Name: Vinay Prasad Mandal

Supervisor: Prof. Haroon Sajjad

Department: Geography

Characterization of Farming Systems for Sustainable Agricultural Development: A Case Study of Katihar District, Bihar

Abstract

Agriculture has always been an important source of livelihood to the rural masses in India. Increasing population pressure on resources has been providing a barrier to achieve agricultural sustainability especially in rural areas. Identification of suitable crop sequence and efficacious measures to increase agricultural yield is necessary for sustainable agricultural development. It not only provides livelihood but also plays a key role in manufacturing and industrial sectors (Sajjad et al., 2014). Thus, the present study characterized the farming system based on land resources, biophysical factors and economic conditions of the sampled farmers to formulate sustainable farming systems for the farmers in Katihar district. Cropping pattern was identified using GPS locations. Maps of cropping pattern during *kharif* (rainy season crop), *rabi* (winter season crop) and *zaid* (short season between *kharif* and *rabi*) seasons were used to analyze the crop sequence in the study area. Block wise CLUI was calculated to identify the land utilization during *kharif, rabi* and *zaid* seasons. Analysis of cropping system revealed rice-maize-vegetables, rice-maize-rice, rice-maize-maize, rice-maize-jute, rice-pulse-rice, rice-pulse-jute, rice-pulse-potato and maize-maize-rice as the suitable cropping sequences on the basis of yield and cultivated land utilization index (CLUI) in the district. Land suitability was examined using analytical hierarchy process (AHP). NPK, irrigation, pH, drainage proximity, flood, rainfall, LULC and soil texture were used to examine the land suitability in Katihar district. Block wise land suitability and crop sequences analysis revealed that highly suitability class was found in Korha block having four rice-based crop sequences and one maize based crop sequence.

Moderate suitability was found in 11 blocks namely Amdabad (rice based), Falka (rice based), Sameli (rice based), Katihar (rice and maize based), Balrampur (rice based), Dandkhora (rice and maize based), Hasanganj (rice and maize based), Kadwa (rice based), Azamnagar (rice based), Mansahi (rice based) and Pranpur (rice and maize based). Farming system was characterized on the basis of biophysical parameters as normalized difference vegetation index (NDVI) and leaf area index (LAI). Relationship between NDVI and LAI was ascertained to validate the spatial distribution of biomass in the study area. Farm level characterization of farming system based was made on the basis of net returns. The data regarding characterization of the farming based on farm level have been collected through field survey, household survey, interviews with farmers and discussion with government officials during 2016-2017. The relationship between farmers category and factors of production were ascertained through correlation and multivariate regression. All the category of farmers received more net returns from the food crops than the cash crops. Cropping pattern and cropping system, land suitability, biophysical indicators, farmers' net returns and enterprises were analysed and integrated to suggest sustainable farming system at block level in the study area. Integration of cropping systems with livestock, bamboo and fruit cultivation were suggested to maximize the benefit of the large, medium, small and marginal farmers.