Valuing ecosystem services from an Environmental Impact Study

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ABSTRACT

Cost Benefit Analysis (CBA) presents an objective analysis whether a proposed mining activity is economically feasible. In consonance with the rapid resource appraisal method of resource assessment in the EIS, CBA was done in order to demonstrate that a localized and contextualized analysis is feasible

Insights include the need for standard values in the country, the need to strengthen the technical output of the resource appraisal, and the appreciation of ecological processes as contributor to economic gains. The concept may be applied in conjunction with the current EIA guidelines in the Philippines.

Introduction

Under the current environmental policy of the Philippines, the Environmental Impact Study (EIS) system is viewed as a decision and planning tool (DAO 2003-30). The assessment process forms an integral part of project planning and an essential part on the preparation of the feasibility study which aims to predict the project impacts in the earliest stage possible to influence policy decisions to reduce cost and present development options. The EIA process is in parallel to the project process with each project step having a counterpart to the EIA process (Figure 1). The pre-feasibility phase of a project is in consonance with the establishment of a baseline data which can be channeled to a Cost Benefit Analysis (CBA). CBA is a rigorous process by which economic values of resources are weighted against the projects concrete gains.

The CBA step is not usually done in the Philippines for the absence of valuation standards. As a downside of this, the EIS system is perceived to favor economic gains over environmental protection (Malayang, 2005; Villaluz, 2010; Ingelson, Holden and Bravante, 2009). While options for projects are presented, they are cursory and are limited by the options of the developer. As there is no CBA, there was also no standard premium that decision makers attribute to environmental impacts that decisions are not independent of their values and subscribed principles (Jay et al., 2007) putting question on the effectiveness of the EIS system as a planning tool.

This paper aims to demonstrate a localized approach to ecosystem services valuation by integrating the concept with the existing policy framework of EIA and putting into practice the use of baseline data in Cost-Benefit Analysis (CBA).

The Project

A mining project is proposed covering 11,522 hectares set to produce 2.6 million tons of nickel and 5 billion pounds of cobalt (Intex, 2009). It is set to invest more than 108 trillion pesos for its 25-year initial mining plan and is considered to be a significant investment to a beleaguered industry criticized for instigating environmental degradation rather than economic development in the host communities. The transference of censure to the mining industry to this particular project is premised on the following: it's location in the critical watershed of Oriental Mindoro, and it is located in an ancestral domain claim of the Mangyans. The watershed feeds the Mag-Asawang Tubig River network that irrigates more than 7,000 riceland downstream, the major livelihood of at least 2 municipalities. The cultural and heritage value of the area is also unparalleled where Mangyan culture is directly intertwined with the land.

Valuation Methodology

The valuation project was an initiated with a review of the baseline study conducted for the proposed mining project in 1991 as part of the EIS for the project. EIS establishes a snapshot of resources given all anthropogenic influences to an area on the time of the study, thus a rapid resource appraisal report. Resources were identified based on four major aspects: terrestrial ecosystem, freshwater ecosystem, marine ecosystem and socio-economic aspect. In consultation with other groups, resources not explicitly identified on the baseline study were also listed. Reviews of related literature were done to look for most logical value that can be transferred by looking at the context of similarity on the location of the study. When there was none, the most economical valuation method is used. .

Resource Value

Computation of damage values of resources were taken in context of the possible impacts. On freshwater fish, impact of increased sediment in the water will compromise its habitat which will result to a) death of the fish from gill damage; b) non-viability of breeding habitat; c) decrease in habitat quality. Decrease in opportunity is taken as proportionate to the loss of land from mining relative to the total mining area, or 2% annually. It should be emphasized, however, that the assumed decrease is for simplicity of discussion as there are no standards for freshwater impact valuation. Impacts usually entail total burial of waterways but with gradual recovery.

Damage costs to irrigation may be due to a) decrease in rice harvest from decreased water quality and damage to soil fertility; b) increased maintenance cost of canals; and given worst case scenario that the waterways may be totally silted over, c) loss of irrigation water. For simplicity of discussion and absence of standards for loss on irrigation water, values were also computed as directly proportional to area of mined site relative to total area set for mining

For all marine resources, annual loss was computed at 1.5% based on actual fish catch reduction data from mining sites in Palawan. Biggest loss is sustained by possible loss of mangrove carbon sequestration function.

Computation of all forest resources was straightforward as resources were valued per 250-hectare block, the proposed mine blocking strategy. Each block valued for its resource was also taken as the total damage cost.

In valuing agricultural resources, only the productive land within the mining tenement and the host barangay were considered. Rice is projected to be impacted by siltation of the river while the fruit-bearing trees may be affected by dust that lowers fertilization probability. Some of the areas may also be permanently closed and cannot be accessed by owners. As these lands are the foremost receiver of silt from mining tenement, the projected impact is about 10% for the first 5 years, 20% for the second 5 years and 50% decrease onwards to 25th year.

Total resource loss values are presented in Table 1.

Table 1. Total Net Present Value for 25 years at 20% discount for all the resources considered.

Aspect	**Total loss at 10% discount for 25 years (in million PhP)**
Freshwater Resources	43.00
Marine Resources	308.62
Forest resources	10,394.61
Agricultural resources	663.47
Resettlement/Disturbance cost	157.11
Health	1,447.41
Livelihood	4.81
TOTAL RESOURCE LOSS VALUE	**13,019.04**
Recurrent Cost	64,059.27
Salary	2,998.50
Taxes	23,979.42
TOTAL PROJECT COST	**202,246.42**

Total direct cost attributed to the company operation is 91,037.19 million pesos bringing to total project cost to 202,246.42 million pesos

Total benefit

Income expected to be generated by the sales of minerals are the biggest of the benefits but will be directly channeled to corporate profit which may be repatriated (RA 7942). Taxes paid by mining companies are the biggest direct benefit from mining projects. Several taxes are expected to be paid – income, business, and income tax. On the community side, direct benefit is through employment of local communities. Bigger than direct employment is the indirect employment computed to have 1:4 ratio (ICCM, 2012).

Other benefit includes the recurrent cost involving funds channeled to environmental protection as well as social development projects. Fund that is exclusively used for host community development is also a big benefit.

Presented in Table 2 is the total benefit of the proposed project.

Table 2. Benefits from the proposed project.

Aspect	Value at 10% discount for 25 years (in million PhP)
Net Income	135,490.75
Taxes	23,002.25
Direct Employment	2,998.50
Recurrent Cost	3,901.69
Community Assistance	977.18
Indirect Employment	8,995.50
Total Benefits	**175,365.86**
Total Costs	**202,246.42**
Net Benefits	**-26,880.56**

At 10% discount factor, total project cost (proponent's cost + damage cost) is at PhP 202,246.42 million while total benefit is at PhP 192,921.73. Total net benefit is PhP -26,880.86 million.

Computed Benefit-Cost Return (BCR) is .44 favoring non-commencement of the mining project.

Insights

It has to be emphasized that environmental cost /damage cost of the project is only 6% of total cost while the proponent's cost accounts for the bulk value (Table 1). On environmental side, it may not be profitable, but hidden on the company's projection is the stock market trading profit which tips the balance towards project commencement. This also spells the possible difference on the CBA process conducted based solely on declarations and those based on projections.

In-step with the EIA process, this paper demonstrate the CBA is doable despite constraints of funding and time. Baseline data are exploited for valuation giving more value to data gathering. Using CBA, the spatial impact of the project is emphasized. Most of the impact predictions in the EIA are confined to at least 1-kilometer radius from the project site. Downstream impact of vegetation clearing as well sediment loading were not tackled clearly in impact predictions.

Environmental valuation is always dependent to data quality. In this valuation exercise, the forest ecosystem services depended so much on values that are derived from foreign publication putting into question the adaptability of the data. Culture is also not valued for the lack of valid quantification option or proxy. As a resource-rich county, Philippines is in need for the government to have standard tools and methodologies that form the basis for informed decision for sustainable resource use.

In support of this articulated need, Wealth Accounting and Valuation of Ecosystem Services (WAVES), a global facility led by WorldBank that promotes natural resource accounting within the national accounting and planning system, included the Philippines as one of the pilot sites (WAVES, 2015). The program tries to tackle the issue of bridging between policy and environmental management by implementing natural capital accounting using United Nations System for Environmental-Economic Accounts (SEEA). The program essentially use a three-step approach: environmental scanning, calculation of benefits and costs, and channeling results to policy decision.

The integration of the program into policy framework, however, is limited by the availability of funds being a donor-driven initiative. The development of ecosystem accounts is currently on its 4^{th} year of the 7- year plan and limitation include limited human resource need. The target of fully integrating ecosystem valuation into the national accounting system may also be buckled down with policy limitation later.

This paper demonstrates that valuation is possible, and that given the existing EIA protocol in the Philippines, economic gains may be estimated and thus adds another dimension for a well-informed decision.

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