

Environmental Capital and Sustainable Development: Macroeconomic Model for the Malaysian Forestry Sector

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Introduction

Environmental and natural resource owners have to guard against consuming their capital because it is the source of their continued well being. The accounting system was established as a backward-looking operation to gauge levels of income or profits for individuals and businesses. Accountants purge capital elements from receipts in order to arrive at a true measurement of income. In order to maintain a sustainable income stream one should calculate the Hicksian income and must account for maintenance of the environmental and natural resource capital stock. Capital needs to be maintained in order to sustain economic development. The calculation of income provides an indication of the amount that people can consume without compromising with present level of standard. Maintaining capital intact is prudent. In the present system of national accounts (SNA), the concept of capital maintenance applies to physical capital only.

Limited account is given to the depreciation of natural resources and the environment when their extraction and eventual depletion contributed to generating economic activities and Gross Domestic Product. Despite agreement among those who favour integrated economic accounts to incorporate natural capital directly into the SNA, no consensus has yet been reached to accomplish the task.

Malaysia is endowed with an extensive forest resource base. The forest area has declined by 23.0% over the last 25 years from 7,583 thousand ha in 1972 to 5,820 in 1996. Yet, the Peninsular Malaysia economy has grown 7.6% in 1974 to 3.8% in 1996 suggesting that the economy is growing sustainably. Nevertheless, there is a trend of forest conversion to make way for development. The share of forest resource rent (net price) of Peninsular Malaysia to its GDP has declined very rapidly from 0.5% in 1972 to 0.25% of GDP in 1996. This reduction implies wavering importance in relative terms but is not true in terms of absolute value.

The specific objectives of the study are therefore:

To develop a NRA framework for forest resource sector in Peninsular Malaysia in order to account for changes in the physical stock of resources as well as changes in the values of forestry resource in Peninsular Malaysia.

To incorporate the value of forest resource depletion into national and forestry sector accounts for Peninsular Malaysia.

To examine whether enough reinvestment is made from derived earnings of the forestry resource in Peninsular Malaysia to maintain sustainable income.

To assess the economic sustainability of the economy of Peninsular Malaysia.

Materials and Methods

The following steps were conducted:

Development of a physical stock and flow of timber during an accounting period.

Development of value accounts and measurement of forestry resource stock, flow and depletion in monetary terms.

Adjustment to national and forest sectoral accounts and also adjustment to an aggregate net domestic investment.

Conducting an economic sustainability test for Peninsular Malaysia.

A physical stock account was developed to trace the change in forest stocks during the last 25 years. Forest stocks include the natural forest, plantation forest and rubber estates and smallholdings. To determine the natural resource depreciation, two methods were compared net price and user cost method. It was found that the user cost that can estimate the Hotelling rent, is more appropriate and consistent with theory. Hence, the study applies the user cost method in estimating the resource depletion in forestry. The Gross Domestic Product (GDP) and Net Domestic Investment (NDI) of the nation are then adjusted by the forest resource depreciation to obtain the adjusted indicators (AGDP and ANDI). The trends in the AGDP and ANDI provide a general indication of the growth in reinvestment and income sustainability.

Sustainability can take either a strong or weak form. Weak sustainability refers to the case where the assumption of perfect substitutability between resource depletion and reinvestment can occur. This measure of sustainability was estimated using the Pearce-Atkinson Measure (PAM) whereby the value of natural capital depletion (forestry) is plotted against net savings with each of the two magnitudes expressed as a percentage of GDP. Net savings refer to the amount available for domestic investment after adjustment has been made for depreciation of fixed physical capital in Peninsular Malaysia. Another measure is the World Bank's measure of "genuine savings" whereby GDP is deducted for total consumptions and physical and natural capital depreciations. Negative "genuine savings" indicate that the economy is in unsustainable path.

Data for national income, savings, reproducible capital were obtained from Annual Yearbook of Statistics, Malaysia, data on timber production and values were collected from Annual Reports of the Forestry Department, data on timber prices were taken from the MASKAYU bulletins of the Malaysian Timber Industry Board, and cost data from firm surveys.

Results and Discussion

Conversion of natural forest land for agricultural and other development activities and other excessive logging caused natural forest timber stocks to decline during the last 25 years. Rubber wood stock also declined over time period because of declining rubber holdings area for other development purposes. However, the timber stock for plantation forest increased during the study period due to an expansion of compensatory plantation area and increasing growth of newly plantation forest.

Despite high extraction rates, the natural forest did not record significant depreciations during the last twenty five years except in 1993. High log prices relative to production costs and the practice of selective harvesting in permanent forest reserves, ensure substantial rents were created raising the asset value of the natural forests over time.

Plantation forest appreciated in value during the initial years as the plantations are adding biomass especially in the first cutting cycle years as no biomass is extracted and timber is harvested from mature stands only. Growth in the remaining stands and new replanting have added timber biomass to replace harvested stands. Theoretically had planting and harvesting areas been equal, it is expected that the rates of depletion to be constant and zero. Annual plantings in Peninsular Malaysia were not equal owing to delays in work contract approvals. The higher value of depletion relative to natural forest is because of higher cost of plantation establishment, maintenance and relatively lower logs prices than that of natural forest.

The timber asset value of rubber holdings was appreciating prior to 1995. After 1996 it depreciates. The annual rents realized from timber production still exceeded additions to the stocks. Annual real rents grew throughout the eighties and nineties as utilization of rubber log in the wood based industries increased. Beginning the middle of the eighties, the rate of depletion in rubber resource stocks rose steadily as land areas planted with rubber declines. Consequently, the proportions of annual depletion over annual rent have grown.

According to the user cost method, the annual forestry sector real adjusted gross domestic product (AGDP) increased for the study period. Despite, decreasing physical stock of forest resources income increased due to an appreciation of the real value of resource rent. However, the net price method provided contrasting findings. The user cost is considered to be the better method in the estimation of resource depletion as it unlike the net price method takes into account the future benefits foregone or gained. For the national economy, using both the methods, the study found that the trend of per capita real ANDP and AGDP increased almost three times over the last 25 years, indicating welfare increase.

Both the weak sustainability test ($PAM > 0$) and the World Bank (1995) Genuine Saving sustainability test confirm the economic sustainability of Peninsular Malaysia with respect to forestry resource depletion. This is suggestive that enough resource rents are reinvested in the economy, particularly in human resource and infrastructure development.

The findings of the present study covering only forestry suggest that Peninsular Malaysia has made a successful transition away from natural resource exploitative activities towards reproducible capital related production. The revenues generated from forest resource extraction have been channeled and invested in such a way so that the over all economic growth rate was sustaining over the last 25 years.

Conclusions & Benefits from the study

A system of natural resource and environmental accounts provides a framework for organizing the information required for effective policy. In their most basic form, NRA provides consistent inventory of resource stock and flow accounts may be developed for various resources, including a unique set of resources such as special ecosystems. In a more advanced form, natural resource and environmental accounts are used for analyzing and forecasting the impacts of changes in environmental policy. As an analytical tool, natural resource and environmental accounts link changes in policy to changes in human activity and resource depletion or growth. As long as human activity is at the level below the regeneration capacity of natural environment particularly forests, there is no secular decline in the quality of these resources. In order to maintain the above balance, a measurement of income incorporating degradation of the natural resources becomes necessary. True income can be thought of as a maximum amount that can be consumed in a given period without reducing the amount of possible consumption in the future period. This concept encompasses not only current earnings but also changes in the assets: capital gains increase income; capital loss reduces income. Present economic management requires that government should know the maximum amount of the forest, both quantity and quality, that can be harvested by a nation without causing its eventual impoverishment. It is important, therefore, that national income be measured correctly to indicate sustainable income.

Patent(s), if applicable:

not relevant

Stage of Commercialization, if applicable:

not relevant

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Graduate Research

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Rosli M.	Economic Valuation Of The Externality From Logging In Muda & Pedu Water Catchment, Kedah.	Resource Economics	M.S.	2000

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