ANTAMINA: TRANSFORMING 25 YEARS OF DATA TO A BIODIVERSIY CONSERVATION TOOL

Claudia Valencia Franke, claudia.valencia@snclavalin.com, SNC-Lavalin, Peru.
Lucía Ibarguren Albín, lucia.ibarguren@snclavalin.com, SNC-Lavalin, Peru.
Edsael Sánchez Rondán, msanchezr@antamina.com, Compañía Minera Antamina, Peru.
Jessica Flores Pérez, jflores@antamina.com, Compañía Minera Antamina, Peru.

Abstract

Antamina is a copper & zinc mine located in northern Peru, operating since 2001. Antamina has been conducting biodiversity surveys since baseline studies were started in 1996, with regular follow-up surveys ever since. That is 25 years of important local biodiversity data.

Although yearly monitoring reports usually assessed main trends to confirm biodiversity was prospering in its surrounding areas, until recently data was being only used to demonstrate compliance with national authorities, external reporting or other informative purposes. But in 2020 they decided it was time to transform such vast information into a tool to preserve local biodiversity.

Data was processed resulting in >40,000 records of flora and fauna species from seven ecosystems. A Biodiversity Action Plan was devised under IFC Performance Standard 6, which led to identifying 14 Priorities for Conservation and preparing a thorough action plan for the next 10+ years. This new level of knowledge has helped to understand the importance of local biodiversity, including the presence of locally endemic species. For example, some were previously only known from a limited number of locations in publications, but in Antamina they have been regularly found, some in abundance and prospering within its area of influence.

This new focus will drive Antamina's efforts to contribute to biodiversity conservation in the coming years, with specific plans to work with other institutions to both contribute to science & be able to plan mining growth while preserving and protecting its biodiversity-rich surroundings.

1. Introduction

Antamina is large polymetallic mining complex that produces primarily copper and zinc concentrates, but also molybdenum, silver, and lead by-products, operated by Compañía Minera Antamina. It is located at an altitude of 4,200 meters above sea level in the Andes Mountains in north-central Peru, in the Ancash Region, approximately 270 kilometers north of Lima. The mine is an open pit, truck/shovel operation, where copper and zinc concentrates are produced, which are then transported by a 302-kilometer slurry concentrate pipeline to Puerto Punta Lobitos (PPL), Antamina's port for shipment to smelters and refineries world-wide. The port is located in the coastal province of Huarmey, also in the Ancash Region.

The Antamina project began in 1998, the year its first Environmental Impact Assessment (EIA 1998) was approved, and commercial production began in mid-2001. Since then, 16 environmental management documents of various magnitudes have been approved, the last one in 2021. All these documents have included baseline studies as well as monitoring surveys for the local biodiversity, resulting in 25 years of significant data about the ecosystems surrounding the mine.

As part of the yearly monitoring program reports, Antamina has been assessing trends to confirm biodiversity is prospering in its surrounding areas. Data was being only used to demonstrate compliance with national authorities, external reporting, and other informative purposes. However, in 2020, Antamina decided that their substantial amount of data should be transformed into an active biodiversity

conservation tool, therefore Antamina's Biodiversity Action Plan (BAP) was conceived. The first version was approved in 2021; it focused on the mine area, where Antamina's most significant activities and associated impacts occur. This paper describes the process of compiling the data, producing Antamina's BAP and the way forward.

2. Study Area Landscape

Due to its location, the mine area is deeply influenced by the Andes Mountains. The Tropical Andes behave both as a pathway for species dispersal and as a biogeographical barrier (Janzen, 1967; Young *et al.,* 2002; Ghalambor *et al.,* 2006), which combined with the extreme weather conditions at high altitudes, has led to many speciation processes, resulting in significant species richness and endemism, making the region a biodiversity hotspot (Mittermeier *et al.,* 1999, 2005; Myers *et al.,* 2000). This area is characterized by a climate that is considered extreme, marked by two well-differentiated seasons, beginning with a few months with intense rains (wet season, peaking between December and March), followed by several months of drought (dry season, peaking between July and September).

Since it is located high in the mountains, the project's study area (≈24 000 ha, which includes the mine area ≈3,200 ha) is characterized by its two distinct extreme seasons. Its landscape is composed of typical high Andes ecosystems. There are six different terrestrial ecosystems, including five natural and two artificial. The landscape surrounding the mine is dominated by natural ecosystems, with Andean grassland and rocky outcrops representing over 70% of the project's study area. Another important ecosystem present are highland wetlands or "bofedales", which only represent 2% of the study area but are highly valued for the multiple ecosystem services they provide, particularly as they are the only "green" areas during the dry months. The final two natural terrestrial ecosystems are shrubland and high Andean Forest, both of which are located at the lower parts of the study area, close to where the two artificial ecosystems (forest plantations and agricultural land) can be found. Finally, there are also many small lakes, rivers, and streams, which are the main aquatic ecosystems present.

Photograph 2-1: Panoramic view of Antamina's ecosystems

3. Processing 25 years of data

Antamina has been collecting biodiversity data since 1996, either as part of baseline studies for EIAs or in follow up monitoring surveys. It must be noted that environmental legislation in Peru was only starting when Antamina's first EIA was produced (1996-1997) and approved (1998), so Antamina has always followed high standards related to environmental performance, basing its studies and activities on international best practice, including World Bank's guidelines. That is why Antamina has a long history of environmental monitoring which includes biodiversity, an aspect that was not specifically required by local legislation in force at the time the EIA was approved.

Over the years, Antamina has tried different approaches to biodiversity data gathering, undertaking different technics and methodologies for each biological group, and working in conjunction with various institutions, from research centers to environmental consultancies, to find the best and most applicable methods for its ecosystems and species. This led to an array of qualitative and quantitative data for the main biological groups (terrestrial – flora, birds, mammals, amphibians, and reptiles; aquatic - plankton, periphyton, macrobenthos and fish), some of which had never been integrated into a formal database.

Following a thorough review of documentation and reports, master databases for the main taxa groups were produced, which included the taxonomic review and update of all species by senior local experts. Species' protection and endemism status were also updated, considering both national and international guidelines and publications, such as the International Union for Conservation of Nature (IUCN)'s Red List of Threatened Species, the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) Appendices and the Convention on Migratory Species (CMS) Appendices. Lastly, the new databases were produced in a format compatible with Geographic Information Systems (GIS), as species location was an important variable for future analysis.

To understand the enormity of the final compiled data, Table 3-1 presents a summary of the number of surveys (field campaigns), database entries and different preliminary species identified to date, for each taxon.

Table 3-1: Summary of historic biodiversity data by taxa included in Antamina's databases for the mine area.

Taxa	Surveys	Database entries	Species
Terrestrial ecosystems			
Flora	30	≈25 000	>650
Birds	30	≈11 000	>50
Mammals	24	≈1 700	>25
Amphibians	19	≈180	5
Reptiles	19	≈80	1
Aquatic ecosystems			
Periphyton	16	≈4 700	>800
Phytoplankton	33	≈4 200	>600
Zooplankton	33	≈650	>140
Macrobenthos	42	≈25 000	>300
Fish	37	≈6 000	9

Source: SNC-Lavalin, 2021.

4. Creating a Biodiversity Conservation Tool

Once the historic databases were finalized, Antamina decided all this data should be transformed into a form of usable knowledge, and that is how Antamina's BAP was conceived, to be used as a tool to contribute to the proper management and conservation of its local biodiversity.

Antamina's BAP was produced with the main goal of reuniting, systematizing, and enhancing Antamina's efforts to better understand and preserve the biodiversity that co-exists with its activities, close to the mine area, which is aligned to Principle 7 of the International Council on Mining and Metals (ICMM) that requires mining companies to be committed to contribute to the conservation of biodiversity and integrated approaches to land-use planning. Furthermore, the BAP was devised to meet the International Finance Corporation (IFC)'s Performance Standard 6 requirements (IFC, 2012) which is internationally recognized as one of the highest standards for properly managing a project's environmental impacts to biodiversity.

The BAP's principal goal is to achieve **no net loss** of biodiversity as a result from the mine's activities, and **net gains** in areas identified as critical habitat. Therefore, the first step was to differentiate modified, natural, and critical habitats (CH). For the latter, the databases were very useful, because they allowed to identify species that could potentially trigger CH category (i.e., highly endangered, locally endemic and/or migratory) and where and how often they were registered. All those that met at least one of the three species PS6 criteria for CH (and further specifics provided in Guidance Note 6 - GN6, 2019 version) were deemed as candidate and underwent a thorough review of available information, both from Antamina and other sources (papers and scientific collections from museums), a task carried out by senior local experts. It must be noted that since Peru is a mega-diverse country it is common for many species to have limited public collected data. This makes it difficult to properly determine a habitat as a critical space for its survival and that is why Antamina involved experts with renown experience in Peru's high-altitude ecosystems. In the end, a precautionary approach was applied, and when in doubt (low number of registries) but it was potentially present due to its known distribution, it was assumed to be a critical habitat and was included as one of Antamina's conservation priorities. Only highly unlikely reports for which no evidence was found (photos or vouchers in Museums), mostly found in older reports, were either dismissed or included as a species that required further field studies to confirm its presence in the area. Secondly, all ecosystems were assessed under PS6 final two criteria, to identified whether there were any regarded as highly threatened or unique, as no areas associated with key evolutionary processes were found. Finally, a GAP analysis was conducted in relation to all PS6 and GN6 requirements, to establish a sound framework and detailed path ahead for Antamina's initiatives and activities related to biodiversity.

As a result, over 10 conservation priorities so far have been established for Antamina, including two ecosystems, one fauna species and several flora species, as well a set of around 50 actions to be carried out in the years to come, with different priorities and timeframes. These actions were organized into seven different objectives, which are listed in Table 4-1, along with a summary of Antamina's actions per objective.

Table 4-1: Summary of number of Antamina's BAP actions by objective.

Objective	Number of actions
Objective 1: Increase biodiversity knowledge in the study area by gathering additional supporting information – as for many species there was very limited information available	≈ 15
Objective 2: Confirm the presence in the study area of high biodiversity value species – as there were a few rare species records that had not been previously reported in the region	≈ 10
Objective 3: Comprehensively evaluate the impacts on the area's biodiversity – including conducting more comprehensive assessments, such as cumulative impacts	4

Objective	Number of actions
Objective 4: Periodically conducting monitoring surveys with emphasis in sensitive species, including Antamina's new conservation priorities	7
Objective 5: Ensure proper application of the mitigation hierarchy in Antamina's biodiversity management	7
Objective 6: Implement a communication strategy on biodiversity and conservation across Antamina and local communities – so that Antamina's efforts are seen and shared by local communities, whose activities are also sources of stress for ecosystems and species	3
Objective 7: Strengthen Antamina's biodiversity governance and participation of local communities – including establishing and strengthening relationships with external stakeholders and working with scientific institutions.	2

Source: SNC-Lavalin, 2021.

As a final point, almost half of these actions have been prioritized for the initial coming years and will be carried out with the help from scientists from renown research institutions, particularly for those species that require further evidence. Antamina's BAP has been devised under an adaptive management strategy, and therefore it is a living document that will continue to grow and nurture from the investigations and studies that will be carried out during the years to come.

5. Conclusion and way forward

Antamina's BAP was developed to meet IFC's PS6 requirements and includes a set of about 50 actions around seven objectives, with well-defined goals and follow-up indicators. The process to define these actions was based on the comprehensive data produced by Antamina over 25 years. These prioritized actions mark a clear path forward for Antamina in its journey towards building a strong biodiversity governance system, with a distinct overarching goal ahead: ensuring that its local biodiversity is preserved in the long run, both by properly managing impacts and by increasing its knowledge, so that better and more accurate management actions and measures can be produced when needed. And the benefit of this new tool will not only be limited to ensuring that Antamina and its local biodiversity can coexist in harmony for many years to come, but it will also significantly contribute to the scientific knowledge and understanding of highland ecosystems and species from north-central Peru.

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