

Measuring Worldwide Resource Sustainability Related to Socio-economic Scenarios under Ecological Footprint Model

Yen-Lan Liu

(Department of Geography, National Taiwan University, Taipei, Taiwan 106, ROC)

Abstract :

This paper describes the questions on the consequences of the assumptions about resource sustainability and economic growth and whether sustainability and economic growth foreclose each other. Specifically, it examines four questions by: (1) Identifying the main factors in earth resource consumption in the past 40 years; (2) Finding relationships among person's nutrition demands, food Ecological Footprint (EF) and income; (3) Formulating functional equations for resource surplus/overdraft periods; (4) Designing Socio-Economic Resource (SER) Matrix: A model to measure local (or national) trending toward sustainability/unsustainability. The main findings of this paper are: (1) $EF=f(\text{population, GDP})$. The results of our analysis are as follows: $EF_{1961-1978}=0.331519701X+0.5$; $EF_{1979-1999}=0.5742425961X^{-1}$, $X=\text{population (billion)}$; (2) Dietary energy supply (DES, kcal/person/day) and Food EF (the sum of arable and livestock EF) based on 1996 data. These results display an exponential growth model: $EF=70.584e^{0.001x}$; (3) GDP (per capita) and DES exhibit a logistic growth model, i.e., the logistic function $EF=367.86$ and $\ln(x) - 274.48$. [Nature and Science. 2004;2(3):19-29].

Key Word :

ecological footprint (EF); socio-economic resource (SER); sustainability matrix; resource consumption; gross domestic product (GDP); dietary energy supply (DES)

Volume 2, Number 3, October 2004, ISSN 1545-0740