



## ***Slope Stability and Soil Erosion Regulation Ecosystem Service: A Case Study with an Area's Revegetation Project***

### **EXECUTIVE SUMMARY**

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In its iron ore exploration and processing activities, Minerita Minérios Itaúna Ltda. has a direct relationship with natural capital, both for water demand in the production and for soil use in the areas where mining actually occurs. In the recent Brazilian scenario, the discussion about slope stability and potential negative impacts has become a trend topic, given the disruptive events.

Considering this context, for the case study, the business chose to assess its relationship with soil erosion regulation ecosystem service in the slopes it operates in Lagoa das Flores Unit, in Itatiaiuçu municipality (Minas Gerais State). For that purpose, Minerita calculated the soil eroded annually in two different land use scenarios, covering a 14-hectare area downstream the mineral deposits.

Initially, soil erosion physical metric was calculated both for a scenario in which the soil was exposed and for a scenario in which there was native vegetation. Applying the Universal Soil Loss Equation (USLE), the amount of soil carried away in both situations was calculated, and the result indicates a

positive impact with revegetation, avoiding carrying away 1,354.03 tons of soil/hectare/year.

In order to value the soil erosion regulation ecosystem service provided by native vegetation, the Avoided Costs Method was used, measuring the cost to remove soil in case of mudslide, which was estimated as BRL 40 per ton. This value only takes into account the removal of carried material, not considering issues related to environmental legal actions, potential silting of water bodies, or damages to neighboring populations. Therefore, with those values in hand, an estimate was made about the return on investment for the revegetation project in 2.5 years.

The results point to the relevance of revegetating exposed slopes in the mining area, thus avoiding carrying away the materials downstream the mined area. It prevents significant impacts to the environment and to the company neighboring population, keeping a good relationship with stakeholders and regulating bodies, and preserving the environment as much as possible.



## Reporting of Dependencies, Impacts and Externalities

Responsible for completing: Gustavo Freitas

### Project drivers

**Goals:** Assess risks and opportunities; Compare options; Assess impacts on stakeholders; Communicate internally or externally.

**Description:** The drivers that encouraged Minerita Minérios Itaúna Ltda. to assess its relationship with soil erosion regulation ecosystem services and estimate the values saved by the business due to the revegetation of exposed slopes were: firstly, the need to avoid any environmental impact/accident, keeping the company surrounding area as preserved as possible, and, secondly, the relationship with neighboring communities and regulating bodies, which would imply extended trust and openness from community members in regards to activities developed by the business.

### Project scope

**Object of the Project Analysis:** Project

**Description:** slopes at the Lagoa das Flores Unit

**Geographic Area:** municipality of Itatiaiuçu (Minas Gerais)

**Step(s) of the Value Chain Included:** Own operations

**Type of Approach:** Retroactive and prospective

**Time Horizon:** 1 year

**Ecosystem Services:** Soil erosion regulation

### Soil erosion regulation

**Role played by ecosystems in controlling soil erosion processes – natural processes, which can be accelerated or retarded depending on the type of use and the soil management practices adopted.**

**Method(s) Used:** Avoided Costs Method (ACM).

**Results:**

**Dependency:** Not estimated

**Impact:** BRL 4,160.00

**Externality:** Not estimated

**Data Used:**

**Type of Data:**

**Total area covered in erosion estimates:** 14 hectares

**Different soil uses:** Soil revegetated with a seed mix

Acquired

**Loss of soil nutrients (Method 1):** Not applicable

**Turbidity in the body of water (Method 2):** Not applicable

**Further Information**

**Results from physical metrics:** 1,354.03 tons of soil/hectare/year

**Assumptions adopted in the valuation estimates:** Cost of the seed mix, labor and equipment used for soil removal.

**Adjustments or derivation applied to the methods and tools used:** Calculated based on the avoided cost for soil removal from the environmentally protected area.

**Others:** 14 hectares of slopes with ramp height ranging between 7 and 10 meters, recovered with seed mix.

## Analysis of the results

The importance of this study to the company is clear when you look at the resulting numbers, which show large scale reduction of negative impacts that can be avoided, by implementing relatively low-cost preventive actions that offer 'environmental safety' for activities associated to the mineral extraction process.

## Management of ecosystem services

**Use of ecosystem service valuation results:** Cost-benefit analysis; Assessment of damages caused to natural resources; Definition of strategic goals and progress monitoring; Environmental system management; Social and environmental impact assessment.

**Description:** The results obtained from all studies related to natural capital can support new actions that help manage risks in the entire mineral extraction industry, introducing new tools for analyses, goal setting, and monitoring, as well as opportunities for improvement in the management system and use of new techniques or strategies related to ecosystem services.

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