

## **Sustainable Agriculture And Land Use Practices: A Micro Level Study In Karipara Gaon Panchayat Under Matia Development Block Of Goalpara District, Assam**

**Kanarpa Nath<sup>1\*</sup>, Dr. Abdul Haque Ahmed<sup>2</sup>**

<sup>1\*</sup>Assistant Professor Department of Economics, Habraghat Mahavidyalaya, Krishnai

<sup>2</sup>Associate Professor, Bikali College, Dhupdhara.

### **Introduction:**

Sustainable agriculture is a type of agriculture that focuses on producing long-term crops and livestock while having minimal effects on the environment. This type of agriculture tries to find a good balance between the need for food production and the preservation of the ecological system within the environment. Sustainable agriculture is an approach to farming that prioritizes natural and renewable resources over synthetic inputs like fertilizers and pesticides. According to the United Nations' Food and Agriculture Organization sustainable agriculture seeks to "meet the needs of present and future generations, while ensuring profitability, environmental health, and social and economic equity." But because there's little regulatory oversight for this practice, farms can call themselves "sustainable" without having to back it up.

### **Importance of sustainable agriculture:**

A regionally integrated system of plant and animal production practices are designed to produce long-term results such as:

- i) Production of sufficient human food, feed, fiber, and fuel to meet the needs of a sharply rising population
- ii) Protection of the environment and expansion of the natural resources supply
- iii) Sustainment of the economic viability of agriculture systems

Indian economy is an agrarian economy, till now more than 50% people are depends on agriculture directly. In the north- eastern economy agriculture has an important role to the state GDP. When productivity of agriculture increases to their expected rate economy become independent and if it is bellow to their expected rate local economy become dependent. Before liberalization farmers of the region did follow traditional process of cultivation, like wooden plough, animal power, human power, hundred percent depends on monsoon, bullock cart, personal and private finance etc. They sold their surplus production in and purchased their necessary product from local market. The farmer has unable to get the proper value of their product. To increasing agricultural productivity Indian government has taken national agricultural policy, 2020. The policy document stated: "Capital inequality, lack of infrastructure support and demand side constrain such as controls on movement, storage and sale of agriculture products etc. Have continued to affect the economy viability of agriculture sector, consequently growth has also tended slacken during the nineties."

The establishment of agrarian economy which ensures food and nutrition to India's billion people, raw material for its expanding industrial base and surplus for export and a first and equitable reward system for the farming community for the services they provide to the society will be the mainstay of reforms of the of the agriculture sector. Thus the national agriculture policy aims to attain the following objectives:

1. A growth rate of over 4 percent per annum in the agriculture sector.
2. Growth that is base on efficient use of resources and conserves our soil, water and bio-diversity.
3. Growth with equity i.e. growth which is widespread across regions and farmers.
4. Growth that is demand derives and creates to domestic markers and maximizes benefit from export of agricultural product in the face of challenges from economic liberalization.
5. Growth that is sustainable technologically and economically.

The policy will seek to promote technologically sound, economically viable, environmentally non-degrading and socially acceptable use of country's natural resources to promote sustainable agriculture. In this connection rural economy has a significant role to achieve the 4 percent growth rate per annum.

A sustainable agriculture approach seeks to utilize natural resources in such a way that they can regenerate their productive capacity, and also minimize harmful impacts on ecosystems beyond a field's edge.

It is a common phenomenon that the population living mainly on small scale subsistence agriculture in the rural areas and specially North Eastern India. Increasing pressure of population on agriculture creates extra demand for food.

Rural people are mainly dependant on agriculture. The process of agriculture of the rural people is caused in an agrarian situation living behind significant change in the socio-economic structure of the rural areas in the region.

Such phenomenon has been observed in the rural area Karipara Gaon Panchayat under Matia Development Block, Goalpara district in Assam, where the density of population is high, person 553 per square k.m. according to census report, 2011. Increasing pressure of population on limited agricultural land acting as the 'push factor' in one hand and on the other hand mechanization in agriculture acting as the 'pull factor' in the economy. Use of tractor, pump set, ploughing, sowing or harvesting by machine in place of human and animal power is known agricultural mechanization. Ploughing is to be done by tractor, sowing and putting of fertilizer by the drill and reaping and threshing by the combine harvest thresher and so on. The tractor will also be used in transporting crops to markets. The old fashion wooden ploughs, bullocks, sickles etc. are eliminated and the work is done by machinery. Thus mechanization of agriculture stands for the use of machinery in all farming operations, ranging from ploughing to the marketing of the produce. It implies the substitution of subsistence farming by mechanized farming.

The present problem is studied in the context of the rural area of Goalpara district of Assam, After 1991, which the most significant change has taken place in the demographic pattern of the people. It is pertinent to note that no systematic study has so far been made in north east India to address the socio-economic issue and relating to the mechanization in agriculture. It is therefore, pertinent to make an in-depth study of the problem of mechanization and socio-economic change in Karipara gaon panchayat of Goalpara district of Assam. The farmers in the area do cultivation using machine power instead of traditional method. Ploughing is done by tractor, sowing and putting of fertilizer by the drill and reaping and threshing and so on. The tractor is also used to transporting crops to markets.

Basically, Goalpara district is more agrarian in comparison with other districts of the region. The district is industrially backward due to the non-availability of some relevant factors invariably connected with the industrial development. The role of organized sector is limited in the district.

As there is insufficient scope of employment opportunity in the industrial sector, a large section of the working force, i.e. approximately 70% of the total working population has chosen agriculture and allied activities as the primary sector of livelihood. The number of population depending on the agricultural sector has been increasing over time creating disguised unemployment mainly due to two reasons. First the high rate of growth of population in the district and second the limited scope of job opportunities in the secondary and tertiary sectors of the economy. The net result is that the total gross income as well as per capita income decreases which in turn increases the volume of population living below the poverty line covering approximately 60% of the total rural population in the district. Thus to remove poverty, on the one hand and to feed the increased population on the other hand, the development of agriculture is the only viable alternative in the district. So the government has taken necessary initiatives for the development of agricultural sector with the application of new agricultural technology or mechanizing the farmers are to apply modern scientific capital equipments in place of bullock and wooden plough, chemical fertilizer in the less fertile areas, H.Y.V. seeds in place of 'desi' or local (indigenous) varieties and the pesticides fungicides etc. for pest attacks and plant diseases. Thus intensive agricultural development programme has been lunched in the district also, anticipating higher productivity in the agricultural sector. The application of all these relevant factors in the production process collectively is known as 'package programme'. The development of agricultural sector is invariably related with the economic development of the district.

Mechanization have significant role to increasing agricultural productivity, increase in income, increase in trade and commerce, etc. which leads to increase the economic development of a country.

Since the study area of the scholar represent a unique solution, it is brought pertinent to take up the present topic for research work at the micro level.

#### **Need of the study:**

It is highly imperative to mechanize agriculture and it is the need of the hour not only to provide food security to the growing population but also to increase farmers' earning and to feed other sectors. The proposed study would unearth the lacunae of agriculture of Assam in general and this study area in particular. Hence, it would be helpful for the policy makers to adopt strategic initiatives to mechanized agriculture and sustainable productivity for raising yield per hectare.

#### **Objective of the study:**

Considering the relevant aspects in the work is designed to study the farm mechanization in Karipara gaon panchayat of Goalpara district the principal objective of the study are:

1. To make a study of farm mechanization and economic sustainability.
2. To make of relationship between farm mechanization and growth of agriculture.

3. To find out the policy for sustainable mechanization if any in the GP.

**Hypothesis:**

In order to achieve the objectives stated above the following hypothesis are proposed and attempt has been made to examine this hypothesis in the course of the work.

1. Farmers are less aware about sustainable agriculture.
2. Farm mechanization in Karipara Gaon panchayat is low.

**Methodology:**

The objectives of the study suggest that it is an evaluative and exploratory research. So, it has to base on secondary and primary data. Secondary information to be gathered from District Agricultural Office, Goalpara, Block Development Officer, Matia, published sources such as - books, journals, periodicals, reports, bulletins, etc. For collection of primary information, two stage sampling conducted. In the first stage of the Karipara Gaon Panchayat area under Matia Development Block selected. In the second stage, two villages are selected randomly from the total villages of ten numbers. The selected two villages are Tilapara and Medhipara. In Tilapara contains total 140 farmers and in Medhipara there are 120 farmers. 5% farmers are selected from the selected two villages, a total 13 sample farmer selected randomly comprising 4 medium (holding range 4 to 10 hectates) farmers and 9 small (holding range 1 to 4 hectares) farmers (P-546, **Dutta and Sundharam; 2006**). Scanty of large farmers in the area has compelled the study to exclude the said category. Finally, using simple statistical tools such as rates, ratios, table, figures, etc; the results of the study have been achieved.

**Profile of the sample farmer:**

The farmers of Karipara gaon panchayat do only Sali cultivation in autumn season from June-July to November-December, once in a year. Different variety of the rice cultivation are Aijong, Ranjit, Joha, Kola Joha, Basmoti, Bahadur, Ratna, Pan Jamuna, Bora etc. From the primary data it is clear that farmers of the GP uses tractor, water pump set, HYV seed, chemical fertilizer, pesticide, sprayer, weeder, thresher etc. There is no government initiated irrigation system to the field. Depending on monsoon they do cultivation in the field and only three sample farmers have water pump set to facilitated irrigation to the paddy field. Those who have no pump set or tractor them hair the pump set and tractor to facilities irrigation and tilling to their paddy field. In the sample village there is no use of combine harvester in agriculture. Each farmer has weeder to pull out weed from paddy field. Now tractors are also used as transport in their field and selling and purchasing product from field to market and market to home. Uses of tractors are increasing day by day in farmers' life in the village. After using the capital equipment in agriculture instead of man and animal power their productivity increases compare to traditional process of agriculture. Traditional paddy seeds are Pati, Rangoi-Pati, Bardhana, Hathimal, Maiguti, Mainagiri, Parma, Hathimal etc. and productivity of these traditional seeds 24 to 28 quintals per hectare. The farmers do cultivation to meet their own demand not to sale or to market supply. It also seen that the owner of the land does not do cultivation themselves in their field. They make share cropping with some poor rural farmer and farm products are divided between them as on their agreement.

For the micro level study of agricultural mechanization in the Karipara gaon panchayat total 13 farmers selected where 4 medium farmers and 9 small farmers. Their population, total cropped area for paddy, implement and productivity shown in the table below:

**Table-1**

Category	Total cropped area for paddy	Implements	No of farmer (Used implement)	Productivity of per hectare
Medium farmer 04	14 hectare	5	04	54 quintal
Small farmer 09	16 hectare	3	06	36 quintal
13	30 hectare	08	10	90 quintal

Total cropped area medium farmers have 14 hectare and they used different types of implement for cultivation such as - tractor, water pump set, weeder, sprayer, reaping and threshing by machine. Small farmers have 16 hectare cropped area, they are not completely mechanized, 6 farmers out of 9 farmers used implement in agriculture. Other farmers follow traditional process of cultivation they used wooden plough, khurpa, bamboo sieve, spade, physical labour, bullock, rain water and traditional implement etc. In the study area farmers do cultivation once in a year. The

productivity of small farmer’s less than the medium farmers. That is 54 quintal per hectare of medium farmer and 36 quintal per hectare of small farmer.

**Table: 2** Tilapara village

Farmer	Size of land holding	Use of tractor	Use of pump set	Use of chemical fertilizer	Use of thresher	Use of combine harvester	Use of HYV	Production per hector
1	1 hector	yes	yes	20kg/h	yes	no	yes	45 Qt.
2	2 hector	yes	yes	22kg/h	yes	no	yes	42 Qt.
3	1.75 hector	yes	yes	21kg/h	yes	no	yes	48 Qt.
4	1.47 hector	yes	yes	22kg/h	yes	no	yes	45 Qt.
5	0.6 hector	yes	yes	20kg/h	yes	no	yes	44 Qt.
6	0.67 hector	yes	yes	24kg/h	yes	no	yes	46 Qt.
7	2.4 hector	yes	yes	21kg/h	yes	no	yes	47 Qt.

Source: Based on 5 percent sample farmers of 2 selected villages

The farmer of Tilapara village does only Sali cultivation in summer season. The farmers mainly use to cultivate Aijong, Ranjit, Joha, Kola Joha, Basmoti, Bahadur, Ratna, Pan Jamuna, Bora Badhana, Chandramukhi etc. are the different variety of rice in summer season in a year. From the primary data it is clear that farmers in Tilapara village uses tractor, water pump set, HYV seed, chemical fertilizer, pesticide, sprayer, weeder, thresher etc. There is no government initiated irrigation system to the field. Depending on monsoon they do cultivation in the field and only three sample farmers have water pump set to facilitated irrigation to the paddy field. Those who have no pump set them hair the pump set to facilities irrigation to their paddy field. They used chemical fertilizer 20kg./hectare to 24kg./hectare as their own idea. In the village there is no use of combine harvester in agriculture. Each farmer has weeder to pull out weed from paddy field. Now tractors are not only used for tilling but also used as transport in their field and selling and purchasing product from field to market and market to home. Uses of tractors are increasing day by day in farmers’ life in the village. After using the capital equipment in agriculture instead of man and animal power their productivity increases compare to traditional process of agriculture. Their average productivity increases 42 quintal to 48 quintal per hector in Tilapara village. The farmers of Tilapara village do cultivation to meet their own demand not to sale or market supply. It also seen that the owner of the land does not do cultivation themselves in their field. They engaged some riot to do cultivation and divided the product between them.

**Table: 3** Medhiara village

Farmer	Size of land holding	Use of tractor	Use of pump set	Use of chemical fertilizer	Use of thresher	Use of combine harvester	Use of HYV	Production per hector
1	1.07 hector	yes	yes	24kg/h	yes	no	yes	46 Qt.
2	1.3 hector	yes	yes	23kg/h	yes	no	yes	44 Qt.
3	0.8 hector	yes	yes	25kg/h	yes	no	yes	47 Qt.
4	1.2 hector	yes	yes	21kg/h	yes	no	yes	46 Qt.
5	1.7 hector	yes	yes	22kg/h	yes	no	yes	45 Qt.
6	1.5 hector	yes	yes	20kg/h	yes	no	yes	44 Qt.

Source: Based on 5 percent sample farmers of 2 selected villages

The farmer of Medhipara village does only Sali cultivation in autumn season June-July to November-December, once in a year. Different variety of the rice cultivation are Aijong, Ranjit, Joha, Kola Joha, Basmoti, Bahadur, Ratna, Pan Jamuna, Bora etc. are the different variety. From the primary data it is clear that farmers in Medhipara village uses tractor, water pump set, chemical fertilizer, HYV seed, weedier to pull out weed and sprayer to spread fertilizer and pesticides, thresher etc. There is no government initiated irrigation system to the field. Depending on monsoon they do cultivation in the field and only two sample farmers have water pump set to facilitated irrigation to the field. In the village there is no use of combine harvester in agriculture. Now tractors are also used as transport in their field and selling and purchasing product from field to home and home to market. Uses of tractors are increasing day by day in farmers’ life in the village. The drivers of tractor have no training for tilling land. After using the capital equipment in agriculture instead of man and animal power their productivity increases Average rice productivity of Medhipara village is 44 quintal per hector to 47 quintal per hector. Before mechanization average agricultural productivity was 25 to 28 quintal per hector. Now the productivity increases at a considerable rate. After using the capital equipment in agriculture productivity increases gradually. It also seen that the owner of the land does not do cultivation themselves in their field.

They used to share cropper for cultivation and divided the product between them. The natures of cultivation in both villages are almost same.

#### FINDINGS:

Analyzing the problem in the study area of Karipara Gaon Panchayat the following outcomes are find out:

- i) The main occupation of the farmers of Karipara Gaon Panchayat is cultivation. They follow seasonal pattern spread over a year i.e. only autumn rice (Sali) cultivation and other session the paddy filed lying unused.
- ii) They used Tractor, pump-set, weeder, sprayer, HYV seeds, chemical fertilizer and pesticides etc. But they have no training how to use of such type of implements in agriculture. They are using it in agriculture as their own idea. This is very critical and gradually decreases in productivity of land.
- iii) Excess use of pesticides and chemical fertilizer is the root cause of threat to bio-diversity. It is the one cause of air, water and land pollution.
- iv) Agricultural Extension service (AES) in the sample village is limited. Without consulting with the AES, use of modern technique and implements destroy the original indestructible power of soil.
- v) Cost of production is increasing more compare to the productivity of per hectare of agricultural holding.
- vi) Sizes of holdings are uneconomic and it is difficult to use of tractor, pump-set.
- vii) Generally, 2 to 3 inches from surface of the land is more fertile which is known as creamer layer of land for agriculture, but use of tractor for tilling dig it 6 to 10 inches. It is one hindrance of sustainable development of agriculture.
- viii) They are not interested to use organic fertilizer in agriculture.
- ix) Farmers are not aware about sustainable agricultural productivity.
- x) Year by year using of chemical fertilizer in agricultural land becoming tight and tight and wooden plough cannot use for tilling.

If there could have been significant development in the field of agriculture and its allied activities due to the rapid growth of rural population. But in course of study, it is found that the Karipara Gaon Panchayat of Goalpara district witnesses a reverse situation. Because majority of the workers belonging young generation are not at all the willing to take up agriculture as their sole way of living hood.

Probable factors determining the production of a farmer are as bellow;

1. Awareness of sustainable agriculture
2. Stability of a farmer's land for cultivation
3. Availability of irrigation
4. Literacy standard of the farm family
5. Economic condition of the farmer
6. Farm size and tenural status of the farmer
7. Personal quality of the farmer
8. Agricultural technology of the farmer which he adopted
9. Government support to the farmer

In order to find out which of the above mentioned factors have the significant bearing on farmers decision in allocation of their sustainable production on different variables- size of land holding, irrigation facilities, use of HYV seeds, use of chemical fertilizer, market situation, credit facilities, knowledge of the farmer, policy of the government etc. The following multivariable regression equation model has been used

$$Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X_5 + \beta_6D + U$$

Where, Y is dependent variable, it indicates the total production of the sample farmers.

$\beta_0$  is the constant which represent the mean effect on Y of all those variables which could not be explicitly introduced in the model.

$X_1$  is the awareness of the farmers for sustainable agriculture

$X_2$  is the size of operational holding of the sample farmer.

$X_3$  is the irrigated area of the farmer.

$X_4$  is the use of HYV seeds

$X_5$  is the use of tractor

$X_6$  is the use of chemical fertilizer

D is the dummy variable use to compute the effect of financial assistant of the sample farmers.

D = 1, indicate directly benefited from government agricultural extension service system.

D = 0, indicates farmer has not received any direct help from the agricultural extension service system.

$\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6$  being the co-efficient of  $X_1, X_2, X_3, X_4, X_5, X_6$  and  $D$  respectively, are expected to be influence  $Y$  positively.

#### SUGGESTIONS

From the study to solve the problem following suggestions are to be made:

1. The productivity of mechanized firm is more than traditional farming but not sustainable. To get sustainable productivity the farmers have to use organic fertilizer first, like Cattle manure is a good source of nitrogen and organic carbon while goat manure is rich in nitrogen and potash.
2. Karipara Gaon Panchayat is populated area and their main occupation is cultivation. There are so many opportunities to generate income and employment in this sector. So, to maintaining sustainability block level initiative is most important through AES. AES should properly monitor the sector. The extension service to the farmer from the agricultural department of Goalpara district should be provided inform of new improved HYV, using season, fertilizer, pesticide, market etc.
3. The farmers of Karipara gaon panchayat are not well equipped with the firm mechanization properly. They used only minimum capital inputs in agriculture and which is the hindrance of rising productivity. So, in this regard the farmers have needed some training programme form agricultural department on how to use the capital equipments properly in their farm. This will lead to sustainable productivity.
4. Some representative farmers should be facilitate to participate in national and international level seminar or workshop, which will help to improving their agricultural productivity and inspire to import their product.
5. In the liberal era industries are growing in anywhere and to their necessary raw material must be supply by the farm sector. In this regards our local government and owner of the industry have made up MOU. This will directly help to the farmer and encourage producing raw materials for the industry. Then farmers will be benefited try to sustainable production.
6. Government should provide special loan on the capital equipment at subsidies rate to the farmer for sustainable productivity.
7. Rural people who have agricultural land they should be directly involved to the cultivation. In this regard government should have significant role to create environment that rural youth willingly come to eco-friendly agricultural.

#### Reference:

- i) Datt, Ruddar and Sundharam, K.P.M. 2007, Indian Economy, S. Chand & Company Ltd. Ram Nagar, New Delhi.
- ii) Indian Society of Agricultural Economics, January to March, 2013, Mumbai, Indian Journal of Agricultural Economics. ISSN, 0019-8014, Vol. 68, No. 1
- iii) Indian Society of Agricultural Economics, October to December, 2020, Mumbai, Indian Journal of Agricultural Economics. ISSN, 0019-8014, Vol. 75, No. 4
- iv) Bhagabati, Jagdish, 2006, In Defence of Globalization, Kalyani Publishers, New Delhi.
- v) Reddy, Narasimha, 2010 Challenges of Decent Work and Development in the Globalizing World, Tata-Mc Grow Hill, Bombay.
- vi) Tidsell, Clem and Sen, Raj Kumar, 2008, Economic Globalization, Vrinda Publications (P) Ltd. Delhi-91.
- vii) Dr. Ahmed Rais, 2009, Globalization and Economic Development, (Parts- I) Mittal Publication, New Delhi (India).
- viii) Hanumantha Rao, C.H. and Rahdakrishna, R, National Food Security: A Policy Prospective for India.
- ix) Planning Commissiopl, Tenth Five Year Plan (2007-2012), Vol. II
- x) Eliennic, G., (1988), Food and Poverty: India's Half Won Battle.
- xi) Lekhi., R.K. (2008), Agricultural Economics.
- xii) Agrawal., A.N. (2008), Indian Economy.
- xiii) Dhar., P.K. (2008), Indian Economy.
- xiv) Web site.