



PREDATORY MINING

- Socio-economic and environmental impacts of the exploitation of heavy sands by the company on the communities in Angoche district



CENTRO DE INTEGRIDADE PÚBLICA
Anticorrupção - Transparência - Integridade

Maputo, Setembro de 2024

Title: Mineração predatória: - Impactos socioeconómico e ambiental da exploração de areias pesadas pela empresa Haiyu Mining, para as comunidades do distrito de Angoche

Director: Edson Cortez

Research team: Mery Rodrigues; Rui Mate; Raúl Massingue

Peer Review: Borges Nhamirre; Júlia Zita

Propriety: CIP

Language Review: Samuel Monjane

Maputo, 2024



CENTRO DE INTEGRIDADE PÚBLICA

Anticorrupção - Transparência - Integridade

PREDATORY MINING

- Socio-economic and environmental impacts of the exploitation of heavy sands by the company on the communities in Angoche district

Maputo, Setembro de 2024

CONTENTS

EXECUTIVE SUMMARY.....	5
1. Introduction.....	7
2. Methodology.....	9
3. Results and discussion.....	10
3.1. Brief history of the impacts of the exploitation of heavy sands by the company Haiyu.....	10
3.2. Socio-economic impact caused by the mining.....	11
3.3. Fiscal aspects of the company.....	15
3.4. Environmental impacts caused by the company.....	17
3.4.1 Destruction of ecosystems.....	17
3.4.2 The alteration of the water and soil quality in Nagonha and Murrua.....	18
3.4.3 The introduction of the species <i>Casuarina equisetifolia</i> in Thopa, Sangage and Nagonha.....	20
4. Conclusion and Recommendations.....	22
5. References.....	24

EXECUTIVE SUMMARY

The extractive sector in Mozambique has been a significant source of revenue for the State and is currently one of the main areas driving economic growth. In 2023, the country recorded growth of 5.0%, in comparison with 4.4% in 2022, which was driven by the extractive industries, tourism, agriculture, transport, and communications, among others.

The extractive industry has caused social, economic and environmental impacts on the host communities which call into question their socio-environmental integrity. Due to the high level of dissatisfaction, the communities have denounced the irregularities which the company Haiyu has been causing. These irregularities have adverse consequences for the welfare of communities, and for the climate and the health of the affected eco-systems. This reality intensifies social inequalities, increases poverty, and causes distrust of government institutions by the local population.

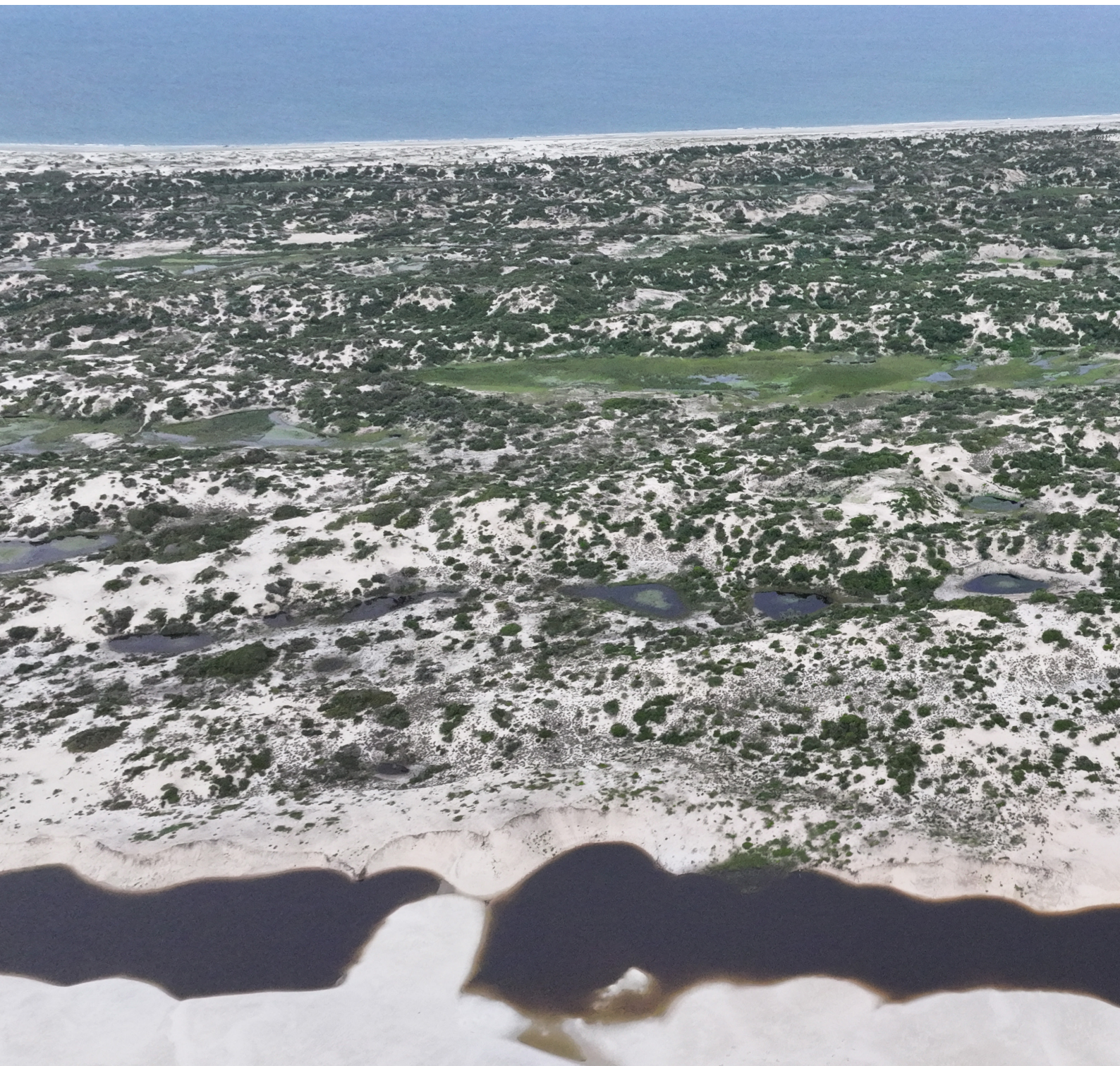
Despite the various denunciations made in the national media, the government and judicial authorities have paid little attention to the socio-environmental problems generated by the extractive industry. In order to help solve these socio-environmental problems, a research study was undertaken with the purpose of assessing the socio-economic and environmental impacts caused by the company exploiting heavy sands, the Haiyu Mining Corporation Limitada in Angoche district in Nampula.

This is a case study of the exploitation of heavy sands by the company Haiyu Mining in Angoche district, in Nampula province. It applies a mixed approach, combining qualitative and quantitative methods which consisted of interviewing several stakeholders, direct observation in the field and collecting water and soil samples for later analysis. The research took place in March and April 2024, with the field work held between 2 and 8 March 2024.

The study found significant evidence of inappropriate practices by the company which have caused negative socio-economic and environmental impacts. These impacts include the loss of means of livelihood, such as agricultural land, trees used as a source of energy, food and construction, failure to comply with the Local Development Agreement, lack of a detailed and publicly accessible plan to close the mines, which could have led to the inadequate closure of the mines at Thopa, Sangage and Nagonha, the destruction of dunes with an impact on the climate, the introduction of the exotic species *Casuarina equisetifolia*, and the alteration of the water and soil quality which endangers public health and environmental integrity.

Based on the main findings of this research, we recommend the adoption of urgent measures to mitigate the socio-economic and environmental problems, especially at a time when the effects of climate change are being felt at global and local level. To this end, it is fundamental that the government, the Haiyu companies, national organisations and the international community comply with their responsibilities, in order to ensure socio-environmental protection. It is thus recommended: (1) to the Mozambican government – set up environmental education initiatives for the host communities; strengthen the fight against corruption, in the sector under consideration in this specific case, and guarantee compliance with the Local Development Agreement and the aspects described in the Report on the Environmental Impact Study; guarantee transparency in the management of the funds transferred to the communities and of the deposit for rehabilitation activities; (2) to the company Haiyu – comply with Mozambican environmental legislation, human and labour rights, the ADL and the plan for closing the mine; make the detailed closure plan and the deposit for environmental rehabilitation accessible to the public; replace the casuarines used in the replanting by native or pre-existing vegetation; make available on the web page the environmental control and monitoring report and the reports on the level of implementation of the ADL; (3) to the government authorities responsible for the environmental and mining sectors – inspect the activities of the company every quarter, including analysis of the environmental quality based on environmental quality studies, and compare them with the company's own environmental quality reports; create an on-line platform that makes available the reports of the inspections held in the companies throughout the country; (4) To the Attorney-General's Office – investigate violations of human and labour rights and environmental crimes and prosecute those responsible; (5) To the environmental

organisations – strengthen advocacy for better protection of the environment; (6) To the academic world – undertake research on the environmental impacts of mining projects; and (7) To local communities, NGOs and international partners - monitor, support and promote sustainable practices, guaranteeing that the mineral resources of Mozambique contribute to the economic and social development of the country in a just and sustainable manner.



1. Introduction

The exploitation of heavy sands¹ in Mozambique has become a significant economic activity, particularly in the provinces of Nampula, Zambézia and Gaza. This resource is mainly exploited by Chinese companies, such as Haiyu Mozambique Mining in Nampula, Africa Great Wall Mining Development Company, Lda. in Zambézia and the consortium between Anhui Foreign Economic Construction (Group) Co., Ltd, and Yunnan Xinli Nonferrous Metals Co., Ltda in Gaza. Other operations belong to the Irish company Kenmare Resources in Nampula and the Russian Tazzeta Resources in Zambézia.

Although the exploitation of heavy sands in Mozambique brings a series of economic benefits (such as revenue for the State, jobs and investment opportunities), it also presents challenges for the environment and for society, including environmental destruction, inadequate resettlement, and demonstrations which have led to deaths. Mitigating these challenges involves a series of measures generally accepted as good practices for the exploitation of mineral resources, notably transparency. However, many of the companies in the mining sector, and particularly the Chinese companies, have been associated with bad practices. By way of example, one can look at the performance of these companies in the transparency assessment index of the Centre for Public Integrity (CIP) for 2023².

This is a case study of the exploitation of heavy sands by the company Haiyu Mining Corporation Limitada, of Chinese capital, which has held a licence since 2011 for the exploitation of heavy sands in Angoche district, Nampula province. Haiyu Mining has exploited heavy sands in the communities of Thopa, Sangage and Nagonha, and is currently operating in Murrua.

The aim of the study was to assess the socio-economic and environmental impacts caused by Haiyu Mining in Angoche district. em Nampula. The research took place in March and April 2024, with the field work held between 2 and 8 March 2024. It applied a mixed approach, combining qualitative and quantitative methods which consisted of interviewing several stakeholders, direct observation in the field and collecting water and soil samples.

Since its implantation in Angoche, Haiyu Mining has promised the local communities that it would bring local development through the contribution of tax revenues, resulting from mining, and from job creation. However, more than a decade later the host communities of the heavy sand exploitation projects in Angoche not only see no benefits from the exploitation of heavy sands, but they have also lost means of livelihood, particularly the trees for obtaining wild fruits and for construction and the land for farming. This land was expropriated from them and granted to Haiyu Mining.

Furthermore, mining destroyed the local ecosystem, through the destruction of vegetation, the removal of soil and the contamination of the air. To make matters worse, after the closure of the mines, there was no restoration of the soil and the local vegetation, as recommended by the laws. The soils were left deformed, and the artificial lagoons are a threat to the public health of the communities. Regarding vegetation, the mining company replaced the local plants with casuarines, an exotic species in Mozambique, well known as a plant that inhibits the growth of other plants around it, and which can hinder the nesting of turtles.

Faced with these problems, the government is apparently adopting a passive posture, since the lack of government action faced with predatory mining, has been reflected in an imbalance between economic development and environmental preservation. This imbalance has promoted a development model which benefits the few to the detriment of sustainability and of collective well-being.

The report is structured into four sections, namely: i) the present introduction which presents the object of the study, the problem, objective and methodology and the main findings; ii) the methodology, describing the methods used in the field to obtain evidence of the socio-economic and environmental problems, including the limitations of the research; iii) the

¹ Heavy sands are minerals which provide fundamental resources for the modern economy. This resource can be found in dunes, beaches or rivers enriched in minerals of high density, such as rutile, zircon, ilmenite and monazite. Less frequently, the other minerals extracted from heavy sands deposits include diamonds and sapphires (Tyler & Minnitt, 2004; TXZMI, 2008).

² Centre for Public Integrity (CIP) (2024). Índice de Transparência do Sector Extractivo em Moçambique – 2023. Available at: <https://www.cipmoz.org/pt/2024/08/21/indice-de-transparencia-do-sector-extractivo-em-mocambique-2023/> [consulted on 11 September 2024, at 09:30am].

results and the discussion, presenting and describing the evidence acquired for the research and making an analysis of the socio-economic and environmental information acquired during the field work; iv) the conclusion and recommendations, which present an outcome of the central ideas of the research, and suggests practical actions to be taken to block the socio-economic and environmental problems caused by the company Haiyu Mining Mozambique Limitada.



2. Methodology

The approach used was mixed, combining qualitative and quantitative methods. The qualitative approach consisted of a bibliographical review, consulting articles, technical reports and environmental impact studies, official documents, audit reports, legal documents, government regulations, reports from NGOs and other pertinent sources to draw up the theoretical framework and prepare the field work. In the field, qualitative data were collected through direct observation, recording images in the places of study, and interviewing government authorities, members of the communities affected, and former workers of the company, to understand the benefits and the problems of the company Haiyu.

The description of the company's history was based on the bibliographical review. An analysis was also made of the compensation policies and practices adopted by the company in response to the damage caused by the exploitation of heavy sands, stressing the adequacy and effectiveness of these practices.

The quantitative approach was implemented at spatial level to assess environmental quality. To this end, a survey was made of the areas degraded by mining. Samples were collected in triplicate of the water and soil from different areas, namely, i) intact area (area never exploited and without much human influence), ii) area where the mine has closed (in the artificial lagoon and in the area adjacent to the lagoon) and iii) area with an active mine (in the site of operations and in the effluent), to determine *in situ* and *ex situ* (in the laboratory) the physical and chemical parameters of the water and the soil. The criteria for selecting the areas were based on areas with and without exploitation of heavy sands to, in a comparative manner, understand what may be the environmental alterations that the company could be causing. The project also mapped the areas of replanting and identified the species replanted in the degraded areas.

To guarantee the quality of the data and the validity of the research, measures were adopted such as triangulation of data, peer review, cross-checking of information, and attention to the credibility and reliability of the sources. The limitations of the research were identified and discussed, including possible biases, restrictions on access to information and other questions which might impact on the validity and generalisation of the results.

The main limitation of the research is the lack of collaboration of the company Haiyu Mining Corporation Limitada, which refused to grant the researchers access to the mining area to collect samples. In February 2024, during the launch of the study on environmental crimes committed by Chinese companies who exploit heavy sands in Gaza, Zambézia and Nampula provinces, the company Haiyu expressed readiness to receive the team of CIP researchers in the first week of March to undertake field work in its mining area. However, when he was contacted, both by phone and by email, the company representative, Amilcar Marrengula, found it difficult to allow the team of CIP researchers access to the company premises. He replied by phone that CIP should wait for 15 days for the company to reply to the request for a visit to the company. This request was submitted on 4 March and so far, there has been no reply (Appendix 1).

3. Results and discussion

3.1 Brief history of the impacts of the exploitation of heavy sands by the company Haiyu

The company Haiyu Mining began the exploitation of heavy sands in 2011. Since its implantation in 2011 and up to 2016, the company Haiyu (Mozambique) Mining Co., Lda. has not enjoyed good relations with the communities, since the company did not hold public consultations so that it could understand and attend to the concerns of the communities. In this period, the community leaderships sent letters to the Nampula provincial government, without success, requesting two interventions - one to cancel the company's land use licence (DUAT) and the other to start public consultations. In addition to the lack of public consultations, the company has caused environmental problems, including blocking natural water courses, destruction of dunes and vegetation and contamination of the soil by discarding mining waste onto wetlands³.

To understand the alterations in the physical environment after implantation of the company, satellite images from December 2010 and October 2014 were compared and analysed. The results showed that, after the start of operations, there was an accumulation of sand and a gradual change in the natural flow of the water. It was also noted that in October 2024, about 280,000 m² of wetlands, in the north of the neighbourhood, were replaced by deposits of sand from mining operations⁴. According to Amnesty, the satellite images from October 2014 clearly showed how the channel linking the Nagonha lagoon, in the west of the neighbourhood, to the Nanthekethe lagoon, to the north of the neighbourhood, was covered with sand, thus blocking the flow of the water.

The activities undertaken by the company significantly increased the risk of flooding, due to the destruction of sensitive habitats such as the dunes, and the visibly growing topographic transformation in Nagonha between 2011 and 2014. The destruction of primary dunes which protected the coastal region against storms and inundations, together with blocking the water course, may have worsened the impacts on the communities and the environment. As a result, on 7 February 2015, Nagonha experienced a major tragedy, which was the flooding throughout the neighbourhood.

These floods caused several socio-economic impacts in Nagonha, namely the destruction of 173 houses, the displacement of about 290 people, the loss of property and of livestock (such as chickens and ducks), and the loss of businesses and livelihoods.

Faced with the disaster, the local communities lost their means of livelihood and shelter. The victims were abandoned since neither the government, nor the company compensated them. To recover, the victims had to travel about a kilometre and clear an uninhabited area (previously used as a source of subsistence), where they built a new neighbourhood with flimsy houses built out of the existing forestry resources, such as stakes. During the field work (March 2024), it was discovered that this new neighbourhood is in a marshy zone, which makes the area prone to flooding.

Nine years after the disaster, in 2024, the affected neighbourhood shows few signs that it was once a residential neighbourhood, due to the great storm that occurred in 2015. In the neighbourhood, one can see a channel opened by the action of the waters, pieces of clothing, a structure built of blocks that was previously a mosque, and some stakes for flimsy houses. Currently, the neighbourhood is used as a meeting point for fishermen and petty traders who acquire shellfish for sale.

Because of the repercussion of the disaster, both nationally and internationally, the company Haiyu had to rebuild its relationship with the local communities, who had previously been ignored. The company had begun to operate without holding any public consultations. Now the first action of the company was to hold public consultations, which, in 2017,

3 Amnesty Internacional (2018). "As Nossas Vidas Não Valem Nada". O Custo Humano da Exploração Mineira Chinesa em Nagonha, Moçambique. <https://www.amnesty.org/en/documents/af41/7851/2018/pt/> [consulted on 30 May 2024, at 10am].

4 Ibid.

resulted in drawing up the first agreement, which was to last until 2022⁵.

The Local Development Agreement (ADL) describes the activities which the company promised to undertake during the exploitation of the resource. These activities include rehabilitating the Sangage Health Centre (including the building of houses for the nurses and the water supply system), building the road and a football field. The Plan was complied with, except for the construction of the road and the football field. In 2020 and 2021, the activities were interrupted because of the Covid-19 pandemic. In 2022, the second agreement was drawn up, which is being partially complied with despite delays in making it operational⁶.

The former administrator of Angoche at the time of the research, Bernardo Alide, said he had no information about many cases that took place in the district. By way of example, in the two years when he was administrator, he had no knowledge of the contract on which the activity of Haiyu was based. He also did not know the overall value of the company's production, or of its payment of taxes, including the 2.75% referring to 2021 and 2022.

3.2 Socio-economic impact caused by the mining

The Local Development Agreement signed between the company, the Government and the community envisages that Haiyu Mining will invest about 150 million MT over five years (2022-2026), representing about 88% of the district's capital budget in 2024, coming from the State Budget⁷. This sum may indicate risks of excessive dependence on the company for local development. It should be noted that the social responsibility of the company should not replace the responsibility of the State to provide basic services and infrastructure.

The local communities can benefit from the activities of the company in various ways, including employment and training, the development of infrastructures, encouragement of local trade, fiscal benefits, community development programmes and agreements on direct benefits⁸. The changes made by the company began to be felt in 2015 when an ambulance was made available to be used by the Angoche rural hospital, and in 2021, the drilling of about 32 boreholes to supply water to the population; the expansion of the electricity grid in Murrua, Namau and Sangage; the training of four students at the Angoche Health Centre, and the rehabilitation of the Centre; the building of schools and porches in various communities; the creation of a cooperative selling inputs. Currently there is more local labour working in the company⁹.

The development of infrastructures promised by the company has faced delays and inconsistencies, causing frustration among the communities who are still waiting for the conclusion of road and school projects. However, it was noted that the benefits from the company are insignificant compared with the damage and losses caused.

The extreme poverty around the Haiyu operations contrasts with the wealth extracted from the place. The Thopa, Sangage, Nagonha and Murrua communities feel dissatisfied with the implantation of the company and its way of working. The communities say that the company has not brought any significant benefits, and they have just passed from "lives that are worth nothing" to "lives that are worth little". The social problems created by the company include:

- Lack of compliance with the ADL which included building a hospital, a football field, roads and a school with at least 10 classrooms.
- Lack of action by the government to respond to the claims of the communities on the company, which makes the population distrustful and frustrated.
- Exclusion of the local community from job opportunities at the company. For admission/entry of the local population

5 Lopes Vasco, chief of Murrua, in an interview held as part of the current research.

6 Ibid.

7 Ministry of Economy and Finance (MEF) (2024). General State Account for 2023. *Volume I*. www.mef.gov.mz [consulted on 11 July 2024, at 9am].

8 ICMM (2019). *Integrated Mine Closure: Good Practice Guide* (2nd edition). <https://www.icmm.com/en-gb/guidance/environmental-stewardship/2019/integrated-mine-closure> [consulted on 11 July 2024, at 10am].

9 Lopes Vasco, chief of Murrua, in an interview held as part of the present research.

into the company, there are corrupt schemes, involving the payment of money.

- Bad working conditions and violation of human and labour rights for the few people of the community admitted to the company:
- Destruction of natural habitats and the consequent loss of local biodiversity, and of sources of income and subsistence.
- Loss of means of livelihood such as native fruits for consumption and sale, firewood for sale and cooking, or stakes for building houses, decline in edible animals due to the loss of vegetation and the sound pollution caused by the company's industrial equipment.
- Deterioration of the quality of life. Loss of agricultural land. The population has to walk for at least 7 km to fetch firewood, degradation of the road (Fig. 3) in both the closed and the active mine by the intensive circulation of trucks carrying heavy sands to the old Inguri Fishing Port, now transformed into a port to load sands for export.
- Atmospheric contamination, particularly in the dry season. The dust caused by the company's trucks reach the homes and the local market, damaging the quality of the food sold, and hence the public health of the consumers and of the residents. Some residents reported recurrent respiratory complications which could be related to this dust.
- Loss of cultural goods: in Napuruma, the company destroyed coffins containing the remains of people beloved of the resettled community.
- In the rainy season, the access roads become muddy, and the motorcyclists face difficulties in reaching their destination (motorcycles are the main means of transport) There are reports that journey time is doubled by the state of the access roads. In Thopa, one of the places where the mine was closed and abandoned by the company, access is chaotic. There are stretches that are so damaged (Fig 1) that they do not allow the circulation of vehicles.

Figure 1: Access road to Thopa



Source: Mery Rodrigues, 2024.

Existence of piles of sand and abandoned potholes. Some of the potholes were filled with water, forming artificial lagoons. The population (children and youths) use the lagoons for recreation (swimming) and of drinking water for livestock, which could be a threat to public health. The turbidity values of the Sangage and Nagonha artificial lagoons (Fig. 2), used for swimming and for animals to drink, varied from 4.08 to 6.31 UTN, values higher than those stipulated in Decree No. 18/2004¹⁰. Hence the quality of the water means it is not suitable for swimming. The turbidity¹¹ may indicate the presence of dangerous micro-organisms (bacteria, viruses and parasites) which can cause diarrhoea, nausea, or other symptoms, representing a danger to health¹², particularly for children and people with compromised immune systems.

Figure 2: Abandoned artificial lagoons, used for recreation and for animals to drink



Source: Mery Rodrigues, 2024.

- Restoration with an exotic species, *Casuarina equisetifolia*, in places where the mine has closed, has brought no benefits to the population, since they suffer reprisals when they cut down the replanted trees. Furthermore, the failure to use pre-existing plant species has had socio-economic repercussions on the communities since they can no longer extract products such as wild fruit from the species *Strychnos spinosa* (Massala, also known as “Rava” in Nampula, “Mathiele” in Zambézia, and “Madokomela” in Inhambane), *Ziziphus mauritiana* (Crab apple), *Anacardium occidentale* (Cashew), *Mangifera indica* (Mango) and *Citrus sp.* (Orange) used as food; wood for building; straw used for making baskets, mats and adornments for use and for sale. These products used to guarantee the livelihoods of the communities of Thopa, Sangage, Nagonha and Murrua.
- Lack of transparency and inadequate communication by the company about its mine closure plans and environmental mitigation measures.

¹⁰ Decree n° 18/2004: Approves the Regulation on Environmental Quality and Effluent Emission Standards, under the terms of article 10 of Law no. 20/97, of 1 October, and under the terms of article 33 of the same law.

¹¹ Turbidity is a physical parameter used as an indicator of water quality, caused by suspended material, such as clay, mud, organic matter, plankton and other micro-organisms which interfere in the passage of light through the water.

¹² American Public Health Association (APHA) (1998). *Standard Methods for the Examination of Water and Wastewater* (20th ed.). Washington DC: American Public Health Association.

Haiyu Mining possesses a Recovery Plan for Mined Areas for the community of Murrua and Sangage, in the mining concessions with the numbers 4776C and 3791C, in Nampula province. The total investment mentioned in the company's recovery plan is about 8 million meticaís¹³. In this plan, the company states that in 2020, it would disburse 613,800 MT for the rehabilitation of degraded areas. The recovery of these areas is done with native plants and casuarines, after the levelling of the mined dunes – but what happened was that the company is worsening the socio-economic problems, through the failure to restore the soils in the degraded areas and the exclusive use of casuarines to restore the degraded areas. Furthermore, it does not possess a detailed and accessible mine closure plan.

The Mozambican legislation on closing mines is governed by various norms and regulations which seek to guarantee environmental rehabilitation and the sustainable use of natural resources. According to the Mining Law (Law No. 20/2014) and the Environmental Regulations for Mining (Decree no. 26/2004)¹⁴, the mining companies are obliged to present a mine closure plan and an environmental rehabilitation deposit before the start of operations. This deposit is intended to cover the costs of environmental rehabilitation after the closure of the mine, guaranteeing that the environmental impacts will be mitigated and that the mined area will be restored to an acceptable state. This has not happened in the closed mines.

The company's approach in the closure of the mined areas shows a significant gap between the legal requirements and the real practices. The lack of a detailed and accessible closure plan, together with the inadequacy of the environmental rehabilitation deposit, raises concerns about the capacity of the company to guarantee effective rehabilitation¹⁵.

It is essential that the Mozambican State exert a more active role in inspection and in demanding compliance with the legal norms. Compared with international good practices, such as those implemented in Australia¹⁶ and in Canada¹⁷, where the companies are obliged to provide exact details of their closure plans and deposits that reflect the real costs of rehabilitation. Mozambique could improve its regulations to prevent companies from abandoning areas without sufficient resources for recovery.

Furthermore, inadequate practices observed in some regions of West Africa, where the lack of inspection and transparency has resulted in severe environmental degradation and negative socio-economic impacts, serve as important lessons¹⁸. It is crucial that Mozambique adopt a more rigorous and transparent approach to guarantee that mining projects benefit the local communities and the environment in the long term.

¹³ Plan for the Recovery of the Mined Areas, of Haiyu Mining.

¹⁴ Decree No. 26/2004: Approves the Environmental Regulations for Mining, under the terms of Article 44 of Law No. 14/2002, of 26 June, together with the provision of Article 32 of Law No. 20/97, of 1 October.

¹⁵ Smith, N. (2013). Environmental regulation of mining: integrating mine closure planning with environmental impact assessment. *Journal of Cleaner Production*, 14(8), 727-736. https://www.researchgate.net/publication/303744393_Integrating_mine_closure_planning_with_environmental_impact_assessment_challenges_and_opportunities_drawn_from_African_and_Australian_practice [consulted on 11 July 2024, at 09:30am].

¹⁶ Australian Government - Department of Industry, Science, Energy and Resources (2006). *Mine Rehabilitation: Leading Practice Sustainable Development Program for the Mining Industry*. https://nt.gov.au/_data/assets/pdf_file/0016/203416/mine-rehabilitation.pdf [consulted on 11 July 2024, at 11am].

¹⁷ World Bank (2006) - Mongolia - *A review of environmental and social impacts in the mining sector*. <https://www.google.com/url?sa=t&source=web&rct=j&opi=89978449&url=https://documents.worldbank.org/pt/publication/documents-reports/documentdetail/583011468274233098/mongolia-a-review-of-environmental-and-social-impacts-in-the-mining-sector&ved=2ahUKEwjFi9CL-Z-HAxWTWkEAHftnAtwQFnoECBMQA-Q&usq=A0vVaw3Y8zQxQpXXaemID6AFIp3J> [consulted on 11 July 2024, at 9am].

¹⁸ Hilson, G., & Maconachie, R. (2009). Good governance and the extractive industries in sub-Saharan Africa. *Mineral Processing and Extractive Metallurgy Review*, 30 (1), 52-100. <https://www.google.com/url?sa=t&source=web&rct=j&opi=89978449&url=https://eiti.org/documents/good-governance-and-extractive-industries-sub-saharan-africa&ved=2ahUKEwjttOm8J-HAxWxZ0EAHRHfDyAQFnoECBMQAQ&usq=A0vVaw0nvFqMXt-V2AsNDLG0cENnq> [consulted on 11 July 2024, at 13pm].

3.3 Fiscal aspects of the company

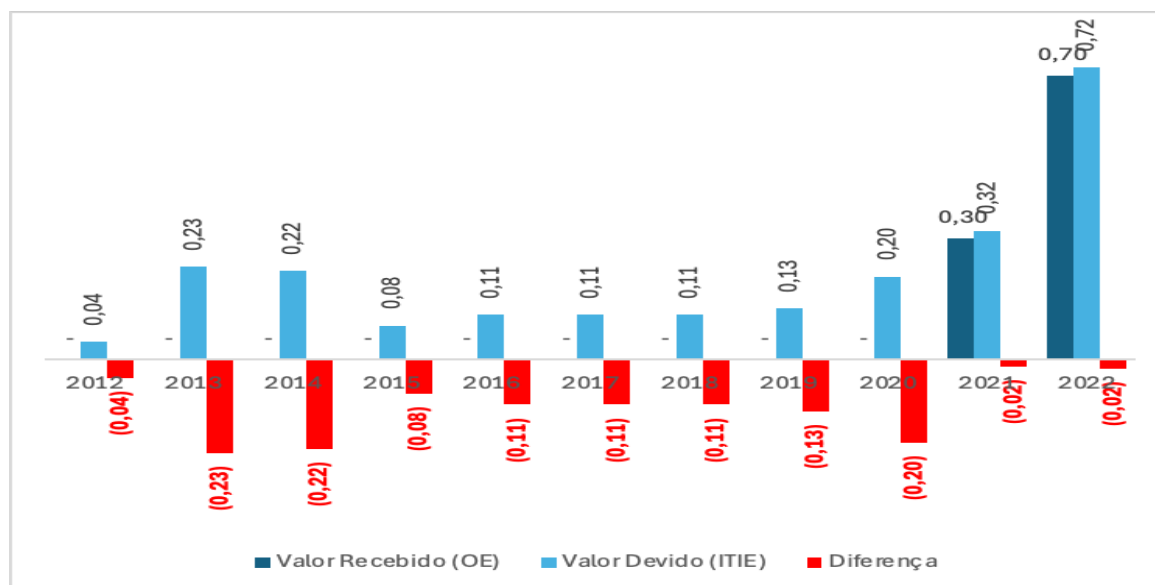
Over about 13 years of operations, Haiyu Mining has paid more than 104 million MT in taxes to the State. 70% of this sum (about 73.2 million meticaís) refers to the tax on mining production. According to Mozambican mining legislation¹⁹, 2.75% of the value of this tax should return directly to the host communities to finance local development projects. However, Angoche district only began to receive these transfers in 2021, and lost about 1.28 million MT, a sum which, if transferred, could have made a difference in the development of the community.

The expectations about the Haiyu Mining project in Angoche were high. It was expected that the company would contribute substantially to State tax revenues, bearing in mind the history of significant contributions from Kenmare, another company exploiting heavy sands in the same province. In 2011, the year when the activities of Haiyu Mining began, Kenmare was the second largest taxpayer in the mining sector. The largest taxpayer was Vale Moçambique.

The current reality, however, shows challenges and mixed results. Information from the company reports, made available by the Transparency Index of the Extractive Sector in Mozambique (ITSE)²⁰, indicate that in 2022 Haiyu Mining employed 537 workers directly in Angoche. 460 of these were Mozambicans, of whom 46 were women. The data from the Extractive Industry Transparency Initiative (EITI) show significant tax payments from Haiyu Mining, mainly through the tax on mining production. However, there are questions about the transparency and the effective use of these funds to benefit the local communities.

Although Haiyu has been paying the production tax since 2011, the host communities only began to benefit from the transfers of 2.75% in 2021. The communities did not receive about 1.28 million MT to which they were entitled during the period between 2012 and 2022²¹, due to the lack of transparency and compliance on the part of the Ministry of Economy and Finance (Fig. 3).

Figure 3: The 2.75% referring to the production tax paid by Haiyu Mining between 2012 and 2022 (in millions of MT).



English translation: Value received (OE); Value Owed (ITIE); Difference

Source: Reports of ITIE, CGE and OE (2008-2024).

¹⁹ Lei n.º 20/2014: Lei de Minas, de 18 de Agosto de 2014, Artigo 20 alterado pela Lei n.º 15/2022 de 19 de Dezembro.

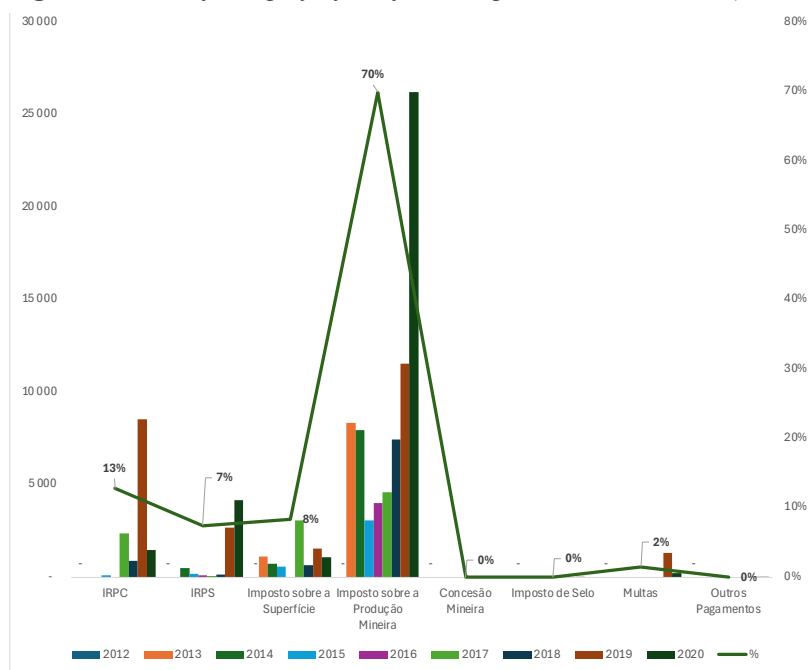
²⁰ Centre for Public Integrity (CIP) (2020). Índice de transparência do sector *extractivo*. Available at: <https://cipmoz.org/wp-content/uploads/2020/10/INDICE-DE-TRANSPARENCIA-SECTOR-EXTRACTIVO-2019-2020.pdf> [consulted on 11 July 2024, at 10am].

²¹ The data from 2023 and 2024 on the production tax paid by Haiyu are still not publicly available.

The fundamental mission of a company, such as Haiyu Mining, is to generate profit. Profit is not a mere consequence, it results from the activity undertaken by the company and demands strategic actions. Among these strategies is the minimisation of the taxes paid to the State, using all possible legal mechanisms to reduce costs.²² In this context, it is crucial that greater benefits for the company come from paying taxes to the State. The State should transform the resources into tangible benefits for the communities and for the country.

Publicly available data show that Haiyu Mining paid a total of 104.8 million MT in taxes between 2012 and 2020. The largest contribution came from the tax on mining production, which accounted for 70% of the total, followed by IRPC (tax on profits) with 13% and the IRPS (Personal Income Tax) with 7% (Fig. 4).

Figure 4: Taxes by category by Haiyu Mining between 2012-2020 (in millions of MT).



Source: Reports of ITIE, CGE and OE (2008-2024).

To ensure that these fiscal benefits are really expressed in improvements for the local communities and for the country, it is essential that there should be a transparent and efficient management of the resources collected. Transparency in the use of these funds is fundamental to ensure that they are directed to critical areas, such as health, education and infrastructures. In addition, it is necessary to strengthen the mechanisms for inspection and responsibility to avoid thefts and guarantee that the taxes paid by Haiyu contribute effectively to sustainable development.

While the company should continue to seek fiscal efficiency, the State should improve its policies of transparency and resource allocation, guaranteeing that the economic benefits generated by taxation result in a real positive impact for the communities and for the country's development.

In an ideal scenario, a combination of taxes on mining production, IRPC and IRPS is essential. The tax on production guarantees stable and predictable revenue for the public finances, regardless of the profitability of the company. The IRPC, with a rate of 32%, is adjusted to the capacity of the company to pay, based on its profits, offering an equitable way of collecting taxes. The IRPS benefits directly the workers and the local economy, although its contribution to the public finances is less²³.

22 Friedman, M. (1970). The Social Responsibility of Business is to Increase its Profits. *The New York Times Magazine*. <https://www.nytimes.com/1970/09/13/archives/a-friedman-doctrine-the-social-responsibility-of-business-is-to.html> [consulted on 11 July 2024, at 12pm].

23 Bird, R. M., & Zolt, E. M. (2005). Redistribution via Taxation: The Limited Role of the Personal Income Tax in Developing Countries. *UCLA Law Review*, 52(6), 1627-1695. https://www.researchgate.net/publication/281258934_Redistribution_Via_Taxation_The_Limited_Role_of_the_Personal_Income_Tax_in_Developing_Countries [consulted on 11 July 2024, at 12pm].

3.4 Environmental impacts caused by the company

The extraction of heavy sands has caused various environmental problems in Angoche, in the communities of Murrua, Thopa, Sangage and Nagonha. The problems include: i) the destruction of ecosystems, such as the dunes and native vegetation, such as Massala (*Strychnos spinosa*); ii) The alteration of water and soil quality (Fig. 5); iii) The introduction of an exotic species, *Casuarina equisetifolia*, in the closed mines of Thopa, Sangage and Nagonha.

Figure 5: Abandoned artificial lagoon.



Source: Mery Rodrigues, 2024.

3.4.1 Destruction of ecosystems

The destruction of ecosystems in Angoche includes the removal of dunes and of native vegetation. The dunes are of great importance for the protection of animals and of dune vegetation. The dune vegetation plays a fundamental role in the formation, stabilisation and maintenance of the dunes over time. It has multiple functions – namely, holding back the force of the winds, protecting the soil from erosion and desertification²⁴, as well as carbon sequestration²⁵.

The destruction of the dunes to make way for the extraction of heavy sands (Fig. 6) has caused habitat loss and fragmentation, affecting not only the landscape in terms of composition (type of habitat), and configuration (form, degree of habitat isolation or fragmentation), but also biodiversity, the functioning of the ecosystems and the structure of the vegetation with effects on the entire food chain and on ecosystem services. The removal of dune vegetation also reduces the rates of carbon storage and sequestration with impacts on the climate.

24 Hanley, M. E., Bouma, T. J., & Mossman, H. L. (2020). The gathering storm: Optimizing management of coastal ecosystems in the face of a climate-driven threat. *Annals of Botany* 125: 197–212. <https://doi.org/10.1093/aob/mcz204> [consulted on 11 July 2024, at 12pm].

25 Drius, M., Jones, L., Marzalletti, F., de Francesco, M. C., Stanisci, A., & Carranza, M. L. (2019). Not just a sandy beach. The multi-service value of Mediterranean coastal dunes. *Science of the Total Environment* 668: 1139–1155. <https://doi.org/10.1016/j.scitotenv.2019.02.364>.

Figure 6: Place which suffered destruction of the ecosystem and where casuarines were used for replanting.



Source: Mery Rodrigues, 2024.

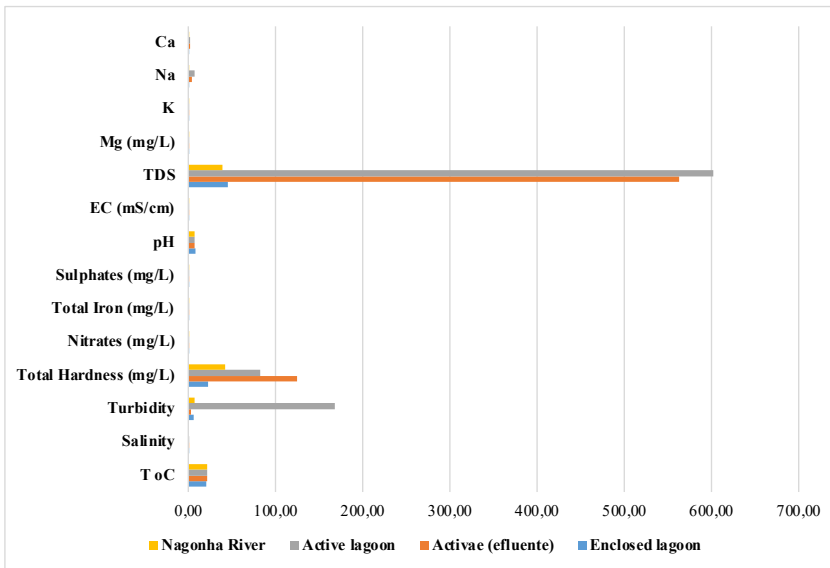
In most regions of the Earth, the mineral resources are overlaid by biological resources which are above the soil. Projects for the exploitation of mineral resources should be drawn up considering biodiversity offsets²⁶, so as to avoid the loss of biodiversity and of the functioning of ecosystems. This factor did not happen. Instead, this mining caused negative impacts on the environment and due to defective inspection and non-compliance with the legislation and regulations for the extraction of sands, the problems are tending to worsen.

3.4.2 The alteration of the water and soil quality in Nagonha and Murrua

The data on the water quality in the artificial lagoons, both closed and active, and in the Nagonha River (Fig. 7), show that there has been no variation in the concentration of nitrates, total iron and sulphates. They had levels lower than 0.5mg/L, 0.2mg/L and 1.0mg/L, respectively. The variation in temperature, salinity and pH was not significant. The variations were from 20.30 to 21.70°C, from 0.00 to 0.01‰ and from 6.72 to 7.62 respectively.

²⁶ A biodiversity offset is a conservation action in a particular area outside of the project footprint which has as its goal to improve a particular type of biodiversity, generating measurable results which will offset the impacts on the same type of biodiversity in the area impacted.

Figure 7: Physical and chemical parameters of the water of the river, of the active mine (effluent and in operation) and the closed mine.

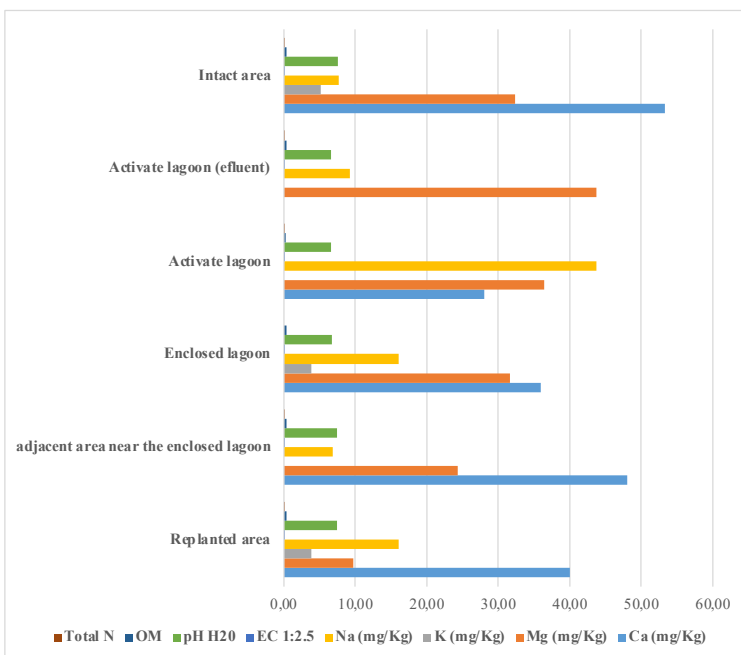


In the water, the closed lagoon shows intermediate values for the parameters studied. However, it showed lower values for hardness (22mg/L) and electrical conductivity (0.07). In the mining operation site, including the residual waters of the active lagoon, it was noted that the water had a smell and recorded higher values for Total Hardness (124mg/L), Turbidity (168.33), Electrical conductivity (0.94mS/cm), Total Dissolved Solids (601.6), Magnesium (0.39mg/L), Potassium (0.39mg/L), Sodium (6.7mg/L) and Calcium (1.51mg/L).

The values obtained from the closed and active artificial lagoons showed there is physical and chemical contamination of the water which characterises the degradation of the water quality in the lagoons. Because the closed lagoons are used for recreational activities and for animal drinking, they are a threat to the public health of the users.

The results of the soil quality in the places studied, namely an intact site, a closed mine and an active mine (Fig 8), showed that the variation in the levels of pH was not significant, varying from 6.58 to 7.58.

Figure 8: Physical and chemical parameters of the soil in intact areas, and areas with active and closed mines.



Source: Mery Rodrigues, 2024

The concentration of Calcium and Potassium in the soil, important for the growth and development of vegetation, fell considerably from the intact mine (53.3 and 5.20 mg/kg) to the active mine (0.0mg/kg and 0.0mg/kg). The active mine recorded higher values for Sodium (43.7mg/L) and Electrical conductivity (0.06), showing there is a greater concentration of salts, and soil with a high level of Sodium which may limit the availability of nutrients in the soil and compromise plant development. These results evidently show that the mining has caused the fragmentation and degradation of the soil, ecological imbalance, damage to the land use patterns in and outside of the mining area, and a reduction in biodiversity, mainly in the areas where the mines are closed, and the introduction of an exotic species (*Casuarina equisetifolia*) has inhibited the native species.

In the soil, the replanted site of the closed mine presented higher values of Total Nitrogen (0.04mg/kg) and the lower values were recorded in the intact mine and in the mine closed without vegetation with an average of 0.01mg/kg. These results could be due to the introduction of casuarina tree in the replanted area. This is a tree with a greater capacity to assimilate the nitrogen, which is essential for plant metabolism and development²⁷, because it has a high organic matter (OM) content in the soil (0.38), which is considered a natural source of nitrogen released during the decomposition process, and because it is also a competitor par excellence, inhibiting the development of species around it. Although the replanted area showed higher values of Nitrogen, the concentration is still low due to the type of sandy soil that is predominant in the study area. Nitrogen deficiency is worse in sandy soils with a high level of water infiltration, and a high power of leaching of nutrients²⁸.

3.4.3 The introduction of the species *Casuarina equisetifolia* in Thopa, Sangage and Nagonha

The company considers itself a model in the recovery of flora. However, this recovery is only done with casuarines (*Casuarina equisetifolia*). This species was introduced into the communities of Thopa, Sangage and Nagonha, after the closure of their mines (Fig. 9).

Figure 9: *Casuarina equisetifolia* introduced in Thopa (left) and Nagonha (right).



Source: Mery Rodrigues, 2024

27 Carvalho, I. R. (2022). Importância do nitrogênio para as plantas. Elevagro. <https://elevagro.com/conteudos/materiais-tecnicos/importancia-do-nitrogenio-para-as-plantas> [consulted on 10 June 2024, at 11am].

28 Silva, M., Silva, M., Duarte, E., Bonetti, R., Paludetto, A., & Miyashiro, C. (2023). A Relação do Nitrogênio com o Desenvolvimento das Plantas e suas Formas de Disponibilidade. Revista Científica Multidisciplinar - ISSN 2675-6218. 5 (1) e514762, doi: 10.47820/recima21.v5i1.4762.

Casuarina equisetifolia is a species belonging to the family Casuarinaceae. It is widely cultivated throughout the world for the establishment of beaches, windbreakers, the stabilisation of coastal dunes, as ornamental trees²⁹ and for construction³⁰, and to mitigate the impacts of future tsunamis and other natural disasters.

Although *C. equisetifolia* provides various services for the environment and for the population, the introduction of this species reduces the integrity of the beaches and the biodiversity, particularly endangered species. *C. equisetifolia* is considered a serious invasive species in many of the world's coastal regions³¹, because of its high capacity to colonise rapidly new habitats, and due to the force of competition. This exotic species inhibits the development of native species, due to the production of allelopathic, phytotoxic compounds and alteration of the chemical composition of the soil and erosion. As a result, it reduces native biodiversity³². These inhibitory effects that the exotic species may provoke on the native species could alter the natural vegetation succession³³ and hence the structure of the beach.

The abundance of native vegetation on the dunes holds back the sand and helps in the gradual expansion of the beach; an annual addition of up to 10,000 cubic metres of sand per kilometre of beach is possible on a dune with good vegetation³⁴. The introduction of casuarines may alter the structure of the beach, since the sand transported is deposited among the casuarine trees instead of accumulating vertically in front of the grasses that stabilise the dunes. In this way, the beach becomes flattened, steep and less consolidated due to the removal of sands by the waves during storms. The formation of steep beaches in places where turtles nest may affect the survival of turtle hatchlings, since nests dug close to the sea run the risk of loss of eggs due to erosion, and mortality due to inundation of salt water³⁵.

Studies report that the casuarines are a moderate hindrance to sea turtle nesting and may distort the sexual proportions of the young since their dense and shallow roots interfere in the construction and temperature of the tests, so that some of the females abandon their attempts at nesting or penetrate into the nest and destroy the eggs during incubation. Furthermore, the hatchlings that emerge from nests dug in areas with casuarines run the risk of becoming entangled in the roots or of being disoriented during the journey from the nesting sites to the beach³⁶. Furthermore, fallen trees may create physical obstacles for the nesting females to navigate³⁷ resulting in abandoned nesting attempts or nesting in sub-optimal areas.

-
- 29 National Research Council (NRC) (1984). *Casuarinas: Nitrogen-Fixing Trees for Adverse Sites*. National Academy Press, Washington D.C., USA.
- 30 Mattsson, E., Ostwald, M., Nissanka, S. P., Holmer B., & Palm M. (2009). Recovery and protection of coastal ecosystems after tsunami event and potential for participatory forestry CDM – Examples from Sri Lanka. *Ocean and Coastal Management* 52: 1-9.
- 31 Wheeler, G. S., Taylor, G. S., Gaskin, J. F., & Purcell, M. F. (2011). Ecology and management of she-oak (*Casuarina spp.*), an invader of coastal Florida, U.S.A. *Journal of Coastal Research*, 27: 485- 492.
- 32 Batish, D. R., Singh, H. P., & Kohli, R. K. (2001). Vegetation exclusion under *Casuarina equisetifolia* L.: Does allelopathy play a role? *Community Ecology*, 2: 93-100.
- 33 Kraus, T. E. C., Dahlgren, R. A., & Zasoski R. J. (2003). Tannins in nutrient dynamics of forest ecosystems-A review. *Plant and Soil*, 256: 41-66.
- 34 Sealey, N. (2006). The cycle of Casuarina-induced beach erosion-A case study from Andros, Bahamas. In: Davis R.L. ad Gamble D.W. (eds.). The 12th Symposium on the Geology of the Bahamas and Other Carbonate Regions. *Gerace Research Center*, San Salvador, Bahamas. Pp. 196 -203.
- 35 Caut. S., Guirlet E., & Girondot M. (2010). Effect of tidal wash on the embryonic development of leatherback turtles in French Guiana. *Marine Environmental Research*, 69: 254-261.
- 36 Godfrey, M. H., & Barreto R. (1995). Beach vegetation and seafinding orientation of turtle hatchlings. *Biological Conservation*, 74: 29 -32.
- 37 Witherington, B., Hiram, S., & Mosier, A. (2011). Barriers to sea turtle nesting on Florida (United States) beaches: Linear extent and changes following storms. *Journal of Coastal Research*, 27: 450-458.

4. Conclusion and Recommendations

The company Haiyu has undertaken mining with insignificant benefits to local units and without mitigating the damage it can cause to the communities, the economy and the environment in the short and medium term. This activity worsens social inequalities since the host communities, which should benefit the most, are the most affected by the company, with the loss of means of livelihood such as land for farming, and plants used for food and construction.

Apart from the limited benefit, the communities affected by mining in Thopa, Sangage and Nagonha where the mines have now closed, run the risk of contracting water-borne diseases because the companies did not appropriately close the artificial lagoons. Currently the water is clouded, and the communities use it for swimming and for their livestock to drink. In these same places where the mines have closed, the use of an invasive exotic species, *Casuarina equisetifolia*, to rehabilitate some of the areas degraded by the mine, could cause serious short- and medium-term damage to the ecosystem, including alteration of the quality of the soil, inhibition of the growth of local vegetation and obstructing the nesting of turtles.

One notes only a feeble concern by the company for questions of environmental preservation, including a detailed and publicly accessible closure plan, safeguarding the Local Development Agreement and the Local workers. The Government has not fully performed its role. Environmental inspection has been notably weak and tax collection has not been complied with. This has caused dissatisfaction and impoverishment in the communities of Thopa, Sangage, Nagonha and Murrua.

The lack of rigorous policies and inspection in the rehabilitation and in the responsible management of natural resources results in worsened degradation of sensitive areas with short- and long-term consequences for sustainable development. It is fundamental that mining should be undertaken while attending to the needs of the communities, prioritising a balance between economic development and environmental preservation.

So that the benefits from mining can be maximised and the negative impacts minimised, it is essential that all the stakeholders play their roles in a responsible and collaborative manner. It is thus recommended:

- i) To the Mozambican Government:
 - Create environmental education initiatives for the host communities or insist that the companies hold environmental education campaigns and basic training for some members of the host communities as part of their social responsibility.
 - Strengthen the fight against corruption, in this specific sector, and guarantee compliance with the Local Development Agreement and the aspects described in the Environmental Impact Study Report, starting with stepped-up inspection and responsibility for soci-economic questions not complied with.
 - Guarantee transparency in management of the funds, transferred to the communities and of the deposit for activities of rehabilitation. Details of the sums deposited by all the extractive companies should be published on the Web pages of the Ministry of Mineral Resources and Energy and of the Ministry of Economy and Finance.
- ii) To the company:
 - Comply with the national environmental, human rights and labour legislation, and good practices in the exploitation of resources.

- Comply with the ADL in the sites with active mines (Murrua) and closed mines (Thopa, Sangage and Nag-onha) and with the mine closure plan.
 - Make the detailed closure plan and the deposit for environmental rehabilitation accessible to the public.
 - Use native vegetation rather than exotic plants in the replanting of degraded areas.
 - Remove the casuarines used for replanting, particularly on the primary dunes.
 - Comply strictly with its obligations for environmental rehabilitation and community development and improve its communication and information mechanisms.
 - Make available on the website the reports on environmental control and monitoring and the level of implementation of the ADL.
- iii) To the National Environmental Quality Control Agency (AQUA), to the National Institute of Mines, to the Ministry of Land and Environment, to the Ministry of Mineral Resources and Energy, and to the Ministry of the Sea, Inland Waters and Fisheries:
- Inspect every three months the activities of the company Haiyu, including analysis of environmental quality, and compare this with the company's own environmental quality reports.
 - Create an online platform that makes available the reports on the inspections held in the companies throughout the country.
- iv) To the Attorney-General's Office (PGR):
- Investigate and hold responsible the protagonists of violations of human and labour rights and environmental crimes.
 - Train judges, prosecutors, and the national administration of conservation areas in matters of corruption and environmental crimes.
- v) To environmental organisations:
- Strengthen advocacy for a better protection of the environment.
- vi) To academics:
- Undertake research into the environmental impacts of mining projects;
- vii) To local communities, NGOs and international partners
- Monitor, support and promote sustainable practices, guaranteeing that the mineral resources of Mozambique contribute to the economic and social development of the country in a just and sustainable manner.

5. References

- American Public Health Association (APHA) (1998). *Standard Methods for the Examination of Water and Wastewater* (20th ed.). Washington DC: American Public Health Association.
- Amnesty International (2018). “As Nossas Vidas Não Valem Nada”. *O Custo Humano da Exploração Mineira Chinesa em Nagonha, Moçambique*. <https://www.amnesty.org/en/documents/afr41/7851/2018/pt/> [consulted on 30 May 2024, at 10am].
- Australian Government - Department of Industry, Science, Energy and Resources (2006). *Mine Rehabilitation: Leading Practice Sustainable Development Program for the Mining Industry*. https://nt.gov.au/__data/assets/pdf_file/0016/203416/mine-rehabilitation.pdf [consulted on 11 July 2024, at 11am].
- Batish, D. R., Singh, H. P., & Kohli, R. K. (2001). Vegetation exclusion under *Casuarina equisetifolia* L.: Does allelopathy play a role?. *Community Ecology*, 2: 93-100.
- Beiser, V. (2017). *Sand mining: the global environmental crisis you've never heard of*. <https://www.theguardian.com/cities/2017/feb/27/sand-mining-global-environmental-crisis-never-heard> [consulted on 11 June 2024, at 11am].
- Bird, R. M., & Zolt, E. M. (2005). Redistribution via Taxation: The Limited Role of the Personal Income Tax in Developing Countries. *UCLA Law Review*, 52(6), 1627-1695. https://www.researchgate.net/publication/281258934_Redistribution_Via_Taxation_The_Limited_Role_of_the_Personal_Income_Tax_in_Developing_Countries [consulted on 11 July 2024, at 12pm].
- Carvalho, I. R. (2022). *Importância do nitrogênio para as plantas*. *Elevagro*. <https://elevagro.com/conteudos/materiais-tecnicos/importancia-do-nitrogenio-para-as-plantas> [consulted on 10 June 2024, at 11am].
- Caut, S., Guirlet E., & Girondot M. (2010). Effect of tidal wash on the embryonic development of leatherback turtles in French Guiana. *Marine Environmental Research*, 69: 254-261.
- Centre for Public Integrity (CIP) (2020). Índice de transparência do sector extractivo. Available at: <https://cipmoz.org/wp-content/uploads/2020/10/INDICE-DE-TRANSPARENCIA-SECTOR-EXTRACTIVO-2019-2020.pdf> [consulted on 11 July 2024, at 10am].
- Centre for Public Integrity (CIP) (2024). Índice de Transparência do Sector Extractivo em Moçambique – 2023. Available at: <https://www.cipmoz.org/pt/2024/08/21/indice-de-transparencia-do-sector-extractivo-em-mocambique-2023/> [consulted on 11 September 2024, at 09:30am].
- Decree n° 18/2004: Approves the Regulation on Environmental Quality and Effluent Emission Standards, under the terms of article 10 of Law no. 20/97, of 1 October, and under the terms of article 33 of the same law.
- Decree n° 26/2004: Approves the Environmental Regulations for Mining Activities, under the terms of article 44 of Law no. 14/2002, of 26 June, in conjunction with the provisions of article 32 of Law no. 20/97, of 1 October.
- Drius, M., Jones, L., Marzialetti, F., de Francesco, M. C., Stanisci, A., & Carranza, M. L. (2019). Not just a sandy beach. The multi-service value of Mediterranean coastal dunes. *Science of the Total Environment* 668: 1139–1155. <https://doi.org/10.1016/j.scitotenv.2019.02.364>.
- Friedman, M. (1970). The Social Responsibility of Business is to Increase its Profits. *The New York Times Magazine*. <https://www.nytimes.com/1970/09/13/archives/a-friedman-doctrine-the-social-responsibility-of-business-is-to.html> [consulted on 11 July 2024, at 12pm].
- Godfrey, M. H., & Barreto R. (1995). Beach vegetation and seafinding orientation of turtle hatchlings. *Biological Conservation*, 74: 29 -32.
- Hanley, M. E., Bouma, T. J., & Mossman, H. L. (2020). The gathering storm: Optimizing management of coastal ecosystems in the face of a climate-driven threat. *Annals of Botany* 125: 197–212. <https://doi.org/10.1093/aob/mcz204> [consulted on 11 July 2024, at 12pm].
- Hilson, G., & Maconachie, R. (2009). Good governance and the extractive industries in sub-Saharan Africa. *Mineral Processing and Extractive Metallurgy Review*, 30 (1), 52-100. <https://www.google.com/url?sa=t&source=web&rct=j&opi=89978449&url=https://eiti.org/documents/good-governance-and-extractive-industries-sub-saharan-africa&ved=2ahUKewjittOm8J-HAxWxZ0EAHRHfDyAQFnoECBMQAQ&usq=AOvVaw0nvFqMXtV2AsNDLG0cEN-nq> [consulted on 11 de July 2024, at 13pm].
- ICMM (2019). *Integrated Mine Closure: Good Practice Guide* (2nd edition). <https://www.icmm.com/en-gb/guidance/environmental-stewardship/2019/integrated-mine-closure> [consulted on 11 July 2024, at 10am].

- Kraus, T. E. C., Dahlgren, R. A., & Zasoski R. J. (2003). Tannins in nutrient dynamics of forest ecosystems-A review. *Plant and Soil*, 256: 41-66.
- Law no 20/2014: Lei de Minas, de 18 de Agosto de 2014, Artigo 20 alterado pela Lei n.º 15/2022 de 19 de Dezembro.
- Mattsson, E., Ostwald, M., Nissanka, S. P., Holmer B., & Palm M. (2009). Recovery and protection of coastal ecosystems after tsunami event and potential for participatory forestry CDM – Examples from Sri Lanka. *Ocean and Coastal Management* 52: 1-9.
- Ministry of Economy and Finance (MEF) (2024). Conta Geral do Estado de 2023. *Volume I*. www.mef.gov.mz [consulted on 11 July 2024, at 9am].
- National Research Council (NRC) (1984). *Casuarinas: Nitrogen-Fixing Trees for Adverse Sites*. National Academy Press, Washington D.C., USA.
- Sambo, M. (2018). *Haiyu Mozambique Mining Company: dinâmicas da intervenção chinesa nas areias pesadas de Angoche*. In IDEAS 97/IESE. <https://www.iese.ac.mz/wp-content/uploads/2018/02/IESE-ideias-97-MSambo.pdf> [consulted on 19 July 2023, at 9am].
- Sealey, N. (2006). The cycle of Casuarina-induced beach erosion-A case study from Andros, Bahamas. In: Davis R.L. ad Gamble D.W. (eds.). The 12th Symposium on the Geology of the Bahamas and Other Carbonate Regions. *Gerace Research Center*, San Salvador, Bahamas. Pp. 196 -203.
- Silva, M., Silva, M., Duarte, E., Bonetti, R., Paludetto, A., & Miyashiro, C. (2023). A Relação do Nitrogênio com o Desenvolvimento das Plantas e suas Formas de Disponibilidade. *Revista Científica Multidisciplinar* - ISSN 2675-6218. 5 (1) e514762, doi: 10.47820/recima21.v5i1.4762.
- Smith, N. (2013). Environmental regulation of mining: integrating mine closure planning with environmental impact assessment. *Journal of Cleaner Production*, 14(8), 727-736. https://www.researchgate.net/publication/303744393_Integrating_mine_closure_planning_with_environmental_impact_assessment_challenges_and_opportunities_drawn_from_African_and_Australian_practice [consulted on 11 July 2024, at 09:30am].
- Tyler, R. M. & Minnitt, R. C. A. (2004). A review of sub-Saharan heavy mineral sand deposits: implications for new projects in southern Africa. *The South African Institute of Mining and Metallurgy*, SA ISSN 0038-223X/3.00.
- Wheeler, G. S., Taylor, G. S., Gaskin, J. F., & Purcell, M. F. (2011). Ecology and management of she-oak (*Casuarina spp.*), an invader of coastal Florida, U.S.A. *Journal of Coastal Research*, 27: 485- 492.
- Witherington, B., Hiram, S., & Mosier, A. (2011). Barriers to sea turtle nesting on Florida (United States) beaches: Linear extent and changes following storms. *Journal of Coastal Research*, 27: 450-458.
- World Bank (2006) - Mongolia - *A review of environmental and social impacts in the mining sector*: <https://www.google.com/url?sa=t&source=web&rct=j&opi=89978449&url=https://documents.worldbank.org/pt/publication/documents-reports/documentdetail/583011468274233098/mongolia-a-review-of-environmental-and-social-impacts-in-the-mining-sector&ved=2ahUKewjFi9CL-Z-HAxWTWkEAHftnAtwQFnoECBMQAQ&usg=AOvVaw3Y8zQxQpXXaem1D6AFip3J> [consulted on 11 July 2024, at 9am].

ANNEX 1



A

Haiyu Mozambique Mining, Co. Lda

Angoche, Nampula

Maputo, 04 de Março de 2024

Assunto: **Pedido de visita a empresa e conversa**

Excelentíssimo Sr.,

Queira por favor antes de mais, aceitar as nossas mais cordiais saudações.

O Centro de Integridade Pública (CIP), uma organização da sociedade civil cujos princípios fundamentais orientadores assentam na Integridade, Transparência e Prevenção da Corrupção, serve-se da presente via para solicitar, à V.Excia, uma visita a empresa e conversa sobre o estágio do projecto de exploração de áreas pesadas em Angoche.

Uma equipa do CIP, ida de Maputo, estará na cidade em Angoche entre os dias 04 a 07 de Março, solicitado uma visita para conhecer as vossas operações, ouvir de V.Excia os avanços, perspectivas e desafios do vosso projecto em relação aos ADL's, protecção ambiental e outras iniciativas com impacto nas comunidades bem como, a recolha de algumas amostras para uma avaliação independente. A nossa proposta é a realização da visita no dia 05 de Março de 2024 às 13h:00. No entanto estamos disponíveis para uma hora ou data que possam receber a equipa entre os dias 04 a 7 de Março de 2024.

Pessoas de contacto: Mery Rodrigues, email: mery.rodrigues@cipmoz.org, telefone +258 825153040 e Raul Massingue, email: raul.massingue@cipmoz.org, telefones: +258 868721111 ou +258 848019294.

Considerando as boas relações de colaboração entre o CIP e a vossa empresa, solicitamos que seja autorizada a visita a vossa empresa e desde já pedimos desculpas pelo envio em cima da hora da carta de pedido de visita.

Cientes de que o assunto merecerá a devida atenção da vossa parte, subscrevemo-nos.

Com mais alta estima e consideração,

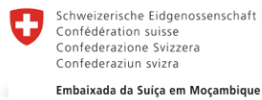
Atenciosamente,

Edson Cortês, Ph.D
Director Executivo



CENTRO DE INTEGRIDADE PÚBLICA
Anticorrupção - Transparência - Integridade

Partners:



Norwegian Embassy



Reino dos Países Baixos

