



IMPACTS OF EXPLOITATION OF STONE IN THE RIVER TENA, NAPO PROVINCE, ECUADOR.



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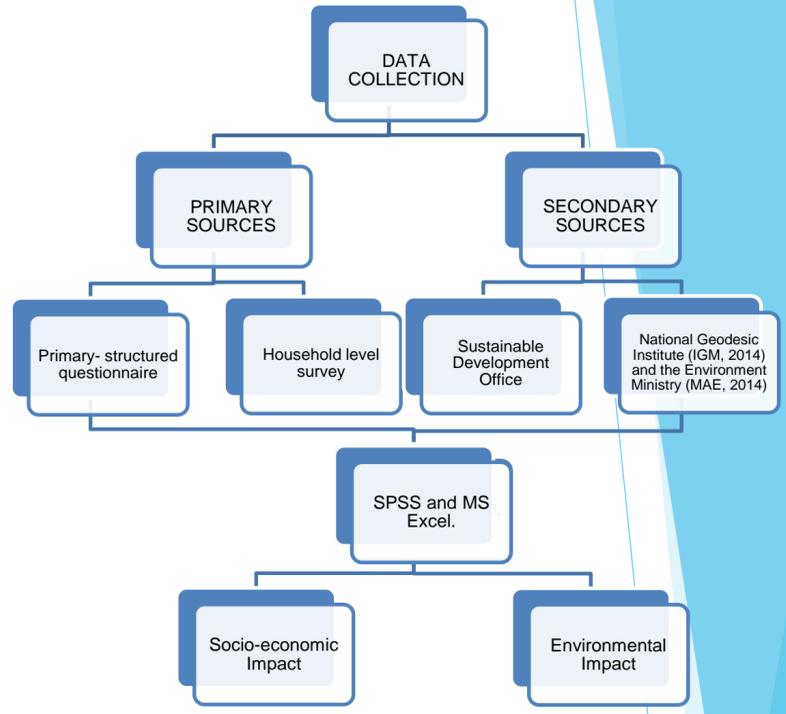
INTRODUCTION

Mining is a major economic activity in many developing countries. It has become one of the main means of livelihood for isolated or low-income communities. Mining exploitation has been carried out in a range of ways from industrially to artisanal or small scale. However, it is highly detrimental to the environment, producing enormous quantities of waste that can have harmful impacts for years. Numerous studies [1-3] have commented on the potentially-adverse impacts that mining can have on the natural environment, on society and cultural heritage and on the health and safety of workers and residents of nearby communities.

In Ecuador, mining is one of people's main sources of income. Over the years, both illegal and legitimate mining have been employed to extract mineral resources

mainly in the south of the country. [4] However there have been few approaches to the extraction of stone, which is one of the country's main economic activities due to growing demands from activities such as road construction, housing construction, flood control and wall maintenance. Mining of stone is carried out in open quarries, riverbanks and riverbeds, where severe environmental impacts can occur such as: water pollution habitat alteration, land conversion and degradation. Skies in the Ecuadorian Amazon Region (EAR) have a high water potential and many of its rivers supply the Amazon basin, hence this activity is carried out in the aforementioned places, hence the importance of examining the main socio-environmental impacts of the activity extractive in the River Tena and the San Pedro community,.

METHODS



RESULTS AND DISCUSSION

Table 1 Socio-economic characteristic of respondents (z=170)

	Frequenc y, n	Per cent, %
Gender		
Male	87	51,2
Female	83	48,8
Household size		
1-3	43	25,3
4-6	108	63,5
7-9	18	10,6
>9	1	0,6
Education Level		
No formal education	67	39,4
Primary	78	45,9
Secondary or Tertiary	25	14,7
Variable		
Main occupation		
Agriculture and livestock	32	18,82
Mining	14	8,24
Tourism	16	9,41
Small business	21	12,35
Agriculture, livestock or mining	27	15,88
Government employment	17	10,0
Construction Work	18	10,59
Unemployed	25	14,71
Total	170	100

Source: Field survey (2015).

Table 2: Main effects on the community from stone mining according to survey respondents.

Variable	Frequency, n	Per cent, %
Effect on the community		
Water pollution and destruction of the river structure.	33	19,41
Floods	48	28,24
Decreased tourism	28	16,47
Death of aquatic species	18	10,59
Soil erosion	21	12,35
Deforestation	16	9,41
Diseases	6	3,53
Total	170	100

Source: Field survey (2015).

Table 3. Measures for the proper management of mineral resources.

Measures or actions	Frequency, n	Per cent, %
Plan the operation properly	39	22,9
Limit exploitation sites.	25	14,7
Meet established environmental measures	63	37,1
Prohibit any extraction of stone	43	25,3

Source: Field survey (2015).

Mining offers a variety of socio-economic benefits, but the environmental costs, if not well managed, can be huge in terms of soil degradation, forest depletion, habitat alteration and water and air pollution [5-7]. These factors have negative consequences for sustainable development and therefore require urgent attention. The extractive industry activity causes serious damage to the soil, damaging soil structure through excavations and the top layer of fertile soil is lost. In our case, the operation is performed on the slopes of the river causing landslides into the riverbed, loss of plant cover and increased erosion. The remains of the

extraction occupy areas of waste storage on the ground. All physical changes have a direct impact on the biotic environment. Physical degradation damages natural habitats and disrupts natural succession, because thin film laminate soil erosion changes the natural conditions and biodiversity is altered [6]. The San Pedro community is known for its rich biodiversity resources. Much of the area is covered by tropical rainforest and the River Tena is surrounded by areas of primary rainforest. According to [8] mining activities can degrade up to about 30% of a forest, affecting Many important flora and fauna species are threatened or endangered.

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CONCLUSIONS

- The economy of the region presents great difficulties with employment generation and family income which leads to the overexploitation of natural resources.
- Despite not being a primary economic occupation for the majority of the region's local people, mining does nevertheless provide essential supplementary income.
- In terms of environmental impacts, the perception shared by local communities is that mining has caused the alteration of river water courses, landscape alteration and damage to the flora and fauna of the Amazonian ecosystems.
- The community supports the proposal to properly plan the exploitation of stony minerals with proper treatment and disposal of waste and compliance with established environmental measures in order to avoid the risks of flooding and direct damages to the environment.

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