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ABSTRACT

The Philippines sits atop vast mineral deposits estimated to be worth around PhP 47 trillion. Yet mining in the Philippines has a mixed track record as far as its impact on human and economic development. This paper tries to draw lessons from the Marcopper Mine in Marinduque, Philippines, using a framework—what we call a "mining and inclusive growth causality chain"—to begin to think through how extractive industries can contribute to inclusive growth. Essentially, there is a chain of inputs and events that—when properly executed by various stakeholders—could lead to very strong economic and human development outcomes not just for the communities directly affected by the mine, but also the country as a whole. Too often, this chain is easily broken by both governance and market failures. Addressing these failures through such means as proper consultative mechanisms, transparent and professionally managed wealth funds, and accountability arrangements for key stakeholders (including mining companies, government agencies, and key regulators) could all contribute to a properly functioning "production chain" that sees natural resource wealth transformed into development outcomes.

Key words: mining, corporate social responsibility, responsible mining, inclusive growth
JEL: F2, F21, O16, O19

* The views expressed herein are those of the authors, and not necessarily those of the Asian Institute of Management. This analysis herein builds on earlier research materials produced by students of the Asian Institute of Management, in learning team 8 of the Masters in Development Management (MDM) Class of 2013, as well as the Management Research Report (MRR) of Mr. John Lindon. Questions and comments on this draft should be directed to TCANARE@AIM.EDU.

I. Introduction

The Philippines sits atop vast mineral deposits estimated to be worth around PhP 47 trillion. Overall the country is the 5th most endowed in the world in terms of valuable minerals. It has the 3rd highest deposits of gold, the 4th highest deposits of copper and the 5th highest deposits of nickel.[1] The potential untapped wealth of the nation is therefore considerable but at present mining plays a minor role in the economy, accounting for only around 1% of GDP (MGB 2011). Mining could be one of the key drivers of growth for the Philippines economy in the future, but reforms are needed to ensure that growth is inclusive and is of the greatest possible benefit to the nation (Habito, 2011).

Mining in the Philippines has a mixed track record as far as its impact on human and economic development. While there are mines operated with the strictest of environmental compliance procedures and with strong corporate social responsibility initiatives, there are also lingering issues on several fronts. There are concerns over equitable benefit sharing between mining companies, who are seen by some as the chief beneficiaries, and the Central Government, the Local Government Units and the host communities, who are sometimes perceived to gain less than their fair share. There have also been well-publicized conflicts in mining areas, often involving host communities concerning their land rights, access to mining sites and the use of water resources. There have also been environmental incidents involving large-scale mining operations. These examples of "what could go wrong" have helped fuel opposition to mining.

While there are many examples of professionally managed mining operations in the Philippines, there are still several examples cited by anti-mining advocates as to how mining runs counter to economic and human development. The case that is probably cited most often is that of the Marcopper mine situated on the island province of Marinduque, which was operated and partially owned by the Canadian mining conglomerate, Placer Dome.[2] This paper tries to draw lessons from that particular mine, by identifying key learning points that can influence the formulation of future mining legislation and policies. It proposes a framework to begin to think through how extractive industries can contribute to inclusive growth, through a causality chain analysis. Essentially, there is a chain of inputs and events that—when properly executed by

[1] DENR website, accessed 10 October 2012, http://www.denr.gov.ph/index.php/component/content/article/16.html

[2] While conclusive legal proof of ownership was never established, Marcopper Mine was widely alleged to be partially owned by President Ferdinand Marcos until he was overthrown in 1986. Placer Dome was acquired by Barrick Gold in 2006.

various stakeholders—could lead to very strong economic and human development outcomes not just for the communities directly affected by the mine, but also the country as a whole. Too often, this chain is easily broken by inherent risks brought about by both governance and market failures. Addressing these failures through such means as proper consultative mechanisms, transparent and professionally managed wealth funds, and accountability arrangements for key stakeholders (including mining companies, government agencies, and key regulators) could all contribute to a properly functioning "production chain" that sees natural resource wealth transformed into development outcomes. This paper takes a very practical view on mining: that by addressing these failures and concerns (most of which have been repeatedly raised by the anti-mining lobby and many development practitioners), it would be possible to achieve "responsible mining"—which we will define in this paper as mining that produces net positive economic and human development outcomes for both the communities and the nation as a whole, while also allowing a competitive rate of return for the private sector.

In what follows, Section 2 describes the methodology for the analysis herein, while Section 3 reviews the literature on how natural resources can be harnessed to boost national development and it identifies specific country examples that could be of relevance to the Philippines. Section 4 presents the research findings focusing on the legacy of large-scale mining in Marinduque in terms of economic development and livelihoods impacts, and environmental governance issues. Section 5 concludes the paper with a number of key lessons from the Marinduque experience that can inform future mining policy and practice in the Philippines.

II. Methodology

The genesis of this paper was a research visit in April 2012 to Marinduque by a group of six students from the Asian Institute of Management's Master of Development Management (MDM) class of 2012. The objective was to analyze the extent to which livelihoods had recovered since the 1993 Mogpog River and 1996 Boac River disasters. The group conducted six focus group discussions (FGD's) in six different barangays in Boac (3) and Mogpog (3) as well as numerous key informant interviews (KII's) as part of a Rapid Area Assessment (RAA) exercise. Interviews were held and data was collected from a range of local sources including the Marinduque Center for Environmental Concern (MACEC), Department of Environment and Natural Resources (DENR), Department of Education (DepEd), Provincial Planning and Development Office

(PPDO), Provincial Veterinary Office, Provincial Tourism Office, Provincial Governor's Office, Philippine National Police Headquarters and Boac Police Station, as well as the Boac and Mogpog Mayor's Office.

The group monitored the state of each river at various points to check the extent of vegetation re-growth and the presence of marine life and observed the state of the surrounding riverbanks. The RAA uncovered indications[3] that local communities felt strongly that they had been excluded from sharing in the benefits derived from large-scale mining activities. In fact, rather than profiting from mining, the communities stated that they had paid a high cost in terms of damage to the environment, health problems from using the polluted rivers, a general lack of economic development and a significant loss of livelihoods both during and after the period that the mine was operational (see Annex 1 for summary of findings of the RAA).

This research paper provides a general assessment of the development legacy (good and bad) of the Marcopper Mine. It underpins the analysis of this issue with data from secondary data sources, as well as from the rapid area appraisal just described. Provincial revenue data was collected from the Bureau of Local Government Finance (BLGF) to establish the extent of local revenue generation during and after the closure of the mine, as well as transfers from the center to the province in the form of budget allocations. Data for neighboring provinces were also collected to validate trends. Data on the Marcopper Mining Corporation (MMC) was obtained from the Security and Exchanges Commission (SEC), while MACEC provided additional data on the firm. Oxfam Australia's 'Mining Ombudsman Case Report: Marinduque Island' by MacDonald and Southall (2005) was a key reference text for this paper; and an effort was taken to update this comprehensive overview of the environmental disasters associated with Marcopper Mine and their aftermath.

III. Theory and Framework around the Concept of "Responsible Mining"

The issue of how natural resources can be best utilized to aid human development has sparked debates for several decades now. There are those who contend that rather than aiding development, natural resources can actually become a 'curse' for many countries. Corden (1994) identified the negative effect that the discovery of natural gas in 1959 had on the Dutch

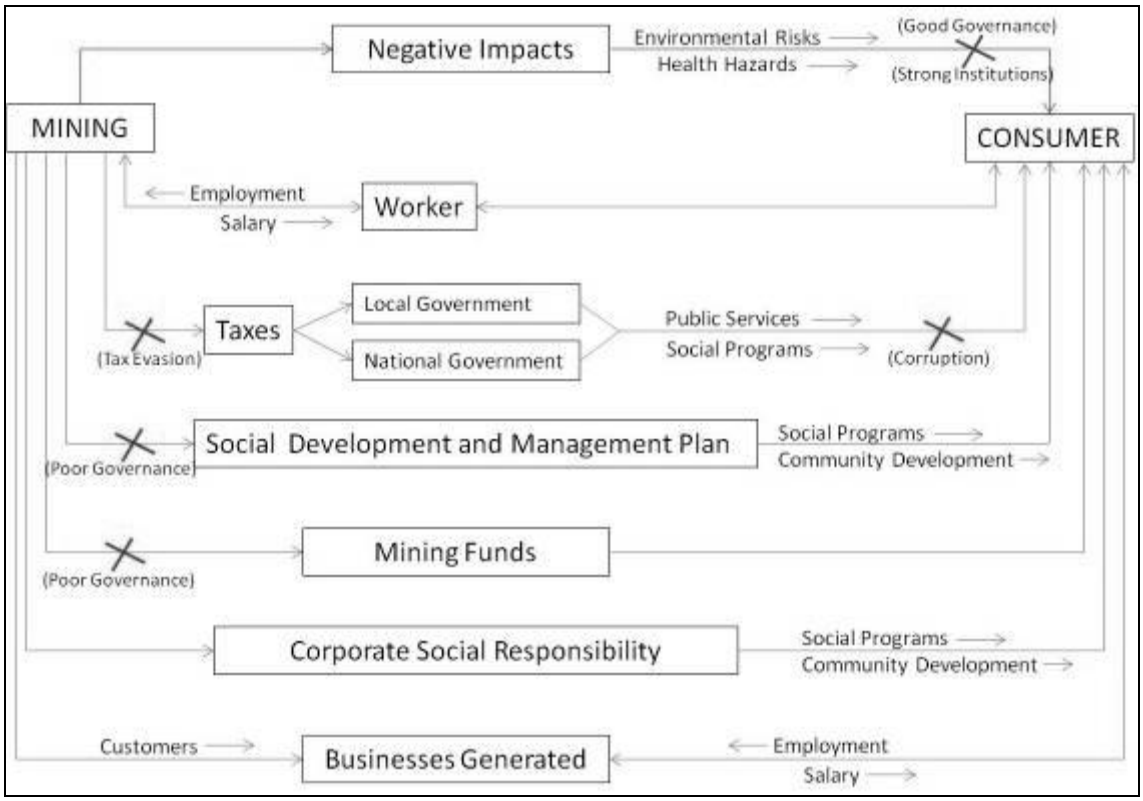
[3] See Learning Team 8 MDM class of 2012, RAA Report 'Marinduque: Heart of the Philippines, longing for true development', Asian Institute of Management.

manufacturing sector. Essentially, the inflow of mining revenues contributed to an appreciation of the Dutch currency, in turn weakening the price competitiveness of their export sector. "Dutch disease" as it became known has since been observed in numerous developing countries where foreign capital has flowed into booming oil or mineral industries, eventually proving detrimental to other sectors in the economy, notably manufactured exports.

An influential study of 70 countries between 1970-1990 by Sachs and Warner (1995) concluded that many of those with higher natural resource exports suffered from comparatively weaker growth. A later study by Humphreys, Sachs and Stiglitz (2007) pointed to stunted development in a number of countries e.g. Angola, Cameroon, Chad, Democratic Republic of Congo, Nigeria and Venezuela. Despite possessing vast reserves of natural resources, these countries have failed to convert this wealth into sustained and equitable development.

This failure to convert mining wealth into lasting development results has prompted a growing number of studies on how exactly this sector fails to promote inclusive growth and development. From a management perspective, we could consider a framework that indicates how mining contributes to inclusive growth and development outcomes as part of a "causality chain". For instance, figure 1, below, illustrates what that chain might look like, when tracing the entire sector and its stakeholders.

Figure 1: Mining and Human Development Causality Chain: An Illustration of Several Possible Breaks in the Chain



Source: Authors' Elaboration

By developing the above framework, we can then identify in a more systematic way, where exactly on this chain certain "failures" (or breaks in the chain) occur. Such incidents of failures could be germane to how governments and markets could both face possible failures, as elaborated in the public economics literature.[4]

The causality chain of how mining can contribute to human development and inclusive growth (including both positive and negative potential impacts) is summarized in Figure 1. Drawing on the literature, the "X"s mark the spots where the chain appears particularly vulnerable. In terms of positive contributions to development, one of the direct benefits of mining to the local population is that it provides employment opportunities, and the salaries paid to these workers go directly to the households. Mining companies also pay taxes and other fees to the government, both at the local and at the national level. The revenues from these taxes and

[4] Elaborating on this strand of literature is beyond the scope of this paper. The interested reader may wish to refer to Arnott, Greenwald and Nalebuff (2003) for a discussion of different government and market failures.

fees, if properly utilized, can be used to provide public services and social programs both in the mining community and for the entire country. This part of the chain can be broken if mining firms do not pay the right amount of taxes or if corruption in the government diverts the use of funds to other purposes. Note that, depending on the cause, different stakeholders on the causality chain become responsible for the potential failure of the entire chain.

The law also requires mining firms to spend at least one percent of its direct mining and milling cost on their Social Development and Management Plan (SDMP), a set of programs aimed at improving the lives of the people in the mining community. Mining firms are also required to maintain several mining funds, including the Mine Rehabilitation Fund (MRF), the Mine Waste and Tailings Reserve Fund (MWTRF) and the Final Mine Rehabilitation and Decommissioning Fund (FMRDF). The MRF is used to rehabilitate areas affected by mining operations while the MWTRF is the fund generated by the accumulation of the mine wastes and tailings fee. FMRDF is used to rehabilitate the mine areas after closure. The possible "break" in this part of the causality chain can come from poor governance – both in the part of the mining firm for failing to implement what is stipulated in the law, and the government for failing to enforce its policies.

More indirectly, the corporate social responsibility (CSR) programs of mining firms can also benefit the community. And mines, especially those located in remote areas, can generate new businesses such as eateries, convenience stores or public transportation. The influx of workers (and their families) creates demand for these businesses and provides them with customers. These businesses, in turn, generate employment and pays salary to their employees. (Based on our own anecdotal evidence, mining communities can easily triple or quadruple in size at the peak operation of a mine.). Moreover, some mining firms also generate their own electricity, and some of the local population benefit from this.

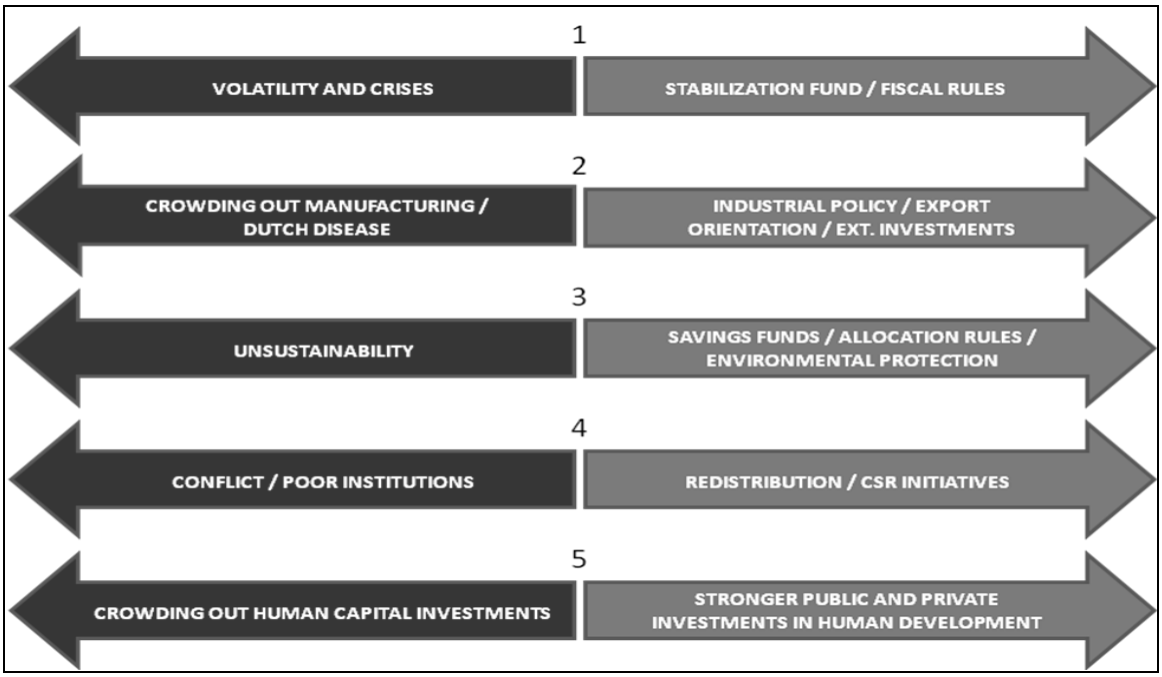
At the opposite end of the causality chain there are also risks of possible negative impacts of mines. Mining, when done with little regard to safeguards and the appropriate technology, introduces environmental risks and health hazards. And the Marcopper incident was one of the most infamous testaments of these in the Philippines. In the same way that the causality chain of mining can be broken by several factors, risks and hazards posed by mines can also be minimized or mitigated. Over-all, these safeguards are also subject to the presence of good governance and strong institutions, so that these could be implemented effectively and protect

the welfare of mining communities. These help to ensure that mining firms follow protocols on construction, mining processes, and safety.

As will be discussed in later sections, the case of Marcopper can be analyzed using figure 1. Indeed, this case seems to suggest a "perfect storm" wherein multiple breaks in the mining and human development chain took place. The health and environmental hazards were obviously not mitigated as some municipalities in Marinduque are still reeling from the effects of the disaster. Until now, a major clean up is still not forthcoming. (There is also still a question of whose responsibility this clean-up is—whether it should be the government or the mining company.) The continued poor state of the municipalities that hosted the mine also brings into question whether and to what extent any of the natural resource wealth extracted by Marcopper was ever used for local economic and human development.

As an additional guide on the potential benefits and costs of mining, Mendoza, McArthur and Lopez (2012) undertook a useful review of the extractive industries literature, and they identified five recurring themes in the country studies that point to how mining can fail to support inclusive growth and how to mitigate and/or adapt to these risks. This is shown in figure 2, with the leftward arrows showing the elements of natural resource curse, and the corresponding rightward arrows showing the potential solutions to address them.

Figure 2: Elements of the Natural Resource Curse and Policies to Improve the Development Impact of Extractive Industries



Source: Mendoza, McArthur and Lopez (2012)

The elements of the natural resource curse include, first, the risk of price volatility and economic crises. Countries heavily relying on mining wealth can severely be affected by sudden price drops and economic crises that weaken the demand for these commodities. The adverse impact of price and economic shocks can be minimized by channeling some of the mining wealth to funds that stabilize public spending and investments, and implementing fiscal rules that minimize boom-bust cycles in public spending. Second is the risk of the natural resource curse, or Dutch Disease, wherein other crucial sectors such as manufacturing is crowded out by mining, as mineral exports appreciates the local currency and discourages exports of other products. Crowding out of manufacturing and the exchange rate appreciation pressure associated with Dutch disease could be counteracted by more proactive industrial policies and investments in public goods that enhance the chances for successful economic diversification.

Third is the unsustainability of mining programs implemented using mining wealth, as some of them cannot be sustained once the mine supporting them stops operating. This can be addressed by following the necessary savings strategy which may include the creation of specially designed savings funds. Fourth is the risk of developing conflict and poor institutions,

which can be mitigated by policies that prioritize social stability and that promote stronger equity. And fifth is the crowding out of public goods, social spending and human capital investments when mining wealth is not managed properly and equitably. This can be mitigated by clear human capital investment plans backed up by mining funds including industrial diversification strategies and livelihood and employment opportunities especially for the youth.

It is possible that all these themes will be relevant to the Philippine case as well. However, based on discussions with experts and the available studies on the mining industry in the Philippines, it would appear that **poor governance and weak institutions**, and **unsustainability and conflict** are possibly the most relevant to the current Philippines context and therefore deserve closer attention.

- **Poor governance and weak institutions**. Improvements in governance, tackling corruption and strengthening institutions are some of the priority reforms of the government. Good progress is being made but there is still a way to go – the Philippines is currently ranked joint 105thout of 176 countries and territories on Transparency International's Corruption Perceptions Index 2012[5]. A particular weakness of the Philippines is the role that elite hereditary groups play within the political and business landscape (Studwell, 2007). The impact that these groups have had in terms of their ability to capture the benefits of economic activities at the expense of the general population cannot be understated. Therefore there is a real danger that the potential benefits that can be gained from future expansion in the extractive industries will not be converted to advances across the whole of society.

  Here it would be useful to consider the link between corruption and poor governance on the one hand and natural resource extraction on the other, which has been made in numerous studies (e.g. Leite and Wedimann, 1999; Glyfason and Zoega, 2002). As Collier and Venables (2008) state "*the emerging consensus is that while resource revenues have a positive effect on economic growth in countries with good governance, their effect in countries with poor governance has, on average, been negative*." It is possible, as some argue, that extractive

[5] Transparency International website, Corruption Perceptions Index, accessed 23 November 2012, http://www.transparency.org/cpi2012/results/.

industries create powerful incentives for rent-seeking which then easily lends itself to government failure. As explained by Standing (2007), the enormity of revenues in extractive industries serves as an attractive target for rent-seeking and corruption. Several studies similarly conclude that countries that are highly dependent on natural resources tend to have higher levels of corruption and are more likely to have authoritarian governments (Leite and Weidmann, 1999; Jensen and Wantchekon, 2004).These conditions suggest that important steps should be taken to further mitigate possible state capture and government failure.

- **Unsustainability and conflict.** The natural resources that the Philippine Government hopes to use as a driver of growth are finite. In order to maximize the potential benefits, it is worth considering how other countries managed such a windfall gain. As far as international literature and development experiences, Botswana, Malaysia and Chile are among the countries that have been relatively more successful in converting their natural resources into drivers of national development (Acemoglu, Johnson and Robinson, 2003: Gleb and Grassman, 2010). We will discuss specific aspects of how these countries have used their natural resource wealth in the country studies that follow. However, in general terms, a common thread present in each success story appears to be how natural resource wealth has been utilized to fuel investments in human capital. By efficient and targeted utilization of taxes, fees and royalties, a fair share of the revenues could be mobilized by the public sector, and then channeled into a broader strategy that would dramatically boost human capital investments, while also facilitating industrial development that would realize the returns on human capital by providing well paying jobs. Mendoza (2011), for example, articulates a proposal for an "inclusive growth trust fund" that could be applied to the Philippines context. The general idea draws on the twin goals of investing the natural resource wealth most effectively, and in ways that also boost the long-run competitiveness and inclusiveness (through broad public investments in human capital) of the over-all economy.

  Nevertheless, important issues of fairness typically raise the level of immediate communities impacted by the mining operations. The potential for

conflict to erupt over the control of natural resources has been observed repeatedly around the globe. Numerous long and bloody civil wars in Africa (Collier and Hoeffler, 2002) have their roots in the struggle for resources. In Iraq Sunni, Shia and Kurdish armed groups compete for control of oil fields. While in Papua Province, Indonesia, separatist groups, environmentalists and local landowners are all struggling with Jakarta over the running of Freeport's Grasberg mine (Leith, 2003).

For the Philippines, which carries the legacy of internal armed conflict, these risks of further natural-resource-related conflict need to be managed well. The recent peace accords signed with the Moro Islamic Liberation Front (MILF) will be jeopardized if equitable benefit sharing mechanisms are not agreed for the extensive natural resources of Mindanao. The problems facing Sagittarius Mines (who has invested many millions of dollars in CSR activities years in advance of the start of extraction at their Tampakan site in South Cotabato) are illustrative of how easily disputes in some areas of the Philippines can quickly escalate into armed conflict.[6] The message for the Philippine government is that environment NGO's, politicians, church groups, indigenous people's representatives and other concerned stakeholders are willing and able to strongly oppose mining companies if they are not satisfied with the actual (or even perceived)"inclusiveness" of how the benefits (and costs) are shared as regards mining operations. Furthermore the boom in the use of social media in the Philippines means that mining is constantly under scrutiny from concerned citizens, now more than at any time in the past.

While there are numerous salutary tales surrounding natural resources and development, there are also positive examples that require equal consideration. The research conducted by Wright and Czelusta (2007) and Lederman and Maloney (2008) found that growth and development were possible for resource rich countries while Pineda and Rodriguez (2010) found that there is a positive correlation between natural resource exports and economic growth and shifts in the Human Development Index. Benny and Cook (2009) demonstrated that economic

[6] Cahayag, W in Davao Today website, accessed 24 October 2012, http://davaotoday.com/main/2012/10/22/outrage-sweeps-mindanao-over-tampakan-massacre/.

growth was achieved when African countries were able to combine petroleum exports with exports of other goods and services. This study and others, for example by Ndulu and O'Connell (2007), suggest that a key element of successfully harnessing growth from natural resources is when such exports form part of a larger, diversified export program. It would seem that this is one of the crucial messages for the Philippines in the medium to long term: expansion of the extractive industries can lead to growth but it should be managed in a manner that does not crowd out other exports, and in ways that also boost human capital investments.

Examples of how natural resource wealth has been utilized to produce positive benefits in three low and medium income countries

As we mentioned above, there is a growing body of literature that highlights the positive role that well planned natural resource policy can play in the development of countries. We have selected three specific examples of Chile, Malaysia and Botswana that could be of relevance in the Philippines context.

Chile. Chile has used the royalties collected from its vast copper deposits to fund Government programs aimed at diversifying the economy. The aim is to reduce the dependence on commodity exports and eventually create a more sustainable economy in the future. One of their mechanisms is to use Government funding to pay for an immigrant entrepreneur scheme called 'Start Up Chile' managed by the Chilean Economic Development Agency (CORFO).[7] The scheme offers a grant of around US$40,000 and other incentives to promising young entrepreneurs who are prepared to relocate to Chile to set up their businesses. Since 2010 close to 500 companies and nearly 900 entrepreneurs from 37 countries have taken part in the program.[8]

A similar scheme in the Philippines could be funded from mining royalties, perhaps to focus on attracting new start-ups to less developed Provinces without large-scale mining or it could be used to help to diversify the local economy in areas with large-scale mining to generate economic activity after the mine has closed. Either option would be useful in helping to avoid the

[7] Chilean Economic Development Agency (CORFO) 2012, Start Up Chile website, accessed 7 January 2013, http://startupchile.org/.

[8] The Economist, 13-19 October print edition, "The Lure of Chilecon Valley." Article available at: http://www.economist.com/node/21564589.

concentration of wealth that currently sees around 33.62%[9] of national income captured by the top 10% of the population, the majority of whom reside in Metro Manila and surrounding Provinces. Research by Estudillo (1997) cited the concentration of job opportunities in the Greater Manila area as one of the major factors behind the large gap between urban and rural incomes. While a more recent study by Stratbase Research Institute in 2011[10] pointed to the Philippines having the largest gap between rich and poor (as measured by the Gini Coefficient) in the ASEAN region. Effectively utilizing the revenue provided by mining could be a positive step in helping to close the gap.

Malaysia. Malaysia has steadily upgraded the skills of its workforce in the oil and gas sector through the enactment of policies that began in 1976 when the state oil company PETRONAS introduced new profit-sharing agreements. Foreign oil companies such as Shell were required to transfer skills and knowledge to local staff allowing them to take on high-level roles in the management and technical side of the oil industry. Shell Malaysia, Shell Sarawak[11] and Shell Sabah all introduced scholarships programs that helped to propel local people into senior positions, thereby reducing the number of expatriates employed within each company. The benefit to the Malaysian economy was two-fold. First, a greater share of salary income was fed into the Malaysian economy instead of leaking out to expatriate overseas bank accounts. Second, and most important, a large cadre of highly skilled managers and technical staff was created that would form the basis of an expansion of the sector across the value chain. The Malaysian Government's Economic Transformation Programme (2010)[12] identifies the oil, gas and energy sector as one of the key drivers that will enable the country to reach high-income, fully developed status by 2020. Their aim is for Malaysia to become the Oil Field Services and Equipment (OFSE) hub for the Asia Pacific region, operating in a similar fashion to Aberdeen in Scotland or Houston, which are the hubs for Europe and the US. The core of skilled managers

[9] Philippines is 93rd of 134 countries in the World Bank survey 2009. Global Finance website, Wealth distribution and income inequality by country, accessed 20 November 2012, http://www.gfmag.com/tools/global-database/economic-data/11944-wealth#axzz2JNLGZQjE/.

[10] Ho, Abigail. 2011 "Philippines leads in income inequality in ASEAN." Philippines Daily Inquirer website, accessed 20 November 2012, http://business.inquirer.net/8377/philippines-leads-in-income-inequality-in-asean-says-study/.

[11] Wee YiawHin. 2008. "A century of growing together." Oxford Business Group website, accessed 8 January 2013, http://www.oxfordbusinessgroup.com/news/century-growing-together-wee-yiaw-hin-managing-director-sarawak-shell-role-miri-plays-in-the-companys-global-strategy/.

[12] Malaysian Government's Economic Transformation Program: A Roadmap for Malaysia, accessed 15 December 2012, http://etp.pemandu.gov.my/upload/etp_handbook_chapter_6_oil_gas_and_energy.pdf.

and technicians created by the scholarships programs of the 1970's, 1980's and 1990's will be crucial in the expansion of the sector, which is expected to create 52,300 additional jobs (many highly-skilled) and add RM131 billion to Gross National Income.

The relevance of this example for the Philippines relates to the need to create more highly skilled and highly paid jobs in the future. At the moment the economy is generating numerous low wage-paying jobs but there is a dearth of higher paying positions, a situation that leads to many skilled Filipinos seeking advancement in other countries. By investing mineral wealth in education and skills training, it may be possible to follow the Malaysian example by creating a more vibrant, value-adding mining sector that could become a regional center of excellence leveraging the advantage that the Philippines already has in English language skills.

Botswana. Botswana also used scholarships programs to boost human resource capacity but, unlike Malaysia, the scholarships programs were aimed at improvements across all sectors of the economy. The income generated from diamond mining was prioritized to assist with improving the national education system through the world's highest levels of public spending e.g. in 2011/12 the Ministry of Education and Skills Development was allocated 31.1% of the total government budget.

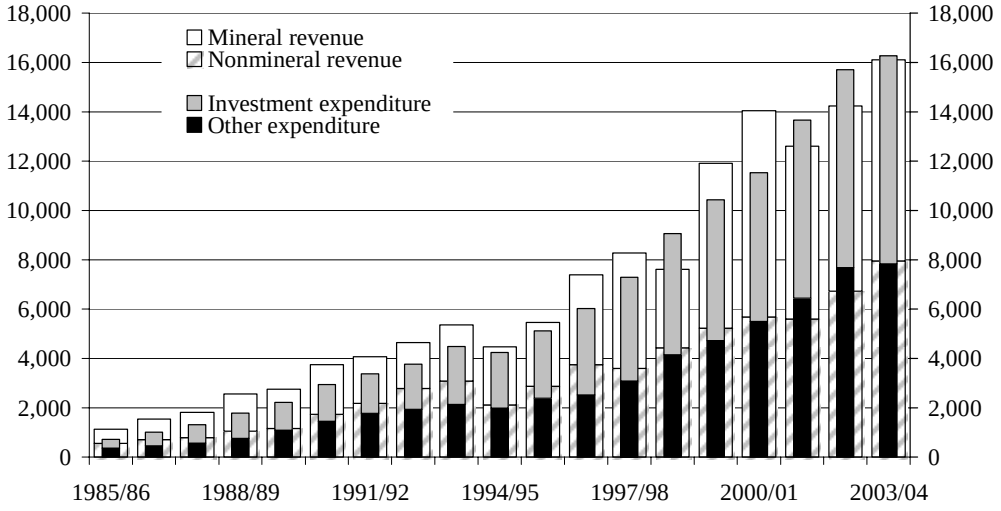
Lange and Wright (2004) looked at the total wealth of the country over the past 30 years and they found that it has steadily increased in that period. Their study covered physical, natural, human and other intangible assets that taken together form the total wealth of the nation. Interestingly the proportion of the economy accounted for by diamond mining has been steadily decreasing. The assumption therefore is that mineral wealth is being converted into other forms of productive capital.

The example of how Botswana uses the wealth generated from diamond mining could be highly relevant to the Philippines as the country embarks on a major push to improve performance in education. As funding for the extra two years of schooling under the K to12 program has to be found from already limited budgets, one potential source could be a tax on mining revenues that is earmarked for K to12 appropriation. By providing a clear link between revenue collected and progressive social programs, the Government may simultaneously address the issues of equitable benefit sharing and transparency in how revenues are expended.

Having clarity on how mining revenues are invested is another example that the Philippines can borrow from Botswana. Iimi (2006) and Conceicao, Fuentes and Levine (2011)

identify the Sustainable Budget Index (SBI) as an important mechanism used by the Botswana Government to ensure that funds are systematically recycled as 'investment expenditure' covering development expenditure and recurrent education and health expenditure. The SBI measures the extent to which mineral revenue is being productively reinvested or is being spent in non-investment areas. If the SBI exceeds 1 (meaning non-investment spending is greater than recurrent revenues), then the nation is exhausting its natural wealth without creating sustainable alternative assets. Figure 3 (below) shows how mineral revenue and investment expenditure have grown in tandem over a sustained period. An SBI-type model could be a useful tool for the Philippines in order to gauge how well mineral wealth is being put to long-term sustainable use.

Figure 3: Botswana mineral revenue and investment expenditure 1985/86-2002/03 in millions of Pula



Source: Iimi (2006)

IV. Legacy of Large Scale Mining in Marinduque

Marinduque hosted the operations of the Marcopper Mining Corporation[13] (MMC) from 1969 to 1996. The mine was one of the world's largest copper mines, employing between 1,000 and 1,500 workers. During the mine's lifetime, MMC claims to have contributed US$1.3 billion in foreign exchange earnings, paid P6.5 billion in direct and indirect taxes, generated P635 million in domestic business, paid out over P3.3 billion in employee salaries and benefits and contributed

[13] MMC's main shareholder was Placer Dome Canada.

P347 million in the form of community assistance projects and subsidized electricity.[14] In the final 10 years of operations alone, the company generated foreign exchange earnings of US$431 billion, paid income taxes of P317 million and excise taxes of P435 million.[15] Contrast these impressive figures with the fact that Marinduque today is a 4th Class[16] province in terms of income with a poverty incidence of 28.6%[17]. Statistics such as these lend weight to the assertions made by residents in the RAA Focus Group Discussions[18] that 27 years of large-scale mining failed to generate benefits for the people of the province.

There are two specific areas that we will examine in this paper in order to describe the legacy of large-scale mining for the people of Marinduque. First, we will look at economic development and livelihoods in the province since the closure of the mine; and then, we will examine some of the environmental governance issues arising from the incidents in Calancan Bay, Mogpog and Boac.

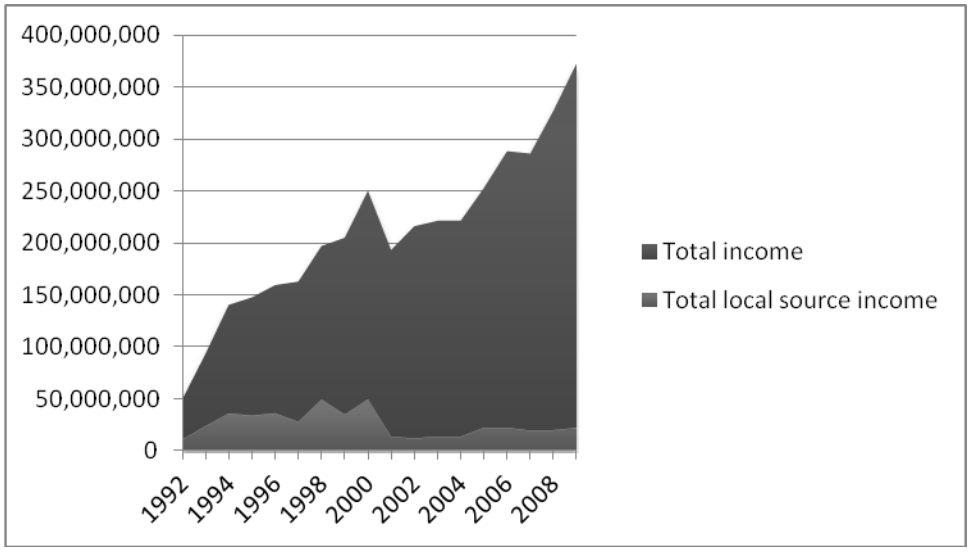
Economic development and livelihoods. Poverty is a fact of life for many in Marinduque with just under half of all households (48.5%) classified as income poor in the 2008 Community Based Monitoring System (CBMS) survey.[19] Furthermore, the same survey revealed that 30.7% of households suffered from food poverty, meaning that they did not have enough income to meet their nutritional requirements, while 5.1% experienced food shortages at one or more point during the 3-month period of the survey.

An aspect of the economy of Marinduque is its over-reliance of the Provincial Government on Internal Revenue Allocations (IRA) to cover the cost of the services it provides. Since the close of the Marcopper mine, there has been a steady decrease in the proportion of the budget generated from local sources of income while at the same time the proportion of the budget provided from IRA has increased dramatically (see Figure 4 below).[20] In 1992 the proportion of the budget covered by local source income (e.g. real property tax, business tax etc.)

[14] Figures are MMC's own from a 1996 PR campaign. Some of the figures have since been disputed but they are indicative of the magnitude of the company.
[15] MMC Annual Report 1996, audited and filed with the Securities and Exchanges Commission (SEC).
[16] NSBC Poverty Statistics 2013, "List of Provinces." Available at: http://www.nscb.gov.ph/activestats/psgc/listprov.asp.
[17] NSBC Poverty Statistics 2009, "Annual per capita poverty threshold, poverty incidence and magnitude of poor families." Accessed 17 October 2012, http://www.nscb.gov.ph/poverty/2009/table_1.asp.
[18] 133 of 134 FGD attendees felt that they received no benefit from large-scale mining.
[19] PEP-CBMS Monitoring Team, 'The Many Faces of Poverty Volume 2', 2008.
[20] All data sourced from annual "Budget Operation Statements, Income and Expenditure, Region IV, 1992-2009" Bureau of Local Government Finance, Manila.

was 28.2%, but by 2009 the proportion had fallen to 6.3%, while the national average in the same year was 14.9%. While over-reliance on IRA is commonplace in the poorer provinces of the Philippines, and some of this reduction can be explained by the fact that nationally, IRA increased during this period due to decentralization policies, both points cannot disguise the problems that Marinduque has experienced in generating income locally since the mine closed in 1996. Locally sourced income in that year was P36,142,336 which equates to 29.3% of the Provincial Governments budget of P123,463,314. Considering the effect that inflation has on the real value of money, the locally-sourced income total of P22,051,714 in 2009 indicates an alarming lack of economic dynamism within the Province. This data lends weight to the sentiments expressed by a range of people interviewed during our RAA visit to Marinduque in April 2012 who felt that the Province had been deliberately over-looked in terms of national Government investment to boost employment options. The theory put forward was that the return of 'large-scale' mining would be much more likely as long as alternative sources of employment and income were not forthcoming. While it is difficult to find any evidence of deliberate policy decisions to support this line of argument, the continuing lack of investment in the Province is hard to refute.

Figure 4: Total local source income as proportion of total income 1992-2009



Source: Bureau of Local Government Finance, Budget Operation Statements for Region IV (1992-2009)

Compounding the lack of economic activity within the Province is MMC's alleged delinquent tax payments that accumulated throughout the 1980's and 1990's. The Provincial Government claims that P1.048 billion[21] is still owed in unpaid real property taxes covering the lifetime of the mine. This represents a huge loss of potential income for the Provincial Government; the figure is almost 10 times the total budget available to the Province in 1996. Furthermore, MMC was able to apply for and obtain regular income tax deferments or tax holidays resulting in no income tax payments to the national government in 1981,1982, 1984, 1985, 1986, 1987, 1993, 1994, 1995 and 1996[22]. Based on the evidence available from MMC's own tax payment history, it would appear that the company was able to avoid significant tax liabilities.

For the people living in the three affected areas of Calancan Bay and the Boac and Mogpog river valleys, the impact of activities in the Marcopper mine in terms of loss of livelihoods was considerable. In Boac, a survey of changes in household income in 1995 and 1996 conducted by Bennagen (1998) found that 65% of households were affected by the MMC tailings spill. The survey (see summary table in Annex 2 and 3) identified the primary and secondary livelihoods in a stratum of the Barangay's representative of the main groupings in the Municipality, e.g. coastal fishing barangays, river fishing, farming and trading. The estimated total foregone income was P50,131,795 in 1996. Using the same data set, the survey also estimated the present values of future foregone income at P180,000,000 (with short-term rehabilitation) and P162,000,000 (with long-term rehabilitation) for the 10 years following the accident. The survey did not include the lost non-marketed use values of the river e.g. recreation, and crucially, it made the incorrect assumption that short-term and long-term rehabilitation efforts promised by MMC at the time of the survey (1998) would return the river to its pre-1996 state. No data is currently available to estimate the total value of lost income from 1996 to the present day for the affected barangays in Boac, but based on the survey by Bennagen, the figure must be assumed to run into hundreds of millions of Pesos and does not bear comparison with

[21] Figures compiled by Provincial Treasurers Office 2006 as part of the Provincial Government's legal claim against MMC and Placer Dome.

[22] Information provided in MMC's audited annual reports filed with at the Securities and Exchanges Commission (SEC).

total compensation payments made to date of P61,068,837.61[23] from Marcopper Environment Guarantee Fund (EGF).

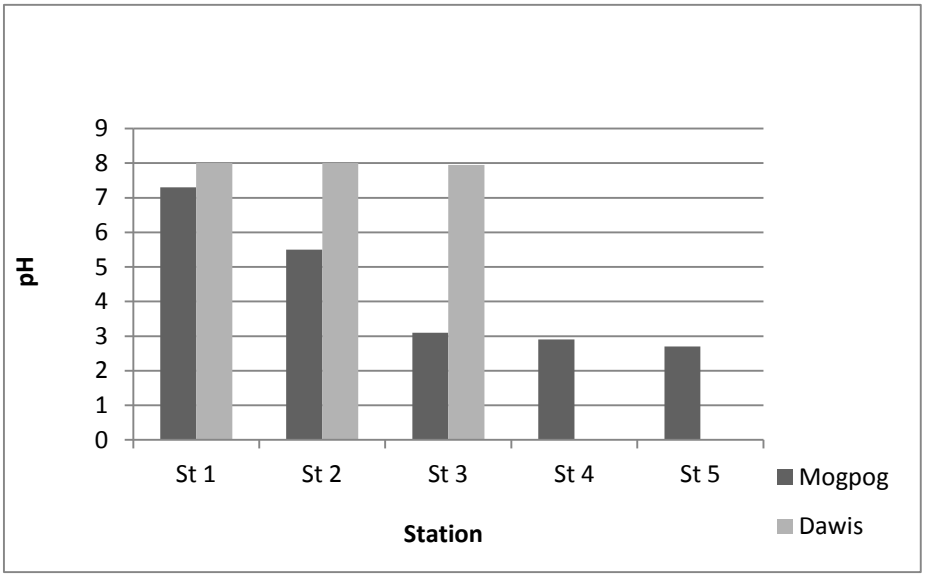
In October 1975 the National Pollution Control Commission (NPCC) approved MMC's request to dispose of its mine tailings via a 14-kilometer pipeline from Tapian Pit to Calancan Bay. From 1975 to 1991 around 200 million dry metric tons[24] was pumped directly into the Bay leading to the destruction of coral reefs, mangroves and rich fishing grounds. The damage was estimated at P521 million (Coumans 1999) and left behind a seven kilometer long causeway in the Bay formed from mine tailings which remains to this day. Fellizar, Ayesa and Bernado (2002) noted that a survey of fisher folk from seven coastal barangays in 1997 conducted by SEARCA recorded that the average volume of catch had decreased by 48% and the average size of fish caught had decreased by 42% between 1988 and 1996. To make matters worse, the fishermen have difficulty selling their catch to people from outside of the Bay due to concerns over the presence of heavy metals noted in a report by Fellizar (1997). In 1988 the Calancan Bay Rehabilitation Program (CBRP) was established by the Philippines Department of Natural Resources (DENR) who ordered MMC to pay P30,000 per day to the Fund. Various projects were attempted to help to rehabilitate the Bay including the introduction of mangroves, insertion of cement reefs and the planting of plastic sea grass. However in 1991, MMC unilaterally ceased payments to the Fund when it stopped using the pipeline, despite the fact that the effects of the previous dumping were on going. Felizar's 1997 review of CBRP stated that despite the various projects undertaken to improve the situation, it had failed to "*introduce effective measures to mitigate the threat of heavy metal contamination in Calancan Bay*."

In Mogpog, livelihoods were adversely affected by the 1993 Maguila-Guila Dam collapse that inundated the Mogpog River valley with toxic mine tailings in silt and water, and by the steady leaking of contaminated water and material from the repaired dam. Almost 13 years after the initial incident, the Mogpog River and surrounding agricultural land was still heavily polluted and Acid Mine Drainage (AMD) was taking a toll all along the river valley (Regis 2006). In this study, measurements were taken at five points from the mouth of the Mogpog River to close to the dam to test alkaline levels in the soil. The Dawis River was used for reference/control purposes, as it was not affected by the dam incident. The results show that alkaline levels

[23] Macdonald and Southall, Mining Ombudsman Case Report: Marinduque Island, 2005, p 33, Oxfam Australia.
[24] ibid., p.15

steadily decline along the river i.e. the soil is increasingly acidic from the dam area to the river mouth (see Figure 3 below). The impact of rising acidity for farmers and fisher folk with holdings close to the riverbank has been noted in terms of lower productivity.

Figure 5: Comparison of Average Soil pH of Mogpog and Dawis Riverbanks

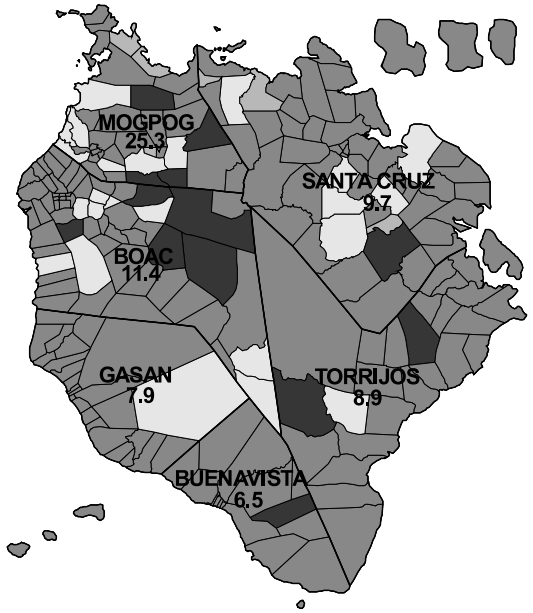


Source: Regis (2006), Page 8

The 2010 Mogpog Economic Profile[25] points out that of the 61.4 hectares of available fishponds in the Municipality, around 51% are underdeveloped due to pollution in the river water supply, inhibiting the growth of fish stocks. As well as fishpond operators, rice farmers in Barangays that were flooded with tailings report a drop in production from around 77 cavans per hectare to 30 cavans per hectare[26]. Households in Mogpog also have to contend with problems in their supply of water with PEP-CMBS (2008) reporting that 25.3% of households do not have access to safe water. The same report notes that Barangays in Mogpog take up 4 of the 5 bottom positions in the Province in terms of access to safe water with one Barangay having 100% of their households without access to safe water (see figure 6 below).

[25] Mogpog Economic Profile 2010, p.29, Mogpog Municipal Government.
[26] Provincial Agricultural Office (2010) in 'Marinduque: Heart of the Philippines, longing for true development', RAA Report, Learning Team 8, MDM class of 2012, Asian Institute of Management.

Figure 6: Map of proportion of households without access to safe water supply, by Barangay, 2008



Bottom 11 Barangays			
Municipality	Barangay	Magnitude	Proportion
Mogpog	Mampaitan	54	100.0
Mogpog	Malayak	65	98.5
Boac	Mahinhin	130	97.7
Mogpog	Mendez	145	96.7
Mogpog	Lamesa	109	94.0
Boac	Ogbac	88	93.6
Torrijos	Talawan	97	87.4
Santa Cruz	Pulong-Parang	157	85.3
Buenavista	Bagacay	183	84.3
Torrijos	Bangwayin	74	78.7
Boac	Mansiwat	70	78.7

Source: PEP-CBMS Monitoring Team, 2008, Page108

In summary, rather than acting as a driver of economic development in Marinduque, large-scale mining appears to have had little or no impact on reducing poverty in the province. The cumulative impact of MMC's operations in terms of loss of revenue for communities who have seen their livelihoods devastated may never be fully estimated and would benefit from further research, but the findings of Bennagen (1998) point to substantial losses. Compounding this negative impact on the island's economy is the loss of revenue in the years where they did not pay income taxes (based on MMC's financial statements).These taxes could have been used to improve services provided by the government.

Environmental governance. The environmental damage caused by the Calancan Bay, Mogpog River and Boac River incidents in Marinduque has been well documented but what is less known is the failure of environmental governance that allowed the three situations to develop. The unconvincing approach to environmental governance extended to the aftermath, which served to compound the suffering of the people of Marinduque.

For instance, in 1986 the National Pollution Control Commission ordered MMC to cease the dumping of waste in Calancan Bay but there were indications that mine wastes continued to

be dumped into the bay. In April 1988, the DENR issued another similar order and later denied MMC a 'Permit to Operate'. This should have brought a halt to the dumping but in May 1988, the order was reversed by the President of the Philippines. Then, in 1990, the Environmental Compliance Certificate (ECC) was approved for 10 years allowing MMC to begin extracting from the San Antonio Pit and to use the Tapian Pit as a repository of tailings from San Antonio Pit. The DENR also signed the ECC that signaled the phasing out of tailings dumping in Calancan Bay. While the residents of Calancan Bay welcomed this move, it was to be the first fateful step toward the 1996 Boac River disaster.

The provisions of the ECC looked good on paper, however fundamental flaws were discovered upon closer inspection, particularly in terms of the capacity of the Multi-partite Monitoring Team (MMT) and the composition and operation of the Environmental Guarantee Fund (EGF). The MMT's role was to assess the operations of the mine to ensure that best practice was being adhered to and that everything was being done to avoid damage to the environment. However, during the inquests held after the incident by the Multidisciplinary Environmental Compliance, Enforcement and Monitoring Team (MECEMT), the DENR admitted that they " lack the technical capability to determine whether or not mining firms comply with the requirements on environmental protection."[27] Furthermore MEMECT's report stated "DENR's Provincial Office (PENRO) is also ill equipped and not sufficiently manned to handle monitoring activities in the Province. Its staff is mostly foresters, with no mining engineer. The PENRO (staff) assigned to Marinduque is constantly changed, weakening further the monitoring efforts."[28]

The Environmental Guarantee Fund (EGF) should have been a vital tool in providing much needed compensation to the residents of Boac. Unfortunately the EGF proved to be inadequate. Bennagen (1998), while listing a number of serious problems with the EGF, states that it was added to the EIA mechanism as a means of securing agreement for expanded mining operations from the local population without "…adhering to economic theory or principles, particularly in terms of optimal rate setting to induce efficient mitigation behavior on the part of the polluters and externality victims."

[27] MEMECT report on Boac accident, May 1996, DENR.
[28] Ibid.

In the same report, it was noted that the EGF was originally set at P5 million but had to be replenished several times by MMC as more than P61 million was eventually paid out by the Fund. However once the Fund was exhausted, DENR had no further leverage with MMC and Placer Dome. They were therefore unable to secure additional funds to provide compensation for residents or to cover the huge costs of rehabilitation of the river. A further criticism was that DENR staff overseeing the EGF did not have any guidelines on how damages would be assessed or compensation would be paid. The guidelines were eventually formulated five months after the accident resulting in delays in payments to residents.

The people of Boac did receive some measure of compensation from MMC when they accepted liability for the accident there. Subsequently, rehabilitation work was undertaken by Placer Dome and payments were made to residents via the EGF of around P61 million. The same cannot be said for the residents of Mogpog as MMC refused to accept liability for the collapse of the Maguila-Guila Dam that inundated the Mogpog River and surrounding land with toxic silt and water in 1993. The company claimed the collapse was an "Act of God" or 'Force Majeure" in contractual terms which meant that liability could be avoided as such events cannot be foreseen or mitigated against. However, it has been reported that the people of Mogpog had vehemently opposed the construction of the dam but were ignored despite numerous petitions to DENR.[29] Marcopper went ahead with its plans for the dam and began construction in 1991. The residents of Mogpog are still living with the impact of the damages from the construction of the dam as toxic discharges continue to flow into the river to this day. While conducting the RAA visit, the team from AIM observed the complete lack of living organisms in and near to the river and the unnatural blue, red and orange tints in the water and soil at different points along the river. This is consistent with the findings[30] of a joint Oxfam Australia and Ateneo De Naga City University research team that found evidence of high levels of heavy metals in soil, water and plants which are considered hazardous to human health.

A final failure in terms of environmental compliance/governance relates to the quality of the re-construction of the Maguila-Guila Dam. Canadian engineering experts from the firm Klohn Crippen were brought to Marinduque in 2001 by Placer Dome to assess the safety of the

[29]Coumans, C. "Marinduque's other toxic river", dated 25 March 1999, http://pcij.org/stories/marinduques-other-toxic-river/.
[30] Macdonald and Southall, "Mining Ombudsman Case Report: Marinduque Island", 2005, p 33, Oxfam Australia.

main structures including the dam and the Tapian Pit drainage tunnel. Klohn Crippen's report[31] concluded that both were in a "state of disrepair and may collapse". The report mentioned that the reconstructed dam failed to meet the design criteria for the Probable Maximum Flood (PMF), which means that it cannot cope with floods of more than 10% of the PMF. This equates to a one or two year (1:2) storm event. However, accepted dam engineering practice states that they should be constructed to withstand a 1:100 year flood[32].

While MMC and Placer Dome have both been heavily criticized for the manner in which they conducted their activities in Marinduque spanning a period of many years, the lack of oversight by various branches of the Philippines Government should not be understated. If accepted good practices had been used or if checks and balances that were already in place had been followed through, then much of the environmental damage could have been mitigated.

V. Towards Lessons Learned

The various lessons that can be drawn from large-scale mining operations in Marinduque are as timely now as they were in the late 1990s. The Philippines has arrived at a fork in the road in terms of how it will handle its abundant natural resource wealth. At the time of writing of this paper in early 2013, the government issued a Presidential Executive Order which ushers in reforms in the industry, as well as triggers new mining law legislation to help improve on past policies.

The Aquino Government signed Executive Order 79 in 2012. This directive attempts to improve upon the provisions of the 1995 Mining Act (RA7942) in terms of revenue sharing, environmental monitoring and protection, and the identification of mining free areas such as national protected areas, island eco-systems and areas that have been earmarked for tourism development. The EO imposes a moratorium on new mining permits that will remain in place until a new improved mining law is passed. The EO has generally been well received by most stakeholders in the mining sector but difficulties lie ahead in formulating the new mining law. Balancing the concerns of the strong and growing anti-mining lobby[33] and the needs of the mining industry will be challenging. If mining is to be a significant driver of growth, large-scale

[31] Klohn Crippen, "Dams and Tapian Pit water Release Facilities Initial Screening Assessment Report, Final Report", 2001.
[32] Vick, "Planning, Design and Analysis of Tailings Dams." 1990, BiTech Publishers, Vancouver.
[33] Catholic bishops have already introduced the Alternative Minerals Management Bill which they hope will succeed the current Mining Act.

investment from international firms will be needed. However the long delays over the signing of the Environmental Compliance Certificate as well as conflict over national and local jurisdiction at Sagittarius Mining's Tampakan[34] site in Mindanao is indicative of the current disincentives to investment[35] that have to be addressed in the new law. While at the same time the very real concerns expressed by the anti-mining lobby have to taken on board so that truly inclusive growth can be achieved.

There are strong voices arguing against mining citing cases of bad practice which raise important points for careful review. However there are competing examples of good practices from other developing countries that have successfully harnessed their natural resources to drive long periods of growth. The lessons from Marinduque offer an opportunity to improve the reputation of large-scale mining in the Philippines by establishing governance and management norms that aspire to world-class standards, yet also take careful consideration of the specific challenges faced by stakeholders in the Philippine context. Some of the key lessons from the Marcopper case that should inform future mining policy and practice include:

- A system of revenue sharing that is fair to all stakeholders including the national government, local government units, local communities and mining companies. A balance has to be found between using mining income to fund national programs and using mining income to address poverty within host communities. This balance should also be guided by a long term view of investing mining wealth, given its exhaustible nature. International benchmarks could be used to strike this balance, so that the concerns of earning competitive returns by the private sector and also allocating a fair share to government (as well as local directly affected communities) are all addressed fairly and transparently. Using mining royalties to generate economic activity that is sustainable after the close of the mine could also be a high priority to help provincial and municipal authorities fund demand for their services.
- Taxes, fees and royalties could be consistently and fairly applied to all mining companies and all payments made could be made transparent and available for public scrutiny. Such transparency should be in the interest of mining companies that aspire

[34]Rappler website, accessed 15 October 2012, http://www.rappler.com/business/special-report/whymining/whymining-latest-stories/8307-mining-eo-pits-gov-t-vs-local-execs.

[35] In the Fraser Institute's Annual Survey of Mining Companies 2010/11 the Philippines is rated 66 out of 79 countries in their Policy Potential Index which measures the positive or negative effect that Government policies have on mining exploration .

towards responsible mining practices, as the ultimate goal of promoting inclusive growth requires inputs from all stakeholders, notably government (and not just the mining companies carrying out responsible mining practices and paying their taxes). A mechanism such as the one used in Botswana could be adopted in order to encourage reinvestment by the government that adds to the human capital of the country. Such investments also create more stakeholders in society who could form the political support behind transparent and accountable mining revenue management and allocation processes.

- Environment guarantee funds could articulate the methodology that will be used to calculate compensation for loss of livelihoods. A baseline survey taken prior to the start of mining activities and then again at regular intervals would be a useful step in ensuring that future payments will fairly reflect the extent of impact on livelihoods. Broad communication of these baseline and other data and evidence could also help strengthen the public's awareness of how exactly the different stakeholders involved—government (both local and central) as well as civil society organizations, the affected communities and the mining management itself—could be expected to engage in transforming mining wealth into final development outcomes.
- These funds could also help ensure that the "worst case" scenarios are fully covered and the money held within these Funds should be accessible to the Philippine government in time to provide adequate responses to any emergency. In the event that the funds are not required to cover accidents during the lifetime of the mine, policymakers could consider how the funds can be used to restore/rehabilitate the environment in the area of the mine site.
- Environmental compliance certificates could be issued in line with extensive consultation with all stakeholders. High priority should be given to encouraging the mining company to gain a 'social license to operate'[36] in addition to a legal/contractual license.
- Staff in Provincial DENR offices where large-scale mining is taking place must have the capacity and resources to adequately monitor the operations of the mine. The

[36] Social license to operate refers to the level of acceptance or approval continually granted to an organization's operations or project by the local community and other stakeholders. For more info: http://www.accsr.com.au/html/sociallicense.html.

turnover of staff in key provincial posts has to be addressed, as well as the requirement for skills upgrading programs to cover vital areas such as hazard mapping and stakeholder analysis.

- The issue of what can and cannot be considered "force majeure" in contracts must be resolved given the increasing magnitude and ferocity of climatic and other shocks in the Philippine context. Inputs from the scientific community would be critical here, in order to arrive at fair arrangements that also provide enough motivation for private sector participation in mining. The construction standards for tailings dams, in particular, need to be revisited given the anticipated trends in storm strength brought about by climate change. Here, the Philippines could be an innovator by developing new approaches and technologies to build more robust structures against climate and other shocks.

If these elements are included in new mining legislation and if those tasked with enforcing it have the resources and capacity to meet the challenge, then the huge potential wealth that exists within the Philippines could be tapped sustainably and fairly. In turn, this could lead to inclusive growth that benefits national government programs as well as host communities and provides a profitable return on investment for mining companies. The entire "causality chain" from mineral wealth under the ground, transformed into investments that boost inclusive growth will need to be carefully constructed and monitored, if the mining industry is expected to be a force for development. The experience of other countries has shown that it is possible to achieve a positive and fair outcome for all stakeholders if appropriate regulatory and governance frameworks are established.

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Annex 1: Summary of key findings from the Marinduque FGD and KII, April 2012

Category	BOAC			MOGPOG		
	BALIMBING	**TABIGUE**	**LAYLAY**	**BOCBOC**	**PILI**	**KAPAYAN**
Population	1707	895	2795	761	526	1298
No of Households	363	204	585	198	146	278
Number of people attending FGD	12	45	20	16	25	16
Livelihood type (before incident)	Farming Fishing	Fishing Livestock Farming	Fishing	Farming Fishing	Farming Fishing	Farming Livestock Fishing
Livelihood type (after mining incident)	Farming	Fishing (sea) Livestock Farming	Fishing (sea) Farming	Farming Quarrying	Farming Charcoal	Farming Livestock Charcoal
Degree affected	75%	100%	80%	80%	80%	100%
Estimated income per household (after mining incident)	>1000	<1000	< 1000	> 1000	> 1000	3000
Land (owned, rented)	rented	rented	owned + rented	owned + rented	owned + rented	Rented
Size of land	> 1 ha	< 1 ha	< 1 ha	< 1 ha	> 1 ha	< 1 ha
Perceived benefit from mining pre-1996 (roads, schools, hospitals, jobs)	None	None	1 directly employed	None	None	None

Feelings about return of mining	Strongly against	Strongly against	Strongly against	Strongly against	Strongly against	Generally against
Preferred future income activities (ranking)	1. Agriculture	1. Fishing	1. Fishing	1. Agriculture	1. Agriculture	1. Agriculture
	2. Tourism	2. Agriculture	2. Agriculture	2. Tourism	2. Tourism	2. Livestock
		3. Tourism	3. Tourism		3. Small scale mining	3. Fishing

Annex 2: Estimated Average Foregone Income by Livelihood Activity, Boac

Livelihood Activity	Households Engaged		Foregone Income (P/household)
	No.	%	
River-Based Activities			
River Fishing	39	17	5,599
Rice Farming			
Tenant	14		11,017
Farm Laborer	7	10	6,386
Land Owner	3		1,487
Crop Trading	55	23	23,093
Kangkong Farming	16	7	3,847
Vegetable & Other Crop Farming	9	4	2,932
Laundry	6	2	4,954
Non River Based Activities			
Coastal Fishing	35	15	17,938
Fish Retailing	4	2	14,540

Source: Bennagen (1996)

Annex 3: Estimated Total Foregone Income, Boac

Barangay	Total No. of Households	% of Total Sample Households	Foregone Income	
			Average (P/HH)	Total (P)
Stratum I: Coastal Fishing				
Laylay	457	40	16,447	
Pili	65	57	12,257	
Stratum Brgys	1,331	48	14,352	9,169,206
Stratum II: River Fishing/Laundry				
Daypay	61	43	10,379	
Malbog	73	50	3,822	
Stratum Brgys	2,616	46	7,101	8,544,458
Stratum III: Farming				
Balogo	212	70	21,439	
Boton	52	69	9,018	
Stratum Brgys	1,972	70	15,229	21,021,421
Stratum IV: Farming Trading				
Canat	135	97	24,982	
Bayuti	35	100	21,722	
Stratum Brgys	498	98	23,352	11,396,710
TOTAL				**50,131,795**

Source: Bennagen (1996)

Annex 4: Chronology of Events

1956
Placer Development Limited undertakes geological exploration in Marinduque.

1967-1969
Marcopper Mine begins construction in Marinduque. The Taipan pit is commissioned.

1975-1991
Mine tailings from the Taipan pit are dumped in Calancan Bay through pipes from the mine site.

1981
The government issued a 'cease and desist' order to stop dumping into Calancan Bay. This came amidst environmental concerns and local protests. The President Marcos orders resumption of dumping after an appeal from Marcopper Mining Corporation.

April 1988
Dumping into Calancan Bay stopped for one month after the government ruled that the mining firm should find an alternative disposal site for mine tailings. However, then President Aquino orders resumption of mining after Marcopper cuts power in Marinduque. The Calancan Bay rehabilitation program was established and Marcopper was ordered to pay PhP30,000 per day on rehabilitation.

1991
The Maguila-Guila Creek was dammed to hold back contaminated silt from the San Antonio pit.

1992
The Tapian pit was used to dispose tailings from the San Antonio Pit. A drainage tunnel at the base of the pit was plugged with cement, which later fails in 1996.

December 1993
The Maguila-Duila dam collapsed killing two children, displacing 70 families, and contaminating agricultural lands.

March 1996
A drainage tunnel linking the Tapian pit to the Boac River burst, causing over three million tons of tailings to flood around the Boac River and out to sea. The government suspends the mine's permit.

Source: Macdonald and Southall (2005)

Annex 5: Photos

The Tapian Pit.
Photo courtesy of the Asian Institute of Management Center for Development Management

The Boac River bank showing the dredged mine tailings from the 1996 incident.
Photo courtesy of the Asian Institute of Management Center for Development Management.

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