Land Use and Cropping Pattern Changes in Kerala

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Natural resources play a significant role in the development of the agricultural sector. Land, one of the primary inputs for agriculture, has always been the focus of discussion regarding its effective utilisation. Land use is "the overall arrangements, activities and inputs that people undertake in a specific land cover type" (Gregorio and Jansen, 1998). Land use pattern is a dynamic process in which each tract of land is assigned to its appropriate class in a system of classes and is a key component in natural resource management. The land use pattern of a region is determined by socio-economic, agro-climatic, ecological, institutional and technological factors (Ramasamy *et al*., 2005; Premakumar and Vinothkhanna, 2015). The decisions on land use considerably impact biodiversity, supply of agricultural commodities, ecosystem services and societal welfare (Claassen and Tegene, 1999; Jose and Padmanabhan, 2015).

Land use classification in India

Till 1949-1950, the total land area in India was classified into five broad categories *viz*., (i) forests (ii) area not available for cultivation practices (iii) other uncultivated land (iv) area under current fallow and (v) net area sown. This five-fold classification was observed to be inadequate to address the country's agricultural planning needs. For better comparability and comprehension, in 1950, the Ministry of Food and Agriculture set up the Technical Committee on Coordination of Agricultural Statistics which recommended a nine-fold classification of land area (Gairhe, 2011). The nine land use categories in India are (i) forests (ii) barren and uncultivable land (iii) land put to non-agricultural uses (iv) permanent pastures and other grazing lands (v) cultivable wastes (vi) miscellaneous tree crops and groves (vii) current fallow (viii) fallow other than current fallow and (ix) net area sown.

Land use statistics of Kerala

According to the land use statistics of Kerala, out of the total geographical area of 38.86 lakh ha, the share of net area sown was 19.91 lakh ha (51.24%) in 2022-23. The shares of forests and land put to non-agricultural uses in total geographical area was 27.83 per cent and 12.52 per cent respectively. The cultivable waste land, area under current fallow and other fallow constituted 2.45 per cent, 1.63 and 1.29 per cent, respectively (GoK, 2024). Since 2005, the geographical area of Kerala has been classified into thirteen land use categories. The newly added land classes to the previously existing nine-fold classification are, (i) marshy land (ii) still water (iii) water logged area and (iv) social forestry.

History of land use in Kerala

Kerala is having a highly dynamic history of land use. After the formation of Kerala state in 1956, the first elected government passed the Agrarian Relations Bill in 1959 to reform the tenancy laws and set land ownership limits. This was replaced by the Kerala Land Reform Act of 1963. This act, which came into effect in 1970, put a cap on landowners' total land holding size and reapportioned the surplus land among indigent peasants and landless labourers. Subsequently, the government of Kerala created cooperative societies to distribute lands confiscated from the state's innovative entrepreneurs. This elicited widespread corruption and surged the cost of operations. According to Nair and Dhanuraj (2016), the implementation of land reforms also led to the landholding fragmentation and the subsequent loss of economies of scale in cultivation. This is evident from the statistics that before the implementation of land reforms, only 81 per cent of the holdings were below 1 ha, but it substantially increased to over 96 per cent in 2015-16 (GoK, 1970; 1992). Even the average size of operational holding in 1970-71 was 0.57 ha and it drastically declined to 0.18 ha in 2015-16 (GoK, 2022).

In order to promote paddy cultivation on an extensive scale, Kerala Land Utilisation Order got implemented in 1967. This land use control policy was framed with the objective to cultivate arable lands that are likely to be left fallow with paddy or other food crops and to prevent land already being used for food crops from getting converted for other uses without prior government approval (Jose and Padmanabhan, 2015). Although large-scale land conversion by

artificially dividing it into tiny plots was not permitted, a significant portion of paddy land was converted to non-agricultural uses by taking advantage of the policy loophole (Guillerme *et al*., 2011; Jose and Padmanabhan, 2015). Later the Kerala Conservation of Paddy and Wetland Act, 2008 was enacted to prohibit the conversion of paddy lands and wetlands, and thereby sustain the ecological system of the state. These two policies coerced the farmers to continue paddy cultivation despite its high costs and low returns. Therefore, the policies created disincentives for farmers and limited their freedom by putting artificial constraints (Nair and Dhanuraj, 2016). Remarkably, the area under paddy decreased by 20000 ha in the year 2012-13, indicating a failure in the implementation of the Kerala Conservation of Paddy and Wetland Act, 2008 (Jose and Padmanabhan, 2015). The substantial decline in paddy area resulted in many ecological repercussions and food insecurity. The climatic changes and water deficit situation in Kerala are mainly due to the substantial decline in paddy fields over the years (Abraham, 2020).

The change in the land use pattern is an important manifestation of human interactions with the environment, which has a variety of repercussions on the ecosystem and human livelihood (Foley *et al*., 2005; De Fries *et al*., 2007; Fox *et al*., 2017). Agricultural land use change is the fundamental driver of societal structure and natural resource dynamics. Since the 1970s, Kerala has experienced rapid changes in its agricultural land use. The agricultural sector has changed significantly in terms of land ownership, cropping pattern, cultivation techniques and cropping intensity. In particular, land use experts have observed a shift towards monoculture and traditional cash crop agroforestry at the cost of diversified homegardens (Kumar, 2005; Peyre *et al*., 2006; Fox *et a*l., 2017). Land use changes, especially agricultural intensification, impacted the biodiversity of landscapes. A significant amount of Kerala's homegardens were converted to coconut and rubber plantations due to commercialisation and landholding fragmentation (Kumar and Nair, 2004).

Causes of land use changes in Kerala

The philosophy and practices of land use in Kerala have changed due to various factors. The extensive migration of cultivators which started in the 1920s from the erstwhile Travancore region to the hilly tracts, particularly to the Idukki district and the Malabar region, resulted in significant land utilization changes (George and Chattopadhyay, 2001; Joseph, 2002; Johnson, 2018). This trend in migration was continued till 1970s until the entire wastelands in the Malabar region were brought under cultivation. A key factor in the growth of Kerala's economy is migration. From 1970 onwards, Kerala witnessed a massive exodus of emigrants to other states and countries. Migration has a direct and indirect impact on the land utilisation pattern of a region. It can be highlighted that migration and remittances from abroad were the major drivers of land use changes in Kerala (Prakash, 1998; Zachariah and Rajan, 2004). The flow of remittances catalysed the rise in speculative demand and land prices (Prakash, 1998). A distinct land use change in Kerala is the increase in the land put to non-agricultural uses. The burgeoning population, nature of urbanisation, improved socio-economic status and the rise in demand for residential plots favoured the land use transition from agricultural to non-agricultural purposes on an extensive scale in the state (Devi and Kumar, 2011; Jose and Padmanabhan, 2015). Urbanisation leads to the inflation of land prices, paving way for the rapid growth of real estate sector. The area under land put to non-agricultural uses increased from 2,75,000 ha in 1970-71 to 4,86,387 ha in 2022-23. (GoK, 2024).

Cropping pattern changes in Kerala

A cropping pattern refers to the proportional area under different crops at a point of time. Rice, coconut, pulses and vegetables were the major crops cultivated in Kerala during the 19th century, the cultivation of which were intended for subsistence and local trade only. Later in the early years of the 20th century, with the arrival of European capital into the plantation sector, the commercialisation of agriculture started in Kerala (Cheriyan, 2004). The farm front of Kerala is distinguished by an incredibly diverse biophysical resource base and agro-climatic endowments that offer a wide range of options for cultivating various crops (Mahesh, 1999). The principal crops which account for more than 80 per cent of gross cropped area of the state are paddy, coconut, rubber, tapioca, banana and other plantains, black pepper, cashew, coffee, tea, arecanut and cardamom.

An analysis of Kerala's cropping pattern changes from its founding in 1956 demonstrates unequivocally that there has been a consistent shift to garden and plantation crops at the expense of food crops. A sizable decline in area under field crops like paddy, tapioca and an increase in area under rubber and coconut are noticed in the state. Thomas (2004) pointed out that the shortage of farm labourers, rapid increase in wages and absentee landowners have also favoured the shift in cropping pattern. The determinants of cropping pattern changes in the state are the anticipated price of the crop, price of the competing crop, anticipated yield, differences in the climate, soil, vegetation, irrigation facilities and cost of cultivation (Mani, 2009; Karunakaran, 2014).

The cropping pattern followed by the farmers in the state is unique and distinct such as (a) monocropping *viz*., paddy, rubber, cardamom, tea and coffee (b) mixed cropping or multiple cropping, especially with coconut as the major crop and black pepper, cocoa, arecanut, banana, ginger, turmeric, tubers and fodder as multiple crops (c) intercropping, particularly banana and vegetables. Kerala is topographically and ecologically diverse, consisting of a mix of coastal areas, wetlands, plains and hills. According to Guillerme *et al*. (2011), the crop choice by the farmers depends on various factors like topography, soil type, irrigation facilities, crop profitability and government policy decisions. The climate, soil and land characteristics of a region heavily influence its agricultural productivity and agro-biodiversity. Since the 1960s, the decline in area and production of annual crops coerced the state to depend on neighbouring states for meeting the requirements, especially grains, vegetables and fruits (Rajasekharan *et al*., 2014).

Conclusion

The evaluation of the physical resources of land and its exploitation pattern has taken essential relevance in the present day due to the burgeoning population and plethora of human needs. Unplanned and unsustainable exploitation of land and its resources is escalating daily in Kerala and other states of India. Land's quality and quantity dimensions have deteriorated due to its extensive uses. To ensure food security for the world's rising population and to reach a desired degree of development, agricultural policy makers must address the daunting issue of sustainable use of natural resources, especially land in the agricultural sector.

A scientific study of land use and cropping pattern is necessary to formulate pertinent land use options and agricultural development policies in the state. The cropping pattern in favour of cash crops is an indicator of food insecurity. Therefore, more focus may be given in providing various incentives to the farmers cultivating food crops. Rational management of land and its resources plays a significant role in the development of the state economy. As land is a scarce resource, the best approach to boost agricultural output and enhance farmers' living conditions is to revamp the productivity and efficiency of land in a sustainable way.

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