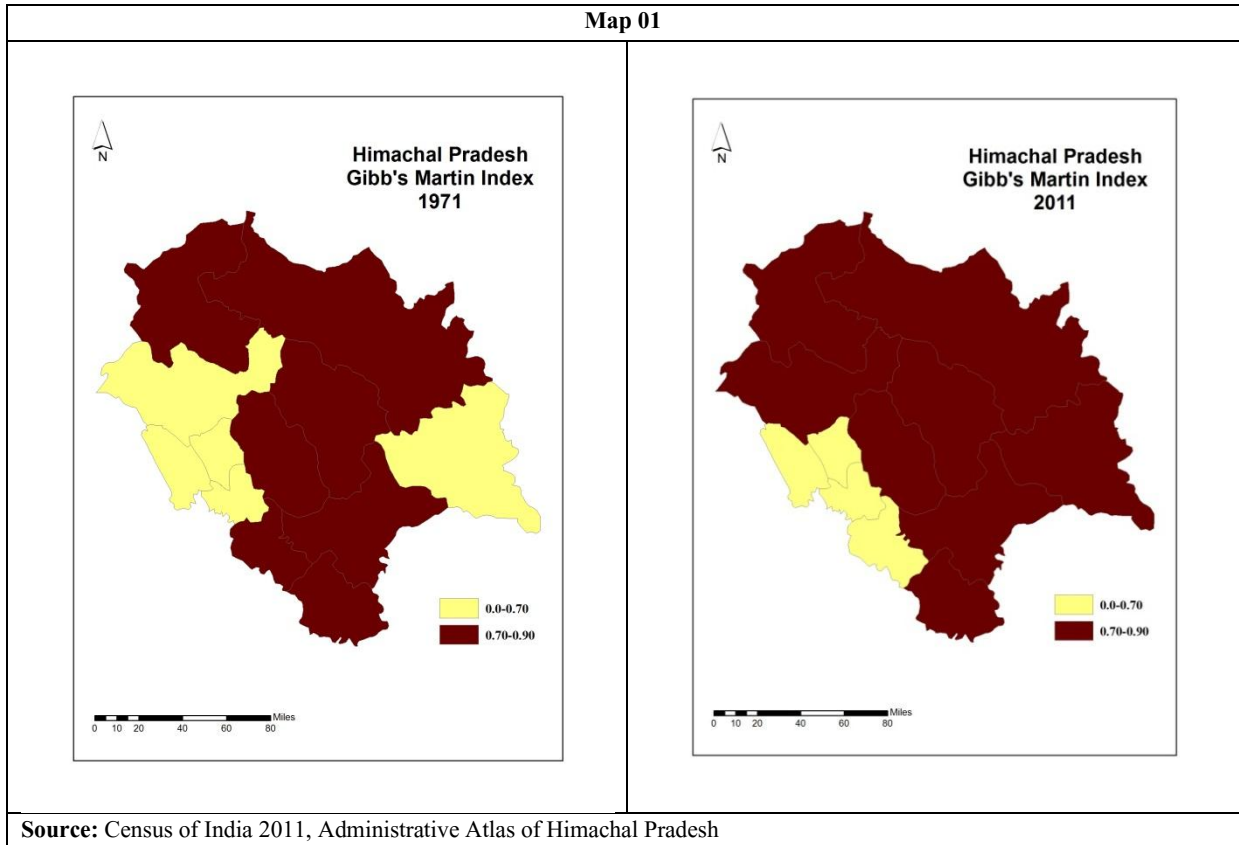
Districts	Years	1971	2011	Change
Bilaspur		0.53	0.56	+
Chamba		0.75	0.73	-
Hamirpur		0.68	0.54	-
Kangra		0.64	0.71	+
Kinnaur		0.69	0.75	+
Kullu		0.81	0.82	+
Lahaul- Spiti		0.73	0.70	-
Mandi		0.76	0.71	-
Shimla		0.79	0.74	-
Sirmaur		0.76	0.80	+
Solan		0.77	0.69	-
Una		0.61	0.61	=
State Total		0.73	0.75	+

Source: Directorate of Land Records, Himachal Pradesh (Index Computed by the Scholar)

*Computed by author through Gibb's and Martin Index

*+ Denotes Positive Change, *- Denotes Negative Change, *= Denotes No Change

Map 01



Source: Census of India 2011, Administrative Atlas of Himachal Pradesh

a) Positive Trend of Change

The state itself has changed positively in case of diversification. Whereas districts like Bilaspur, Kangra, Kinnaur, Kullu and Sirmaur (Map 01) has also shown a positive change in the process of crop diversification. Kinnaur and Kullu are two out of three districts where the process of diversification has knocked at its early stage. Both the districts are blessed with suitable climate for fruits and vegetables and on the other **hand with good** road connectivity. District Kinnaur faces little difficulty in few months of the year due to heavy rainfall or snowfall. However many parts of Kullu are blessed in case of connectivity with the other parts throughout the year. Tourist places of Kullu attracts tourists whole year which demands agricultural produce. One major factor in this positive change in Kullu is the setup of IARI (Indian Agricultural Research Institute) with its three experimental farms in the valley *i.e.* Naggar Farm, Baragram Farm and Sarsai Farm, these farms do experiments with the seeds of various crops and then they let farmers know which seed is best for more production. District Kangra and Bilaspur are much favored with variety of climate throughout the year. **They** have three different seasons which are summer, winter and rainy. However they are blessed with low altitudes which offered them the privilege to build good roads. These two districts also have a big share of total population of the

state(Kangra has the highest share of population number of the state). To fulfill the demand of growing population on its available land these two districts adopted crop diversification. Apart from this these two districts has changed their attitude from cereal crops to fruits and vegetables. The setup of agricultural university in the district Kangra gave boost to the farmers. As this university provides facility to the farmers to test their soils in their labs free of cost to know which crop they can grow in their fields or which fertilizers are deficit in their soils. The case of district Sirmaur is very different as its climate is very much suitable for the cultivation of fruits and vegetables. But this district started the process of diversification in late eighties. Therefore the district is trying variety of fruits and vegetables like apple, peas, potatoes, tomatoes *etc.*

b) Negative Trend of Change

Shimla and Solan are the districts which were carved out from the district Mahasu. These two districts are the two out of three districts which started the diversification of their crops in the early stage of diversification with the introduction of apple. But later they adopted specialization instead of diversification. Therefore their index of diversification is somehow showing negative trend from its early stage towards the recent time. In case of Shimla,

which is the state capital large amount of land has been converted over the years into many government institutes like Himachal Pradesh University, Vidhan Sabha, IGMC (Indira Gandhi Medical College) and many more. Apart from these factors; this district is also a full year concentration of tourist interest which demands residential construction like hotels. These small-small factors somehow putting major influence on the available land and resources. On the other hand the main reason behind the negative change in the index of diversification in Solan is that it is the only district which has the major concentration of industrialization in the state. This automatically converted a large amount of its available land into non-agricultural activities. Case of specialization is somehow same in the case of Chamba and Lahaul- Spiti. As these two districts have problem of closed road during winters due to heavy snowfall. Therefore farmers here go with specialization so that they can utilize their time and land to the maximum. District Hamirpur and Mandi are the major areas from educational point of view. Hamirpur has three major institutions *i.e.* National Institute of Technology, Himachal Pradesh Technical Institute and IEC Institute of Health Sciences and Research. On the other hand Hamirpur is the district which has a very small share in the area of state but is on number second in the distribution of population according to 2011 Census. In district Mandi, Himachal Pradesh has the only IIT (Indian Institute of Technology). Apart from these important institutions they also have many educational colleges or institutions. Whereas the most important factor like variation in the climate throughout the year does not support the process of diversification. The major factor is that at their early stage of diversification they started with the development of educational institutes simultaneously.

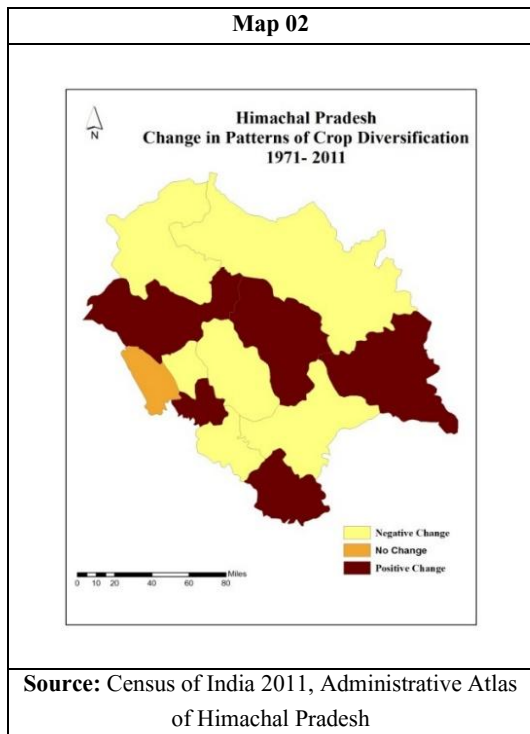
c) Districts with No Change

The only district with no change is Una (Map 02). This district has the climate and topography almost as Punjab. Therefore they are more focused on cereal crops instead of fruits and vegetables. Only areas which show little side of diversification are those which are in the foothills. The major factors which support its cereal growth or stagnant growth is the well connected canal system and road transportation.

Apart from these above discussed factors there are many other factors which are favoring or hindering the process of crop diversification in the state. Discussing the favoring factors first, formation of agricultural institutions like potato and mushroom research centers in Shimla and Solan respectively gave a boost to the farmers to produce these crops in their native areas. Government is supporting the farmers by giving them the facilities like MSP (Minimum

Support Price) which supports farmers by purchasing their produce on a fixed price, if they are not able to sell it in the market. An addition to the facilities provided by the government is the establishment of institution like HPMC (Horticulture Produce Marketing and Processing) which is fully dependent on horticulture produce. The major change in the purchase and sale of the agriculture produce occur after the formation of WTO (World Trade Organization), which gave open trade market to the farmers. Due to which the middle man's profit got vanished and the farmers got the chance to sell their produce directly in the market, which directly increase their profit margin. Apart from these factors the most important one is that Himachal is a tourist state, which attracts tourists throughout the year. For fulfilling the eating demands of the tourist farmers have to produce according to the demands. The demand of fruits and vegetables is not in the home state but also in the neighboring states like Haryana, Chandigarh, Delhi and Punjab due to their climatic limitations they are not able to produce many fruits (Like apple) and vegetables. Whereas Himachal is very much capable of producing not only on season but also off season vegetables and fruits. The most important one is the development of communication network like roads. Best and recent example of this is the development of Shimla-Chandigarh four lane roads, which will reduce its travel time to half.

The state is no doubt doing well with its shifting crops but still there are so many factors which are hindering the growth of its shifting attitude. The most favorable factor that is climate became a curse for its agriculture in winters. Best example of this is in the Lahaul Spiti, where farmers produce world's best quality of peas in winters. But they are not able to sell it in the market due to closed roads during winters. The diversification of crops which **started** with the introduction of apple in three districts. *i.e.* Shimla, Kullu and Kinnaur is somewhere getting stagnant in these districts due to ageing of trees. Due to the mountain topography farmers have small size farms which are terraced. These terraced farms don't allow farmers to use modern machinery, which automatically increase their work and labour. The population of the state as well as the nation is growing very fast and so as their demands. This growing population needs space for living due to which the land available for agriculture is shrinking. The growing population is also forcing farmers to do subsistence agriculture so that they can fulfill their family needs first. Many parts of the state are very well connected with roads but there is a lot which needs improvement. There are many parts of the state which are isolated or there are no roads to those places. The conditions got worse in the rainy and winter season for which the roads need improvement.



Conclusion

In the nutshell of this discussion it can be said that the state of Himachal Pradesh is doing well with its agriculture on its available land. The farmers of the state no doubt have done a lot to improve their agriculture or to increase their production or profit. They are using HYV seeds, shifting their agriculture from cereals to cash crops. On the other hand government is also providing facilities like building institutions for agricultural research, agricultural education, giving minimum support price, building roads *etc.* these kind of boosters are boosting farmers skills to shift from one crop to another. But farmers in the state are already have problems with the topography and climate. The climate become worse in the winters due to which almost half of the state get out of reach in terms of roads and tele-communication. Farmers in the state are dependent on terrace farming which is also a big hindrance in their farm activities as they don't allow farmers to use modern agricultural machinery. To conclude this discussion it can be said that the farmers in the state are giving their best to increase the production on the shrinking land but there is a lot to be done so that they can earn more and more profits.

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