Chapter 14
Measuring Dynamics of Ecological Footprint as an Index of Environmental Sustainability at the Regional Level using Geospatial Information Technology:
Measuring Ecological Footprint Using GIS

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ABSTRACT

Ecological Footprint (EF) analysis is the spatial measurement of ecological load exerted by the humans on the earth that arises from the concept of sustainability and sustainable use of Earth's resources. A region-based EF study is conducted for Birla Institute of Technology, Mesra (India) campus to improve its sustainability. Highlight of the study is the explicitness of the methodology for determining the

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EF that incorporates analysis derived from conversion factors mentioned in the Ecological Footprint consultancy publications along with inputs from GIS domain. Questionnaire-based survey from the respondents regarding resource utilization and geospatial enumeration of land use land cover that harbors the population and their resources are the two integral parts of the analysis. Total EF of the institution campus is calculated to be 0.645 gha/ individual. This analysis provides a strong framework for combining efforts in a manner that can communicate the immediate priorities for improving the sustainability strategy of the campus area.

INTRODUCTION

Ecological Footprint (EF) analysis deals with the procedure to estimate how much of the Earth (or how many planet Earths) it would take to support humanity if everybody followed a given lifestyle. For 2006, humanity's total ecological footprint was estimated at 1.4 planet Earths – in other words, humanity uses ecological services 1.4 times as fast as Earth can renew them. Ecological footprint analysis is now widely used around the globe as an indicator of environmental sustainability. It can be used to measure and manage the use of resources throughout the economy. It can be used to explore the sustainability of individual lifestyles, goods and services, organizations, industry sectors, neighborhoods, cities, regions and nations. Since 2006, a first set of ecological footprint standards exist that detail both communication and calculation procedures.

Ecological footprint analysis compares human demand on nature with the biosphere's ability to regenerate resources and provide services. It does this by assessing the biologically productive land and marine area required to produce the resources a population consumes and absorb the corresponding waste, using prevailing technology. Footprint values at the end of a survey are categorized for Carbon, Food, Housing, and Goods and Services as well as the total footprint number of Earths needed to sustain the world's population at that level of consumption. This approach can also be applied to an activity such as the manufacturing of a product or driving of a car. This resource accounting is similar to life cycle analysis wherein the consumption of energy, biomass (food, fiber), building material, water and other resources are converted into a normalized measure of land area called 'global hectares' (gha).

The current study aims in calculating the EF for Birla Institute of Technology, Mesra campus in order to improve its sustainability[1]. Limitations and assumptions in the analysis are critically dealt with. Highlight of the study is the explicitness of the methodology for determining the EF. Current scenario pinpoints the absence of standardized methodology for calculating EF. The method incorporates the analysis derived from conversion factors mentioned in the Ecological Footprint consultancy

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