

Economic diversification and mine closure: An analysis of the Misima Mine case

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Abstract

Misima Mines Limited (MML) operated a large open-pit mine on the island of Misima in Papua New Guinea, from 1990 to 2004. The mine was a joint venture between Placer Dome (80%) and state-owned Orogen Minerals (20%). It produced 3.7 million ounces of gold, earning more than US\$ 4.5 million for the state.

About 5,000 people currently live on Misima Island. Prior to the mining activity, the majority of Misimans were dependent on subsistence farming and trade with neighboring islands. The bulk of their food was home grown, supplemented by fishing and occasional game. During the mine operation, a sustainability plan advisory committee (SPAC) was created to support sustainable development of the local communities. Members of the SPAC included representatives of Misiman churches and non-governmental organizations (NGOs); local landowners; national NGOs; international NGOs; and government officials from the local, district, provincial, and national levels. The first consultation document was produced in 2000, when the SPAC was formed; however, different interests and disagreements among local groups represented in the SPAC negatively affected planning, development, and implementation of projects. In terms of environmental reclamation, the entire site has been revegetated and rehabilitated. Despite the financial contribution to the community and local government after the mine ceased operations, the area still has rundown buildings and an inconsistent power supply, and social projects initiated during the mine life have not continued.

This paper aims to understand and reflect on the dynamics and existing challenges that prevented more positive and long-lasting results to the local community. This is achieved through a historical analysis of documents and interviews with the Misima management team, including one member who was involved in the Misima Mines Closure Committee. Key elements of the Cobar case study are also discussed, with the goal of providing further insights. The Cobar case is relevant because, since its inception in 2008, the Cobar economic diversification model has helped to create 55 businesses. Together

these businesses have generated over US\$ 2,983,000 in gross sales, created 105.5 new jobs, and generated US\$ 998,850 in direct investments into the community of Cobar, in New South Wales, Australia. The results of the overall study show that community engagement is critical and that grassroots entrepreneurial programs are important to creating meaningful community engagement.

Introduction

The paper begins by giving a detailed background of Misima Island's geology, climate, and mining history, including historic mining and Placer Dome Inc.'s (PDI) exploration and extraction. The background includes a brief description of the indigenous populations present on the island. The paper then goes on to examine PDI's sustainable closure plan, which included environmentally and socially responsible practices. The paper studies the environmental and social closure plan, the post-closure environment, and current social and political conditions. Once the backdrop has been set, the authors outline the methodology of using historic documents and interviews to frame the challenges that hindered many goals. A discussion of the documents used during research is followed by an analysis of the interviews. Themes are taken from the materials and highlighted for further discussion in the conclusion.

Misima is a volcanic island 220 km off the east coast of the Papua New Guinea (PNG) mainland, in the Milne Bay province of the Louisiada Archipelago island cluster (Salim et al., 2002; Jackson, 2002). The island runs roughly 40 km east to west and 10 km north to south; it is a challenging island to travel across due to rugged mountains and thick tropical rainforest (Byford, 2003; Salim et al., 2002).

In 1880, Australian explorers discovered rich deposits of gold on Misima, atop a hill 400 m above sea level, and constructed some of the first modern underground mines (Jackson, 2002). By 1889–1890, the gold had attracted 400 foreigners and 1,200 migrating Papuans to Misima and the surrounding islands (Byford, 2003). The industry did not expand too quickly, as underground mining was difficult and therefore most mining activity was limited to alluvial operations (Byford, 2003). Production picked up in the mid-20th century as underground mining techniques improved and the Umuna lode — a large deposit of gold ore — was discovered, only to dwindle during World War II as workers were evacuated to avoid Japanese soldiers (Bergerud, 1996). It wasn't until 1977, when Placer Dome Ltd (PDI) gained an exploration lease, that a large-scale mining operation was planned (WCB Resources Ltd., 2010).

Placer Dome Asia Pacific managed Misima Mines Ltd. (MML), 80 percent of which was held by PDI and 20 percent of which was held by the state-owned Orogen Minerals Ltd, from 1989 to 2006 (Boutilier, 2002; Barrick, 2012). The open-cut mine operation used truck and shovel mining methods (Salim et al., 2002; Jackson, 2002) to excavate around the historic mine site (Jackson, 2002). Rich ores were processed immediately on site, while low grades were stored for processing later, when the mine

was more depleted. During peak production, MML produced 3.2 million ounces of gold and 16 million ounces of silver (Jackson, 2002).

Extraction of ore ceased in 2001, while low-grade stockpiles continued to be processed until 2004, alongside environmental reclamation activities (Boutilier, 2002; Jackson, 2002). Exploration of low-grade ore on the island is an option for future mining endeavors. During the height of production, Misima employed 780 people, of whom 82% were local; however, after 2001, employment dropped by 50% (Jackson, 2002). In 2006, Barrick Gold Corporation bought MML from PDI and took over the completion of the reclamation and closure duties. The reclamation of the mine site was not overly complicated due to the use of proactive waste disposal and ore treatment techniques as well as an early schedule for reclamation activities (Barrick, 2012). After relinquishment in April 2012, the 12 square kilometers of land was returned to the Misiman people to use for crops and housing (Barrick, 2012).

There are 5,000 people in Misima today. 16 villages are scattered along the coasts, while the central business district in Bwagaoia is on the southern edge of the island (Salim et al., 2002). Before the mining industry came to Misima, the people lived off the land, hunting, gathering, and growing local food crops. The economy was based on trade with nearby islands, and the culture was heavily influenced by the people's relationship with the land and neighboring tribes. The tribes were matrilineal, and women played a leading role in the management of agriculture and land use. Once mining introduced consumer culture, the people of Misima became less dependent on crops as they held little monetary value (Byford, 2003). Because the western side of the island has limited access due to treacherous terrain, the people from these parts did not experience the same effects that came to other parts of the island with the mining industry (Byford, 2003).

Sustainability Plan Advisory Committee and Misima Mines Closure Committee

Placer Dome Inc. was cautious when planning the Misima mine; it wanted to leave the environment in a productive state and the community enriched once the mine was closed (Placer Dome Asia Pacific, 2000). In order to execute this, PDI created the Sustainability Plan Advisory Committee (SPAC) in 1999; its purpose was to develop a sustainable mine closure plan that was acceptable to all stakeholders. Stakeholders such as government, industry, landowners, local businesses, community members, NGOs, and aid agencies were invited to participate in the development of the plan (Salim et al., 2002; Petueli et al., 2001; Jackson, 2002). Because many of the stakeholders were not accustomed to being on a committee, it was difficult for the group to make conclusive decisions (Petueli et al., 2001). Furthermore, there was suspicion amongst the community members regarding some of the other stakeholders' incentives (Petueli et al., 2001). Concurrently, the PNG-based NGO whose duty was to provide village economic diversification plans that were comprehensible to the locals and truly reflected their desires

broke up suddenly and its work was lost to the closure plan. For this reason, the Misima Mines Closure Committee (MMCC) was formed. The committee used the triple bottom line strategy in planning for a sustainable mine closure: environmental protection, social responsibility, and economic diversification were included with a strong community partnership process (Petueli et al., 2001). The efforts and projects that were underway during and after the mine closure are discussed below.

Environmental stewardship

In order to protect the environment, a submarine tailings disposal process was used rather than a land based tailings dam, which could result in acid rock drainage and heavy metal leaching (Petueli et al., 2001; Salim et al., 2002). The ore excavated from MML was pulverized and mixed with cyanide to leach out the gold. This solution was then passed through a carbon absorption circuit to capture the gold, while tailings were disposed. Before the tailings were transported to a safe depth of 112 m below sea level for deep sea tailings placement (DSTP), they were treated to reduce the toxicity of the heavy metal and cyanide water. There have been two accidents related to the deep sea tailings disposal operation; the first had minor implications and the later had slightly more severe consequences. A pipeline broke in 1997, caused by an underwater landslide, and tailings poured out at 55 m below sea level. The plum, however, descended rather than surfacing, and no damage was reported. In 2001, a pipeline broke closer to the surface, at 10 m below sea level, and tailings material clouded the surrounding coral reef. MML claimed that toxicity was within acceptable limits and there appeared to be no serious long-term harm to the aquatic ecosystem (Salim et al., 2002).

In order to return the land affected by mining back into a productive state for agricultural or garden purposes, this land had to be reforested and revegetated. The reforestation and revegetation plan was underway in 2001, before the mine was fully closed. By 2006, the deconstruction of the mine site earthworks had been completed, and by 2012, the full reclamation was successfully implemented (Department of Industry Tourism and Resources, 2006; Salim et al., 2002). From a short distance, the site looks like a natural, lush landscape (Barrick, 2012).

Community planning

It was important to MML to provide the community with stable and lasting water, electricity, and communication systems, as well as improved health, education, and order. MML invested in necessary infrastructure, such as roads, an airport, and a dock. Furthermore, it developed a business plan to ensure economic growth after closure and a trust fund to support the new amenities (Barrick, 2012; Salim et al., 2002). The community development portion of the mine closure plan outlines project goals that sought to empower local community groups, through partnerships with stakeholders and government, and to

maintain amenities and programs put in place by PDI. Projects included improved education, civic duty, public infrastructure, health, and medical services (Petueli et al., 2001). Throughout the mine life, MML trained the local people and hired them as employees; at one point, 93% of the workforce was local (Petueli et al., 2001). MML also invested in training 13 nurses and 21 university students seeking degrees in mining or related fields and sponsored an additional 169 students for college (Petueli et al., 2001).

In order to supply the community with reliable electricity and power to run the water pump, MML constructed and ran a 250 kW hydroelectric generator for the townspeople of Bwagaoia. After MML closure, the responsibility for running and maintaining the generator was passed to the local landowner group and government (Resources Department of Industry Tourism and Resources, 2006). However, when a part from the hydroelectric generator broke, the locals were unable to replace it, and power became sporadic as an individual had to be present at the generator station to manually operate the broken part.

Traditional farm crops are economically unviable for commercial trade on Misima; therefore, MML has supported the introduction of cash crops: cocoa, copra (for extraction of coconut oil), nutmeg, vanilla, and mace (Jackson, 2002). The Samurai Murua Agricultural & Rehabilitation Training (SMART) Centre was a partnership program started by MML; it included the Cocoa and Coconut Research Institute and the Milne Bay Department of Agriculture and Livestock. The project aimed to provide market training and high quality seed stock to farmers (Petueli et al., 2001). Additionally, the SMART Center had a demonstration facility where Misimans could learn to improve the yield from their home gardens (Petueli et al., 2001).

The Women's Association (WA) was organized to engage the female population in economic diversification. Women were invited to propose projects they felt would be useful to the community, and the WA would help with funding and training. Three projects were executed; however, each project failed to last over the long term. First, a group of women suggested that they take over the management of the local PDI guesthouse. WA trained the women to bookkeep and run a hotel; however, within a few years, the business was bankrupt. Drum ovens were installed in the central business district so that women could bake and sell bread, but the ovens have been abandoned. Lastly, some women asked for sewing machines to make clothing, but when the sewing machines broke and were never fixed, the project was deserted. According to Petueli's case study report on the mine closure, the failure of the projects was due to a "lack of commitment from the community" (Petueli et al., 2001, p15).

Post-closure context

According to Barrick, the closure planning and early actions towards the reclamation of land affected by mining allowed for the relinquishment to proceed in 2012. In other words, the reclamation was a success

(Barrick, 2012). The decision to use the deep sea tailing disposal method saved the sensitive landscape from the threat of acid rock drainage and heavy metal contamination. The few waste rock dumps that pose a threat to the environment on site have been capped and sealed with oxidized waste rock and topsoil or stockpiled for future processing (Salim et al., 2002). The DSTD has had some effects on the marine habitat, including coral deaths in nearby reefs and the migration of reef fish; however, these are not permanent and the reefs are expected to revitalize in time. The unknown variable is the soft rock effects on deep-sea aquatic life, as there have been no conclusive studies (Salim et al., 2002). It is predicted that, although deep-sea environments take longer to rejuvenate due to colder temperatures, the environment will restore (Salim et al., 2002).

A lot of planning went into the community development plan, and as noted, not all of the projects were successful. The mining industry introduced a modern consumer economy into the region, improving healthcare, education, and infrastructure (Salim et al., 2002). While this can be viewed as a success, the dependence on income to maintain the benefits has been difficult to manage. The island essentially became dependent on the direct and indirect employment associated with the mine, and since closure, the plans to overcome the loss of income have not been sufficient (Jul-Larsen et al., 2006; Salim et al., 2002).

MML employed 780 people; after excavation discontinued, half the labor force was kept on, 82% of whom were local Misimans, to continue processing the low-grade stockpiles and aid in reclamation efforts until full closure. To help with the plethora of newly unemployed technicians, MML worked with the Misima Mineworkers Union and Oyatau Limited, an international employment and recruitment office, helping place the locally trained miners in other mines around PNG and the world (Jackson, 2002; Petueli et al., 2001; Salim et al., 2002). The problem with this plan is that not enough workers are working off-island to support the community's deficit of employment; furthermore, men have to leave their families.

While the closure plan included training and funds for local government to maintain public infrastructure and social programs, the town is in disrepair. PDI enabled the PNG national government to use the funds from an imposed tax credit scheme and trust fund to build and maintain amenities and support social programs once the closure was complete. However, to this day K 16 million (approximately US\$ 6.1 million) of the Kalopu trust fund remains tied up in court in a lawsuit between landowners and non-landowners, while the people of Misima struggle to keep their electricity and water pump running (Salim et al., 2002). It can be argued that the closure plan did not supply equal infrastructure across Misima, but focused solely on the villages nearest to the mine site, when many workers commuted from villages further away, which received no amenities (Jackson, 2002). These nearby villages have also received the largest share of compensation, and outlying communities feel cheated (Byford, 2003).

Misima was once a cashless economy, relying on community support and shared wealth; this harmony has been disrupted by the uneven distribution of wealth that occurred during and after mining

(Jul-Larsen et al., 2006). This, in turn, has changed the dynamic among community members, and conflict has ensued (Jul-Larsen et al., 2006). The most notable conflict has resulted from the entitlement to royalties or compensation of landowners (Byford, 2003), who represent a relatively small population of people affected by the mining. The legal disputes on this matter have caused the hold on funds, which should be aiding the community. Those who have received their compensation have allegedly not planned for the future or contributed to community needs (Salim et al., 2002). Furthermore, the unequal distribution of labor and income has caused disparity in the community, creating imbalance between men and women, youth and the elderly, locals and non-locals, and among different ethnic groups (Jul-Larsen et al., 2006).

Byford (2003) published a paper looking at the effects of the mining industry on Misiman women, framed in the context of employment and new social dynamics. Because women were not hired for mining work, their job opportunities came in the form of indirect employment and were less stable than men's work. Furthermore, the abundance of cash on the island resulted in an increase of alcoholism and prostitution, which in turn caused problems for families.

Methodology

For the purpose of understanding the mine closure planning in Misima, the authors of this paper reviewed documents from industry, government, and scholarly sources. From these perspectives, the authors were able to draw a history of the island, the community, the mining operations, mine closure, and post closure environment. Furthermore, the authors took the research of the Misima mine closure actions and outcomes one step further by interviewing former management from Placer Dome and management from a new prospective mining company interested in mining the remaining ore from Misima.

These semi-structured interviews were based on a set of questions that aimed to inform the authors on some general facts about the political, socio-economic, and environmental situation during the planning, operation, and closing phases of the mine. The questions allowed the interviewees to frame the strengths and weaknesses of the closure plan and give insight into any outside threats or opportunities that affected the plan. Finally, the interviewees were asked what lessons could be taken away from their experience.

Each personal interview was allotted one hour and was recorded and transcribed. Two interviews took place in a public restaurant and the third interview took place over Skype, a private online meeting space. The fourth interviewee responded to questions via email. After reviewing the interviews, the authors discussed the main themes that emerged throughout the discussions and in the revision of historical documents in order to highlight them in this research paper.

The first individual interviewed was the exploration manager on Misima from 1981 to 1986 and had over 45 years of experience exploring prospective mining territories in 30 countries. This explorer's

knowledge of the Misima site was enlightening. The explorer had experience in other parts of Papua New Guinea and was familiar with the terrain, climate, and indigenous populations. The second individual interviewed worked on Misima when it was in the feasibility study stage and during project development. During the mine life, this second interviewee acted as the chairman of the Misima Mines Closure Committee and worked closely with community members and stakeholders on community development projects. The third interviewee was not involved in the Placer Dome/Barrick Misima mine but is the director of an exploration company involved in an ongoing drill program on Misima, which is proving to be commercial grade. The fourth interview was conducted via email correspondence with an engineering manager who worked on the Misima construction team between 1988 and 1989 in field engineering, contract management, scheduling, and cost control for the mine construction.

Discussion and analysis of the results

In 2000, Placer Dome Inc. published the *Misima Mine Sustainability Report*, which outlined the proactive projects underway at the time that aimed to improve the community before and after mine closure. This account pairs well with *A look back at the Misima mine closure*, the report Barrick Gold Corporation published in 2012, after it acquired Placer Dome Inc. and its properties and projects in 2006. It is apparent from the industry documentation of the closure planning that Placer Dome intended to use the triple bottom line (Petueli et al., 2001), a strategy that includes leading practice (Jul-Larsen et al., 2006) and assumes the most economically efficient mining techniques coupled with environmentally and socially responsible operations. This movement towards corporate social responsibility is further explored by Jackson (2002), who discusses the importance of capacity building in communities affected by mining as a means to support continuing projects and amenities after mine closure. Jackson's paper makes suggestions to the PNG government regarding mine closure legislation to produce standardized best practices in the region.

Some of the literature reviewed criticizes aspects of the community development plan because some of the key projects failed to continue after the mining company was gone. The Prospectors and Developers Association of Canada (PDAC) uses the "Stakeholder 360," a measurement tool developed at the Centre for Innovation in Management at Simon Fraser University (SFU) and used to measure the quality of social capital in a community to explain the failed projects. PDAC states that the failure of community development projects in Misima was due to weak relationships among the stakeholders (Salim, et al., 2002). Another criticism noted that the selection of community voices included in planning excluded members of the community such as non-landowners and women. Julia Byford (2003) discusses the ways in which Misiman women could be better represented in the community development plan for

future mining projects in the region. To facilitate the organization of the ideas, this section is divided into sub-topics.

Community engagement

According to the chairman of the Misima Mines Closure Committee, the most important aspect in community planning is building “true relationships” with the locals. When creating the community plans, the MMCC spent a lot of time engaging the people of Misima to decipher their expectations, concerns, and desires regarding the mine project. The exploration manager explained that one challenge for those engaging the communities was the incredible variety of cultures across the island.

There were two main concerns that community members made clear: they wanted the environment to be protected and they did not want any off-island tribesmen working at the mine due to past histories and disputes. To reduce their environmental footprint, the exploration team made camp directly on the exploration site. The project development team carefully considered not only how to reduce environmental harm, but also how to leave the land in a better state than previously found. The chairman explained that, physically, the environmental closure was satisfactory because before mining, the land was too mountainous to use for farming and after land leveling, the area was flat enough for gardening. Additionally, a man-made lake was left behind, available for farming fish. This left the land more productive and accessible for Misimans in the area.

The exploration manager explained how ensuring that only local tribesmen received employment from the mine was in PDI’s best interest. First, the cost of transportation to and from the island was reduced, and second, the cost of housing was reduced. PDI simply controlled all transportation on and off the island, to safeguard against immigration. Local community members were trained vigorously to become journeymen and mine operators, and eventually around 80% of the employees at MML were Misimans.

Social chain of custody

The interviewees were asked to discuss challenges that community development projects face, in particular those at Misima. The exploration manager explained how, in general, the loss of knowledge along the “social chain of custody” is a difficult issue to manage; community development projects are passed from the exploration team to the construction team to the operations team, and finally to the closure team. At each stage of the mine’s life, information can be lost, promises can be broken, and conflict can occur. To prevent this, appointing a mine manager early can ensure continuity. According to the chairman, Misima Mines Ltd. (MML) was lucky to have a camp/site manager working from the first stages of exploration. The camp/site manager was an “ex-kiap,” a former Australian patrol officer from before PNG gained independence. He lived on the island before PDI arrived, spoke the local language,

and knew many community members. Although this individual lacked a mining background and site management skills, his knowledge of the communities and the language were assets for community planning projects, allowing MML to avoid the common challenge of losing project details during the turnover of employees at different stages of the mine's life.

Poor management of funds

In Papua New Guinea (PNG), not all mining operations are created equally. The report *Extractive industries review: Project visit to Papua New Guinea*, funded by the World Bank Group (WBG), notes that many WBG community development projects deteriorate in PNG due to poor management of funds. Furthermore, the paper states that that loss of royalties has left local communities feeling "cheated" (Salim et al., 2002). When asked to explain how PDI allocated compensation for those people directly affected by the mine, both the exploration manager and the chairman described a different process than what was discussed in the papers. There was an understanding that "ownership on the island was complicated"; tenure was not subject to square footage, but was tied to resources. The engineering manager supported the complexity of land tenure and resource ownership amongst clans, stating that during "land clearing and timber harvesting for construction," the "process of coming to consensus agreement over the ownership of individual trees in the forest was time-consuming." PDI recognized its inability to understand how to divide the compensation fairly; it relinquished this job to tribal leaders who knew the families and the land. Disgruntled landowners and non-landowners alike have voiced their grievances, stating that they were not compensated, and the money has never been recovered. Furthermore, PDI paid royalties to the national government, which dealt funds to the provincial government, which in turn was meant to invest some of these funds in the island. Government in Misima was very limited, and there was no evidence that royalties were invested to support the Misiman community. The engineer discussed the idea that PDI became a "surrogate government until post-closure, at which point governance effectively ceases to function," a process which would be best to avoid for new mining projects in PNG.

Community project challenges

The community development plan included a number of different initiatives intended to improve the quality of life for the locals; however, some failed to mature and/or continue after the mine closed. The chairman describes a couple of projects that did not evolve as expected due to a misunderstanding of Misiman culture and values. MML started a housing project in which a small percentage of employee pay would be combined with a donation from PDI to build new homes. To the dismay of mine management, participation in this project was low. An investigation into the cause uncovered a cultural value pertaining to homes as being disposable due to divorce laws; a divorced couple has their home burned down.

Therefore, no one wanted to invest in a new home because divorce was a common occurrence in the culture. When PDI announced they would build a water pump for any communities whose water supply was going to be disrupted by the mine, half the island claimed they needed a new water supply. PDI build a network of pipes, pumping water to different communities; however, within years, most were broken. Pipes would be found cut in the jungle by machetes. The chairman explains that this was not necessarily an act of vandalism, but of uneducated curiosity. Furthermore, the people would not attempt to fix the pipes, because no one took ownership of the project, and therefore people lacked the motivation to keep it maintained.

When the director of the prospective mining company visited Misima in September 2012, he described how some of the legacies PDI wanted to leave behind for the benefit of the community had fallen apart. For instance, the commercial fishing boat bought to improve the fishing market had burned and sunk in the recent past, and the coconut plantation and processing plant were abandoned. While it cannot be said how the fishing boat caught fire, the abandonment of the coconut farm and processing plant was caused by lack of administration. The prospector explained that an important part of a “strong enterprise is building capacity” at the community level. While PDI hosted training sessions to develop technical skills for the islanders, more management and leadership skills were necessary for the progress of these projects.

The chairman was proud to say the most successful social program implemented on Misima was the job-training program that provided scholarships and training for students to become journeymen, equipment operators, and miners. Offering skills and knowledge as means of opportunity has been the most lasting and “intergenerational legacy” supplied by PDI. Currently, Oyatau Limited has successful recruited 300 Misiman miners to work around PNG and the world. The miners working within PNG fly in and out of mine sites, and have voiced their desire for another mine to open on Misima so that they can remain on the island with their families.

Current economy

When asked to discuss the current economy on Misima, the prospector said there is “barely an economy on the island,” meaning that after the mines left the cash economy faded and the traditional subsistence farming and trade lifestyle returned. What little money does trade hands is used in the small grocery and bread shop or to buy small amounts of kerosene. For the most part, it can be argued that “no economic development has advanced since Misima Mine’s influence.” The roads have deteriorated, the water pipes have broken, and there is “barely enough electricity to run the small grocery store.”

The prospector had the opportunity to talk with some of the miners who travel off the island for work and make good wages. He asked them where they spend their money, if not on Misima. Many used

the money to send their children to boarding school in Australia to ensure better future opportunities for them, thus supporting the theory that the training has left an “intergenerational legacy.”

The possibility of another mine is under examination; current gold exploration presents the possibility of a mine with a 10-year lifespan, mining 6 million tons a year. However, if copper exploration is fruitful, the mine life could extend up to 50 years, mining 30 million tons a year of gold and copper. Either possibility would be a substantial project for Misima, and could employ from 350 to 1,000 workers. The question remains: how will the community development plan proceed if this project comes to pass? How can new management work with community members to ensure a prosperous future when the mine comes to closure?

Conclusion

This paper aims to understand the dynamics and reflect on the existing challenges that prevented more positive and long lasting results to the local community on Misima, Papua New Guinea. The management team at Misima Mines Ltd. was interested in leaving the environment and community in a healthy state. The environmental reclamation of the site was successful due to early reforestation and revegetation efforts. The land around the mine was made more useful to locals because the leveling of landmass made the area flat enough for agriculture and a lake formed in a pit that can be used fishing. The community development plan, however, proved to be more problematic; management met with many challenges in executing and sustaining its projects and programs.

From a positive side, PDI maintained some staff members throughout multiple stages of the mine’s life. The chairman was involved in the earliest stages of the feasibility study and then through the project development stage. The site manager was on the ground from the exploration stage until closure. This allowed PDI to maintain a dialogue with the community during its continued commitment to improving Misiman well-being, with less chance of losing information along the “social chain of custody.” In order to provide the Misimans with reliable water and electricity, PDI installed a water pump and hydroelectric dam — actions that were supported by the community and government. Furthermore, it can be argued that PDI left a legacy of knowledge and skills through the training programs and scholarships made available to the islanders. Today, 300 trained Misimans work off-island in mines around PNG and the world, benefiting from an income that would otherwise not exist.

On the other hand, a lack of capacity within the community can be reported as the main reason for the situation on Misima today, where many projects have been neglected or abandoned. On Misima, many projects may have reflected the desires of the community (for example, for fresh running water, electricity, and roads); however, the implementation and management of these projects was run by PDI before mine closure. Other projects were planned through a top-down approach and did not reflect the desires of the community (for example, the housing project). Since the company was the main driver

behind the projects implemented on the island, the community did not possess the sentiment of ownership to lead the projects after the mine closed. In addition, the maintenance of these amenities requires financial funds; it has been challenging to manage royalties and trust funds set aside for these endeavors.

The study shows that the new developers would like to avoid any paternalistic planning and would prefer to focus on creating a long-lasting bottom-up economic diversification model through capacity building and strong stakeholder relationships. Recognizing that top-down community plans can be problematic is an important step towards more stable, long-lasting projects.

The management team at the Cobar Mine, Australia, for instance, decided to approach its community closure plan from a different angle than the usual top-down approach. The company supported a grassroots approach to planning and implementing programs to foster local economic diversification. Community members are at the center of the process, which promoted community engagement and helped to create a strong sense of ownership. It is expected that if the community enjoys some social capital and is given the right tools to build capacity, it will be natural to develop long-lasting successful projects. In Cobar, following the implementation of this economic diversification model, the town opened 43 new businesses, providing 90 new jobs, generating over C\$ 2,456,300 in gross sales, and reinvesting C\$ 776,650 into the community (McFaul, et al., 2013).

After reviewing a diverse selection of historical documents and interviewing members of the Misima Mine management team, the authors of this paper conclude that the socio-economic dynamic of the mine closure needs to be assessed and planned early during the project development phase. Creating a stable plan for economic diversification following closure should include capacity building and ownership of development plans within the community. Building trust and relationships among all stakeholders and providing the community with the training it needs to manage its projects can achieve this goal. The authors are aware of the limitations of this paper, due to the lack of inclusion of voices from the Misiman community. As this research study continues, and we envision visiting Misima to be able to include and capture the perceptions of the community in the near future.

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