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**CHAPTER VII**  
**FINDINGS AND SUGGESTIONS**

## **7.1 Introduction**

Land which is a fixed factor and scarce in nature always creates the problem of allocation or utilisation in the maximum possible manner. Since the utilisation has to be conducted properly according to the needs and preferences, the human beings who are the inhabitants of Earth have to play an important role in the utilisation. The purpose for which the land is used is based on needs, wants, preferences and choices of the people who are utilizing the land. The human beings are the most important decision makers in dealing with the utilisation of land. Land, the scarce factor is utilised for a number of purposes as land is the base for every economic activity. Without land, nothing is possible now on the land, not even an economic activity such as consumption, production or distribution can be conducted without the base of the fixed factor, land. Since land is fixed, scarce and is used for a number of uses, its value is also increasing at a faster rate especially in areas where it is used for a number of purposes. The use of land is also dependent upon the growth and development of the specific region as the reflections of it can be seen on the purposes for which land is used.

Land use pattern is clearly explained with the help of Nine-fold Classification which is done by Indian Council of Agricultural Research (ICAR) and from the classification, the purposes for which Land is used is identified and the main purpose for which the land in Kerala is used is for agricultural purposes itself which is identified in the categorization as Net Area Sown. The study focuses on the Land Use Pattern and the main categorisation - Net Area Sown in Kerala, the utilisation pattern of Net Area Sown, the main participants in the utilisation of Net Area Sown – farmers and how the farmers are engaged in the Net Area Sown by making a proper utilisation of the area as well as how they can earn living from the Net Area Sown. The findings of the study is relevant to know about the Land Use Pattern and the Net Area Sown, the most important and leading category in the Categorisation of Land Use Pattern.

## **7.2. Major findings of the study**

Land use pattern in India and Kerala is favouring a sustainable environment friendly ecosystem by attaining Sustainable Millennium Goals. The important point to be noted is that In India, the area which is favourable to sustainable ecosystem is 69 percent with 46 percent Net Area Sown and 23 percent Forest Area while in Kerala it is 81 percent with 53 percent Net Area Sown and 28 percent Forest Area which gives us the strong

evidence that India and Kerala is an agriculture based economy and majority of Indians and Keralites are dependent upon agriculture for their livelihood. The Net Sown Area a proxy for land used for agricultural purposes is an indicator of sufficient food availability and food security to the existing population in Kerala. The findings of the study related to the objectives is relevant and is given in detail

**To examine the trend of different land use categories in Kerala during the period from 1991- 2017.**

- Net Area Sown has the highest Mean Value in all decades followed by Area under Forest and are the main components of Land Use in Kerala during the whole period of 1956-2015. In 1956-65, the third position is occupied by Barren and Uncultivable land which includes mountains and hills while it acquired only the last position which is approximately around zero in 2006-2017
- The Compound Growth Rate (CGR) of Land Use - Forest, Non-Agricultural Land, Fallow Other than Current Fallow, Current Fallow, Net Area Sown is positive while that of Barren and Uncultivated Land, Permanent Pastures , Miscellaneous Tree Crops, Cultivable Waste, shows rate of decay during the whole period 1956-2018.
- The Compound Growth Rate show an increasing growth in F, NA, NAS and a decayed growth in BU, P, T, CW, FOCF, CF in initial periods among which the decayed CW, FOCF and CF is a symbol of favourable Land Use Pattern.
- In 1960-61, about 20 percent of Total Agricultural Area is kept as unutilized in Kerala which is far higher than 14.09 percent at the National level.
- But after that Kerala recouped from the crisis by reducing the unutilized area and it remained stagnant at around 5 percent from 1970 onwards which is lesser than 12 percent at National level interpreting that Kerala is successful in utilizing the land resources especially the agricultural area and is helpful to provide a better food security to the living population.
- The Net Area Sown which provides the food security is almost stagnant around 60 percent throughout the 63 years which proves that utilisation of the area is not much affected by changes in the economy.
- Comparing the variability in Land Use Categories, the Coefficient of Variation is higher for Land used for Non- Agricultural purposes in 1956-65. In 1996-2005 i.e. the Post Liberalisation Period, NA, BU, P, T, FOCF and CF has a high variability

or is less stable compared to NAS and no variability exists in Forest Area. The Net Area Sown is less variable, more consistent, uniform and homogenous in area utilisation.

- Net Area Sown is far above the proportion of land for non- agricultural purposes reflecting the sustainable and ecological utilisation of land giving preference to Millenium Goals.
- A declining trend in the Net Area Sown during the period of 1991 to 2018 – the Post-Liberalisation Period but still the variations are occurring within the limits of 200 million hectares to 230 million hectares.
- The Net Area Sown under Food Crops and Non- Food Crops during the period 2005-2017 is reflected in two different ways - the area under Food crops is decreasing at an increasing rate with a variation of -26.94 percent, while that of Non- Food crops are decreasing at a decreasing rate with a variation of -2.24 percent which reflects the probability for the occurrence of food shortage in the future time periods.
- Seasonal Crops such as Paddy, Turmeric and Ginger are showing a declining trend while the Perennial and Annual Crops are showing a sharp increasing trend in Area and Production in Kerala.
- High positive variations are reflected in three crops – Rubber, Arecanut and Banana – the crops which have cost effectiveness and high market prices while negative variations occurred in paddy and tapioca, the main staple food crops of Kerala

**To analyse the areal distribution of crops and crop diversification in the districts of Kerala.**

- Index of Crop Diversification is high and approaches one in almost all the Districts of Kerala indicating perfect diversification.
- The number of crops is highest in Highlands with the largest variety of crops cultivated while in all the other physiological regions, there exists moderate or high crop diversification and Kerala is proving to be a model for other states due to existence of the crop diversification which reduces the risk and uncertainty in agricultural production and provides a guidance to agriculturists to bravely face the

possibility of occurrence of an agricultural crisis and be a risk averters in agricultural sector.

- Idukki and Wayanad are the two districts with a large variety of diversified perennial crops such as Pepper, Cardamom, Arecanut, Banana, Plantains, Tea, Coffee, Rubber, Coconut and Jackfruit
- In Kerala, 12 different leading crops with area equal to or more than five percent as the ratio to Net Area Sown exists and it implies that Crop Diversification exists in the Districts of Kerala.

**To interpret the influence of regional variations in Land Use Pattern on Cropping Pattern in selected area in Physiological Zones.**

- 57.6 percent of farmers owned lands with less than 1 Hectare, that is low sized lands, 18.7 percent own small sized land holdings with a size in between 1.01 and 2 Hectares, only 14.0 percent owned Semi- Medium sized lands in between 2 to 4 Hectares and only 9.7 percent owned Medium sized lands with area between 4 and 10 Hectares.
- Majority of farmers owned Marginal sized lands with size of less than 1 Hectare.
- Increased number of respondents in the Marginal Lands and absence of respondents in Large size lands reflect the fact that farmers with Large size lands are lesser in selected area within the Physiological Zones.
- Within the Lowland itself, 66.7 percent, 15.0 percent, 13.3 percent and 5 percent respondents own Marginal, Small, Semi-Medium and Medium sized lands respectively.
- Within Highlands 40 percent owned Marginal Holdings, and within Midland, 70.8 percent owned Marginal Lands. Medium lands are comparatively high in Highlands with 21.7 percent while within the Highlands, Marginal Holdings are higher than other categories.
- A proportional distribution of all land size exists in Highlands with high proportion of Medium land as respondents in Highlands of Agali Panchayat, Palakkad own 21.7 Medium sized lands.
- Among the total respondents, only a single respondent belongs to the age of less than 30, 55.3 percent belongs to the age group of 31-60 and 44.3 percent belongs

to the age group of greater than 61. Within the Lowlands, no farmer respondent has an age of less than 30 is included, 68.3 percent belongs to age group of 31-60 while 31.7 percent belongs to the age group of greater than 61.

- Within the Midlands, no respondent has the age of less than 30, 65.0 percent belongs to the age group of 31- 60 and 35 percent belongs to the age of greater than 61.
- Within Highlands, one respondent belongs to the age of less than 30 with 0.8 percent, 39.2 percent respondents belongs to the age group of 31-60 and 60 percent respondents belong to the age with equal to or greater than age - group of 61+ within Highlands, majority are Irulas of Scheduled Tribe Community of Agali Panchayat who are healthy enough to engage in agriculture keeping in consideration an in-depth relationship between nature and man.
- While considering the Social Group, gender and ownership of respondents, joint ownership exists only in ST Category of Highlands depicting the inclusion of siblings in ownership and not the better half.
- Among the total respondents, Male respondents have 84.3 percent of individual ownership while Female respondents have 15.7 percent of Individual Ownership.
- But 98.1 percent of Joint Ownership is held by male head of the family while only 1.9 percent is held by women respondents.
- Among the 'Others' category, Nair and Christian widows are leading in individual female ownership of land. The Nair caste carries matrilineal system of land ownership in which the ownership is vested in female members of the family.
- Among the total respondents, 31.3 percent farmers have Lower Primary education, 2.3 percent have Upper Primary Education, 39.7 percent have secondary education, 15.7 percent have Senior Secondary Education and 11.0 percent have Higher Education.
- In Lowlands, 50 percent of respondents have farming experience of less than 20 years, 40 percent have farming experience of 21- 40 years and 10 percent have farming experience of greater than 41 years.
- In Midlands, 34.2 percent of respondents have farming experience of less than 20 years, 58.3 percent have farming experience of 21- 40 years and 7.5 percent have farming experience of greater than 41 years.

- In Highlands, 19.2 percent of respondents have farming experience of less than 20 years, 59.2 percent have farming experience of 21- 40 years and 21.7 percent have farming experience of greater than 41 years.
- Among the total respondents, 84.7 percent have a history of agriculture within them as their parent's main occupation is agriculture itself while 15.3 percent have non- agriculture as their main occupation.
- In Lowlands, no area is kept as Area Sown More than Once because only mono-crop cultivation can only be preferred after the rainy season with the draining out of excess water from the land.

**To analyse the relationship between Size of Agricultural Land Holdings and its determinants in selected area in physiological zones.**

- The mean size of land owned as Built-up area in Lowland is 0.015 Hectares while the Net Area Sown is the highest with average size of 1.583 Hectares. The average size of utilised agricultural area is 1.50 Hectares and the Gross Cropped Area is 1.502 Hectares. While in Midland, Average Built-Up Area is around 0.016 Hectares, Average Net Area Sown is highest with 1.292 Hectares while Area Sown More than Once is 0.356 as the paddy is cultivated twice in an agricultural year.
- In Highlands, the maximum average size of land owned in Net Area Sown is the highest with 2.283 Hectares. The Utilised and Unutilised Agricultural Area as well as the Gross Cropped Area is High in Highlands.
- While considering the Total land owned, land area is almost uniform in Current Fallows, Fallows other than current fallows, Water Bodies and Unutilised Agricultural Area with a less deviation from Mean size of land.
- Average land size as well as Standard Deviation of Total land possessed is very high when compared with Land leased in and Land leased out. Area leased in as well as area possessed is high in Medium lands than in other categories of land.
- The Multiple Regression Analysis results indicate that the variables - Type of Family, Area of Self-Acquired Land, Area of Hereditary Property, and Agricultural Income positively influence the Net Area Sown. This is evident from the positive signs of the estimated coefficients of the corresponding variables. This means that if Type of Family (TF), Area of Self-Acquired Land (SAL), Area of Hereditary Property (HP) and Agricultural Income (AI) increase, there exists an increase in Net Area Sown.



- Within Lowlands, 100 percent cultivation is cereals with exclusive paddy cultivation, within Midlands, maximum proportion of Net Area Sown is used for Paddy Cultivation with 31.0 percent , along with Spices and Condiments which occupy 20.5 percent, Oilseeds especially Coconut, Fresh Fruits and Vegetables,
- In Highlands, Pulses occupies the first position followed by Fresh Fruits especially plantain, Oilseeds and Spices and Condiments. Plantation crops is also cultivated in Agali panchayat in Highlands
- In Lowlands of Venkitangu and Kuzhalmannam, Paddy – a Monocrop is preferred for cultivation as the watershed land can be used only for the cultivation of rice as rice requires more wetland for cultivation. The availability of water is necessary for paddy which is naturally available in Lowlands with a natural water drainage and irrigation facilities with natural manmade canals.
- The Midlands prefer paddy, vegetables, oilseeds, arecanut, pepper with a combination of about eight varieties of crops while Highlands with Kodassery and Agali together contribute 25 varieties of agricultural crops which is an agricultural asset to Kerala. Agali has a uniqueness in the production of Pulses and can be called as the Pulse Bowl of Kerala. People of Agali considered Pulses as the staple food which provides sufficient Nutrients and Proteins to the inhabitants especially Tribal people.
- The Highlands in Physiological Zones takes a very remarkable position in the production of Pulses such as Kodomillets(Veragu), Foxtail Millets (Thina), Amaranthus, Sorghum which are protein rich, nutritious, superfoods, minerals like iron, magnesium, phosphorous and potassium, Eleusine coracana(Ragi),Chama(Panicum Miliaceum).

**To analyse the Cost and Revenue arising from cultivation of different crops in the selected panchayats in different phases.**

- In Lowlands, only Food Crops are cultivated in the three different phases from 1991 to 2019. Since the topography is suitable only for the cultivation of Paddy, the farmers preferred the production of Food Crops only, Paddy in the area.
- In Phase I, in Midlands, 80.2 percent of Net Area Sown is used for production of Food Crops and only 19.8 percent for Non- Food Crops.

- In Phase II, 78.8 percent of Net Area Sown is used for production of Food Crops while only 21.2 percent is used for Non- Food Crops. A very slight variation can be seen in Food Crops as well as Non-Food Crops and thus creating a agricultural stagnancy in the Net Area Sown
- But still there exists a positive indicator of development in cereals in Venkitangu and Kuzhalmannam where the farmers cannot change the utilisation pattern due to the specific features of Physiological Zones.
- Spices and Condiments includes agricultural products such as arecanut, pepper, nutmeg, vanilla and is mainly cultivated in Pazhayannur in Midlands and Kodassery, Agali in Highlands.
- Cultivation of all except Paddy and Rubber crops showed an increasing trend and Net Area Sown under vegetable cultivation increased at an increasing rate. Since Pazhayannur is considered as a Special Agricultural Zone for vegetables and vegetable cultivation is promoted through agricultural institutions such as Kerala Agricultural University through provision of seeds, seedlings, micro irrigation facilities and productivity enhancement programmes.
- In Agali, the areal-wise cultivation of Plantain increased due to increasing prices but the cultivators always faced the problem of attack of wild animals. Though Bhavani river is flowing through Agali as the main source of irrigation, variations in altitude in the area is itself a bottleneck for production due to increased irrigation cost which mainly arises from cost of motor pumpsets for irrigation.
- By the traditional system of cultivation, tribals have to keep mandatorily a portion of their harvest for animals and birds and a certain proportion for the relatives. Though the two traditional customs are going on, the tribals faced attack of the Net Area Sown by Wild animals especially, herd of elephants, Boars and Bisons.
- In Kuzhalmannam which belongs to Midlands, 73.7 percent of Net Area Sown under Paddy Cultivation is Marginal land, 25.0 percent is Small and 1.7 percent is Semi- Medium land. The main crop cultivated is paddy with different varieties of paddy itself such as Jyothi, Uma, Rohini, Ponni, Swetha, Matta Thriveni and Ponni IR-8.
- Except in case of paddy and rubber cultivation, all other crops are profitable to the farmers. Loss in Paddy cultivation is due to climate vulnerability and loss in Rubber cultivation is due to decreasing market prices.

### **7.3. Conclusion**

The study reveals that the farmers are really interested in agricultural activities as the land they owned is a Hereditary property which is given to them by their forefathers. The farmers are attached to the land with an affection towards nature and they are concerned about the nature which they have to protect and become a part of sustainable development. The farmers are satisfied with their main occupation or primary source of income though a little hurdles they have to face. Though the declining trend of Paddy cultivation is a threat to the food security to be availed in the economy, it can be corrected by ourselves through motivating the youth as well as through proper consideration and solutions and suggestions are necessary for upliftment of Paddy cultivation in Kerala.

### **7.4. Suggestions and recommendations**

Proper Land Utilisation is necessary as land is scarce and the needs and wants have to be identified properly to make a better utilisation knowing the preferences by ordering the needs and choices. Since Net Area Sown is the most important land use in Kerala and a larger community is dependent upon the Net Area Sown, the farmers who are utilizing it for the benefit of themselves as well as for others, the proper utilisation of Net Area Sown through agricultural activities is necessary in Kerala economy. Diversity exists in crop cultivation according to the characteristics of Physiological Zones and farmers are playing their role in the most efficient manner, but some suggestions are required to improve the existing agricultural situation in the economy. In order to attain a stabilized and sustainable agricultural Growth, the valid suggestions are

#### **❖ Motivate each and everyone to participate in agricultural activities**

- Creating interest in each and every person through motivational classes in Grama Sabha or Community Programmes
- Make sure the participation of people through proper networking and issuing public notices
- Provide proper information to people about seeds, fertilisers
- Creating Organisations or groups or clusters within which the informations can be circulated
- Application of least expensive or traditional techniques of production

❖ **Proper land utilisation by cultivating the fallow lands**

- Proper coordination and grouping through creation of community gardens
- Creation of Orchards for growing fruits and vegetables
- Group effort of family can be promoted to reduce the increasing cost of cultivation
- Raising Livestock farming
- Provision of Direct Marketing of fresh vegetables through the gardens itself
- Off – grid living – living in farms and orchards to reduce carbon footprint

❖ **A better participation of educated youth in agricultural activities**

- Promote agriculture through farm development organisations in schools like ‘Seed’
- Be mandatory to participate in any of the clubs or organisations in schools
- Create a nature loving mind and to conserve the existing nature
- Conservation of nature for future generations
- A better awareness will keep them stick on in agriculture rather than searching white collar jobs

❖ **Provide proper awareness and information to farmers**

- Through Agricultural Universities
- Farm Development Bureaus
- Krishi Bhavan
- Appointment of agricultural co-ordinators to reach every person in village
- Padasekharasamitis
- Moving caravans by universities for sale of fresh vegetables and fruits

❖ **Promoting use of better seeds and bio-fertilisers**

- High yielding seeds generated from traditional seeds
- Promoting livestock cultivation through which bio fertilisers can be made available

❖ **Promotion of Organic and Homestead Farming**

- Organic farming with the help of bio fertilisers
- Less use of chemical fertilisers will reduce the spread of diseases such as cancer

❖ **Through these, a proper sustainable development in Millenium Goals**

### **7.5. Need for better utilisation of Net Area Sown**

Better utilisation of Net Area Sown is required to attain a long term stabilized agricultural growth for the creation of food security in the Economy. Attainment food security as a primary goal in Millenium Goals is attainable through a proper utilisation of Net Area Sown

### **7.6. Scope for future research**

Since agricultural development is necessary for the whole world, the relevance of continuing in agricultural activities creates scope for further research in agriculture. Each and every person is dependent upon agriculture upto that time for which food intake is necessary for the existence of life on Earth.

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