



Accounting for Environmental Resources in Tanzania: A Theoretical Review

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Abstract

This paper has gone a long way to shedding light on how Tanzania accounts for environmental/natural resources destruction in the calculation of the national income or GDP with a view to avoiding an ecological/biodiversity bankruptcy and in so doing attaining greener economic growth. Green growth is nothing more than growth that improves the welfare of both current and future generations and that acknowledges the social costs and benefits of growth and its distributional implications in both the short and the long run. To say the least, Tanzania has not been taking into account environmental/natural resource destruction in the calculation of the national income. Economic growth that has been sustained by Tanzania has not been green growth, since it has been attained at the expense of environment/natural resources destruction, for which, no deductions of the cost to the environmental resources have not been made. Failure to account properly for the natural resource destruction that occurs in the process of national income generation makes the GNP unrealistic. Under such a scenario where omissions of environmental destruction in the calculation of the national income make the country an ecological bankrupt, even if its GDP may be rising is unrealistic.

Keywords: *Environmental resources, Green growth, Tanzania, Deforestation, Biodiversity bankrupt*

1.0 Introduction

Economic theory studies aspects of economic life that answer questions like, what to produce, how to produce, and for whom to produce, so that scarce resources may be efficiently allocated with a view to maximizing human happiness. So long as natural resources were available in unlimited quantities, natural resources and environmental issues could have been simple social issues. It is only with the transformation of natural resources and environmental goods into economic goods that economists started applying economic principles and theories to natural resources and environmental issues (Karpagam 2001, Kolstad 2000). The abuse of environmental resources has transformed environmental resources into economic goods, through a reversal in the supply-demand relationship of environmental quality, that is, the demand for environmental quality has registered a drastic increase while the supply of clean air, water, and other resources have declined (Bilame 2020). The increase in demand for environmental resources is attributed to the affluence that accompanies economic growth and development. At the verge of subsistence, people always worry about the quality of nature. To be more specific,

for poor communities what matters is survival that is sustained at the expense of natural resources and environmental goods degradation.

Use is made of nature both directly and indirectly to transform raw materials into final goods. During this production process, nature is polluted by emissions and wastes. Hence the conflict arises as a result of the incompatibility of the basic ecological system and the economic principles of business profitability, economic growth, and expansion of world markets (Arrow *et al.* 1996). To restore harmony, to reconcile the interests of human beings and nature--an ecological reorientation of the economic policy is required. Unless we derive unifying principles from these disciplines--ecology and economics--unless we adopt an ecological outlook that views society as a great interacting network of co-existing populations, many of our social and economic policies are doomed to failure (Arrow *et al.* 1996, Ekins 2000).

To this end, a country's national income which is defined as the total monetary value of goods and services produced in a given period of time usually one year must take into account natural resources and environmental concerns. Generally, Gross National Product (GNP) is the basis upon which countries are ranked from rich to poor. It is regarded as an indicator of a healthy economy--a rising GNP indicates that the country's health economy is improving and a falling GNP indicates a deterioration in the country's health economy as long as the environmental side effects of production and consumption activities were negligible and insignificant (Harris and Goodwin 2003, Davidson, 2000). However, today's economic activities result in significant damage to the environment and natural resources, which impose considerable costs on existing as well as on future generations. The particular way we measure GNP or GDP fails to consider environmental and natural resources concerns. In fact, GNP per capita does not by itself constitute or measure welfare or success in development. It does not distinguish between the aims and ultimate uses of a given product nor does it say whether it merely offsets some natural or other obstacle or harms or contributes to welfare (Karpagam 2001, Harris and Goodwin, 2003).

To this end, the objective of this paper was to make an analysis of whether accounting for environmental resources in Tanzania takes care of the negative effects brought about by the exploitation of those resources. Specifically, the study sought to shed light on the extent to which unsustainable harvesting of environmental resources and depletion of natural resources

due to unsustainable human activities are indeed taken care of when computing the economic growth (GDP) of the country.

2.0 Methodology

The methodology that was employed by this study involved reviewing various documents and publications covering the subject matter. A descriptive critical analysis of the information obtained from those documents and publications occupied a central place. It should at this juncture be noted that information/data from those publications were those that show the extent of the environmental degradation that Tanzania has and is experiencing and whether the extent of such degradation has been taken care of in the course of computing national income (GDP) growth.

3.0 A Review on Accounting for Environmental Resources

3.1 Accounting for Environmental Resources in Books of Accounts

A country's economic bookkeeping consists of income and capital accounts. While income accounts produce the Gross National Product (GNP) figure, capital accounts track changes in wealth. As timber factories, textile mills, office buildings, and other artifacts become old and fall into disrepair, subtraction is made from the capital accounts to reflect their depreciation in value (Ekins 2000). However, no similar subtraction is made for the deterioration of forests, soils, air quality, and other natural endowments (Grossman and Krueger, (1995). When trees are cut and sold as timbers, the revenue from such sales is counted as income and reflected in the GNP. Surprisingly, no deduction is made for the deterioration of the forest's destruction of a natural resource (asset). Not making a deduction of the costs imposed on the destruction of the natural resource (forest), inflates the national income and wealth. A country with such inflated levels of GNP will be considered better off than it really is and will automatically be ranked higher on the economic performance scale (Davidson, 2000, Karpagam, 2001). To this end, a failure to account properly for the natural resource destruction that occurs in the process of national income generation makes the GNP unrealistic. Under such a scenario where omissions

of environmental destruction in the calculation of the national income make the country an ecological bankrupt, even if its GNP may be rising.

The deficiency in the ability of the national income accounting framework to account for the environment arises mainly because of the inconsistent treatment of natural and manmade capital.

There are three specific shortcomings (Karpagam 2001). These are:

- ✓ First, the conventional national income accounts system measures a nation's wealth in terms of manmade capital only and ignores natural capital. Though natural capital (e.g. exploitable forests, fish stocks, minerals, and other assets such as fresh air, water, and the like) are valued highly by society, they are not included in balance sheets. Although national accounts, allow for the depletion of manmade capital in arriving at an estimate of Net National Product (NNP) or national income, they fail to record the depreciation (depletion) of natural capital.
- ✓ Secondly, the costs of environmental protection, that is, the expenditure incurred to restore environmental assets (such as pollution control equipment and medical expenditures on pollution-related diseases) are included in the national income and show up income-generating activities. No allowance is made for the corresponding environmental damages. Such expenditures referred to as 'defensive expenditures' are 'regrettable necessities'. Environmentalists feel that they should be regarded as the costs of consuming other goods and services rather than as benefits. Private firms deduct defensive expenditures from value added. In contrast, national income accounting considers such defensive expenditures as productive contributions to national output, if they are incurred by the public sector or households. It is held that such defensive expenditures should also be deducted from GNP in its current form.
- ✓ Thirdly, any residual damage to the environment that has not been covered by defensive expenditure should also be deducted from GNP. Failure to do so will give an exaggerated estimate of the GNP. To avoid this, any pollution that remains should also be assessed in terms of its damage and the assessed value should be deducted from the GNP.

The calculation of the GNP/GDP is thus distorted in two ways by overworking undesirable outputs (pollution) and by ignoring beneficial environmental-related output. Forests provide the best example of the distortion arising out of the failure of the national income accounting to

account for the depletion of the natural resource base upon which the production of wealth depends. Commercial felling of trees at rates greater than their regeneration increases current income levels at the expense of a decline in capital assets. Developing economies dependent on primary resources such as timber, minerals, and agricultural crops will be affected most if national income accounting excludes environmental factors.

Similarly, a failure to deduct damages done to the environment (pollution) while compiling the national income, leads to unrealistic GNP or GDP figure. The omission of environmental degradation in the compilation does not reflect sustainable income. Sustainable income is the maximum that can be consumed in a given period without reducing the amount of consumption available in the future period. Failure to measure sustainable income will affect development and growth. Of all the different concepts related to GNP, NNP or national income is considered to be relatively more sustainable because it deducts capital depreciation from GNP (Karpagam 2001, Davidson, 2000). However, GDP and GNP are more widely used because of difficulties associated with the measurement of capital depreciation. In spite of the difficulties in the measurements of capital consumption, environmentalists hold that allowances for capital consumption or depletion should not be confined to manmade capital alone, but should also be applied to natural capital such as forests, fish stocks, etc. Only when such adjustments are made will accounting reflect sustainable income or true income.

True income, in other words, refers to the maximum amount a nation can consume without depleting the stock of assets available for future generations. This requires allowance for depreciation and hence constitutes the difference between GNP and national income. Based on the same principle, environmentalists argue that GNP should be adjusted for the depletion of natural capital also; otherwise, income will be overstated. Environmentalists argue for three kinds of adjustments to national income to reflect the impact of income-generation activities on the environment. These are, as noted already, adjustments for the depletion of natural capital, adjustments for environmental degradation, and adjustments for defensive expenditure.

3.2 Real Calculation for the Value of Natural Resources

Adjustment for the depletion of natural resources requires that the stock of natural resources such as oil and gas reserves, stock of fish, forests, etc. should be treated in the same the way as stock

of manmade capital. Thus, a reduction should be made for the depletion of natural capital. Under the conventional system, NNP would be defined as:

$$NNP = GNP - D_M$$

Where “ D_M ” is the depreciation of manmade capital. If accounting is attempted for the depletion of natural capital,

Where “ D_N ” is depletion of natural capital. There are two ways of calculating D_N :

- ✓ Depreciation method
- ✓ User cost method

In the depreciation method, depletion is valued as that part of receipts from the sales of resources that can be uniquely attributed to that resource. Assuming zero extraction costs, whole receipts R would be attributed to the depletion of the resource. Hence environmentally adjusted GNP , referred to as, ENP , would be:

$$ENP = GNP - D_M - R$$

With the positive cost of extraction, “ R ” will include a cost element (like wages, rent, etc.); depletion then will be less than “ R ”. The depreciation method is criticized for not making allowances for the depletion of natural capital in the expression of GNP/GDP . On the other hand, the user cost method provides for deduction in GDP and GNP by redefining “ R ”. The user cost method is based on the principle that “ R ” the receipts from sale of a natural resource comprise of two elements: capital consumption or user cost method “ U ” and income “ M ” The recognition that the ownership of a natural resource confers an income advantage to its owners, makes all the difference. The relative shares of two elements--“ U ” and “ M ” in R depend upon the level of reserves, current rate extraction, and choice of discount rate to apply to future flows of income from sales. In user cost method R is defined as net receipts from sales, i.e. gross revenue from sales of the resource less purchase of current goods and services required to extract the resource.

The depreciation method estimates of income are significantly greater than estimates arrived at using the user cost method. This is because in the depreciation method depletion is expressed as:

- ✓ $D = R - \text{Cost of extraction}$, whereas, in the user cost method,
- ✓ $D = R - M - \text{Cost of extraction}$.

There is an additional income element to be subtracted and hence the residual estimate of depletion is less. In the used cost method GNP and GDP would be redefined to exclude the user cost depletion estimates. Hence income estimates using this method will be less than that of using conventional measures.

Environment degradation occurs when the quality of natural environment declines, caused by pollution of air, water, etc. Such degradation should be accounted for in the same way as the depletion of mineral resources discussed earlier above. However, practical problems of valuing the effects of such degradation are more severe than in the case of mineral resources. Deviation from an accepted environmental standard defined by the environmental authority is usually considered for measuring degradation. The cost of restoring prescribed quality/standards will give an estimate of environmental degradation. The definition of 'environmental standards' however, poses problems.

While estimates of depletion of natural mineral resources may be obtained using the replacement cost method or restoration cost method or willingness to pay method, degradation of environmental quality may be estimated using a willingness to pay method. Environmentalists argue that in addition to the depreciation of manmade capital and depletion of natural resources, costs of environmental degradation should be deducted from GNP/GDP to arrive at a sustainable national product.

In the conventional standard approach to national income accounting, defensive expenditures are treated as any other form of consumption and show up as income-generating activities. They are directly or indirectly included in GDP. Environmentalists argue that such defensive expenditures should be excluded from or at least deducted from GDP so as that we come closer to sustainable income. In the absence of defensive expenditure, there is environmental degradation--depletion of natural capital--identification and measurement of such expenditures pose challenges.

The practical, conceptual and theoretical limitations of attempting to measure the depletion of natural capital and identification of defensive expenditures are indeed overwhelming. However,

such an environmentally adjusted GNP and NNP will provide a more useful guide to economic performance and therefore to policy than the conventionally defined GNP and NNP.

3.3 The Current Status and Practice for Tanzania Accounting for Environmental Resources

Physical assets such as building equipment are valued monetarily as productive capital, but natural resources, in general, are not. In current accounting practices, the costs of depreciation of manufactured assets are usually subtracted from, or "written off against," the value of production as the assets depreciate with age. "This practice recognizes that a consumption level maintained by drawing down the stock of capital exceeds the sustainable level of income. Natural resource assets are not so valued. Their loss entails no debit charge against

Tanzania is endowed with valuable renewable natural resources such as forests, freshwater, fisheries, and coral reefs. The Northern Highlands of Kilimanjaro and Mt. Meru, and the Southern Highlands near Mbeya provide fertile soils for agriculture and species-rich forests. The Eastern Arc and Coastal Forests are globally recognized biodiversity hotspots that contain some of the highest densities of endemic plant and animal species in the world. Forests and woodlands cover over 50 percent of mainland Tanzania and provide vital habitat for biodiversity, protect watersheds and deliver ecosystem services (URT, 2017).

Competing demands for and open access to many of Tanzania's natural resources are causing the resources' degradation and are limiting their ability to continue to provide goods and services. Demand for water is increasing faster than available supply, with conflicts over water becoming increasingly common as a result. Tanzania's renewable per capita freshwater resources have declined from more than 3,000 m³ in the nineties to around 1,600 m³ in 2015, which is less than 1,700 m³ per capita, the threshold below which a country is considered water-stressed by the United Nations (World Bank, 2017b). Poor land use and watershed management practices have led to the degradation of forests and watercourses, threatening the very natural resource base upon which Tanzania's economy and the poor depend on. Deforestation rates are among the

highest in the world (Tables 1 and 2), with an estimated annual net loss of 483,859 ha over the period 2002-13 (URT, 2017). The country's unique wildlife assets have experienced an unprecedented crisis due to poaching, overcrowding, and the associated degradation of biodiversity. Overfishing and uncontrolled small-scale fishing are threatening the sustainability of fisheries, the resource base that many poor fishing communities depend on for their livelihood.

Table 3.1: Annual Net Loss of Forest Area: East Africa

	Forest Area (Thousand Ha)		Average Annual Change Rate (%)		
	1990	2015	1990-2000	2000-2010	2010-2015
Kenya	4,724	4,413	-2.8	1.7	0.9
Malawi	3,896	3,147	-0.9	-0.1	-0.6
Mozambique	43,378	3,7940	-0.6	-0.6	-0.5
Tanzania	55,920	46,060	-0.7	-0.7	-0.8
Uganda	4,751	2,077	-2.0	-3.3	-5.5

Source: World Bank 2019

Table 3.2: Annual Net Loss of Forest Area: Top Countries in the World

	Annual Forest Area Net Loss (2010-2015)	
	Area (Thousand ha)	Rate (%)
Brazil	98	0.2
Indonesia	684	0.7
Myanmar	546	1.8
Nigeria	410	5.0
Tanzania	372	0.8
Paraguay	325	2.0
Zimbabwe	312	2.1

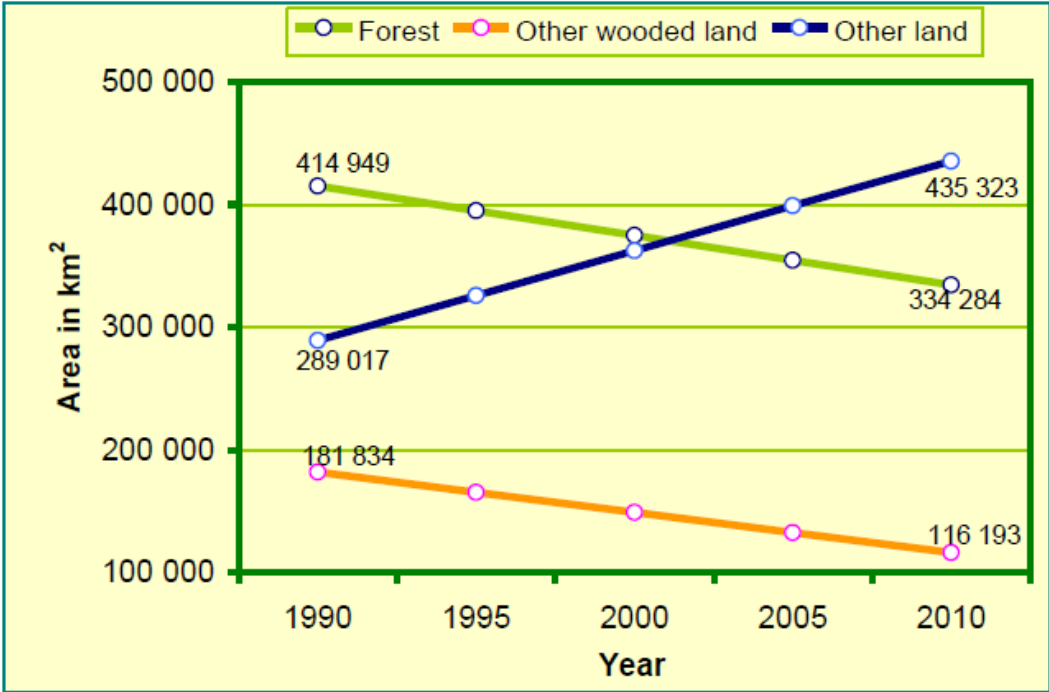
Source: World Bank 2019

The poor are most affected by the degradation of natural resources. Land degradation has been found to increase the likelihood of household poverty, as it reduces agricultural productivity.

Deforestation—among others caused by smallholder farmers’ shifting cultivation and tree cutting for fuel wood and charcoal production— reduces water availability, thereby worsening poverty levels. Degraded fisheries, due to open access and insufficient regulation, limit the availability of fish protein for the coastal and great lakes communities. Not only Lake Tanganyika is a prime example of an area marked by a significant decline in fish catches due to overexploitation but also Lake Victoria whose Nile perch fisheries declined significantly (Bilame 2012). Other forms in which the poor are disproportionately affected by natural resources degradation is through the increased burden of disease: contaminated water, attributable to the lack of proper sanitation facilities, causes cholera outbursts (Penrose et al., 2010) and increases the proliferation of disease vectors such as mosquitoes.

Population and economic growth are driving the depletion of natural resources, and the degradation of ecosystems and habitats. The ecosystem services these resources provide are vital for the country’s population. Particularly rural communities will be negatively affected by their degradation and overexploitation, as natural resources are a primary source of food and energy for them. The opportunity Tanzania faces is to reconcile the use of natural resources to meet the demands of the population and economy with the need to maintain functioning ecosystems. Reaching this balance will catalyze sustained growth. However, the current trend in the use of natural resources is not sustainable, leading to persistent degradation and loss of ecosystems, which constitute the main cause of natural capital loss. Although there is no current data on the trend of land cover in Tanzania, Figure 3.1 hereunder, gives us a clear message on the level of land degradation.

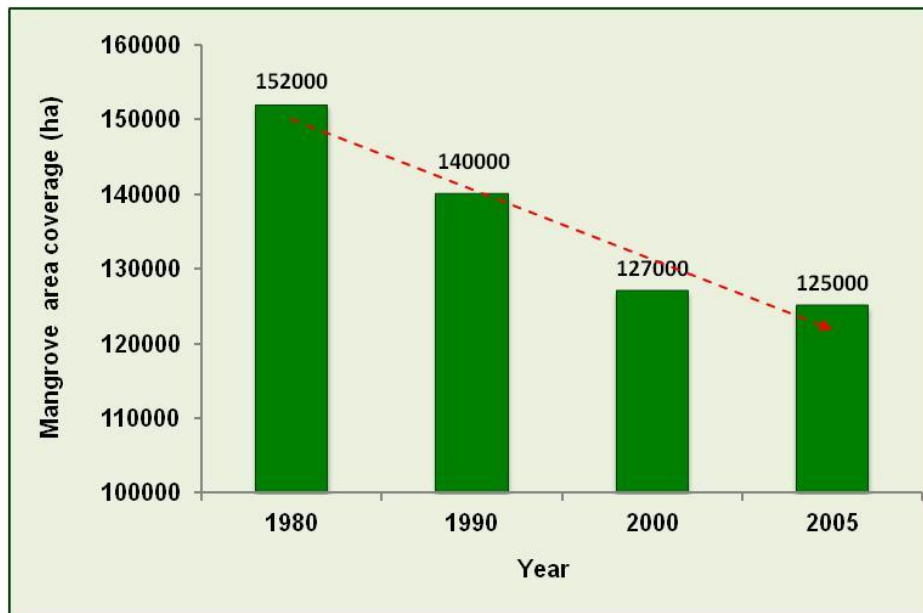
Figure 3.1: Trends of various land cover in Tanzania, 1990–2010



Source: URT (2012)

The extent of deforestation differs from one ecosystem or forest type to another. For example, a loss reported for mangrove forests in Tanzania mainland in a period of 25 years from 1980 to 2005 was 18% (FAO 2007). Despite the lack of current data for the same, it should be evident that mangrove forests have been degraded significantly.

Figure 3.2: Trends in Mangrove Area Coverage (1980–2005)



Source: FAO 2007

As a resource-based economy with a high urbanization rate, Tanzania's environmental degradation undermines economic growth and quality of life and disproportionately affects the poor. Rapid economic growth through the liquidation of natural capital provides a temporary boost to the economy but fails to create a base for sustained advances in wealth and human well-being. On the other hand, a development that focuses on the efficient and sustainable management of natural capital lays the foundation for long-term inclusive growth.

Based on the above discussion and data provided in Tables and Figures, one may ask some questions that call for food for thought. Does Tanzania's economic growth reflect green growth? Does economic growth take care of the negative effects brought about by the exploitation of environmental resources? Does the rising GDP in Tanzania indicate the country's healthy economy with respect to the environmental side effects of production and consumption activities? If answers to these questions are no, what should be done for Tanzania to attain a win-win solution?

Attaining a win-win solution implies nothing more than attaining economic growth that is green. Green growth acknowledges the trade-offs between growth and green. Production growth that is environmentally and socially sustainable enhances welfare the most, as environmental

degradation and increasing inequality reduce welfare (Economist 2014). The main difference between 'growth' and 'green growth' is that the latter acknowledges the role of natural capital in growth and its important role in the welfare of future generations. As it has been noted, capital stocks are crucial for growth and development, and, in order for development to be sustainable, current generations should make sure that capital stocks are at least maintained (Dercon 2012). Natural capital forms part of the capital stock of a country, so degradation of ecosystems, deforestation, and resource depletion reduces the welfare of future generations if resource rents are not reinvested in alternative capital stocks. When resource rents are reinvested in alternative capital stocks (e.g. human capital or other assets) future generations could inherit a similar amount of capital, and sustainable development would still be ensured (World Bank 2013).

As timber factories, textile mills, office buildings, and other artifacts become old and fall into disrepair, subtraction is made from the capital accounts to reflect their depreciation in value (Ekins 2000). However, no similar subtraction is made for the deterioration of forests, soils, air quality, and other natural endowments (Grossman and Krueger, (1995). When trees are cut and sold as timbers, the revenue from such sales is counted as income and reflected in the GNP. Surprisingly, no deduction is made for the deterioration of the forest's destruction of a natural resource (asset). Not making a deduction of the costs imposed on the destruction of the natural resource (forest), inflates the national income and wealth. A country with such inflated levels of GNP will be considered better off than it really is and will automatically be ranked higher on the economic performance scale (Davidson, 2000, Karpagam, 2001).

Failure to account properly for the natural resource destruction that occurs in the process of national income generation makes the GNP unrealistic. Under such a scenario where omissions of environmental destruction in the calculation of the national income make the country an ecological bankrupt, even if its GNP may be rising and it is unrealistic. The rising GNP of a country that is associated with environmental destruction neither can be termed *green growth* nor *inclusive growth*

From a welfare-economics perspective, green growth is nothing more than growth that improves the welfare of both current and future generations and that acknowledges the social costs and benefits (including environmental costs) of growth and its distributional implications in both the short and the long run (IPCC 2014, Jetske and Ezra 2015, Bilame 2020). To that effect, the core meaning of the concept of green growth can be simply stated as economic growth (growth of

gross domestic product or GDP) which also achieves significant environmental protection and takes on board all major sectors of the economy that employ a large proportion of the active working population (Jetske and Ezra 2015).

To this end, green economic growth takes into account environmental/natural resources destruction in the calculation of the national income with a view to avoiding ecological/biodiversity bankruptcy. An economic growth that is not green is likely to be attained at the expense of environment/natural resources destruction for which no deduction of the cost to the environment is made. If the deduction of the cost imposed on the environment is not made, the kind of economic growth (DGP) so far attained might not be realistic.

4.0 Conclusion and Recommendations

This paper has shed light on how Tanzania accounts for environmental/natural resources destruction in the calculation of the national income or GDP with a view to avoiding an ecological/biodiversity bankruptcy and in so doing attaining greener economic growth. As noted earlier on, Green growth is nothing more than growth that improves the welfare of both current and future generations and that acknowledges the social costs and benefits of growth and its distributional implications in both the short and the long run.

It is obvious from the reviewed literature that Tanzania has not been taking into account environmental/natural resources destruction in the calculation of the national income with a view to avoiding ecological/biodiversity bankruptcy. To this end, the economic growth that has been sustained by Tanzania has not been green growth since it has been attained at the expense of environmental/natural resources destruction for which no deduction of the cost to the environmental resources has not been made.

Since subtraction is made from the capital accounts, say for factories and office buildings as they become older, similar subtraction should be made for the deterioration of forests, soils, air quality, and other natural endowments from the national income or GDP. When trees are cut and sold as timbers, the revenue from such sales is counted as income and reflected in the GDP. Surprisingly, no deduction is made for the deterioration of the forest's destruction of a natural resource (asset). Not making a deduction of the costs imposed on the destruction of the natural resources, inflates the national income and wealth. A country with such inflated levels of GDP

will be considered better off than it really is and will automatically be ranked higher on the economic performance scale.

Failure to account properly for the natural resource destruction that occurs in the process of national income generation makes the GNP unrealistic. Under such a scenario where omissions of environmental destruction in the calculation of the national income make the country an ecological bankrupt, even if its GDP may be rising is unrealistic. The rising GNP of a country that is associated with environmental destruction neither can be termed *green growth* nor *inclusive growth*. This study recommends that Tanzania should strive to account properly for the natural resource destruction that occurs in the process of national income generation with a view to making GDP growth a reality.

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