

AGRICULTURAL DEVELOPMENT AND ECOLOGICAL IMBALANCE IN KUTTANAD

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ABSTRACT

Kuttanad taluk in Alappuzha district in Kerala is famous for agriculture and people in this taluk mainly depend on paddy cultivation. In this paper, we have studied Agricultural Development and Ecological Imbalance in Kuttanad. Agricultural practice has moved from traditional style to modern ways in the present scenario. The traditional agricultural style is mainly a livelihood programme. But the modern style is such that it has turned to be a commercial one, adopting modern agricultural equipments with hybrid seeds, modern thinking and with a market oriented outlook. The impact of this has been both negative and positive. Farmers tend to make more profit but there is damage to the environment. The adaptation of modern agricultural practices is vital for development of the nation. Agricultural development is very essential for sustainable development of our country. So we should try to reduce the negative impacts and move forward.

Keywords: Agricultural Development, Paddy Cultivation, sustainable development, water scarcity, Pollution, Environment and Ecological Imbalance.

1. INTRODUCTION

A study of an inter relationship between economic agents and economic activities are very much relevant in the context of an analysis between agricultural development and ecological imbalance in kuttanad. Economic activities include agriculture, mining, fishing, industry, transport and all such activities. Human activity has been increasing day by day leading to a rapid depletion of natural resources. Along with depletion of resources human activities result in environmental degradation and pollution. Hence the major problem of the modern economy is the problem of depletion and pollution. In this paper, we study some of the factors affecting Kuttanad taluk due to the usage of modern techniques in agriculture and suggest some measures to minimize it.

2. MAJOR FACTORS AFFECTING THE KUTTANAD TALUK DUE TO MODERN PRACTICES.

Whenever, we introduce new techniques in any field, there will be both positive and negative impacts. If the positive impact is more beneficial we go for the implementation of new technique and try to minimize or overcome the negative effects. In this session, we study a few negative impacts in Kuttanad taluk by introducing modern practices in agriculture.

2.1 Transformation of cropping pattern from food crops to cash crops

Rice is a staple food produced and consumed in Kerala. Kuttanad is mainly remembered as the rice bowl of Kerala [31],[9] and [18]. The fields lie at a level of 1.0-2.5 m below mean sea level [15] and [10].Geographically Kuttanad is having certain unique topological features. Kuttanad is man-made granary of Kerala [28] and [7].

Due to scarcity of laboures and its high wage rate majority of farmers quit paddy cultivation [21] and [29]. There are farmers cultivating cash crops other than food crops. The conversion of paddy fields for growing coconut [25] and garden crops altered the economy leading to environmental problems. The paddy cultivators believe that they should stick on to ways on making profit. The environmentalists argue that conversion of paddy land into other crops will affect the ecological balance. Conversion from one cultivation to other negatively affects the nature of land. It leads to changes in the drainage factor of the land leading to water logging during rainy season.

2.2 Conversion of wet land into dry land

Population is increasing in all economies and countries like India are facing the problem of inhabitation for the increase in population [30]. The land man ratio is decreasing year by year [35] and [15] due to the increase in population. Human beings are the most vulnerable features adapted to any environment. This means they inhabit in any natural environment [2], whether the weather is too hot or too cold. Along with these human beings convert the natural environment with the earth moving techniques [33].

The low lying agricultural paddy fields were filled with soil from distant places with the modern machinery [15]. The low lying wetlands are nature's gift for the conservation of water, water bodies, and the peculiar environment of the place and also living space for some peculiar animals, birds, fishes, frog and the like. When the wet land is converted into dry land the entire system is changed causing damage to the above said plants, animals and creatures creating environmental degradation.

2.3 The increased use of chemical fertilizers and pesticides

Man is now very much aware of the defects of the modern method of cultivation. For instance human beings are severely affected by the use of endosulphan in the plantation area of Kasargod District in Kerala. The new born babies are deformed by way of the use of such pesticides which means not only the present generation but the posterity is also severely affected. Such activities may be a threat to the whole human life. Considering this, agricultural experts and scientist are now arguing in favour of bio- cultivation.

There has been a trend in favour of the use of bio-manures and also the use of other natural techniques to prevent pest in the field of cultivation. But interview with majority of farmers in Kuttanad reveal that they are not willing to do paddy cultivation without the use of fertilizers and pesticides. The studies reveal that in India the consumption of fertilizer has been increasing over the years¹ [20]. It is without doubt that pesticides and chemical fertilizers have negatively impacted the environment and ecosystem in our nature [39].

Scientist pointed out that the use of chemical fertilizers is one of the reasons in the destruction of the ozone layer and in global warming. The pesticide contamination of water, food, soil, should danger the human and animal life [32]. It will contaminate the water in the area, in the nearby rivers, ponds, canals and wells [25]. It causes irreparable damage to the overall system especially loss of biodiversity [33]. Nitrate contamination of water bodies leads to several types of diseases. Micro-organisms that grow on water surfaces kill the plants living in the bottom of water bodies by preventing sun light to penetrate the water surface. It will also damage the life of certain creatures which are very essential for maintaining the environment for example frog, snake, tortoise and the like.

Oversupply of fertilizers will soften plant tissue resulting it to more sensitive resulting in plant diseases and attack from pests [26]. Moreover the use of fertilizers and pesticides reduces the storage capacity of the soil. Even a slight rain causes floods due to the reduced storage capacity of the soil [34].

Fertilizer oriented Green Revolution technology increased the output but destroyed the environment irreparably [14] and [36]. The law of genetic diversity is lost due to commercialization of agriculture and introduction of new crop varieties [32].

¹ The use of chemical pesticides in India jumped from 154 tonnes in 1954 to about 90,000 tonnes in 2008 at an average of 0.5 kg/ha (GOI, 2011). Our country is the second largest consumer of fertilizers in the World after China. The rate was about 26.5 million tones of Nitrogen, Phosphorous and Potash, (NPK) (GOI, 2013). An Indo- Dutch study has revealed that fertilizers and pesticides used in Kuttanad was 50 to 75 % more than those used in other regions (Mathew Dennis Marcus, 2010).

2.4 Over use of soil

The soil in Kuttanad area is fine alluvial deposit with strong admixture of organic matters [38] and [25]. It is silty clay and extremely acidic in reaction. This acidic nature is mainly due to the production of sulphuric acid by microbiological oxidation of sulphur compound present in the soil [13],[12] and [33].

The natural environment in Kuttanad is suited to cultivate the land for only one season. But with the advent of modern science and technology the area under cultivation in Kuttanad is being used either twice or thrice every year. If the soil is overused the fertility of land and soil microbial biomass will deteriorate [26]. So over burdening the soil will reduce yield and will harm the life and ecosystem of the locality [16].

Most agriculturalists had assumed that a number of "ecological diseases" have been associated with the intensification of food production. Agricultural development creates some problem in the soil of Kuttanad, some of them are soil erosion, loss fertility of soil, salinization and alkalization, pollution of water systems, reduce nutrients [34] and [22]. It creates reduction of yield [25].

2.5 Mining of lime

Agriculture is a seasonal occupation in Kuttanad [38]. The paddy land owners in Kuttanad found the mining of lime an additional source of income. Lime is an important element of Vembanad Kayal. The most important type of lime is seen in Kuttanad from the fossils of Austriya, Veloritta, Meratrikes [12]. Lime is collected for different purposes. A small share is used for agricultural purposes and major share is used for cement factory [23]. The opening of mines causes abandonment and selling out of agricultural land. It disfigures the landscape of the soil. Along with it, it is a hazardous job to human beings [17]. For the conversion of land and the protection of human life the Government should create suitable policies in the interest of the welfare of the people.

2.6 Increase in population and sanitary problem

Kuttanad is a densely populated area in Kerala. The place is always flooded with water throughout the year [18]. Here arises the sanitation problem in Kuttanad [4]. Hanging latrines are very common in banks of the canals in Kuttanad. [37]. It is often difficult to construct septic tanks. During the rainy season Kuttanad faces the threat of floods. There is no proper drainage system and the waste water from houses and shops are led in to the open fields, which are the root cause for water born diseases [12].

2.7 Scarcity of drinking water

Even though Kuttanad is surrounded by water drinking water is very scarce. The drinking water quality of Kuttanad is very poor due to the unlimited use of fertilizers and pesticides in paddy cultivation [4],[5] and [16]. Saline water from the backwaters also enters the fields [2] and [19]. Thus the quality of the water is degraded. The people of kuttanad depend on water from the Pampa River brought through pipe lines for drinking water [8].

The water in Kuttanad is polluted not only because of agriculture but also because of urban waste, coir retting and dredging for lime shells. Drinking water is also polluted due to sewage flowing out of urban and semi urban areas of the district [37]. Increased fertilizer application has resulted in water contamination by chemicals like nitrate and phosphate. It has also changed the ground water level [33]. Tourism also adds to the problem of waste management in Kuttanad and adjoining areas [22].

2.8 Thottappally spill way

The first step for the development of Kuttanad was the construction of this spill way. It is constructed to solve the problem of floods and crop loss. It flush away extra flooded water from the Pampa, Maniala and Achenkoil rivers into the sea before it floods Kuttanad [25] and [36]. The spillway was completed in 1958 [13]. A number of technical and organizational short comings took place in the construction of the spillway. The spillway did not function effectively as it was visualized due to its faulty design [1],[39] and [6]. Its poor implementation, maintenance and management, salt water intrusion through the spillway has become a big problem for the farmers of the region [33]. It failed to discharge the designed rate of flow of water 64000 cusecs. So it is less effective in flood control of this region than that expected [12].

2.9 The problems connected with Thanneermukkam bund

The second step for the development of Kuttanad was the construction of Thanneermukkam bund. The regulators at Thanneermukkam have adversely affected both farming and the general population of the region [25]. Thanneermukkom bund was constructed to prevent saline water from sea to Vembanad Lake entering the agricultural fields in Kuttanad during summer season [25],[36] and [13]. It has a length of 1402 mts. Its construction started in 1955 and its operation started in 1974 [12]. The barrage is in a poor state with most of its shutters corroded. For the barrage to work effectively its duration of closure should not exceed a three-month period [37]. When completed it will have a total span of 1410 meters and will have a total of 90 shutters³.

The following are the additional problems caused by the construction of Thanneermukkam regulators.

- a. The construction of regulators at Thanneermukkam has severely reduced backwater area available for growth of prawns. Several species of fishes that grow in saline water have disappeared due to the prevention of flow of sea water into the lake [25] and [1].
- b. Salt water is needed for the growth of lime. Therefore lime growth is affected by the level of salt in water [1] and [12].
- c. As a result of closure of Thanneermukkam bund, the acidity of the soil has increased. This is because Kuttanad area is marshy land. The soil of Kuttanad is acidic. To reduce acid calcium carbonate is applied in the fields and filled with water. As a result the acidic element of close out of the field. The closer of Thanneermukkam bund has stopped this flow. This has negatively influenced paddy cultivation in Kuttanad [12].
- d. The construction of regulator increased the growth of water weeds. This caused problems to paddy cultivation and inland navigation. Water became stagnated due to construction of barrier. This creates the other problems like mosquitoes, snakes and difficulty in navigation [28].

According to the environmentalist the Thanneermukkam bund would obstruct the natural flow of water on a permanent basis and result in accumulation of silt².

2.10 The influence of salt water during busy season

The physical feature of Kuttanad is entirely different from the rest of the country [28], [38] and [27]. It is surrounded with different water bodies [18]. The waters of Vembanad Lake are a mixture of salt water of the Arabian Sea [28]. The salt water enters into the field during rainy season [2] and [19]. This caused problems to paddy cultivation.

2.11 Pollution

India is trying to achieve rapid economic development without adequately managing the environment. Recently pollution loads has increased beyond the carrying capacity of the environment [24] and [37]. Pollution impacts ecosystem and related economic activity like agriculture. It means the negative impact caused by manmade deeds on nature. Pollution mainly affects land, water and air.

- a. Water Pollution- Water is polluted mainly due to the addition of organic wastes, solid wastes and sewage, coir retting, fuel contamination from mechanized boats. Excessive use of chemical fertilizers and pesticides contaminate the lake ecosystem [25] and [37]. Among rivers, the Pampa is the major contributor of solid pollutants [3]. Hanging latrines also contribute a share to water pollution [4].

² The Hindu, News Paper, 2018 April 29, Sunday.

Kuttanad is a great tourist attraction centre in India [33]. The tourist department and private individuals now provide house boating through the water ways. As a result of influx of tourist waste management has become a problem. The uses of houseboats have resulted in the overthrow of inorganic waste in to the water ways being accumulated in backwaters [37].

- b. Land Pollution-The increased use of chemical fertilizers led to increasing pollution [16]. It also negatively affected the living conditions of the people.
- c. Air Pollution-After harvest the fields of Kuttanad were set on fire to prepare for next agricultural season. This smoke from these fires caused air pollution in this region. And also air pollution cause climate change.

The economic loss due to pollution includes cost of treatment and wage loss during sickness [24].

2.12 The extinction of living creatures like frogs, snakes and other living organisms.

The application of pesticides in the soil results in the end result of small and other type of creatures [16]. They are connected to each other. The application of chemical pesticides has resulted in the disappearance of frogs, snakes and other rodents from the rice fields of Kuttanad. The frogs and snakes used to control pest. Now they use chemical pesticides for this purpose [12].

3. IMPACT ON ENVIRONMENT DUE TO MODERN TECHNIQUES

The environmental condition of Kuttanad region increased the chances for diseases caused by the damages to the environment through human activities. This is mainly due to the continuing scarcity of pure drinking water, heavy dosage of fertilizers and pesticides diluted in the water sources, lack of measures to control lifestyle diseases and so on.

A daily news of the Hindu reported that major death are caused by the ecological damages created directly or indirectly by farmers. The report was on the basis of a survey conduct in August 2010 by the Department of Community Medicine of the Alappuzha Medical College, the Regional Prevention of Epidemic and Infectious Diseases (PEID) Cell and the State Disease Control and Monitoring Cell (SDCMC). That survey, covering 8,091 people from 1,809 houses in the seven wards of Kainakary panchayath. It reveals that 91 deaths that is, 27 per cent of the total 334 deaths in the seven wards from July 2004 to July 2009, were due to cancer [5].

The ecological damages can directly or indirectly affect farmers. The following are the environmental disasters which affected the farmers in India³.

Table: Environmental Disaster from 2002 to 2012

Sl No	Year	Environmental Disaster
1	2002	Drought
2	2003	Heat wave in Andhra Pradesh for 20 days continuously
3	2002-03	Extreme cold climate in North India
4	2004	Drought like condition in July season
5	2004-05	Extra ordinary rise in temperature during the month of March
6	2005	Flood
7	2005-06	Cold wave
8	2006	Floods in the states of Rajasthan and Andhra Pradesh. Drought in the North eastern sates
9	2007	Extra ordinary difference in temperature
10	2009	Extreme drought all over India
11	2010	One of the hottest year
12	2011	High deficiency in level of rain fall
13	2012	Drought in the states of Punjab, Haryana, Gujarat and Karnataka. Neelem Cyclone and drought in Andhra Pradesh

Source: Secondary Data Collection

4. SUGGESTIONS TO OVERCOME THE EFFECTS

In this session, we suggest a few measures to overcome the effects in the environment in Kuttanad taluk by the implementation of modern techniques in agriculture.

1. Steps are to be taken by the Government to protect the wet land and environmental quality of the place. Particular laws are to be enacted for this purpose.
2. Researchers are to be done by the Government and agencies for promoting bio cultivation and provide facilities for production of compost, green manure or other organic manure. It would bring safe and healthy food and ensure food security. Therefore this type of organic farming is suitable for sustainable agricultural development.

³ Matrubhumi Azchappathippu (Malayalam) 2017 October 8-14, Volume-30.

3. Low lying rice fields in Kuttanad should be used for fish culture. Cultivating rice and fish in paddy fields helps to increase fertility of the soil and paddy cultivation. Fish helps to control the weeds in paddy fields. It helps to decrease the cost of production.
4. As the region is faced with the problem of sanitation, Government even now is providing certain sanitary services like open drains, closed drains and both drains. But all such facilities are insufficient while considering the situation in Kuttanad. Hence, Government is to devote more financial assistance to the panchayath for providing better sanitation and drainage facility.
5. Waste management must be done in an efficient way through modern technology. In every agricultural season water is polluted with the application of chemical pesticides and fertilizers. This may contaminate the nearby wells, canals, and even the public water supply system. Proper water treatment is to be done in every agricultural season before permitting the water to flow in to the water streams from the paddy fields.
6. The Thanneermukkom bund (Governmental report) is faulty in its installation. Even now its performance is not satisfactory. Hence there is an urgent need to renovate this bund with modern facilities.
7. There is also an urgent need to renovate the Thottappally Spillway to solve the problem of floods and crop loss. The technical and organizational shortcomings are to be effectively resolved to get the best results.
8. Government has enacted a number of pollution control laws. But all such laws are not enacted in the full sense of the term. There must be an effective machinery to implement the laws enacted for pollution control.
9. There is a problem of extinction of peculiar species of fishes, frogs, tortoise, of the place. Steps are to be taken to protect all such species of animals and preserve the ecological balance.
10. Our country is promoting tourism. There is an urgent need to start a tourist centre of the tourist department at Kuttanad. So that the needs of the place can be reported at the earliest to the tourist department.

5. CONCLUSION

The importance of environment is to be considered while human beings involve in economic activities. It is the environment which provides resources both renewable and non-renewable. Environment assimilates waste by either absorbing them or dispersing them. Environment also supports the life system by making ecological balance and genetic diversity. Last but not the least environment provides aesthetic enjoyment and scope of recreation. World Bank, IMF, WTO, UN, all such agencies accepted environment as a necessary condition for human life and also for attaining sustainable development of the economy.

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