

Mapping Distribution Patterns of Population Density in GN Divisions based on Land Use Type Paddy – Eravur Pattu DS Division in Batticaloa District

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Introduction

Population density and distribution form one of the major tools used in the development. They can be used as an index for the development in the form of infrastructure and financial allocation. Lack of information in digital based form to the government and non- governmental stakeholders is a major drawback to engage in the development, based on the population distribution. Moreover, the calculation of population density as a flat value over the area without considering the land use, leads to the low density values in a particular DS Division. Therefore it is necessary to observe the population density distribution over an area with land use. Thus this study shows that the land uses which are not used for residential purposes such as water bodies, scrubs and forests, etc. should be removed from the calculations to get an understanding of the real areas where the population is concentrated. A value should be given to the residentially used lands that are known as residential potential. The study adopted the residential potential values from the findings of Indrasiri *et al.*, (2007) which has been applied for the Kalutara District, Sri Lanka.

This study has been carried out for the Eravur Pattu DS division, Batticaloa. The division is one of the leading contributors to the paddy production (23% in 2011) which consists of 39 Grama Niladari (GN) divisions with the population of 74020, whose main livelihoods are paddy, high land crops and animal husbandry (Statistical data, 2011). The agricultural land contributes around 43% of the total land extent of Eravur Pattu DS division and this clearly shows that the majority of the population engages in farming in the DS division. Studies show that the extend of the paddy and other crop land is diminishing due to various factors such as climatic change, land degradation and fragmentation, unplanned land use for development, etc. Therefore, it is necessary to develop a study with the objective of creating a map related data base on land use in paddy and other crops on GN level population density and distribution to the Eravur Pattu DS division, Batticaloa.

Methodology

This study presents the results obtained for Eravur Pattu DS division based on paddy and agricultural crop land use patterns. Population data at GN level were obtained from the statistical data, Eravur Pattu District Secretariat (2011). Topographical sheets of Batticaloa district (1:50000) were obtained from the Survey department to extract the land use pattern. The validity of the land use patterns were confirmed by the field visits and random questionnaire survey carried out in the GN divisions. The population distribution based on land use pattern was obtained for paddy by the following method which was adopted from the study by Indrasiri *et al* (2007). The paddy land use was digitized using Arc GIS 9.2 version in order to extract from the source data. The land use data set was intersected by the GN boundaries of the same DS division to extract the land use in each GND. Land use was classified into residential and non – residential and among residential land use pattern, paddy land was selected. Moderate residential percentage was given to paddy which was adopted from the study of Indrasiri *et al* (2007). Based on the residential percentage of each land use, the area contributing to residential

purpose by each land use was calculated for each GN division. The total residential area for each GN division was calculated. By dividing the population from residential area in each GND, population density was calculated. By multiplying population density by residential area of paddy land use, population distribution was calculated. Arc GIS 9.2 was used to map the population distribution based on paddy land in the Eravur Pattu DSD.

Results and Discussion

In the preparation of the digital land use pattern map, the land areas were divided into residential and non-residential land use. Forest, scrub, grass, mangroves and water bodies were identified as non-residential land use in the Eravur Pattu DS division. Among the residential land use 7 types of agricultural land use patterns were identified. Urban land uses are categorized under non-agricultural land use. However, considering the major livelihood pattern of the people in this area paddy land was selected. Figure 1 (a) shows the population density in the Eravur Pattu DS division in flat rate where the land use pattern is not taken into consideration. The population density classes were categorized into low, medium and high for easy understanding. The high and medium population density relies on the urban GN divisions such as Chenkalady, Eravur, Kommathurai and Iyenkerny, whereas the low density covers the most part of rural villages in the DS division. The GN divisions with low population density (flat rate) have higher extent of land area including agriculture/ non-agriculture and residential and non-residential land use compared to the urban GN divisions.

This reduces the density in these GN divisions such as Karadiyanaru, Eralakulam, Koduvamadu, Marappalam and Veppavettuwan. But these are the main paddy producing GN divisions in the Eravur Pattu DS division. The reservoir of Rugam is situated in these GN divisions and the irrigation channels flow can be observed here where the paddy cultivation is being carried out extensively in both seasons Yala and Maha. These facts can be ensured when a residential value is given to the paddy lands after discarding the non-residential land use in the particular GN divisions. The results obtained from the above method (Figure 1 (b)) showed high population density value in the paddy producing areas in the DS division. These results also supported by the study carried out by Indrasiri *et al* (2007) where same type of map representation was observed for Kalutara District when a residential value was given for vegetation.

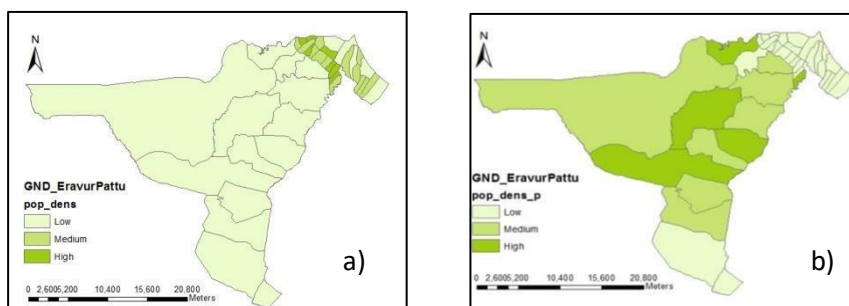


Figure 1. Comparison of the flat rate population density with moderate residential percentage assigned to paddy and crop land,:(a) population density – flat rate (b) Population density –with Moderate Residential percentage (paddy land).

Population distribution is another key index to make decision in a spatial basis. The distribution pattern gives a clear idea where the population is concentrated and how it differs based on the land use pattern. Figures 2a shows that the population is distributed highly in the paddy land compared to other non-agricultural lands.

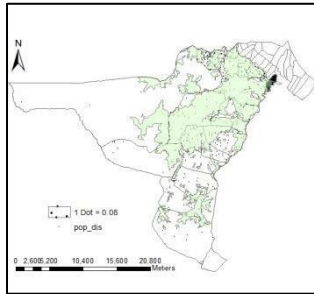


Figure 2. Population distribution of Eravur Pattu DS division according to the moderate residential percentage to vegetation.

The findings of the questionnaire survey reveal that the populations around these lands are fully engaged in paddy cultivation which is their main income generation sources. These map representations give a clear picture about the agricultural settlements and provide a good data base for the stakeholders to plan future developments based on agriculture. This is verified with the results of statistical data, questionnaire survey and field visits in these areas. Unwanted infrastructure planning and developments can be avoided by these types of data when it is used in planning.

Conclusions

The comparative study related to population density and distribution based on land use pattern in the Eravur Pattu DS Division, Batticaloa gives better idea in spatial distribution for further agriculture based researches rather than considering flat rate of population density.

References

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