



Economic value of marine ecosystem services in Zanzibar: Implications for marine conservation and sustainable development

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ABSTRACT

Marine ecosystem services are seriously undervalued, resulting in under-investment in conservation and lost opportunities for economic growth and poverty reduction. Economic valuation provides a powerful tool for sustainable development by showing how dependent the economy is on an ecosystem and what would be lost if the ecosystem is not protected. This paper estimates the value of marine ecosystem services in Zanzibar, links the values to the national income accounts, and quantifies how the benefits from each ecosystem service are distributed among five different stakeholder groups. Marine ecosystem services contribute 30% of GDP, yet the ecosystem is seriously degraded due to both human and natural causes. The paper explores the reasons for this, focusing on the distribution of benefits and the (dis)incentives this creates for conservation, especially among local communities that steward the marine ecosystem.

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1. Introduction

The critical role played by coastal and marine ecosystem services, especially in poor communities in developing countries, is now widely recognized; yet the Millennium Ecosystem Assessment [1] reports that these ecosystems continue to deteriorate worldwide, and with them the capacity to support human well-being. Unless the economic value of all ecosystem services is recognized, their contribution to sustainable economic welfare will be seriously underestimated, resulting in under-investment in conservation and lower incomes.

When integrated with the national income accounts, economic valuation can help two distinct but equally important groups: (1) line ministries, private sector and civil society organizations directly involved in the use and management of the marine ecosystem; and (2) agencies responsible for macroeconomic management, like the Ministry of Finance which controls the national budget and makes policies that indirectly affect the marine ecosystem. The former are often quite receptive to economic valuation, which can clearly help them with management. The latter have no direct responsibility for the marine ecosystem. To engage these decision-makers, we must demonstrate that they also

have a stake in sustainable ecosystem management. We do this by integrating ecosystem values with national income accounts in order to show the ecosystem's influence on the major indicators of macroeconomic performance, such as the contribution to GDP, employment and the balance of payments, and what can potentially be lost under mismanagement. But it is not sufficient just to estimate values; the *distribution* of benefits is crucial both for sector-level managers and macroeconomists.

Distribution of benefits is a critical factor for both target audiences but for slightly different reasons. At the sectoral level, information about distribution of benefits contributes to improved management; countless studies have shown that incentives for sustainable management are strongest when benefits accrue to those who steward natural resources. But in many developing countries, local communities often lose out to other users; when local communities do not have a sufficient stake in the sustainable management of a natural resource, conservation often fails.

At the macroeconomic level, policy-makers in many countries have adopted development plans in which poverty reduction has joined the traditional macroeconomic goals of economic growth and stability. Under such plans, monitoring poverty and income distribution has become a priority for macroeconomists. Valuation that shows the distribution of incomes from marine ecosystem services, especially the share accruing to poor communities, can demonstrate to macroeconomists the role of sustainable marine ecosystem management in achieving poverty reduction goals. This paper reports an application of this 'environmental accounting'

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approach to economic valuation of marine ecosystems in Zanzibar, integrating valuation with national income accounts.

Zanzibar is a small, densely populated island archipelago off the coast of Tanzania with many endangered and rare species of corals, fish, seagrass, mangroves, and other flora and fauna. The average per capita GDP was only \$415 in 2007 and roughly 50% of the population falls below the poverty line [2,3]. Its population of 1.1 million is highly dependent on the marine ecosystem, which, as we will show, accounts for 30% of GDP. Poverty reduction and economic development will depend on sustainable management of its natural capital, especially the coastal and marine ecosystem [4–6]. But despite its clear economic importance, the marine ecosystem is seriously degraded due to both human and natural causes: uncontrolled tourism development, rapid population growth, overfishing and destructive fishing practices, over-harvesting of mangroves, dumping of untreated wastewater from urban areas and periodic coral bleaching.

In the Zanzibari economy of 25 years ago, local communities had free access to the marine ecosystem and received all the benefits, almost entirely from artisanal fishing.¹ But from 1985 to 2007, Zanzibar embarked on rapid growth of a tourism based economy—annual tourist arrivals increased from about 19,000 to 219,000. Its spectacular beaches and coral reefs, combined with a rich cultural heritage, make Zanzibar a unique tourist destination and it has been declared a World Heritage Site. But the impact of this development path on the marine environment and local communities, the stewards of the marine ecosystem, were not carefully considered. The local communities are increasingly losing out to other stakeholders and Zanzibar's unique environment is becoming seriously degraded.

Economic analysis provides stakeholders with a powerful tool for decision-making based on the economic value of the marine ecosystem. Valuation provides a tool to understand how dependent the economy currently is on the ecosystem and to identify opportunities to promote marine conservation and sustainable development in the future. To do so, we explore: (1) the value of marine ecosystem services in the macroeconomy; and (2) how economic benefits are distributed among different stakeholders. We discuss the incentives or disincentives this creates for marine conservation and sustainable development.

The paper is organized as follows: the next section describes the overall methodology and data sources used. Section 3 describes the economic value of each of the major ecosystem services, and the distribution of benefits among five different stakeholder groups in Zanzibar and outside Zanzibar. The final section integrates the valuation of all ecosystem services with the national income accounts, and discusses the policy implications for marine conservation and sustainable development, as well as priorities for further work.

2. Approach to valuation of Zanzibar's ecosystem services

A comprehensive framework for accounting for marine ecosystem services in Zanzibar [7] is based on the approach of the United Nations [8] and the European Environment Agency [9] which integrates economic accounts with physical accounts for land use and the major components of the ecosystem, such as coral reefs and mangrove forests. We report only the economic accounts here. Using the categories of the Millennium Ecosystem Assessment, Zanzibar's most important ecosystem services include:

Provisioning services:

Fishing and fishing-related activities.

Seaweed farming.

Mangrove harvesting for fuel, timber, and other products.

Cultural and education services:

Tourism and related activities.

Education and research related to the marine environment.

Regulating services:

Habitat provision for fisheries and other species:

Waste water assimilation.

Natural hazard protection: storm protection and beach erosion control.

In order to integrate ecosystem values with the national accounts, the valuation approach must be consistent with the national accounts, which are based on market prices.² Income in the national accounting sense is called 'value-added,' and when one speaks of a sector's contribution to GDP, it refers to that sector's value-added. Value-added is calculated as gross revenue (the value of output) minus the cost of intermediate inputs (goods and services) used for production. Value-added consists primarily of two components³

- Compensation of employees—wages and salaries plus benefits and in-kind payments.
- Gross operating surplus or mixed income—a residual income that remains after paying for all other production costs. This component of income is a mix of several things: the earnings of the self-employed who are not paid an explicit wage; the 'surplus' to cover the cost of capital and depreciation; and resource rent that may occur when natural resources are the basis for economic activity.

Value-added accrues mainly to the private sector: employees and owners of businesses. The government of Zanzibar, like all governments, also benefits from economic activities, as the recipient of taxes and fees that are paid out of value-added. Relatively little information is available about taxes and fees in Zanzibar. We have included revenues that are either reported or can be reliably estimated: (a) visa and airport departure fees paid directly by tourists in Zanzibar, (b) some of the taxes and fees paid by businesses which include tourism-related levies (hotel bed night levy, restaurant levy and tour operator levy) and (c) part of the VAT, income and other taxes and levies. This represents a lower bound estimate of taxes and fees paid to the Zanzibar government. There is no estimate of additional taxes and fees that may be paid to the mainland government.

Given Zanzibar's focus on poverty reduction and the implications for sustainable management of benefits accruing to local communities, five groups of beneficiaries are distinguished:

A. Beneficiaries in local communities where activities based on marine ecosystem services occur:

- 1 Zanzibari villagers in coastal areas where most beach hotels are located and most fishing and seaweed farming occurs.
- 2 Urban Zanzibaris involved in businesses in Zanzibar Town and its suburbs, mainly tourism and some fishing.

B. Beneficiaries in Zanzibar, but not in communities where activities occur:

¹ Fisheries operated as an open access resource with no management. This was sustainable at that time because the population and fishing capacity were low relative to the resource.

² In contrast to the measurement of economic welfare.

³ A certain category of taxes, taxes on production, is also part of value-added, but is not significant in most of Zanzibar's marine-based economic activities.

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