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**NATIONAL COUNCIL  
OF  
BHUTAN**



**SOCIO-ECONOMIC AND ENVIRONMENTAL  
IMPACT ASSESSMENT OF MINING AND  
QUARRYING ACTIVITIES IN BHUTAN**

**FEBRUARY 2013**

## FOREWORD

The Natural Resources and Environment Committee of the National Council is pleased to present this report on the Socio-economic and Environmental Impact of Mining and Quarrying in Bhutan, a study carried out as per directive of the National Council during its 9<sup>th</sup> session.

The main objective of this study is to thoroughly review and research the affects of Mining and Quarrying on the Environment as well as to analyze its economic and social impacts.

This study was carried out with assistance of the Royal Society for Protection of Nature (RSPN). While more in-depth study can be undertaken in the future, if need be, the Committee would like to thank Lam Dorji (Ph.d), Dago Tshering and Kuenzang Choden for their comprehensive work.

The committee also wishes to thank all those officials of the concerned organizations who have provided valuable inputs during the course of this study.

I would like to thank all my fellow colleagues of the committee in general and the Honorable Member of Gasa in particular for actively participating in the works of the committee while finalizing the report and for their constructive consideration of the issues and for their unanimous support on the findings and recommendations.

I also wish to acknowledge and thank the National Council Secretariat for its kind support in the administrative matters.

This report was presented to the 10<sup>th</sup> Session of the National Council on 25<sup>th</sup> February 2013 and after thorough deliberation the House adopted the recommendations reflected in the following pages.

The committee looks forward to consideration and implementation of the recommendations by the relevant agencies.

March 2013  
Thimphu

Chairperson  
Natural Resources and Environment Committee

## **MEMBERS OF THE NATURAL RESOURCES AND ENVIRONMENT COMMITTEE**

1. Honorable (Dr). Mani Kumar Rai, Chairperson
2. Honorable Sonam Dorji, Deputy Chairperson
3. Honorable Ugyen Tshering, Member
4. Honorable Tshering Dorji , Member
5. Honorable Sangay Khandu , Member
6. Ms. Karma, Committee Secretary

## RECOMMENDATIONS ADOPTED BY THE TENTH SESSION OF THE NATIONAL COUNCIL

*Recognizing* the principle of intergenerational responsibility as enshrined in the National Environment Protection Act 2007, which also emphasizes on ‘*The Middle path strategy*’ to balance economic development with environmental conservation.

*Realizing* that the Mines and Minerals Management Act 1995 mandates all mining and quarrying to be carried out in scientific manner and the miners are required to carry out progressive restoration of the mined area during operation of the mine or quarry to minimize negative socio-economic and environmental impacts, and,

*Further recognizing* that the Environmental Assessment Act 2000 requires the National Environment Commission Secretariat to report to the National Environment Commission on the implementation and enforcement of the Act on annual basis,

The National Council of Bhutan would like to call upon the government:

1. To prioritize on conducting detail geological mapping of the country before embarking on further mining and quarrying activities.
2. To delineate clear responsibility among various agencies involved in leasing, monitoring and supervision of mines and quarries and hold them accountable for any lapses.
3. To revisit the existing policies, legislations, guidelines, standards for licensing, operation and management to ensure that the mines and quarries are operated as per the provision of the laws.
4. To carry out cost benefit analysis and socio-economic and environmental impact of mining and quarrying.
5. To review the effectiveness of environmental restoration measures currently under practice. (For instance, talc mines which are abandoned are not restored or reclaimed as required by the law. If any company or individual leaves the mined area without restoring or reclaiming it, the burden falls directly on the government and indirectly on the general public.)
6. To ensure that all the mining and quarrying companies file the annual tax return properly and ensure proper co-ordination between Department of Revenue and Customs and Ministry of Economic Affairs.
7. To include all the above and other measures necessary to carry out mining and quarrying activities in line with the middle path strategy and intergenerational responsibility as enshrined in the NEPA 2007 in the next annual report that National Environment Commission Secretariat is mandated to produce in order to inform the National Environment Commission and public at large as per the law for further consideration.
8. To freeze issuing mining licenses till above issues are resolved.

## **Report of the Committee to the 10<sup>th</sup> Session of the National Council**

**Resolution 8:** *“The National Council, after thorough deliberation on the issue, resolved to entrust the Environment and Natural Resource Committee to initiate the engagement of a consultant to thoroughly review and research the affects of mining on the environment and conduct cost benefit analysis if such activities were to be taken over by the government from the private sector. The Environment and Natural Resource Committee would be required to prepare the terms of reference for the engagement of a consultant and the report had to be submitted to the 10th Session for further deliberation.”*

In keeping with the resolution, the committee first finalized the following terms of reference (TOR) for the study:

- a) To assess the situation and trends of mineral mining and quarrying in the Kingdom of Bhutan
- b) To analyze the economic, social, and environmental impacts of mining and quarrying in Bhutan
- c) To deduce recommendations including viability of nationalization of mineral mining in Bhutan

Based on the above resolution and the TOR the Committee would like to submit this summarized report for deliberation by the House during the 10<sup>th</sup> session.

### **1. Situation and Trends:**

As per the report, mining and quarrying activities in Bhutan has constantly increased over the last 30 years and progressively falling in the domain of the private sector. There are 28 mines and 46 quarries operational in the country at present covering a total lease area of 3870 acres accounting for 0.04% of the country's area. It is interesting to note that highest numbers of licenses (4 mines and 10 quarries) were issued in the year 2010. This perhaps indicates the demand for infrastructure development under the first elected government. There is also increasing desire on the part of the private sector to engage in mining and quarrying activities. Mines and quarries are licensed on renewable tenure of up to 30 and 5-10 years respectively.

Though a comprehensive geological survey has not been carried out as yet, about 33% of the total geographical area of the country has been geologically mapped. Mineral mines and quarries are largely concentrated in western Bhutan with the largest number of mines in Samtse. Wangdi, Thimphu and Paro have the largest number of quarries owing to concentration of infrastructure development projects such as hydro-power, housing and roads.

The NEC as the national authority on environment and the DGM as a competent authority in mining sector are the two primary institutions that regulate mining activities in the country. Mining permits are issued by the Department of Geology and Mines upon fulfillment of a number of requirements and procedures. The structure of ownership of current mining sectors reveals majority of the mines are operated by registered companies while quarries are operated by individuals. Compliance Monitoring Unit, Environment Services Division of the NEC and DGM are mandated to conduct regular and uninformed compliance monitoring of mines and quarries. As of now about 42% of the sampled mines and quarries did not comply with the environmental requirements. As regards compliance monitoring, the study also noted the possibility of operating a mine without meeting the environmental clearance requirements.

The Environmental Restoration Bond (ERB) does not appear to meet the intended restoration requirement for couple of reasons. First, the ERB rate is not based on rational assessment of restoration needs. Second, there is inconsistency in procedure and weak mechanism to ensure the fulfillment of restoration requirement.

## **2. Economic, Social and Environmental Impacts of Mining and Quarrying:**

Mines and quarry are extractive and exploitive industries which inevitably depletes natural resources that are irreplaceable. Although mining and quarrying seems to be economically lucrative business in Bhutan, the evidence of corporate income tax declared by the sample mines reveals that it is lucrative for some and not for others. From the 31 sites visited, 14 have declared profits and 9 have declared loss, 1 is closed, and no data could be obtained for the rest. The number of permits issued has been on the rise, so it is irrational to assume that the mining and quarrying business is economically not profitable.

While the law emphasizes national ownership of natural resources, the current mechanism of licensing for mining/quarrying do not represent direct optimal public benefit from mining sector. Instead benefits are largely individualized. Even company shares are limited primarily to promoters and the share of general public in companies is small. The study found only 32% of the 31 businesses sampled was owned by shareholders and (68%) businesses were individually owned.

The share to the national exchequer from mining and quarrying sector increased from Nu. 153 million to Nu. 220 million. Currently, it accounts for 1.26 % of the national revenue collected through royalty, mineral rents, license fee (bid value) and surface rent. However, gauging from the trend in mines and quarry production and revenue generation, it appears that government has not derive as much value for money as it did earlier. It may be said that more mineral resources are exploited today to generate the same value of money that was generated few years ago even after factoring in inflation.

The current mechanism seems not to optimize national revenue from mining and quarrying in the context of:

- a) Non-revision of royalty, mineral rent, license fee and surface rent. The current rates were fixed as far back as 2006.
- b) Consistent application of initial bid value over long term lease period, which could be renewed up to 30 years.
- c) Application of lease rent is inconsistent between Acts. According to Forest and Nature Conservation Act of 2006, lease rent for Government Reserved Forest is Nu. 1000 per acre per annum for industrial and other purposes. However, DGM applied a surface rent of Nu. 640 per acre per annum.
- d) Continued exploitation of natural minerals allowed even under claimed loss and or nonpayment of Business Income Tax/Corporate Income Tax. Long term lease without periodical reviews guarantee benefits of resources exploitation without fear of non-compliance.
- e) Unsubstantiated price of minerals/materials whether sold in country or exported.
- f) Treating captive mines as a part and not separate entity of another business under the same ownership results in difficulty in ascertaining the revenue.

Although the industry does not seem to provide permanent source of employment, the study revealed 61% of the workforce is comprised of Bhutanese and the half of that comes from local communities.

Corporate Social Responsibility (CSR) activities contribute positively to the social way of life of the community. It has been provided in the form of scholarships to students, annual donation for religious purposes, support for health facilities and drinking water and irrigation support. The concept of CSR cannot be misunderstood as compensation for the negative impacts suffered by communities.

The negative impacts of mining and quarrying may be explained in terms of lost opportunities to the community. The long term custodians of the natural resource ultimately are the community people residing in the area. Negative social impacts are displacement of the communities from their original settlement, disruption of social harmony and cohesion.

While it is desirable to assess the economic value of environmental impacts for the purpose of deriving the merit of mining and quarrying activities, it was beyond the scope of this study to engage in such assessments. The negative impacts of mining and quarrying have been reported by NEC since 2009 in its “Environmental Assessment of Existing Mines and Quarries.” It reports that *“It is an accepted fact that mining causes disturbance and damage to the environment. The magnitude of impact on environment depends upon the geological formation of the mining area and the method of mining operation. All mines in the country are open-case type which could affect the environment by changing landscape, pH medium of soil and water, flora and fauna, and socio-economics aspects.”*

### **3. Nationalization of Mines and Quarries:**

Nationalization is the act of acquiring privately owned enterprises by state governments with or without compensation. It is, generally, not considered as a common or popular policy of modern world. It is popularly associated with autocracy and as a trait of impoverished government to generate revenue. Hence, nationalization is generally discounted as a legitimate economic policy choice and pursuit of nationalization are generally seen as policies of immature, imbalanced and unreasonable democracies. However, nationalization and privatization cycle tend to occur in developing countries in areas of natural resources and utilities sectors. It is more likely to occur in a situation where there is high commodity price and low profit sharing from private firms to governments. Furthermore, it is more likely when inequality is endemic or worsens in the country and especially when the rents from natural resources or utility companies are perceived as benefitting only a minority.

In our context, the rights over mineral resources have been nationalized under constitutional provision (Article 1, Section 12 of the Constitution). Issues of nationalization of mines and quarries may be irrelevant if it is related to mines and quarries in the future. Since minerals are state property, the government may manage them on its own if it deems appropriate. However, given its own limitation of the government in operation of business entities, nationalization of mines and quarries currently operated by private sectors may be considered only after thorough cost-benefit analysis.

### **Conclusions:**

Mineral resources are the property of state and its use shall be regulated by law. While mining undoubtedly contributes to socio-economic development of a country, the exploitative nature of activity results in inevitable damage to environment. Considering that business built around renewable natural resources offer the best opportunities for sustainable development, mining and quarrying businesses not only deplete the natural resources stock but immensely undermine the ecosystem services, the potential economic opportunities of which are not currently known. The non-renewable nature of the industry may not bode well with the country policy of sustainable development. Furthermore, Bhutan's location in the fragile and rugged mountain ecosystem coupled with the institutional constraints of ensuring effective compliance and monitoring with environmental standards and norms presents a special challenge in determining the merit of mining and quarrying as socially, economically, and environmentally viable activity. Mining and quarrying have short-term economic benefits with long-term costs.

However, in context of Bhutan as a developing country, mining and quarrying is increasingly relied upon to meet the raw material needs of infrastructure development. Dependence on such economic activities may be more of a need driven. Therefore, how effectively and efficiently the government is able to optimize the economic and social benefits from mining and quarrying while minimizing the



environmental impacts is the key in utilizing these non-renewable resources. The current mines and quarry are neither economically optimized nor socially equitable nor environmentally sound.

## **Recommendations:**

*Recognizing* the principle of intergenerational responsibility as enshrined in the National Environment Protection Act 2007 that also requires 'The Middle path strategy' to balance economic development with environmental conservation.

*Realizing* that the Mines and Minerals Management Act 1995 mandates all mining and quarrying to be carried out in scientific manner and the miners are required to carry out progressive restoration of the mined area during operation of the mine or quarry to minimize negative socio-economic and environmental impacts.

*Further recognizing* that the Environmental Assessment Act 2000 requires the National Environment Commission Secretariat to report to the National Environment Commission on the implementation and enforcement of the Act on annual basis.

The National Council would like to call upon the government:

1. To focus on conducting geological mapping of the country as a top priority for determining mineral deposits in the country.
2. To delineate clear responsibility among various agencies involved in leasing, monitoring and supervision of mines and quarries to hold the agency accountable any lapses. For instance, the Department of Geology and Mines, Department of Forest and Park Services, National Environment Commission, Dzongkhags, National Land Commission and others. It is important to revisit the existing policies, legislations, guidelines, standards to ensure that the mining and quarrying is operated as per the provision of the laws. For instance, talc mines which are abandoned are not restored or reclaimed as required by the law. If any company or individual leaves the mined area without restoring or reclaiming it, the burden falls directly on the government and indirectly on the general public.
3. To carry out cost benefit analysis of mining and quarrying in terms of its socio-economic and environmental impact;
4. To review the effectiveness of environmental restoration measures currently under practice.

To include all the above and other measures necessary to lessen the socio-economic and environment impacts of mines and quarries in the next annual report that National Environment Commission Secretariat is mandated to produce in order to inform the National Environment Commission and public at large as per the law.

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## Acronyms

AFC	African National Congress
BFAL	Bhutan Ferro Alloy Limited
CIT	Corporate Income Tax
CSR	Corporate Social Responsibility
DGM	Department of Geology and Mines
DMDP	Draft Mineral Development Policy
EDP	Economic Development Policy
EIA	Environmental Impacts Assessment
ERB	Environmental Restoration Bond
FDI	Foreign Direct Investment
GDP	Gross Domestic Product
GNH	Gross National Happiness
GNHC	Gross National Happiness Commission
GSI	Geological Survey of India
ICMM	International Council on Mining and Metals
JiPL	Jigme Industries Private Limited
JMCL	Jigme Mining Corporation Limited
MMMA	Mines and Minerals Management Act
MT	Metric Ton
NCB	National Council of Bhutan
NEC	National Environment Commission
NREC	Natural Resources and Environment Committee (National Council)
NSB	National Statistical Bureau
PCAL	Penden Cement Authority Limited
PPP	Public Private Partnership
RGOB	Royal Government of Bhutan
RSPN	Royal Society for Protection of Nature

## EXECUTIVE SUMMARY

The study indicates that the Mining and quarrying activities in the country are neither economically optimized nor are they socially equitable, or environmentally sound. Hence, the concerns expressed in the media and the Parliament are legitimate on the basis of ground observations.

While mining undoubtedly promotes economic growth, the negative social and environmental impacts are imminent and the efforts to address the issues are overshadowed by the short-term economic benefits.

Although the law emphasizes national ownership of natural resources, the current mechanism of licensing for mining/quarrying do not represent optimal public benefit from mining sector. Instead, benefits are largely limited to few individuals. The company shares are also limited primarily to promoters and the share of general public in companies is relatively small.

Further, the study concludes that the mechanism currently adopted do not optimize national revenue from mining and quarrying as indicated by non-revision of royalty, mineral rent, license fee, surface rent that has been fixed as far back as 2006 . Moreover, the initial bid value was stretched over longer lease period ( the lease period goes up to 15-30 years without any provision for revision). Application of lease rent is inconsistent between Acts. Due to the difference in the lease rent between the Forest and Nature Conservation Act of 2006 and the Land Act of Bhutan 2007 operators are levied the lower rent in resulting decreased revenue collection to the national coffer. According to Forest and Nature Conservation Act of 2006, lease rent for Government Reserved Forest is Nu.1000 per acre per annum for industrial and other purposes. The Department of Geology and Mines applies a surface rent of Nu. 640 per acre per annum based on the Land Act of Bhutan 2007.

The study also found that although a number of companies have declared loss implying nonpayment of Business Income Tax / Corporate Income Tax, they continue to exploit minerals. There is an apparent absence of standard price of minerals/ materials irrespective of whether they are sold in-country or exported. The prices declared by the businesses are found to be undervalued, particularly in the case of one mine/quarry that had fixed low price of materials supplied to a sister concern of the same owner.

There are both positive as well as negative impacts of the mining activities to surrounding communities. On the positive side, Mining infrastructures provide fringe benefits to communities in terms of providing road and bridge accessibility. Transports plying on the access roads are often helpful. The Corporate Social Responsibility (CSR) activities of the companies/ businesses have helped

communities to meet their certain needs that are beyond their capacity to address. Some of the CSR activities include building community infrastructure like road, gewog Office, school, and provision of temporary employment to locals. The negative economic impact of mining and quarrying may be explained in terms of lost opportunities to the community. The long term custodians of the natural business built around renewable natural resources offer the best opportunities for sustainable development, mining and quarrying businesses not only deplete the natural resources but immensely undermine the ecosystem services, the potential economic opportunities of which are not currently known. Few communities from the sampled sites also complained of agricultural crop damages in terms of quality and quantity primarily due to excessive dust from the mines and quarries, like, affect on production of orange, apple and chili .

The Environmental Restoration Bond (ERB) does not appear to meet the intended restoration requirements because the ERB rate is not derived from rational assessment of restoration needs. The practice of returning the ERB to the operator upon completion of mining activity is a mere addition to profits already made from the business since there is no mechanism to ensure that the restoration requirement is fulfilled. Ground observations show the investment in restoration is negligible.

The nationalization of mining and quarrying activities in the country is not a viable option. The act of nationalization does not represent liberal democracy. It is still possible to optimize social, economic and environmental benefits of mining and quarrying activities without nationalizing them.

There are instances of weakness in the government system such as inadequate institutional capacity, poor coordination mechanisms, lack of trained human resources, and insufficient facilities of concerned government institutions for monitoring, enforcement of regulations on mining and quarrying. As a result there are higher incidences of non-compliance suggesting low probability of getting caught on rule breaking. The long term lease arrangement without periodical review guarantees benefits of resource exploitation without fear of non-compliance to the law.

There is overall lack in the technical and professional management capacity among the mining and quarrying operators in terms of planning and implementing mining and quarrying activities to sufficiently suit the fragile mountain terrain of Bhutan.

Lastly, the study concludes that mining and quarrying are essentially damaging to the environment even if the intent of it may be a situation of no option under pressing developmental needs.

# INTRODUCTION

## **Bhutan: An overview**

The Kingdom of Bhutan is located in one of the most fragile and rich ecosystems in the world. The country, though tiny with an area of 38,394 km<sup>2</sup>, is richly endowed with natural resources and minerals. The Royal Government of Bhutan (RGOB) has progressively adopted a middle path approach to modern economic development wherein the quality of environment would not be compromised in the process of delivering economic development. 72% of the country is under forest cover and over 50% has been declared as protected areas and biological corridors. This has enabled the country to possess richly intact natural ecosystems that are home to some of the world's most endangered species.

Bhutan has gained immense international attention mainly for its leadership in environmental conservation, promotion of Gross National Happiness (GNH) as an alternative approach to modern development, and for the selfless grant of democracy by the Fourth King. Today, Bhutan remains the youngest democracy in the world with the first democratic parliament completing its term in mid 2013. With its development guided by the philosophy of Gross National Happiness (GNH), the country's planning commission has been renamed 'Gross National Happiness Commission (GNHC)' with the mandate to plan projects and programmes aimed at fostering happiness and wellbeing of the people.

Although Bhutan opened up to modern development only as late as the 1960s, it has achieved significant economic development within the span of last fifty years. Nonetheless, as a least developed nation, the country remains primarily an agrarian economy with 68.5% of the country's 708,265 (NSB 2011) population still engaging in subsistence agriculture and forestry<sup>1</sup>. The agrarian communities settled in the river valleys, along mountainsides, and in higher elevations are essentially dependent on the natural ecosystems for their day-to-day livelihood needs. Despite engagement of a larger section of the population, the contribution of agriculture sector to GDP remains proportionately low and decreasing<sup>2</sup>. The government remains the primary driving force in economic development of the country. Bhutan's foreign exchange earnings primarily depend on the hydropower exports, tourism, aviation, and export of agricultural produce and minerals. The civil service and government owned corporations are primary providers of employment with a fledgling private sector comprising of businesses largely in the area of natural resource based industries, cottage and micro businesses. Although the country has a

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<sup>1</sup> Labor Force Survey Report, 2011 by Ministry of Labor and Human Resources, RGOB. Statistics as per National Statistical Bureau, RGOB.

<sup>2</sup> Agriculture share to GDP (National Statistical Bureau): 22.6% in 2005, 18.2% in 2009, 16.8% in 2010 and 15.7% in 2011



per capita income exceeding US \$ 2000<sup>3</sup>, 25.8% of the country's population is assessed to be under multi-dimensional poverty. Rural-urban migration and associated unemployment especially in urban areas (5.8% in 2011) is a major concern. In recent years, the increasing trade deficits have led to economic crisis characterized by Rupee shortages, restrictions on bank loans and imports, and associated impacts on the private sector.

## The Study

### Background

Mining and quarrying activities in the country have been on the rise with reported impacts on communities and the natural environment. The resulting impacts suffered by communities and the fragile mountain ecosystems are now a cause for concern to many. In the last few years, Bhutanese media have raised serious concerns over environmental and social impacts of mining and quarrying<sup>4</sup>. There is also the general perception that the large profits harnessed by few proprietors of mines and quarries is hugely disproportionate to the socio-economic and environmental costs that the government, communities, and the general public suffer now and potentially in the future. In addition, the general public opinion that mines and quarries are operated by a handful of individuals raised concern over associated disproportionate and inequitable distribution of economic returns from extraction of public resource. Such issues have caught the attention of the National Council (NC) during its ninth session. The National Council has therefore questioned whether mining should be in the domain of the private sector. Towards this, the Natural Resources and Environment Committee (NREC) of the National Council was delegated with the task of commissioning a study to assess the social, environmental, and economic situation of mineral mining in Bhutan.

The NREC of the National Council entrusted the Royal Society for Protection of Nature to conduct a study that will enable it to apprise the NC at its tenth session. Accordingly, RSPN commissioned the study in October 2012. Based on the directives of the NREC, the objectives of the study were set as follows:

- d) To assess the situation and trends of mineral mining and quarrying in the Kingdom of Bhutan
- e) To analyse the economic, social, and environmental impacts of mining and quarrying in Bhutan
- f) To deduce recommendations including viability of nationalization of mineral mining in Bhutan

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<sup>3</sup> Nu. 118,750 or US \$ 2,120 for 2011 @ Nu. 56 per USD derived on the basis of NSB, RGOB statistics for 2011

<sup>4</sup> Kuensel Editorial of 14 May 2009 on NEC and accountability; The Bhutanese article titled 'TB patients suffer in Gidakom hospital as Quarries multiply in Bjemina' of 28 March 2012.

## **Scope and limitations**

The study, in general covers the entire country with the overall sampling population of existing mines and quarries as per information provided by the Department of Geology and Mines (DGM). Considering the time limitations, the study engages representative samples of mines across the country to derive first hand information on ground realities. Every effort has been made to sample mines to represent different categories and locations.

The study recognizes the importance of deriving monetary value of social, economic, and environmental impacts of mining and quarrying in determining a definitive conclusion on the worthiness to nationalize mining activities in the country. This was not possible given the time, resources, and expertise required for that level of detail. Further, the level of details in the gathered data was highly variable owing to variations in size and management capacity of the respective mines. Hence, this study is limited in its scope to preliminary assessment of socio-economic and environmental impacts of mining/ quarrying activity in Bhutan. Observations and analyses were based on official data of the Mining Division, DGM and supplementary data gathered from mine/ quarry managements. Data gathered from the sampled sites was also used for identification of gaps in policy and practice and every effort was made to reflect on the quarrying and mining industry as a whole and not on specific undertakings. Specific names are cited only in cases where such mention was inevitable to substantiate the points.

# LITERATURE REVIEW

## Theoretical context

### Types of goods/ resources

Political economists classify resources on two crucial dimensions i.e., the ease with which potential users can be excluded from access to the good (the excludability of the good) or the difficulty of excluding individuals from benefiting from a good; the subtractability of the benefits consumed by one individual from those available to others, which means whether using a portion of the good shrinks the supply that remains (rivalness of a good).

Based on these attributes of subtractability and exclusion, goods are generally classified into four types as illustrated below:

A general classification of goods (excerpt from Ostrom et. al 1994: 7)

		Subtractability	
		Low	High
Exclusion	Difficult	Public Good	Common Pool Resources
	Easy	Toll Good	Private Goods

From the above classifications, it is clear that good and services can be easy to exclude and subtractable; difficult to exclude and nonsubtractable; difficult to exclude but subtractable; and easy to exclude and nonsubtractable. Goods and events that individuals value differ in terms of how easy or costly it is to exclude or limit potential beneficiaries (users) from the good (exclusion) and the degree of subtractability of one person's use from that available to be used by others (Ostrom et al. 1994).

Open access resources are those resources over which no property rights have been recognized and to which no one has defined rights and duties. Open access is an acceptable method for resource management only when we do not need to manage resources at all: when demand is too low to make efforts worthwhile (McKean 2000).

Open access is the absence of well-defined property rights. Access to the resource is unregulated, is free and open to everyone (Feeny et al. 1998). It is a situation in which no property rights are recognized (Ostrom et al. 1999; Bromley 1992). Rights have no meaning without correlated duties and the management problem with open access resources is that there are no duties on aspiring users to refrain from use (Bromley 1992).

### Concepts in resource management

Of the four main types, common pool resources characterized by their 'subtractability' and 'non excludability' has dominated discussions related to issues

in natural resource management. Common pool resources (CPRs) are goods that can be kept from potential users only at great cost or with difficulty but that are subtractable in consumption and can thus deplete and ultimately disappear (Ostrom et al 1994; Ostrom et al. 1999).

McKean (2000) pointed out that there are risks associated with inappropriate categorization of resources. She argued that goods once described as pure public goods such as air, water, road, bridges (non subtractable in consumption) in economics text books are not at all public goods as they are subject to crowding, wear, and depletion.

Natural resource systems on which human beings utterly depend are not public goods but common pool resources (McKean 2000). It is therefore important to distinguish goods and services appropriately if risks are to be avoided or minimized and for appropriate policy formulation (McKean 2000; Runge 1992).

### **Theory of the commons**

Common pool resources (CPRs) have been noted to be reducing in quantity and degrading in quality. Concerns over loss of forests, dwindling fishes, and polluted air have been raised at local, national, regional and global level. Various theories have attempted to explain the unprecedented deforestation and degradation of natural resources. The fundamental cause of such problems is 'free riding' i.e., whenever a person cannot be excluded from the benefits that others provide, each person is motivated not to contribute to the joint effort of providing the benefit, but to free ride on the efforts of others. The tragedy of the commons, the prisoner's dilemma, and the logic of collective action relate to the problems faced by individuals in working towards a collective benefit.

### **Tragedy of the commons**

Because common-pool resources are difficult to exclude and subtractability is easy, the ultimate result of human use is thought to be tragic. Hardin (1968) in his famous article "Tragedy of the Commons" highlighted that degradation of the environment is expected whenever many individuals use a resource in common. He strengthened his position by concluding that as overuse of an unmanaged commons reduces carrying capacity, ruin is inevitable (Hardin 1998)

Ostrom (1990) noted that Hardin was not the first to notice the tragedy of the commons. She referred to Aristotle's observation that "What is common to the greatest number has the least care bestowed upon it. Everyone thinks chiefly of his own, hardly at all of the common interest" (Politics, Book II, Ch. 3 quoted by Ostrom, 1990). Much of the world, she said, is dependent on resources that are subject to the possibility of a tragedy of the commons (Ostrom, 1990).

### **Policy and regulatory context of mining in Bhutan**

Constitution of the Kingdom of Bhutan provides the context under which the mineral resources of the country may be governed or managed. Article 1, Section 12

of the Constitution states that the 'Rights over mineral resources, rivers, lakes, and forests, shall rest with the state and are the properties of the state, which shall be regulated by law'. Hence, Bhutan's mineral resources are state property. Further, Article 5 of the constitution has a direct bearing on the extent to which mineral resources can be allocated and exploited. It requires minimum 60% of the country to be maintained under forest cover at all times. The associated policies and laws include:

The Middle Path - National Environment Strategy: The Middle path strategy was one of the pioneer documents that captured two important development philosophies of His Majesty the Fourth King's. The philosophy of middle path approach to modern development i.e., meeting the social and economic needs of the people while still conserving the natural environment and the philosophy of Gross National Happiness (GNH) as more important than Gross National Product. These philosophies have guided the policies and path of modern development that accord priority to environmental conservation (NEC, 1998).

The National Environment Protection Act emphasizes the 'Middle Path' strategy by according importance to principles of environmental protection in order to achieve sustainable development<sup>5</sup>. The Act accords equal priority to economic development while requiring natural resource extraction to be properly planned and executed in harmony with local ecology and terrain (NEPA, 2007).

The Environmental Assessment Act of 2000 (RGOB 2000) and National Environment Protection Act 2007 (RGOB 2007) establishes the legal basis and institutional mechanisms to regulate environmental standards and promote sustainable development. The standards and procedures set under these Acts have a direct bearing on the viability of mines and quarries in the country. Regulation for the Environmental Clearance of Projects and Regulation on Strategic Environmental Assessment, 2002 not only provides the procedures for issue of environmental clearances but also determines the powers of competent authorities to issue environmental clearances. Annexure 2 of the Regulation empowers the Department of Geology and Mines to screen and issue environmental clearance for mining and quarrying activities in areas less than 3 hectares.

Since mineral exploitation by nature is environmentally damaging, This may further be constrained by the limitations in restoring mines to ecologically viable areas.

The Mines and Minerals Management Act (MMA) of 1995 and the associated Mines and Minerals Management Regulations (MMMR) of 2002 provide the regulatory framework for quarrying and mining in Bhutan. The MMA 1995 states that '*all rights of ownership of minerals are vested exclusively in the Government whether occurring in private or government land*'. The regulations define the

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<sup>5</sup> Article 7 to 10 under Chapter II, Principles applicable to Environmental Protection, of National Environment Protection Act of 2007

procedures for permitting, operational guidelines, payments, fines, and penalties, and restoration requirements for mines and quarries. The National Environment Commission (NEC) and the Department of Geology and Mines are the regulatory authorities.

The Economic Development Policy of 2010<sup>6</sup> recognizes the potential for further discovery of minerals in Bhutan. It requires a mineral development policy to be in place by 2010 to allow selective and cautious exploitation of minerals for industrial purpose and management of non-renewable resources. Section 7.6 of the Economic Development Policy 2010 could potentially guide future revision of the MMMR.

Although a mineral development policy has been drafted, it remains in the draft form even as of end of 2012 and awaits endorsement by the Royal Government. It appears from the provisions that the policy is a reiteration of existing modalities followed in the mining and quarrying sector. It allows prioritized allocation of captive mines for raw materials for manufacturing industries with proof of substantial value addition and availability for raw materials. Except for materials such as boulder, stone chips, and sand, already auctioned large scale mines upon fulfillment of domestic requirements, shall be allowed export of minerals in raw form within the time period set forth in the agreement. The notification X-49/DGM/2006/257 of the Department of Geology and Mines that came into effect from 1<sup>st</sup> October 2006 provides for levy of lower Royalty for in-country value addition and higher for export of raw materials. The notification remains valid till date.

One important element of the policy is the provision to encourage and promote participation of broader section of the society in mining and trading for equitable distribution of income from mineral resource exploitation. It calls for consideration of inter-generational equity, maximize returns, ensure transparent and equitable allocation and access to mineral wealth and prevent undue damage on the ecology and environment. In an attempt to foster this objective, the initial draft was known to have contained provisions that allow only one mine per family and to bar concerned individuals and their family members from engaging in mining business for ten years if their permit was terminated. The private sector opined that the number of mines to be owned by any individual should be based on the needs of the industry, the capacity of the individual or the company, and that denial of permits to family members would be violation of basic constitutional right of an individual. In the context of the above, the provisions were reported<sup>7</sup> as removed. The current policy calls for government investment in completing geological mapping of the country with provisions to allow public private partnership (PPP) model in exploration.

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<sup>6</sup> Economic Development Policy, RGOB, 2010

<sup>7</sup> Business Bhutan article 'Mining policy violates basic rights' of 10 July 2010; Business Bhutan article 'One mine per family clause removed' of 12 March 2011

## Impacts of mining

According to the International Council on Mining and Metals (ICMM)<sup>8</sup>, mining has the potential to affect biodiversity throughout the life cycle of a project, both directly and indirectly. Direct or primary impacts from mining can result from any activity that involves land clearance (such as access road construction, exploration drilling, and overburden stripping or tailings impoundment construction) or direct discharges to water bodies (riverine tailings disposal, for instance, or tailings impoundment releases) or the air (such as dusts or smelter emissions). Direct impacts are usually readily identifiable. Indirect or secondary impacts can result from social or environmental changes induced by mining operations and are often harder to identify immediately. Cumulative impacts occur where mining projects are developed in environments that are influenced by other projects, both mining and non-mining.

Experiences in West Africa<sup>9</sup> reveal that mining undoubtedly contributes to the socio-economic development of a country. Mines not only generate employment but also contribute as a source of national income. However, it does not happen without impacts on the environment and natural resources of the country. Such activities are known to create profound disturbance to nature and human balance. Natural ecosystems are difficult to be reconstituted and the quality of life can be altered after the end of the mining activities. The high cost related to compensation and weak monitoring capacity of Governments and reactions from civil society organizations have not allowed tracing out the real effects of mining and the respect for environmental standards.

In 2009, the NEC conducted an environmental assessment of existing mines and quarries. The report titled 'Environmental Assessment of Existing Mines and Quarries'<sup>10</sup> contains general findings of the monitoring exercise. In addition, it outlines specific findings and provides recommendations on immediate, medium and long-term approaches for specific undertakings. It also calls on the DGM to revisit the current mining practices to come up with a clear direction for holistic mineral development in the country.

## Nationalization of mining

Nationalization is the act of acquiring privately owned enterprises by state governments with or without compensation. Governments may opt for nationalization for economic, financial, social, strategic and nationalistic reasons. However, nationalization also has costs in terms of financial, economic, political and reputational implications.

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<sup>8</sup> International Council for Mining and Metals (ICMM), 2006. Good Practice Guidance for Mining and Biodiversity.

<sup>9</sup> Source: <http://www.gwp.org/GWP-West-Africa/Le-GWP-AO-en-Action/News-Events/Mine-and-environment/>

<sup>10</sup> NEC 2009. Report on 'Environmental Assessment of Existing Mines and Quarries'

## METHODOLOGY AND OVERVIEW OF STUDY SITES

### Sampling: Representative sampling

For the purpose of primary data collection, a questionnaire was developed (Annexure I). Considering fund and time limitations, mines were selected on the basis of random sampling while maintaining flexibility to replace sample mines that were either under development or not operational. In such situations, a replacement site closest to the survey destination was chosen. From a total of twenty seven registered mines and forty six active quarries, in the country<sup>11</sup>, fourteen mines and seventeen quarries were sampled as follows:

*Table 1: List of sampled mines and quarries*

Sl. No	Name of Company/individual	Name of mine/quarry	Type	Dzongkhag
1	Tshering Construction	Gathrak Stone Quarry	Quarry	Bumthang
2	Damchen Pvt. Ltd.	Shadumardu Talc Mine	Mine	Chukha
3	Druk Mining Pvt. Limited	Omchina Quartzite Mine	Mine	Chukha
4	Mr. Kencho Dorji	Lomjoshum Stone Quarry	Quarry	Chukha
5	Mr. Dilip Kr. Mukhia	Maure Iron Ore Mine	Mine	Dagana
6	Construction Dev. Corp. Ltd (CDCL)	Kilikhar Stone Quarry	Quarry	Mongar
7	Mr. Jamphel Norbu	Langukha Stone Quarry	Quarry	Paro
8	Dawa Dhotshang	Pachulum Stone Quarry	Quarry	Paro
9	Tshering Wangdi	Thongtimo Stone Quarry	Quarry	Paro
10	Gup Tshering Wangchen	Lamjolo Stone Quarry (WB)	Quarry	Paro
11	Mr. Gem Tshering & Penjor	Lomekha Stone Quarry	Quarry	Paro
12	Mrs. Zangmo, Zangmo Export	Tshongkha Stone Quarry	Quarry	Paro
13	Mr. Changlo and Namgay	Lomekha Stone Quarry (WB)	Quarry	Paro
14	Druk Satair Corporation Ltd.	Khothakpa Gypsum Mine	Mine	P/Gatshel
15	Eastern Bhutan Coal Fields	Rishore Coal Mine	Mine	S/Jongkhar
16	Penden Cement Authority Ltd.	Penden Limestone Mine	Mine	Samtse
17	Bhutan Ferro Alloys Ltd. (BFAL)	Tintale Quartzite Mine	Mine	Samtse
18	Bhutan Minerals Pvt. Ltd.	Dappar Quartzite Mine	Mine	Samtse
19	Lhaki Cement Pvt. Ltd.	Titi Limestone Mines	Mine	Samtse
20	Jigme Mining Corporation Ltd.	Chunaikhola Dolomite Mine	Mine	Samtse
21	Penden Cement Authority Ltd.	Kalapani Calc-Tuffa Mine	Mine	Samtse
22	Penden Cement Authority Ltd.	Uttare Limestone Mine	Mine	Samtse
23	Bhutan Stones & Minerals Company	Pugli Stone Quarry	Quarry	Samtse
24	Kuenphen Norden Mining Company	Khariphu Limestone Mine	Mine	Thimphu
25	Nortak Mines & Minerals Pvt. Ltd	Gidaphug Top Marble Mine	Mine	Thimphu
26	Singye Group of Companies	Bjemina Stone Quarry	Quarry	Thimphu
27	Tenzin Thinley & Sonam Pelzom	Gidaphug Stone Quarry	Quarry	Thimphu
28	HRH Dasho Khamsum Singye Wangchuck	Dojim & Geerza Stone Quarry	Quarry	Thimphu
29	Dasho Wangdi Jamyang, White Tara Tour	Wakletar Stone Quarry	Quarry	Tsirang
30	Ex- Lyonpo Sangay Nidup	Taksha Stone Quarry	Quarry	Wangdue
31	Tashi Norbu	Khenpajichung Stone Quarry	Quarry	Wangdue

<sup>11</sup> All mines owned individually or collectively as a corporate body, are licensed by Mining Division of the Department of Geology and Mines under a lease agreement.



Field visit to the sampled mines and quarries was conducted in November 2012 for a period of a month. During the field visit, the surveyors gathered information from the managers and proprietors of the mine/ quarry. Local people in and around the sample mines and quarries were also randomly interviewed.

The study relies heavily on secondary data including policy documents, journal articles, news coverage, and official data maintained by the Department of Geology and Mines.

Microsoft Excel and SPSS software were used for data entry and analyses. The study attempts to explore relevance of theories and experiences to the context of this study.

### **Overview of Study Sites**

The **Ghatak Stone Quarry** is located 20 kilometers away from Chamkhar town on the East-West Highway in Bumthang Dzongkhag. The materials from the quarry are extracted with the help of two excavators and transported to the stone crushing unit which is located 1 km away from the quarry site. Around 7 to 8 truckloads of stone aggregates are produced on daily basis and supplied to Nangkhor Ura road construction site which is undertaken by the same management.

The quarry has four major areas of deposit located above the national highway and the management has been able to extract only one fifth of the total reserve covering a total lease area of 12.28 hectares. The nearest community to the quarry is the Tangsibi village which lies 7.5 kilometers downstream of the quarry .A small stream runs through the stone quarry and into a deep gorge downstream parallel to the Tangsibi village. However, this stream is not used by the community for any purpose.

The quarry is owned by Mr. Tshering Tobgay of Tshering Construction, who bought it from Mr. Dorji Wangchuk, the former Ura Gup, at the cost of Nu. 54, 00,000. The current lease is valid from 1st October 2006 to 10th October 2016.

**Sadhu Madhu Talc Mine** covers an area of 7.18 hectares consisting of 4.168 Government Reserve Forest and the remaining is a private land owned by the proprietor of the mine, Dasho Yab Ugen Dorji. The actual mining activity started in 2008 and is now the only operational talc mine in the country.

The mine is located North East of Pachu River, which is approximately 2 kilometers away from the Sahdu Madhu village and 18 kilometers away from Phuntsholing town. The mine is operated as a captive mine which supplies raw talc to its sister concern agency, viz. Damchen Talc Industries where the raw material is grinded into talc powder and exported to India. The Pachu River flowing adjacent to the mine was diverted to ease the accessibility within the mine and the talc processing plant. The lease validity is from 1 June 2011 to 31 May 2014.

**Omchina Quartzite Mine** is located in Omchina, Geling Gewog under Chukha Dzongkhag. It is over 22 kilometers away from Phuntsholing after crossing Kamji settlement. The mine has a total area of 49.95 hectares of which over 30 % of the total area is under operation. The lease period for the mine is from 13 February 2010 to 12 March 2014.

The mine was initially managed by Druk Stone and Mineral Company in 1993 until it was taken over by the then Druk Mining Ltd (now Druk Mining Private Limited) in 2004. Currently, the mine is operated with shares floated to individuals, corporate bodies, and religious institutions. Although the primary licensing was for mining quartzite, the mine also extracts construction materials such as boulders and produces stone aggregates of varying sizes.

The mine area was initially used as pasture land by Geling community but it is now fully demarcated for mining purpose since there is no community within its vicinity. The mine is equipped with excavators and uses explosives for extraction of the materials.

The **Lomjosham Stone Quarry** was started in the late 90s to extract boulders by Mr. Kencho Dorji. It is located at Lomjosham, Chapcha Gewog under Chukha Dzongkhag. The quarry was primarily started to meet the demand of construction material requirements for the construction of Chukha Dzong.

The lease area covering 5 acres however could not be fully extracted owing to the expiry of the lease term in 2009. Although the quarry is not operational, the visit was carried out to understand the impacts and the status of the area after the activity. It was noticed that there was no sign of proper re-vegetation. The majority of the area is exposed and barren except the sparsely growth of vegetation in areas.

**Maure Iron Ore** located at Maure under Nichula Gewog (Lhamoyzingkha), Dagana Dzongkhag was established in December 2010. The total mining area covering 4.4 hectares is privately owned by Mr. Dilip Kumar Mukhia, of which 1.23 hectares are under operation. The mine is first of its kind in mining Iron Ore in the country and operates on seasonal basis.

The mine was initially started by Penden Cement Authority Limited (PCAL) in 1994 but the community turned down the operation due to nonpayment of compensation to the local community by the management. During its operation, the community is hired as laborers. Currently, the land owner manages the mine with seasonal operation. Phalam Khani stream originates from the area (around 100 meters above the mine site) and it used only for bathing purpose as it is warm during winter season.

**Kilikhar Stone Quarry** is located approximately few hundred meters above the national highway leading to Trashigang and three kilometers away from the Mongar town in Kamang under Kilikhar village.

The quarry was initially started by the Department of Roads to meet the increasing demand of stone aggregates for developmental activities in Mongar Dzongkhag including the road expansion project. The initial development of the quarry was largely met under the Japanese Government fund in terms of infrastructure and equipment procurement.

The quarry is fully operational with the help of two excavators deputed at the site. A hi-tech stone crusher is located adjacent to the quarry to crush the materials into stone aggregates. Since 2010, the quarry is managed by the Construction Development Corporation Limited headed by a Mines Manager. With an estimated deposit of 0.54 million metric ton (MT), the quarry has an annual production target of 60,000 MT of crushed stone aggregates. The data maintained at the site office indicates an overwhelming achievement of over 51,000 MT extractions in 2012 compared to 6000 to 10,000 MT in its earlier years of operation.

The quarry is located on a total lease area of 5.86 hectares with a valid lease for 10 years. (25 August 2005 to 24 August 2015). A small stream runs adjacent to the quarry and falls into the deep gorge below the road but it is not being used by the community for any purpose.

**Langukha Stone Quarry** is located in Dogar Gewog under Paro Dzongkhag. The quarry was initially operated by Ap Wangdi and later the lease was transferred to Mr. Jampel Norbu of Kuenga Construction Company. The lease allows extraction of quartzite which is finally crushed into aggregates of different sizes. The quarry also sells crushed sand, stone boulders and flat stones (Doleps).

The quarry has a lease period of over a year from 15 December 2012 to 31 May 2014. Since the deposit is on a cliff, dusting and soil erosion was not observed as an issue at the time of site visit.

Under the same Dzongkhag, the Jatu Stone Quarry operated the **Pachulum Stone Quarry** for five years covering an area of 3 hectares. In 2010, Mr. Dawa Dotshang took over the management of the quarry. However, the lease agreement signed in 2011 has the lessee as Tashi Phuntsho, promoter of Ms. Jatsho Stone Industry. Stone is the primary material extracted from the quarry for production of construction material. The quarry is fully operational with valid lease period from 7 January 2011 to 31 December 2014.

The quarry is in conflict with a community which is located in a distance, away (Lomekha) from the site. Geographically it is impossible for the dust to impact the said communities as the quarry is located in a ravine and away from the settlement.

The **Thongtimo Stone Quarry** started its operation in March 2012. The ownership changed frequently (three to four times) over the years but it is currently managed by Mr. Norbu Wangyel of Jambala Hiring although the actual license was granted in

favor of Mr. Pema Khandu. The quarry has a total lease area of 6.36 hectares of which 4.5 hectares are under operation. The lease is for nine years starting from 28 April 2004 to 8 April 2013. There is also no community close by the quarry site.

The **Lamjolo Stone Quarry** is operated in two blocks. The west block has completed the quarrying activity and the management is extracting materials from the east block which is under full operation. The mine extracts Micaceous quartzite and quartz muscovite-biotite schist deposit. The total lease area is 1.20 hectares which is located at Lamjolo, Dogar Gewog under Paro Dzongkhag. The lease period is for 10 years from 1 February 2004 to 31 January 2014.

**Lomekha Stone Quarry** is located at Dawakha under Dogar Gewog in Paro. The quarry has operated for two years since its establishment in 2010. The quarry extracts boulders which are crushed into aggregates of different sizes. The total leased area is 5.65 hectares of which 4.2 hectares are under operation. The lease period is for ten years (10 April 2010 to 10 April 2019). The quarry is managed by Mr. Gyem Tshering and Mr. Penjor.

With acute water shortage at the site, the requirement to sprinkle water to suppress dust is clearly not attainable in this quarry. Although the quarry affects the community of Lomekha in general, one particular household close to the is immensely impacted.

Another quarry located right next to Lomekha Stone Quarry is **Lomekha West Block Stone Quarry** with a total lease area of 2.02 hectares. The lease term of 10 years was granted with effect from 1 October 2012 to 30 September 2022 in favor of Mr. Changlo and Mr. Namgay. The operation has not yet begun as there was community conflict right after the construction of the approach road.

Initially there was community consent and the public clearance for the quarry was given. However, very recently, the quarry was suspended after some members of the community, who had earlier given the clearance, filed a petition against it.

**Tshongkha Stone Quarry** is located at Tshongkha under Dogar Gewog, Paro Dzongkhag. It was established three years ago (2009) under individual license holder, Mrs Zangmo. A total of one hectare is under operation out of 2.96 hectares leased area. The lease period expires on 30 June 2019. The lease is for extraction of boulders which is crushed into aggregates of different sizes. There are five national workers of which none are local.

**Khothakpa Gypsum Mine** is located at Khothakpa under Shumar Gewog and is approximately 16 kilometers away from the Pemagatshel Dzong. The mine was identified by J.S Jangpangi, Senior Geologist under the Geological Survey of India (GSI) during the initial period of GSI involvement in mining survey in Bhutan. Initially, the mine was managed by the RGOB as Shumar Gypsum Mines from 1983 to 1987. However, the Penden Cement Authority Limited took over and managed it

from 1987 onwards until it was taken over by the current management, Druk Satair Corporation Limited in 1993. The mine now operates as a shareholding company with shares floated to the public.

Although the leased area for the mine is 26.77, a portion of it measuring 2.11 hectares is not put under excavation since this area is occupied with infrastructure such as guest house and Druk Plaster and Chemicals Ltd. The mine is surrounded by Khothakpa and Yalang village in the east, Denchi village in the south, and Druk Presidency Private Limited (another gypsum mine) in the west. A small stream which runs parallel to the mine meanders into the river below Denchi village. The mine runs on a 15 year lease period (1 January 2004 and 31 December 2018) and it is one of the public auctioned mines in Bhutan.

**Rishore Coal Mine** is part of the SD Eastern Bhutan Coal Company Limited and was operational since 2004. The mine is located approximately 5 kilometers away from Deothang town towards Rishore village under Samdrupjongkhar Dzongkhag and covers a lease area of 27.48 hectares.

The mining of coal is a tedious activity involving manual labor to collect and load the product into the vehicle as a measure to maintain purity of the coal. Production is at peak only in winter season with daily production of over 20 truckloads. However, in summer, the production drops down to less than 8 truckloads due to excessive rain which hinders the accessibility to the mining area.

The Rishore village is located next to the mine comprising of 15 households. The people of this village settled in the area only after the mine was identified and operated. The community comprises of households who were deprived of their land holdings in Deothang due to the Army cantonment establishment. As a replacement for their land, the villagers then resettled in Rishore. The mine is operated with 14 excavators, 4 bull dozers, and 59 trucks deployed for carrying over burden (OB) materials. A small stream runs adjacent to the mine and it is completely turbid with oil content. However, there is no community living downstream of the mine. This mine is also one of the public auctioned mine in the country and it runs on a 15 years lease term (1 September 2004 to 31 August 2019).

**The Penden Limestone Mine**, popularly known as Penden Mine, came into existence in 1972 through a Royal Charter with HRH Prince Namgyel Wangchuck as its first Chairman and the actual operation started only towards 1976. The mine was initially developed by the Geological Survey of India (GSI) and it recommended the establishment of a cement plant in the area with a capacity of 300 MT based on the potential deposit and viability of the mine. This led to the establishment of the current Penden Cement Authority Ltd (PCAL).

The mine is located in Pugli, 13 kilometers away from the PCAL cement plant in Gomtu and falls under the jurisdiction of Gomtu Gewog under Samtse Dzongkhag. Until 2004, the mine was managed by Penden Cement Authority Limited with no

lease agreement. The mine covers a total lease area of 133.18 hectares with a lease approval from 1 November 2004 to 31 December 2022.

The mine is operated as a captive mine and supplies raw materials exclusively to its cement plant (PCAL) in Gomtu. Because of its long operation in the area, the extent of mining is visible with the extraction exceeding over 100 meters of depression formed for the continuous mining activity. However, the quality of the limestone mined is not considered as the best deposit and thus it requires sweetener (tuffa) for producing quality cement. The mine employs Indian laborers from across the border on seasonal basis for specific works and also engages local community.

During the initial development of the mine, the densely populated communities surrounding the mine were relocated to Samrang and Borilla under Samdrup Jongkhar Dzongkhag.

**Tintale Quartzite Mine** covers an area of 4.56 hectares under Sangngagchhoeling Gewog in Samtse Dzongkhag. The mine was started towards the end of 1992 as a captive mine to supply raw materials to Bhutan Ferro Alloys Ltd., located in Pasakha. The mine runs on a lease period of 5 years (1 October 2010 to 30 September 2015).

The mine was first identified by the Geological Survey of India and based on this report, the present management initiated to operate it for commercial purpose. However, around 0.5 hectares of the mine area could not be operated because of low grade materials.

The mine is operated with two excavators and a compressor is used for drilling purpose. It also uses explosives for material extraction. All the sizing activity (40-70 mm) is carried out manually by laborers hired within the local community. The mine is located above the Jitti River under Sangngagchhoeling Gewog, Samtse Dzongkhag and it is approximately 15 kilometers away from the Sipsu Dungkhag Office.

With limited production at site, the Bhutan Ferro Alloys Ltd. factory in Pasakha receives supplementary quartzite supply from Pakchina Quartzite Mine under Sampheling Gewog in Chukha Dzongkhag.

**Dappar Quartzite Mine** is located in Dappar under Norbugang Gewog, Samtse Dzongkhag and it is 4.5 kilometers away from the Daina Bridge. The mine covers a total area of 8.04 hectares with a lease term of 5 years from 6 December 2007 to 5 December 2012. The mine has been operational for the last 15 years since 1997 and it is managed by the Bhutan Minerals Pvt. Ltd.

Initially, the mined materials were directly sold to Druk Wangden Export who then exported the materials to Bangladesh. However, from 2005 onwards, all the mined quartzite is directly supplied to Ms. Bhutan Ferro Alloy Ltd. (BFAL).

The mine is operated on seasonal basis because of its inaccessibility in the monsoon during which the entire road stretch starting from the Diana Bridge is covered by the river. As a measure to overcome this issue, a stock yard at Diana stocks all the mined materials while the mine is accessible. The mining activity is carried out with one excavator, two compressors and local workers from the adjacent community.

The **Titi Limestone Mine** is located in Titi under Gomtu Gewog, Samtse Dzongkhag. The mine is approximately 16 kilometers away from its cement plant (Lhaki Cement) in Gomtu. The mine prospecting and identification was commissioned by the Geological Survey of India and its commercial operation took place in 1992.

While the firm deploys its own excavators for deposit extraction, the transportation of the materials from the mine to the cement plant is entirely outsourced to interested transporters. The annual production cost of the limestone extraction in the mine is estimated at Nu.265/MT. According to the management, the limestone production cost should not exceed Nu.350/MT at any time to run the cement plant successfully.

Apart from Penden Limestone mine, this mine also lead to relocation of nearby communities who were compensated either through land compensation payment or land replacement at different location within the country. Since the mine is nearing its total deposit extraction, the management has already identified an adjacent area (Titi B) to continue its mining activity. Although the mine was initially owned by four promoters, at present the mine is owned by Dasho Ugyen Dorji and it is operated as a captive mine for supply of limestone deposits to Lhaki Cement plant located in Gomtu. The mine covers an area is 33.46 hectares with a lease term from 22 August 2005 to 21 August 2015.

There are plans to promote commercial farming as part of restoration initiative where the mined area will be planted with commercial viable species viz. broom and mint plantation which will be handed over to the local community for management to foster community income generation scheme and at the same time in attaining the environmental restoration requirements.

**The Chunaikhola Dolomite Mine** is located in Pugli, 10 kilometers away from Gomtu under Samtse Dzongkhag. The mine was originally promoted by Chhundu Enterprise with its operation outsourced to TISCO in 1984. However, after two decades of operation, the mine was stopped by the Royal Government in 2004 and a year later, Jigme Mining Corporation Limited (JMCL) was granted approval to run the mine.

The mine covers a total lease area is 72.59 hectares of which, only 6 hectares are utilized presently for core mining activity. The deposit in the area is estimated to last at least another 100 years of operation.

The mining activity is fully mechanized and the management claims it as one of the best managed mine within the region. The dolomite excavated from the mine is crushed into finished dolomite chips which are then exported to India through the sister concern firm, Jigme Industries Private Limited (JIPL). Therefore, JMCL engages only in mining activity while the raw materials are directly traded off to JIPL. The mine has over 284,286 shares and the public share accounts to 30 percent of the total shareholding. This mine is also one of the three public auctioned mines operated on lease term of 15 years from 15 May 2005 to 14 May 2020.

Located 10 kilometers west of the Penden cement plant is the **Kalapani Tuffa Mine** under Samtse Dzongkhag. The mine is located next to the Indo-Bhutan international boundary consisting of 15 blocks measuring 58.34 hectares.

The mine was operationalized in 1979 and few blocks namely block 1, 2 and 7 have completed its mineral deposit extraction. The main material extracted is tuffa containing high calcium carbonate content which is mainly used as a sweetener in the production of cement when the actual content of the limestone in the raw material falls below average requirement. The biggest hindrance to this mining activity is the Shukti River which swells in summer, thereby disrupting the transportation of materials from the mine to the cement plant. Therefore, the mine is operated in the month of October till the beginning of the monsoon in May/June. Much of its manual work is outsourced to contractors who hire the services of Indian laborers from Bandapani, India.

This mine is also managed by the Penden Cement Authority Limited as a captive mine with the current lease period covering 5 years which began from 22 January 2009 and will last until 22 January 2014.

**The Uttare Limestone Mine** is located 7 kilometers away from the Penden cement plant which is also a subsidiary captive mine managed by the Penden Cement Authority Limited. The mine covers an area of 41.1 hectares for operation with a 5 year lease approval from 19 February 2010 to 18 February 2015. The mine is also under the Samtse Dzongkhag jurisdiction.

The mine is subdivided into three blocks namely 1, 2, and 3. The mine is dug with excavators while the workers are deployed for segregation of the mined materials. The nearest community in the periphery of the mine is Uttarey village which comprises of two households. There are also several villages situated further away from the mine namely, Palo Uttarey, Dolongthang and Khanabati comprising of over 150 households collectively. Since there is no stream or water source close by the mine, the workers are supplied with piped water at the site. The mine is equipped with a small laboratory to test everyday limestone content at site and also has a small medical dispensary to provide emergency medical services to the workers.



The **Pugli Stone Quarry** is located approximately 3 kilometers away from the Pugli under Samtse Dzongkhag. The quarry was initially started in 2005 and it caters both Bhutanese as well as the Indian customers across the border in supplying stone aggregates for construction purposes.

The quarry covers an area of 12.08 hectares with a mineral reserve of 5.1 million metric ton with annual target of 50,000 metric ton production. However, the quarry is able to produce only about 100 metric ton of stone aggregates per day. Due to decreased demand for the crushed stone aggregates in the region there is minimum activity in the quarry. The nearest community, Boteykhar comprising of 18 households is located approximately 1 kilometer away from the quarry site and the Pugli River flows adjacent to the quarry. The quarry is managed by Dhendup Enterprises with a lease approval for five years which began from 1 July 2012 and will last until 31 June 2014.

**Khariphu Limestone Mine** is located at Khariphu under the Mewang Gewog, Thimphu Dzongkhag. From the total lease area of 23.8 hectares, only 4.5 acres is under operation. Kuenphen Norden Mining manages the mine with a valid lease for 10 years. (1 March 2004 to 31 March 2014). The lease agreement grants the right to the miner to extract crystalline. The raw material is dispatched to Kuenphen Norden crushing and powdering unit in Pasakha from where the finished product is exported to Bangladesh. The mine activity is coming close to its end with all of the deposits being almost extracted. Although the progressive restoration works such as plantation has not really been successful, the management is hopeful to have better restoration activity after the completion of the mining activity. There are no communities within the distance that would be adversely impacted by the mining activities.

**Gidaphug Marble Mine** started its operation in 2000 on an area of 21.6 hectares. The mine has been approved to extract crystalline limestone and marble. It is managed by RSA Private Limited. It is located at Gidaphug under Mewang Gewog in Thimphu. The current lease period is for 5 years (1 April 2008 to 31 March 2013).

Located approximately 25 kilometers from Thimphu and 5 kilometers from Khasadrapchu is the **Bjemina Stone Quarry** under Mewang Gewog, Thimphu. It was established as early as 1989 and the current lease expires in 2016 (which is subject to extension). Of the 26.8 hectares leased area, 10 hectares is under operation.

The quarry is managed by Singye Group of Companies which provides raw materials for aggregate manufacturing unit. While land degradation is inevitable, there is still room for mitigation measures to reduce the negative impact on the environment. Heavy dusting has covered the vegetation close to the quarry and there were complaints from the local residents on the dusting issues. A water source is located at the top of the quarry site. Although the management claims to have carried out appropriate plantation works, the present status of plantation activity is minimal.

There are also overburden (soil waste) and its dumping issues in the quarry. More environmental damages are likely in future as the quarry extends its operation size.

**Gidaphug Stone Quarry** is located in Gidaphug under Mewang Gewog, Thimphu. It was established in 2004 with a lease area covering 5.56 hectares which was further revised and now covers 13.43 hectares. The quarry is managed by Mr. Tenzin Thinley with a 10 year lease period (31 March 2004 to 31 March 2014). The material extracted from the quarry includes quartzite chips, stones and sand. The current employment includes 30 workers of which 23 are national workers. However, none of the local community is involved in the work. Plantations, retaining walls and sedimentary tanks have been initiated as restoration activities.

**Dojim and Geerza Stone Quarry** started from 1 August 2007 to extract quartzite band with a lease period of 20 years (1 August 2007 to 31 July 2027) licensed to HRH Dasho Khamsum Singye Wangchuck. Currently, the quarry operates on 21.72 hectares of the total 40.02 hectares of leased area. It is located at Namseling under Mewang Gewog in Thimphu.

The communities downstream of the quarry are Simo (1 km from the factory and more than 2 km from the quarry), Danglo (2 kms from the factory and 5 kms from the quarry) and Jimchukha (more than 3 km from the quarry). The quarry was fined once (penalty of Nu 3, 00,000) in 2010 when a flash flood occurred. After the payment was made, an Environment Management Plan was developed (over burden and waste relocation and Management Plan 2012).

The management indicated that it will at least take five years to fully succeed in complying with environmental standards as it takes time to make benches, stable drainage and others. Every June the quarry management plants trees at the second and the third benches (finished benches) worth Nu 20,000 but the growth of the trees are relatively poor primarily due to absence of top soil.

Production from **Wakleytar Stone Quarry** started in March 2011. The quarry is operated on a lease area of 21.31 hectares of which only 3 acres are under operation at present. White Tara Tours (owned by Dasho Wangdi Jamyang) owns the quarry and the lease period is from 1 October 2009 to 31 September 2019. It is located at Wakleytar near Nechethang under Patala Gewog, Tsirang. In this case again, the degradation of the vegetation is immense. There are no streams and rivulets close by the quarry and no human settlement surrounding the quarry.

Under the ownership of former Lyonpo Sangay Ngedup, the **Taksha Stone Quarry** was established in January 2010. It is located at Taksha under Daga Gewog, Wangduephodrang. The lease area covers 28.8 hectares of which only 20 acres are under operation. The quarry sells boulders to Damchen stone crushing unit (a sister company) at a price of Nu. 150 per ton. There are 15 workers of which 3 are non-nationals. Restoration works have yet to be carried out and there is no communities

close by the quarry. The current lease is for 8 years (1 January 2012 to 31 December 2019).

The stone quarry is located above the Wangdue-Tsirang highway. During the field visit to the actual quarry site, the impact of the quarry on the vegetation was observed to be visibly damaging. Large numbers of trees are removed with progress in the extraction works. The overburden soil along the mountain terrain seems inevitably vulnerable to erosion. From the occupational hazard point of view, the narrow approach road (given the height of the quarry site which is located 3 kilometers away from the main road) could pose a greater risk to the vehicles transporting the material.

**Khenpajichung Stone Quarry** is licensed to Mr. Tashi Norbu and it is located at Khenpajichung (seven kilometers away from Wangduephodrang bridge) under Gasetsho Wom Gewog, Wangduephodrang. The quarry is operated on a lease area of 4.87 hectares with approval to extract Biotite Gneiss for use as construction materials. The quarry was established on 23 November 2010 with the lease period ending on 22 November 2020.

According to the management, the quarry was established on a slope prone to land slide (which would block the highway). Currently, three workers are employed at the site and six at the company. The quarry (location-wise) faces the Punatsangchhu Hydropower Project (Phase 1). Initially when it started, a vibrant 10 years of operation was predicted owing to the distance between the quarry and the Power Project to generate a huge quantity of boulders (around 5,000,000 MT) to be supplied to the Project. Later, the Project rejected the quarry's produce on the ground of its inferior quality. As the extraction went on, the number of stones lessened and the amount of soil increased leading to constant dropping of soil with potential to cause landslide during the monsoon period.

## MINERAL MINING AND QUARRYING: SITUATION AND TRENDS

Bhutan's late arrival on the stage of modern development and its pursuit of strong environmental policy has enabled it to emerge as a country with rich natural and mineral resources. Because of limited in-country capacity, geologic mapping and mineral exploration activities in the country was first assisted by the Geological Survey of India. Even after the establishment of Geological Survey of Bhutan in April 1981<sup>12</sup>, the Geological Survey of India continued its assistance until its exit in 2002.

Mining and quarrying activities in the country are directly regulated by the Department of Geology and Mines. According to the Draft Mineral Development Policy (DMDP) 2011, about 33% of the total geographical area of Bhutan has been geologically mapped.

### Status of mineral resources in Bhutan

The official status of the mineral reserves in the country may be derived from the Draft Mineral Development Policy 2011. Though a comprehensive geological survey has not been carried out, the known mineral resources of the country include Copper ore, Lead – Zinc ore, Tungsten ore, Coal, Dolomite, Graphite, Gypsum, Limestone, Marble Slate, Talc, Ferro Silicon grade Quartzite, Shale and Iron ore.

*Table 2: Status of mineral resources in the country*

Mineral	Location	Reserve (in million tones) and Grade
Copper ore	Gongkhola in Black Mountain area, Zhemgang Dzongkhag	2.5 inferred, with 1.5% Cu.
Lead-Zinc ore	In Genekha area, Thimphu Dzongkhag	3.116 in Chakula – Proved 0.514 in Romegong Ri – Probable
Tungsten Ore	Dholpani and Bhurkhola , Gelephu Dungkhag	0.45 estimated down to 30 m depth in Dholpani .
Coal	Deothang and Bangtar, S/Jongkhar Dzongkhag	Reserve very tentative
Dolomite	All along the foothill of Southern Bhutan.	Very huge reserve. Proved reserve will be rendered by DGM as and when required.
Graphite	Khepchishi (above 3992 m altitude) Paro, Dzongkhag	23.53 proved by drilling.
Gypsum	Khothakpa and Uri Chu, Pema Gatshel Dzongkhag	56.45 proved (in Khothakpa); 13.60 estimated (in Uri Chu and Khar). Remaining reserve much less, mining going on
Limestone	Pagli – Titi , Gholtey area, Gaylegphu Dungkhag Kanamakra, Gaylegphu Dungkhag Korungri and Kerungri,	Reserve almost exhausted by PCAL Reserve being assessed Huge Reserve of high grade

<sup>12</sup> In February 1988, the Mining Division of the then Department of Trade and Mines was merged with Geological Survey of Bhutan to create the existing Department of Geology and Mines.

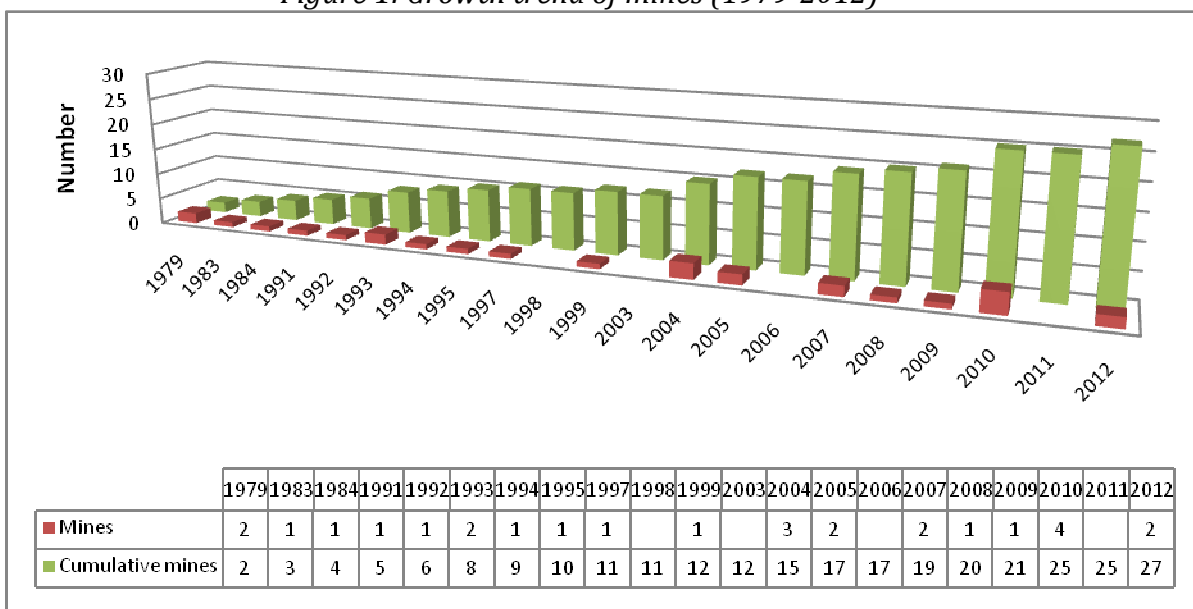
	S/Jongkhar Dzongkhag	Limestone Huge reserve of cement grade limestone
Marble	Khanku (Paro Dzongkhag) In northern region of Bhutan such as, Haa Wangtsa, Chaylaila, Paro, Jemina Thimphu Sha Bhel Wangdiphodrang, Hasilo and Pangpeysa Paro and Bunakha, Chukha Dzongkhag	12.44 proved. 29.59 Probable. Reserve not proven
Slate	Bhel (Bonsegeoma) and Kobja areas both in Wangdiphodrang Dzongkhag	16 million cubic meters. A large portion is already extracted for roofing purposes in Bhutan.
Talc	All in foothill belts in SW Bhutan	Reserve not assessed properly, because the deposit is very erratic and patchy in nature
Ferro Silicon Grade Quartzite	Quartzite in Shumar Formation	Reserve not assessed systematically

Source: Draft Mineral Development Policy, RGOB 2011. Page 6

### Growth trends in mining and quarrying activities

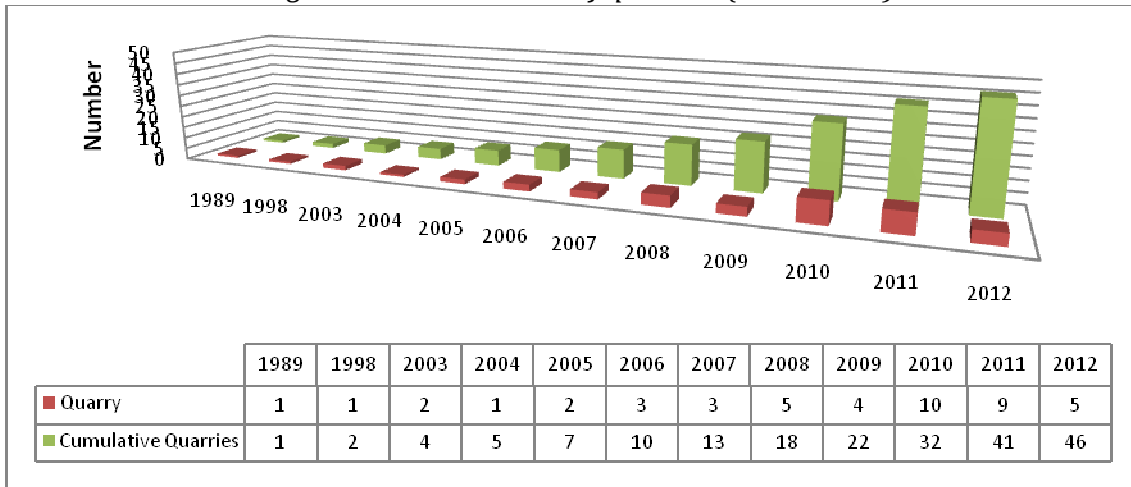
Mining and quarrying activities in Bhutan has constantly increased over the last thirty years. Although licensing for mines began in 1979, quarrying as a private licensed activity began only ten years later with one license issued in 1989. The highest number of licenses (4 mines and 10 quarries) were issued in the year 2010 perhaps indicating the demand for infrastructure development under the first elected government.

Figure 1: Growth trend of mines (1979-2012)



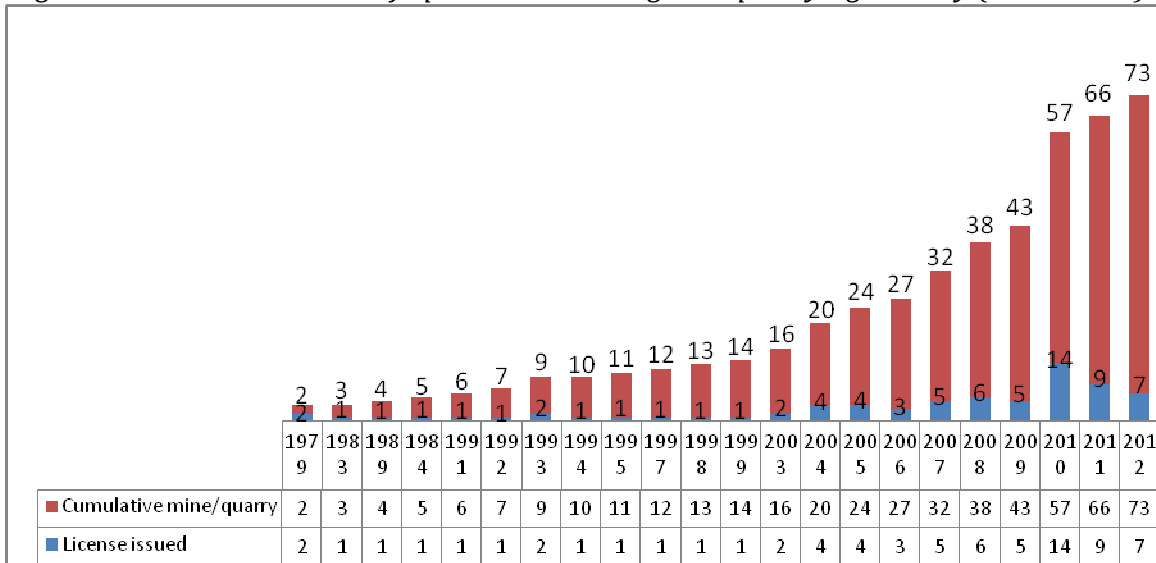
Though quarrying activities by private sector began as late as 1989, there has been sharp growth in the activity owing to emphasis of the Royal Government on major infrastructure development like hydropower and road construction. Quarries also enjoy relatively long term renewable tenure up to 10 years. As of 2012, there are 46 operational quarries in the country.

Figure 2: Growth trend of quarries (1989-2012)



The overall scale of mining and quarrying activities in the country may be observed from the cumulative number of operational mines and quarries. Mines and quarries are licensed on renewable tenure of up to 30 and 5-10 years respectively. Hence, every license issued has meant increase in the cumulative number of operational mines or quarries. As of 2012, there were a total of 73 licenses issued of which 14 were issued in 2010. Majority of the licenses issued in recent times were for quarries (see figure below).

Figure 3: Cumulative trend of operational mining and quarrying activity (1979-2012)



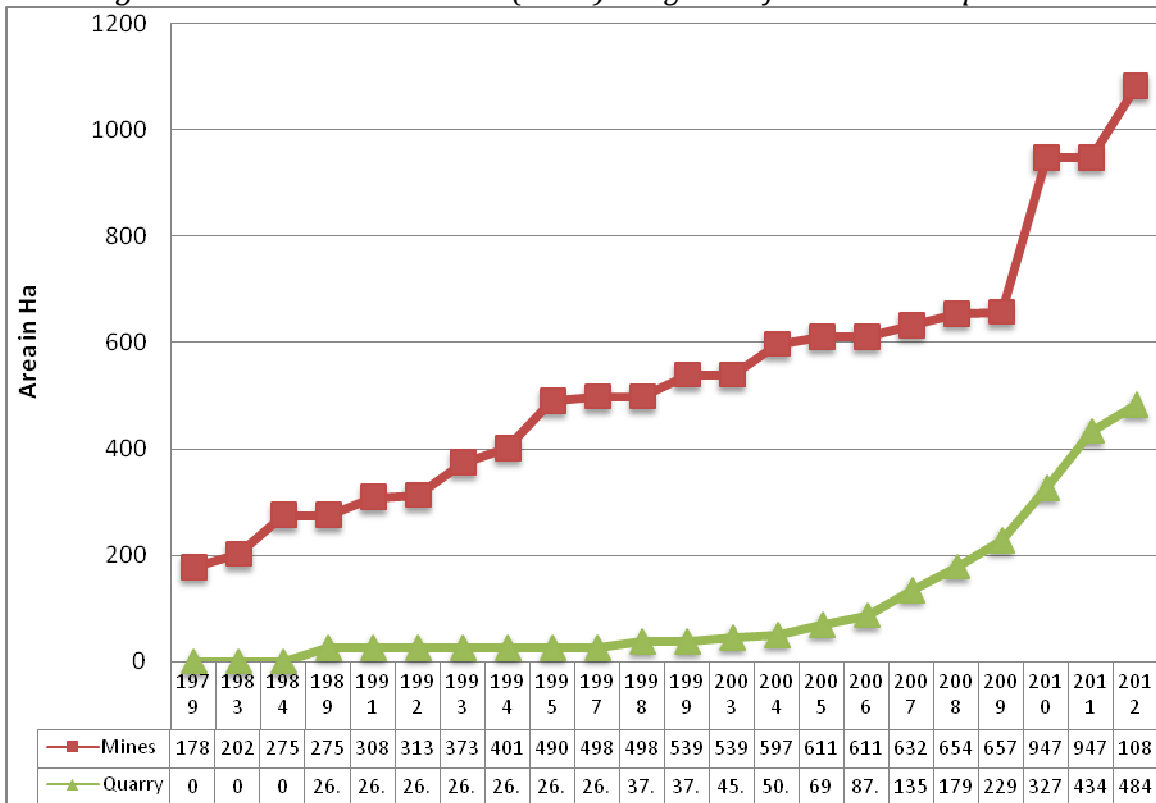
Note: Excludes mines or quarries that were either suspended or closed

There is also increasing desire on the part of private sector to engage in mining and quarrying activities. According to the National Environment Commission and the

Department of Geology and Mines, there are many applications for new mines and quarries.

While the number of operational quarries far exceeds the number of operational mines, the land area designated for mines and quarries tell a different story. Since mining and quarrying activities are extractive in nature and considering that the activities are located in the fragile mountain ecosystem, the area of land being exploited or designated for the activity should be noted. The graph and associated table below reveals that the area of land designated for the 27 mines is 1082 hectares (2674 acres) and the area designated for exploitation under 46 quarries is 484 hectares (1196 acres). Hence, the area allotted to mining far exceeds the area allotted for quarrying.

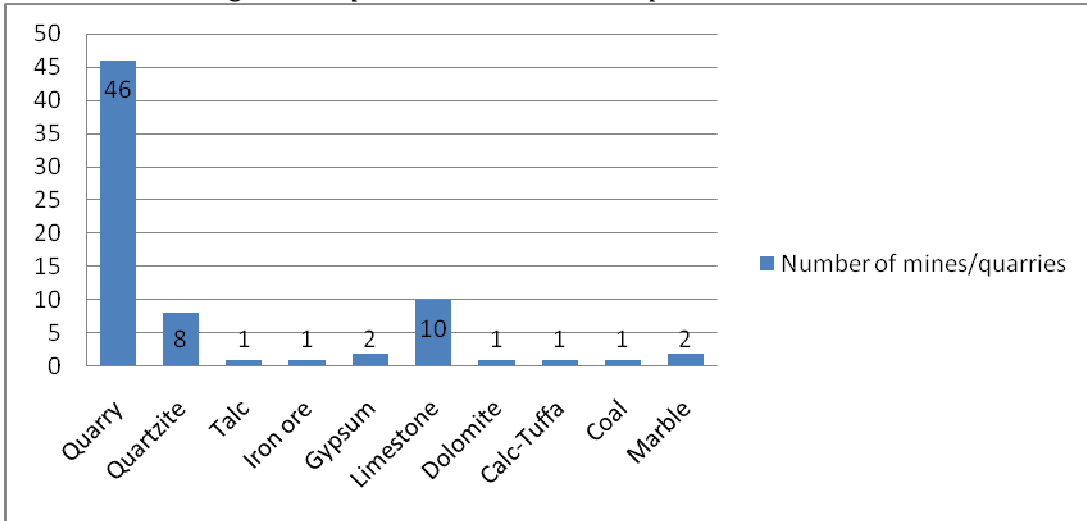
Figure 4: Cumulative land area (in Ha) designated for mines and quarries



### Distribution of operational mines and quarries

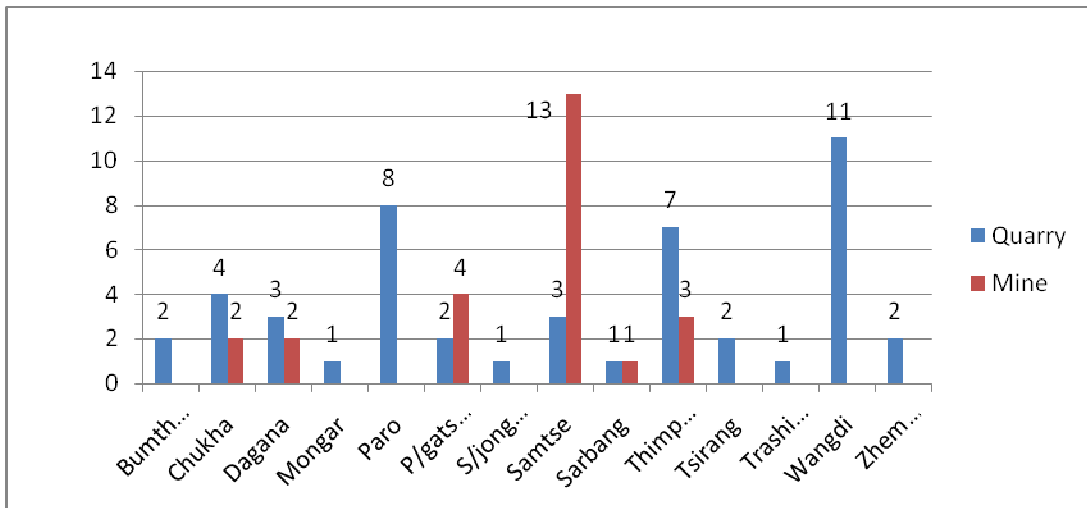
Though mining activity was initiated by the government only in 1970s, it has progressively fallen in the domain of the private sector. Currently, there are 27 mines and 46 quarries covering a total lease area of 3870 acres accounting for 0.04% of the country's area.

Figure 5: Operational mines and quarries in Bhutan



Mineral mines are located in six Dzongkhags and quarries in 14 of the twenty Dzongkhags. Overall, mines and quarries are largely concentrated in western Bhutan with the largest number of mines in Samtse district (see figure below). Wangdi, Thimphu and Paro have the largest number of quarries owing to concentration of infrastructure development projects such as hydro-power, buildings, and roads.

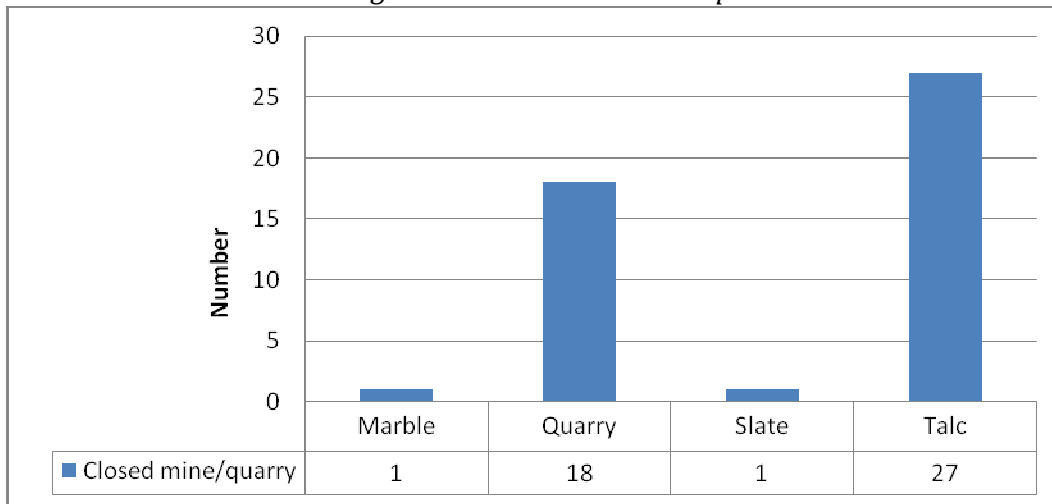
Figure 6: Distribution of mines and quarries by district



Mines and quarries are closed under circumstances of expiry or termination of lease agreement or exhaustion of mineral reserve. Till date 27 talc mines, 18 quarries, and 1 marble and 1 slate mines have been closed. Talc mines were closed for the time being by DGM. Some of the mines were closed either under corruption charges, surrendered, or terminated.



Figure 7: Closed mines and quarries



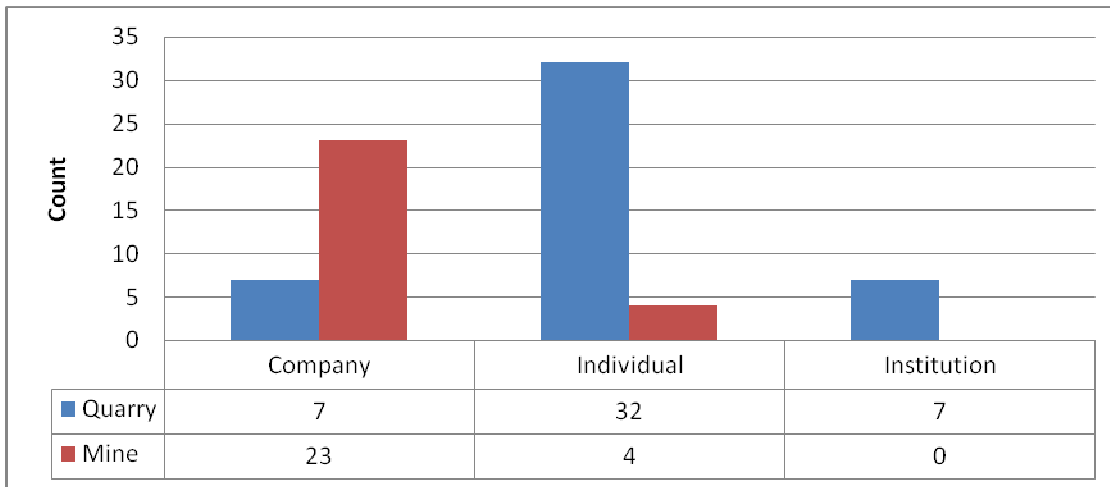
### Governance and institutional mechanisms

The mining sector is governed primarily by two government institutions i.e., the Department of Geology and Mines (DGM) of the Ministry of Economic Affairs and the National Environment Commission (NEC). The DGM is the governmental agency responsible for carrying out mapping and exploration of mineral deposits in the country and regulates mining and quarrying activity in the country. The NEC as the national authority on environment sets the environmental standards in the development and operation of mines and quarries. Compliance to required standards are monitored and enforced by both NEC and DGM.

Mining permits are issued by the DGM upon approval of the proposed mining plan and upon fulfillment of a number of requirements and procedures. An illustration of the requirements in the process of securing a mining permit is given in Annexure II. While there are other requirements, the environmental impact assessment of the proposed mine or quarry requires specific processes to be fulfilled. In securing environmental clearance from the NEC, the proponent is required to submit environmental impacts assessment (EIA) report for the project. The required EIA procedure for mining activity is illustrated in Annexure III.

While the process for obtaining a mining lease is clearly outlined, the extent to which a mine can be operated by an individual or a company is determined by the financial and technical capacity of the proponent. The structure of ownership of current mining sector reveals majority of the mines are operated by registered companies, quarries are operated primarily by individuals. 23 of 27 mines are owned by registered companies where as 32 of 48 quarries are owned by individuals. 7 of the 48 quarries are owned by institutions (see figure 8).

Figure 8: Structure of existing ownership of mines and quarries



### Compliance and compliance monitoring

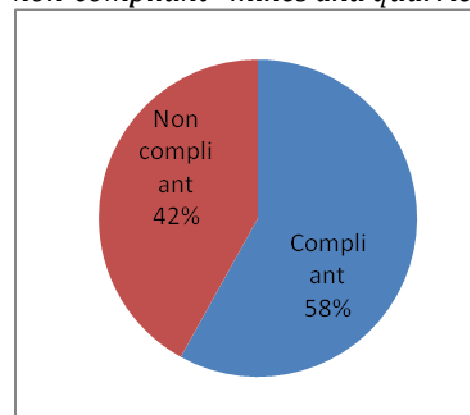
Compliance Monitoring Unit, Environment Services Division of the NEC and DGM are mandated to conduct regular and uninformed compliance monitoring of mines and quarries. For the purpose of regular monitoring, the DGM maintains personnel in quarry and mining sites. In some cases, the personnel are entrusted regular monitoring of multiple mines and quarries. The primary role of the DGM personnel stationed in quarry and mine sites include recording of production and dispatch of materials, and monitor operational safety and environmental standards. The NEC conducts annual monitoring of mines and quarries with additional monitoring visits fielded on the basis of feedbacks on issues related to specific mines or quarries.

In assessing the compliance monitoring and level of compliance in the sample sites, 13 of 31 sites have paid penalties in the range of Nu. 5000 to 300,000 (Refer table below). This suggests 42% non-compliance.

Table 3: Fine/ penalty paid by sampled mines and quarries

Penalty (Nu.)	Frequency	Total (Nu.)
5000	2	10000.00
10000	4	40000.00
15000	2	30000.00
22000	1	22000.00
30000	1	30000.00
70000	1	70000.00
200000	1	200000.00
300000	1	300000.00
<b>Grand Total Nu.</b>		<b>702000.00</b>

Figure 9: Proportion of compliant/ non-compliant mines and quarries



As regards compliance monitoring, the study presumed the possibility of operating a mine without meeting the environmental clearance requirements. 6 of 31 operating mines and quarries were unable to produce valid environmental clearance at the site (see table below). According to officials, it is not possible for a mine or quarry to operate without a valid environmental clearance. This situation was explained as a context in which environmental clearance renewal was underway or delayed. In such a case, it suggests mines/ quarries with expired environmental clearance validity continue to operate in confidence of obtaining the renewal.

*Table 4: Number and percentage of operational mines and quarries with valid/invalid environmental clearance*

Validity of environment clearance	Mine/quarry	Percentage
Yes	25	80.6
No	6	19.4

### **Environment Restoration Bond**

Environmental Restoration Bond (ERB) is a security deposit for restoration activities required to be carried out at the end of mining or quarrying activity. Till now, a sum of Nu. 10 per metric ton (MT) of production has been levied. ERB payments are collected from the mine or quarry owners annually on the basis of total targeted production for the year. Alternatively, mine/ quarry owners have the option of making upfront payments calculated on the basis of total targeted production based on the feasibility study. There have been instances in the past when ERB amounts could not be collected. Efforts are therefore made to collect ERB years ahead of the expiry of the lease term.

ERB deposits are generally maintained in joint signatory accounts in the name of specific mines/ quarries with Bank of Bhutan. The accumulated ERB amount is refunded to the mine owner in proportions equivalent to the restoration work verified by DGM as satisfactory carried out by the owner. Although 27 talc mines, 18 quarries, and 1 marble and 1 slate mines have been closed till date, the strict enforcement of restoration requirements and associated refund of ERB could not be carried out owing to i) suspension of the mines and associated legal proceedings, ii) lack of institutional capacity for record keeping and monitoring prior to 2008.

*Table 5: Environmental Restoration Bond (ERB) maintained in the Bank by DGM*

<b>Name of Mines</b>	<b>Dzongkhag</b>	<b>(ERB) Nu.</b>
Gathrak Stone Quarry	Bumthang	400,000.00
Damchu Stone Quarry	Chukha	50,000.00
Kungkha Quartzite Mine	Chukha	960,000.00
Omchina Quartzite Mine	Chukha	2,645,840.00
Paga Ketolungpa Stone Quarry	Chukha	202,980.00

Pakchina Quartzite Mine	Chukha	3,600,000.00
Shadumardu Talc Mine	Chukha	567,500.00
Maure Iron Ore Mine	Dagana	228,000.00
Mutwakhola Stone Quarry	Dagana	3,000,000.00
Kilikhar Stone Quarry	Mongar	3,999,000.00
Lamjolo Stone Quarry (West Block)	Paro	100,000.00
Pachulum Stone Quarry	Paro	391,250.00
Thongtimo Stone Quarry	Paro	811,338.00
Tshongkha Stone Quarry	Paro	425,250.00
Cherungri Gypsum Mine	Pemagatshel	897,870.00
Eastern Bhutan Coal Fields	Samdrupjongkhar	4,000,000.00
Chunaikhola Dolomite Mine	Samtse	8,529,200.39
Dappar Quartzite Mine	Samtse	1,004,563.00
Dipujhora Talc Mine	Samtse	30,990.00
Ghardara Stone Quarry	Samtse	219,168.80
Haldurey Kholsa Talc Mine	Samtse	136,640.00
Haurikhola Limestone Mine	Samtse	1,007,381.00
Kalapani Calc-Tuffa Mine	Samtse	154,470.00
Kharikhola Talc Mine	Samtse	600,000.00
Lampathey Quartzite Mine	Samtse	1,040,460.00
Lower Saureni Talc Mine	Samtse	60,000.00
Mowatar Talc Mine	Samtse	122,320.00
Penden Limestone Mine	Samtse	10,095,273.30
Pugli Stone Quarry	Samtse	1,019,363.00
Simanadara Talc Mine	Samtse	436,000.00
Soilaykhola Talc Mine	Samtse	150,000.00
Sukreti Face-8 Talc Mine	Samtse	236,000.00
Sukreti Talc Mine	Samtse	414,240.00
Tinpawa Quartzite Mine	Samtse	2,043,465.00
Tintale Quartzite Mine	Samtse	1,468,158.00
Titi Limestone Mines	Samtse	4,000,000.00
Tumkey Talc Mine	Samtse	56,000.00
Upper Sukreti Talc Mine	Samtse	180,000.00
Uttare Limestone Mine`	Samtse	6,748,666.60
Rongri Limestone Mine	Sarpang	1,511,653.00
Bama Stone Quarry	Thimphu	53,200.00
Bjemina Stone Quarry	Thimphu	3,000,000.00
Dalukha Stone Quarry	Thimphu	50,000.00
Dojim and Geerza Stone Quarry	Thimphu	2,250,000.00
Gidaphug Marble Mine	Thimphu	1,499,375.00
Gidaphug Stone Quarry	Thimphu	1,284,000.00

Khariphu Limestone Mine	Thimphu	2,000,000.00
Kibuloomchu Stone Quarry	Thimphu	100,000.00
Langukha Stone Quarry	Thimphu	829,247.35
Ngabephu Stone Quarry	Thimphu	106,500.00
Kuchikhola Stone Quarry	Tsirang	204,000.00
Wakletar Stone Quarry	Tsirang	441,784.00
Gewachhu Stone Quarry	Wangduephodrang	414,180.00
Jungomlo Stone Quarry	Wangduephodrang	535,000.00
Khenpajichung Stone Quarry	Wangduephodrang	439,676.00
Sha Ngawang Granite Quarry	Wangduephodrang	250,000.00
Tabchikha Stone Quarry	Wangduephodrang	102,000.00
Taksha Stone Quarry	Wangduephodrang	1,342,500.00
Tshodremithang Stone Quarry	Wangduephodrang	310,500.00
Wangchena Stone Quarry	Wangduephodrang	402,400.00
<b>Total ERB collection Nu.</b>		<b>79,157,402.44</b>

Mine operators believe that the amount held as ERB deposit is likely to exceed the cost of restoration work. The logic for this perception appears to come from the fact that restoration work requirements may not be quantitatively defined at the time of approval leaving space for any standard of restoration as justifiable by the mine owner.

### Material production and revenue

Productions of materials from the mines and quarries except for Iron ore and Shale have increased over the years. Accordingly the revenue generated in the form of royalty, mineral rent, license fee and surface rent have also increased.

*Table 6: Production by mines for the period 2005-2011*

Mineral Type	2005	2006	2007	2008	2009	2010	2011
Dolomite (million MT)	0.389	0.477	0.579	1.248	1.029	0.27	0.91
Limestone (million MT)	0.536	0.581	0.544	0.584	0.65	0.68	0.75
Gypsum (million MT)	0.151	0.204	0.189	0.248	0.3	0.344	0.38
Coal (million MT)	0.085	0.098	0.105	0.124	0.049	0.064	0.10
Marble (ft <sup>2</sup> )	4,005	3,813	12071	12301	13074		
Slate (ft <sup>2</sup> )	2,909	5,873	78107	822	18998	0	0.00
Quartzite (million MT)	0.053	0.04	0.064	0.095	0.083	0.119	0.09
Talc (million MT)	0.043	0.054	0.062	0.056	0.064	0.027	0.02
Iron Ore (million MT)	0.006	0	0	0	0	0	0.00
Shale (million MT)	0.001	0.001	0	0	0	0	0.00
Stones (million MT)	0.147	0.232	0.389	0.409	0.512	0.79	2.42
Granite Slabs (ft <sup>2</sup> )	9,436	8,311	14430	8227	19905	0	0.00

As of 2011, the total revenue generated is Nu. 220 million.

## **ECONOMIC, SOCIAL, & ENVIRONMENTAL IMPACTS OF MINING AND QUARRYING**

Bhutan has undergone unprecedented political and socio-economic development in the last one decade. With decentralization and devolution of power from the throne, the people of Bhutan are increasingly caught in the pursuit of economic development. Despite the policy of fostering economic growth through renewable natural resource and sustainable development, the numbers of citizens pursuing environmentally damaging resource extractive businesses have been on the rise. With accelerated economic development initiatives especially infrastructure (roads, urbanization, hydropower, etc.), demand for stones and gravel, sand, minerals, and raw materials for industries are on the rise. Businesses in this area are generally seen as money minting ventures.

The private sector has increasingly taken up quarrying and mining activity in the country. Prior to late seventies, the Royal Government availed the assistance of the Geological Survey of India in geological exploration and mapping of the country. Privatization of mining began in mid seventies with two licenses issued to Penden Limestone mine and Kalapani Calc-Tuffa mine primarily to meet the raw material requirements for Government owned Penden Cement Authority Ltd. Ever since, the number of mines and quarries in the country has cumulatively increased under provisions for extension up to a maximum of 30 years tenure. Currently, there are 27 mines and 46 quarries with valid tenure. It may also be pointed out that the democratic period i.e., 2008-2012 had the largest number of permits issued with fourteen issued in 2010.

### **Impacts of mining and quarrying**

Mining is a complex activity that includes exploration, exploitation, and trading. While mining undoubtedly contributes to socio-economic development of a country, the exploitative nature of activity is necessarily an environmentally degrading one. The viability of mining or quarrying is a question of the extent to which the economic benefits from the activity exceeds the cost of social and environmental damages and the extent to which restoration after the activity is feasible and cost effective.

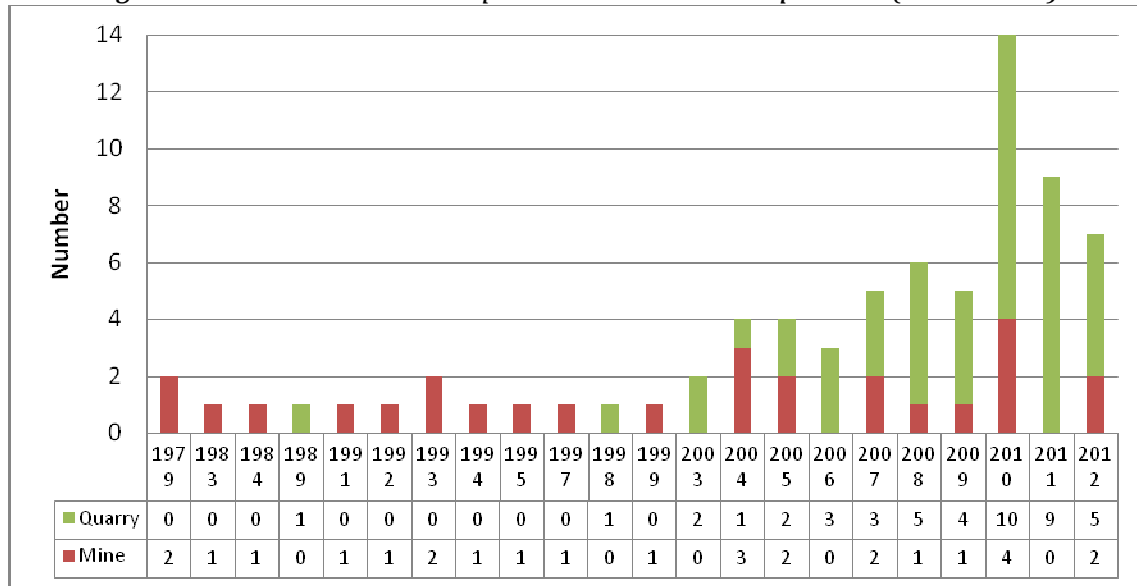
Bhutan's location in the fragile and rugged mountain ecosystem coupled with the institutional constraints of the concerned government agencies in compliance monitoring presents a special challenge in determining the worthiness of mineral mining as socially, economically, and environmentally viable activity. Based on the data gathered, this study attempts to highlight the economic, social, and environmental impacts of ongoing mining and quarrying activities in the country.

### **Economic assessment of mining and quarrying**

In assessing the economic impacts of mining and quarrying in Bhutan, this study first provides an overview of the mining sector, growth trends and its contributions

to the national economy. Based on the information gathered from the field, the study then attempts to assess the economics of mining from the perspective of the business entities engaged in mining and from the perspective of the national government.

Figure 10: Growth trends in operational mines and quarries (1979-2012)



Minerals of economic value exploited by the mining sector include Copper ore, Lead – Zinc ore, Tungsten ore, Coal, Dolomite, Graphite, Gypsum, Limestone, Marble Slate, Talc, Ferro-silicon grade Quartzite, Shale and Iron ore. With surge in construction development projects in the country over the last five years, sand, stones, and gravel have also gained immense economic value. Increased engagement in mining/quarrying and applications for new ones suggest the attractiveness of mining and quarrying as profitable businesses.

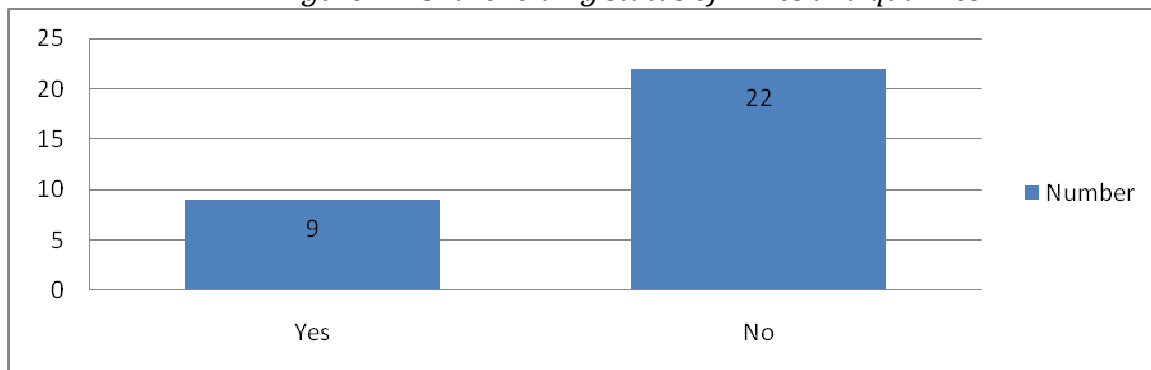
### Economics of mining and quarrying activity from individual business perspective

Although mining and quarrying seems to be profitable business in Bhutan, the evidence of corporate income tax declared by the sample mines reveals that it is profitable for some and not for others. From the 31 sites visited, 14 have declared profits and 9 have declared loss, 1 is closed, and no data could be obtained for the rest. Mines and quarries generally incur loss in the early years of operation due to huge capital investments. Profitability of 4 mines and 1 quarry could not be ascertained because investments were made long time ago for which there are no records available or a new management has taken over upon purchase of the permit.

While no reliable figures were available to ascertain the profitability of mining and quarrying business, a number of observations suggest it is a profitable business sector:

1. Private sector engagement i.e., the number of permits issued has been on the rise. It is irrational to associate non-profitability of a business sector to its growth.
2. Mineral/ material pricing liberty: Observations from the field reveal cases where owners maintain liberty to fix the price of the minerals or materials sold to their own sister company or mineral prices are nonexistent in case of captive mines. This may have implications on the profitability of the business and associated revenue to the government. For example, Taksha stone quarry sells boulders for Nu. 150 per ton (i.e, about Nu. 1500 per truck load) to Damchen stone crushing unit. Prices fetched by other stone quarries range between Nu. 2000 to 3000 per truck load. In another case, no prices exist for minerals from Penden/ Uttari/ Kalapani and Titi Limestone mines which are operated as captive mine<sup>13</sup> for Penden Cement Authority Ltd and Lhaki Cement Pvt. Ltd. respectively. Hence income and associated business and corporate income tax for these mines do not exist. The BIT/ CIT for the above mines are paid by respective Cement companies.
3. Lower cost of compliance: Although Bhutan has strong guidelines for operation of mines and quarries, observation on the ground reveal that mines and quarries engage minimal standards of safety and environmental quality. Requirements for management of air, water and soil were observed to be sub standard. Although the requirements seemed not practically feasible due to terrain and lack of easily available water, it also meant that costs were not incurred to the extent required by law. In addition, safety standards are also not observed to the extent required.
4. Limited profit sharing: The study found that only 8 out of 14 mines and 1 out of 17 quarries sampled were shareholding companies. Within this group, it has been noted that number of public shares is far less than the shares held by promoters. The remaining 22 (70%) businesses were individually owned. Either case reveals prominence of individual ownership over public shareholding suggesting dividends from public resource exploitation are maximized by small group of people.

*Figure 11: Shareholding status of mines and quarries*



<sup>13</sup> Captive mine: a mine whose product is taken largely or wholly by the owners of the mine for their own use or for a subsidiary's use.



## Economics of mining and quarrying activity from national government perspective

In the context of Bhutan as a developing country, mining and quarrying are essential activities in infrastructure development, generation of employment, and earning foreign exchange to some extent. Mining and quarrying have short-term economic benefits with long-term costs. Generally, the long-term cost of such activities is shadowed by development needs and rationale for short-term benefits.

In the context of the above, the RGOB has increasingly relied on the mining sector to meet the raw material needs of its construction and natural resource based industries. Such economic activities may be more unavoidable than prioritized. Irrespective of the economic worthiness of this sector, national governments may be left with no option but to go for mining and quarrying. It is therefore a question of how effectively and efficiently the government is able to optimize the economic and social benefits from the activity while minimizing the environmental impacts of such activities.

The economic benefits of mining or quarrying activity may be seen in terms of direct benefit to the Government or indirect benefits to the general public that otherwise is the obligation of governments to fulfill. The national government perspectives to economic worthiness of such undertakings include:

1. Revenue and time value of money

Mining and quarrying activities in the country are a source of revenue to the national exchequer. Its share of national revenue increased from Nu. 153 million to Nu. 220 million. The current percentage contribution of mining industry to national revenue is (1.26%) in 2011<sup>14</sup>. The sources of income include:

- a) Royalty, mineral rent, license fee (Bid value) and surface rent (see table below)

*Table 7: Revenue generation from royalty, mineral rent, surface fee and license fee (Nu. Million)*

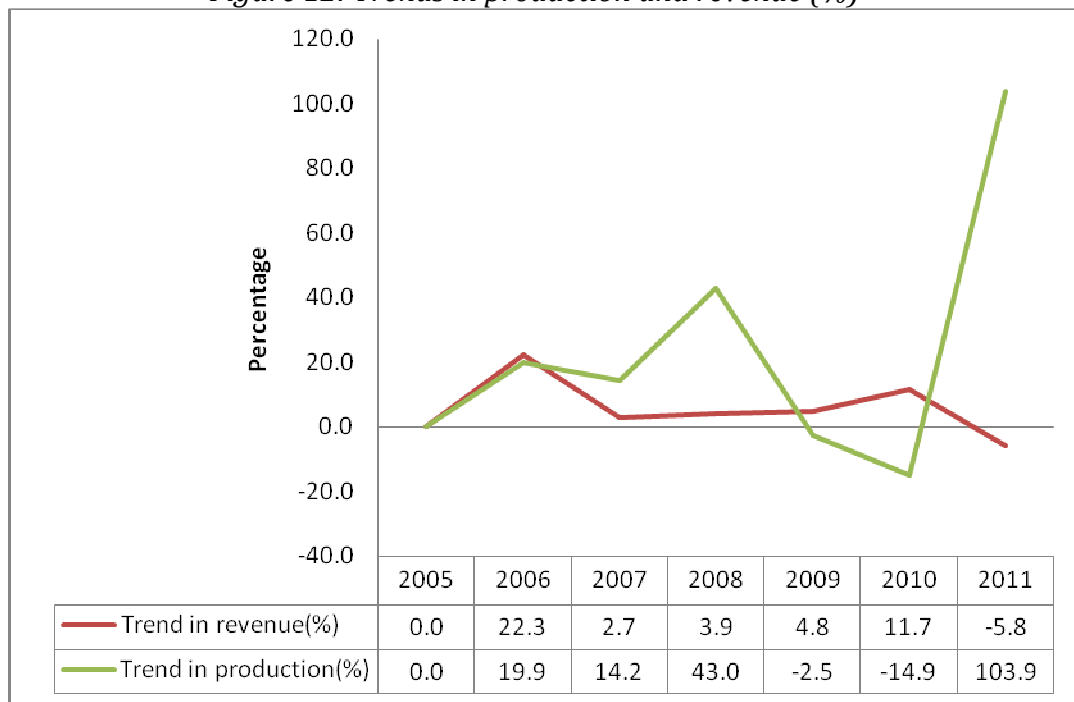
Revenue Type	2005	2006	2007	2008	2009	2010	2011
Royalty	66.542	77.872	81.911	102.825	110.545	129.747	119.241
Mineral Rent	11.438	13.471	14.373	19.205	20.754	25.306	22.372
License Fee*	64.5925	95.3468	95.3468	77.1118	77.1118	77.1118	77.1118
Surface Rent	0.415	0.453	0.503	0.547	0.807	1.488	1.311
<b>Total Nu. (Million)</b>	<b>152.988</b>	<b>187.143</b>	<b>192.134</b>	<b>199.689</b>	<b>209.218</b>	<b>233.653</b>	<b>220.036</b>

*License fees (Bid value) are applied only on public auctioned mines (Dolomite, Gypsum, and Coal)*

<sup>14</sup> Calculated on the basis of NSB statistics and revenue information from DGM

It is generally expected of production changes to be associated by similar changes in revenue. However, the graph below shows that the trend in mines and quarry production are not consistent with the revenue generated. Although the initial (2006) increase in revenue (22.3%) was rationally associated with an increase in production (19.9%), there is an unexplained decrease in revenue against increase in production from 2007-2009 and 2010 to 2011. Another unique observation is the slight increase in revenue against a decline in production from 2009-2010. Unless this trend is explained by untimely or delayed realization of revenues, it may represent a lack of mechanisms to assess business income on the basis of production or improper declaration of business information.

Figure 12: Trends in production and revenue (%)



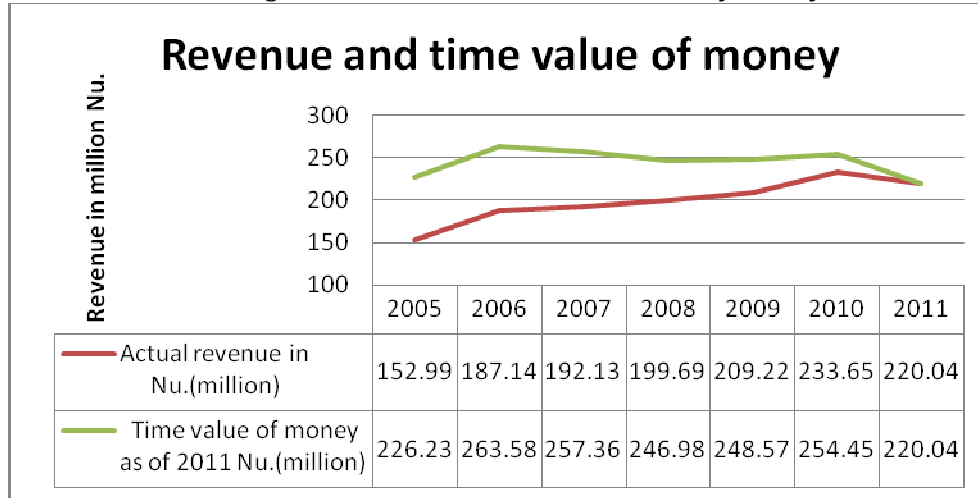
Note: Does not include marble, granite and slate production as information available are in different units.

Gauging the current revenue from mining activities (by factoring in inflation<sup>15</sup>) against the earlier revenue performances, it appears the government has not derived as much value for money as it did earlier. From the graph below, it may be said that more mineral resources were exploited to generate that value of money that was generated back in 2005. For example, after factoring in inflation only, the time value of money for the

<sup>15</sup> Inflation rates were based on the annual average inflation rates as per National Statistical Bureau. Interest rates were however not factored in.

Nu. 152.99 million revenue generated in 2005 works out to Nu. 226.23 million in 2011.

Figure 13: Revenue and time value of money

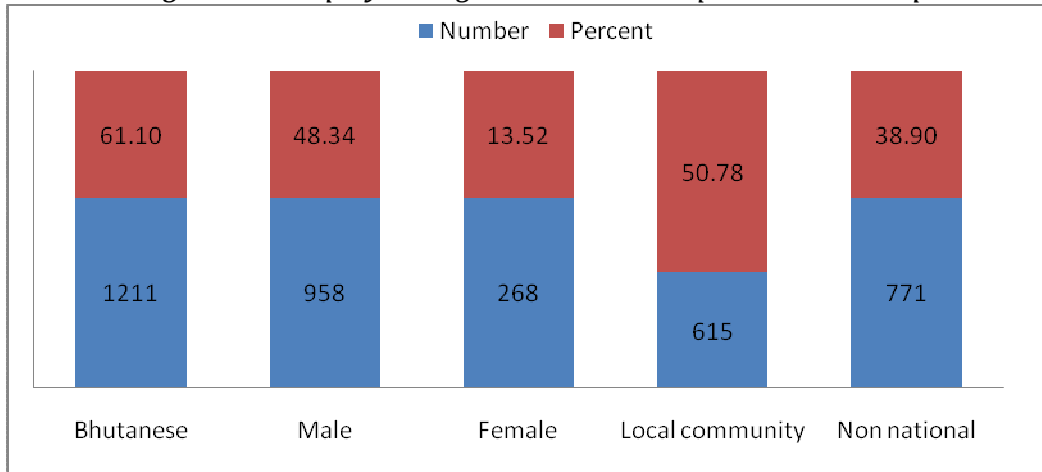


b) Taxes: The other revenue that the Royal Government derives from this sector is the annual Business or Corporate Income Tax (BIT/CIT). For example, the CIT paid by sampled mines range from Nu. 1.5m to Nu. 61.7m in 2011. In case of Tintale, Titi, Penden, Uttare, and Kalapani mines, the associated proportion of CIT could not be ascertained as they were merged with their companies. However, it is deemed covered by CIT declarations of their respective companies. Additionally, there are contributions in terms of personal income taxes of the personnel engaged in the mining sector.

## 2. Employment

Given that it is the primary obligation of the government to promote and provide employment, the role played by mining and quarrying industry in employment generation cannot be discounted. Although the industry does not seem to provide permanent source of employment, the study reveals that 61% of the workforce in sampled mines is comprised of Bhutanese. 50% of the Bhutanese workers come from local communities indicating contribution of the industry to local economies. Though the number of people benefiting from such employments could not be calculated, the social structure and dependency rate in Bhutan suggests that number of indirect beneficiaries could be significant.

Figure 14: Employment generation in sampled mines and quarries



### Impacts of mining industry on local economy

There are both positive as well as negative impacts of the mining activities to surrounding communities.

#### *Positive economic impacts include:*

**Improved accessibility:** Mining infrastructures provide fringe benefits to communities in terms of providing road and bridge accessibility. Transports plying on the access roads are often helpful in commuting to market.

**CSR activities of the business help uplift local livelihoods:** The Corporate Social Responsibility activities of the companies/ businesses have helped communities meet certain needs that are beyond their capacity to address. Some of the CSR activities include building community infrastructure like road (by Lhaki to Gomtu Gewog Office), school (Jemina), and provision of temporary employment to locals.

#### *Negative economic impact:*

The negative economic impact of mining and quarrying may be explained in terms of lost opportunities to the community. The long term custodians of the natural resource ultimately are the community people residing in the area. Considering that business built around renewable natural resources offer the best opportunities for sustainable development, mining and quarrying businesses not only deplete the natural resource stock but immensely undermine the ecosystem services, the potential economic opportunities of which are not currently known. Further, a mine once exploited will take ages to gain the characteristics of a productive area. Government may directly or indirectly incur cost in mitigating associated environmental problems in the future.

**Compromised crop yields in adjacent communities:** Few communities from the sampled sites also complained of agricultural crop damages both in terms of quality

and quantity primarily due to excessive dust from the mines and quarries. Example: Affect on orange production in Khothakpa from the Gypsum Mine, Barma Chemicals and Druk Plaster and Chemical Ltd; on chili production by quarries in Dagar, Paro; on apples in Jimena etc.

Wear and tear on public infrastructure: Mining and quarrying activities impose immense wear and tear on public infrastructure especially roads. The constant transportation of heavy material on public road hastens the rate at which the quality of such infrastructure is degraded. The economic impact therefore is in the form of public inconvenience and vehicular depreciation, the cost of which are borne by the individuals or translates into the cost of road maintenance, which may be required earlier than under normal circumstances.

### **Social Impacts of Mining and Quarrying**

Mining and quarrying have social impacts that may be positive and negative. Observations from the field reveal the following social impacts:

#### *Positive social impacts:*

Corporate Social Responsibility (CSR) activities contribute positively to the social way of life of the community. The managements of mines and quarries have provided assistance of various kinds to the adjacent communities. Some of the social initiatives undertaken are scholarships (SD Eastern Bhutan Coal Ltd., Lhaki Cement, RSA), annual donations for religious purposes (Jemina, Pachulum), Support for health facilities (Penden and Lhaki in Gomtu), and drinking water and irrigation support (Gidaphu, Jemina, PCAL, Dojim and Geerza). Such financial support to the community not only helps the communities in specific economic needs but also help them preserve their culture and traditions.

#### *Negative social impacts:*

Displacement of communities: Although displacement of communities is not a common observation, it has happened in a few instances. Penden limestone mines have required the Titi community to be relocated to Borilla, and Samrang in Samdrupjongkhar. There are also potential threats of further displacement due to planned extraction. For example, the exploitation of additional mining block by Titi mines will potentially displace the village of Titi 'B'.

Social disharmony: Mines are generally not welcome by the community. However, community members with vested interest sometimes facilitate community clearance resulting in differences of opinion and rift among households and family members. Mines are also known to adopt strategies to maintain community support by way of donations often unaccounted for to the community as a whole.

### **Environmental Impacts of Mining and Quarrying**

While it is desirable to assess the economic value of environmental impacts for the purpose of deriving the worthiness of mining and quarrying activities, it was beyond the scope of this study to engage in such assessments.

The survey covered three aspects of the environment- air, vegetation, and water assessed on the basis of physical observations and turbidity test kit conducted in sample sites. Since the study was conducted during the winter season, some of the mining and quarrying activities were less as the laborers had gone home for their holidays. Hence, the impacts reflected below, especially those related to water, may not adequately represent the situation in monsoon season.

Prior to venturing into the negative environmental impacts, it is important to present the efforts made by mine and quarry operators in meeting environmental requirements. Some of the visible activities include:

Progressive restoration: Check dams and retaining walls were observed in few mines and quarries. Traces of plantation efforts were also visible with negligible evidence of survival rate.

Terracing: Terraces were made for slope stabilization and control of soil erosion.

While the above were carried out in fulfillment of the requirements of the mine plan, it appeared superficial and inadequate to meet the intended objective of addressing the issues. Having said this, the study also deems it necessary to point out that the Himalayan terrain makes it practically difficult for some of the requirements to be implemented.

Negative Environmental Impacts: The negative impacts of mining and quarrying have been reported by the NEC since 2009 in its *'Environmental Assessment of Existing Mines and Quarries'*. It reports that *"It is an accepted fact that mining causes disturbance and damage to the environment. The magnitude of impact on environment depends upon the geological formation of the mining area and the method of mining operation. All mines in the country are of open-case type which could affect the environment by changing landscape, Ph medium of soil and water, flora and fauna, and socio-economic aspects."*

Below are the negative impacts of mining and quarrying activities deduced from the existing visit to sampled mines and quarries:

Air quality: The dust from all the quarry and mine sites visited is directly exposed to the air. It is mostly visible on the approach road as the trucks move and from the stone crushing activities. While the visibility of dusts at the mine/quarry site is limited to the surrounding vegetation, the potential negative impacts, on the community and laborers, due to long term exposure to dust cannot be discounted simply based on visibility. Evidences of the air quality around the mines were visible from dusts settled on nearby houses and plants. Evidences of such can be taken from houses located along the approach road (to Dojim and Geerza Stone Quarry) starting from the highway. This made it difficult to conclude on the actual amount of dusting during the peak production.

It is a standard requirement on the part of the miners to constantly spray water to suppress dust. Although some of the mines had water spraying vehicles, majority of the sites visited showed no evidence of compliance to such requirement. In some cases like Lomekha Stone Quarry, Omchina Quartzite Mine and Uttare Limestone Mine, the requirement was essentially not possible owing to lack of water. In all cases, the dust suppression efforts were irregular except for few mines who had just deputed vehicles to spray water. There were two instances (Gidaphug Marble Mine and Chhunaikhola Dolomite Mine) where the water sprinkling vehicles were out of order.

**Vegetation:** In terms of vegetation, the nature of mining activity results complete removal of plant matter. Progressive restoration is mandatory as per the lease agreement (support by the Environment Restoration Plan and Environment Management Plan). However, visits to sample sites show negligible efforts in restoration of the mines. The primary restoration activity carried out is plantation of trees. Restoration attempt at progressive restoration mines seemed unsuccessful. In Bjemina Stone Quarry, Kharipphu Limestone Mine, Gidaphug Marble Mine, Penden Limestone Mine and Uttare Limestone Mine plantations works were carried out in the completed benches, however, the growth of the trees are really weak. There was general agreement among mine managements that vegetation restoration in exploited mines is next to impossible.

**Water:** The impact of the mining/quarrying activities on water was determined by physical observation and turbidity tests. The test revealed an increased turbidity in downstream areas as compared to the upstream results. There is also high probability of runoff from the mines and quarries into the nearby water source during monsoon. In Rishore Coal Mine, the small stream at the entrance of the mine is completely polluted after it crosses the approach road mainly from the spillage of coal from the vehicle plying over it. There was also an instance of river diversion activity carried out at the talc mine in Shadhumadu to gain accessibility between the mine and the processing plant.

Another common sight among the quarries and mines is the dumping of overburden soil. In most of the cases, it is just thrown down a ravine. Although there are designated dump yards identified in their management plan, dumping trend appeared irregular. The dump site at study sites of Rishore Coal Mine and the new Gypsum Mine operated by Druk Presidency seemed vulnerable to such erosion during the monsoon. Being located in the Himalayan terrain, it is unavoidable that dumped soil will be washed away during the monsoon explaining the increased turbidity of rivers during the monsoon.

**Aesthetic values:** It is also being observed from field visits that the scarring of the landscape is extensive. Those affected have noted comparable decline in aesthetic value of their area over the years. For a country focusing on tourism as a major

source of revenue, the mining scars impair the aesthetics of the lush green forests, which is an eye sore for any onlooker.

Other impacts: Other key issues include the impact of blasting in mines and quarries. Apart from sound pollution, blasting impacts may also trigger landslide and damages to infrastructure. In one case, a community of Kilikhar reported of damage to their monastery due to blasting at Kilikhar Stone Quarry.

Across the border and at the international level, the impacts of mining activity on neighboring the border areas have also been highlighted. A Reuter's report titled 'Mines Destroy Bhutan's Mountains' (2007) highlighted impacts of environmental damages on wildlife and water resources across the border. The report concluded by saying '*India's environment ministry complains that Bhutan is not enforcing scientific mining norms. It wants forest cover to be replanted where possible and barriers constructed to stop landslides affecting West Bengal*'.

## **NATIONALIZATION OF MINES AND QUARRIES**

### **Nationalization: A global perspective**

Nationalization is the act of acquiring privately owned enterprises by state governments with or without compensation. Governments may opt for nationalization for economic, financial, social, strategic and nationalistic reasons. However, nationalization also has costs in terms of financial, economic, political and reputational implications.

In the context of above definition, nationalization is not a common or popular policy of modern world (G Keeton & M Beer, 2011). While it has enjoyed greater support and profile in the 1930s to 1950s, nationalization today is popularly associated with autocracy and as a trait of impoverished governments to generate revenue. Hence, nationalization is generally discounted as a legitimate economic policy choice and pursuit of nationalization are generally seen as policies of immature, imbalanced and unreasonable democracies.

Chang et.al 2012<sup>16</sup> established five stylized facts about nationalization and privatization. First, nationalization and privatization are repeated cyclical phenomena prevalent in developing countries. Second, Privatization - nationalization cycles tend to occur more often in the natural resources and utilities sectors. Natural resource companies are significantly more prone to undergo the recurring cycle of nationalization and privatization. Third, nationalization of natural resource industries tends to occur when the price of the corresponding commodity is high. A high real price for minerals is a stronger predictor for state

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<sup>16</sup> Chang, Roberto, Constantino Hevia, and Norman V. Loayza. 2012. Privatization and Nationalization Cycles. January 2012.



expropriation<sup>17</sup> risk than political or economic crises are. Fourth, contracts for the exploitation of natural resources between governments and private companies are such that commodity price windfalls are mostly appropriated by private firms. A combination of high commodity prices and low profit sharing from private firms to host governments gave them large incentives to expropriate. Five, nationalization is more likely when inequality is endemic or worsens in the country, and especially when the rents from natural resource or utility companies are perceived as benefitting only a minority.

Experiences in South Africa, Latin America, and Southeast Asia reveal that foreign firms are generally targeted for nationalization. Studies commissioned by the African National Congress (ANC) on state intervention in the mineral sector<sup>18</sup> suggest that nationalization would clearly be a route to unmitigated economic disaster for the country and its people. Rather, it proposes investigation of rent share, growth and development to make targeted interventions in achieving the desired outcomes of state control.

### **Context of nationalization in Bhutan**

Historically, the state has been the provider of all services such as education, transport and communication, infrastructure development, health, etc. In addition, businesses such as tourism (eg. Bhutan Tourism Corporation Ltd.), trading (eg. State Trading Corporation of Bhutan, Food Corporation of Bhutan), and industries (eg. Penden Cement Authority Ltd.) were managed and operated by the government. As the country progressed with Five Year Plans, increasing emphasis was placed on 'privatization as the engine of growth'. The role of private sector gradually increased with corporatization of government owned businesses and liberalization of licensing policies and opening up of the economy to Foreign Direct Investment (FDI) in recent times.

In the mining sector also, there has been gradual shift from government engagement to private sector businesses. As pointed out earlier, engagement of private firms in mining and quarrying have also increased from 1979 to 2012.

Since the beginning of modern economic development in 1960s, nationalization has occurred in the context of the following:

- Forest and Nature Conservation Act of 1969 (now 1995) that defined forest resources as state property. Within the provisions of this Act, definition of *Sokshing* took away the ownership rights of people over the *Sokshing* registered in their Thram (Dorji L, 2006).

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<sup>17</sup> Expropriation: Any act by which a government gains a greater income share than it was entitled to under the original contract with the foreign investor.

<sup>18</sup> African National Congress 2012. Maximising the Developmental Impact of the People's Mineral Assets: State Intervention in the Mineral Sector (SIMS). Policy Discussion Document, March 2012

- Land Act of Bhutan 1979 and 2007 that first emphasized the definition of *Sokshing* and later in 2007 ruled to delete *Sokshings* from people's land register.
- The Mines and Minerals Management Act (MMMA) of 1995 that states that '*all rights of ownership of minerals are vested exclusively in the Government whether occurring in private or government land*'
- The Constitution of the Kingdom of Bhutan under Article 1, Section 12 of the Constitution states that the '*Rights over mineral resources, rivers, lakes, and forests, shall rest with the state and are the properties of the state, which shall be regulated by law*'.

From the above, it is clear that the natural resources of the Kingdom including minerals have been nationalized and therefore are state property.

### **Agenda of Nationalization of Mines**

Bhutanese media raised number of issues about mining and quarrying activities in Bhutan. Apart from reports on environmental and social impacts of mining and quarrying, there was general public perception that the national wealth of mineral resources was exploited for the benefit of a few. This issue was introduced in the ninth session of the National Council (upper house of the Parliament) in June 2012. A proposal for conducting research on issues related to Mining was introduced by the Representative of Gasa Dzongkhag. While noting the increasing trend in mining activity owing to development needs, concerns were expressed over the non-compliance to environmental standards as reported by the NEC. In the absence of the Mineral Development Policy, the miners were deemed to have profited while the local inhabitants were victimized in facing the environmental problems.

A committee was identified and appointed to review the affects of mineral mining and extraction of the public resource by private parties within Bhutan. After thorough deliberation, the council entrusted the Natural Resource and Environment Committee to initiate the engagement of consultant to thoroughly review and research viability of taking over mining activities by the government from the private sector.

### **Viability of Nationalization of Mines and Quarries**

As discussed above, mineral resources of the country have been nationalized under constitutional provision. Issue of nationalization of mines and quarries may be irrelevant if it relates to mines and quarries in the future. Since minerals are state property, the government may manage them on its own if it deems appropriate.

However, in the context of mines and quarries currently operated by private sector, the issue of nationalization implies disabling operations of existing private enterprises that have been legitimized under mining lease agreement and undertaking of mining activity by the government. Considerations for nationalization should be made only in the context of a favorable cost-benefit analysis. The following points are essential to be considered:

- a. Compensation: Since the current mines and quarries were granted under a lease agreement, nationalization will entail compensation to the individuals or firms.
- b. Inefficiency of government bureaucracy: Governments are generally not effective or efficient in profit making. Bureaucratic processes in the government and the associated inefficiency may lead to higher cost of operation of mines and quarries. Further, government officials are equally vulnerable to corrupt practices that may ultimately make public benefit a question.
- c. Conflict of interest: The role of government is primarily to govern or regulate. In the context of government taking over of mines and quarries for its own engagement, the regulator becoming the operator is a case of 'conflict of interest'. This may lead to compromise on the socio-economic benefits and environmental standards.
- d. Inappropriate allocation of budget: Mining requires immense investment. Direct engagement of government in mining and quarrying may require prioritized allocation of national budget for mining activity, which in turn may mean lesser for other areas.

## CONCLUSIONS

Existing mines and quarries are not regulated and managed to optimize equitable public socio-economic benefits and lack environmental soundness. However, nationalization of mining activity is not a viable option.

The study concludes that:

1. The economic benefits of mining and quarrying activities are neither optimized in terms of national revenue nor equitable in terms of public ownership.
  - a. The current mechanism seem not to optimize national revenue from mining and quarrying in the context of:
    - i. Non-revision of royalty, mineral rent, license fee, and surface rent. Current rates were fixed as long back as 2006. (Annexure IV)
    - ii. Application of initial bid value over long term up to 15-30 years lease period.
    - iii. Continued exploitation of natural minerals allowed even under claimed loss and or nonpayment of Business Income Tax / Corporate Income Tax.
    - iv. No mechanism to ascertain mineral prices with that of existing national, regional and international markets.
    - v. Treating captive mines as part of other businesses under the same owner. In such a case, revenue from mines cannot be ascertained.
  - b. The current mechanism of licensing and operation of mines and quarries do not garner the envisaged optimal public benefit from mining sector. The observed benefits accruing to small section of the population emanates from

- the fact that mines and quarries are either individually owned or majority of the shares are held by few people.
2. While social benefits such as employment and CSR activities of mining and quarrying businesses accrue to local communities, there are tradeoffs in terms of pollution and associated decline in ecosystem services and agricultural production.
  3. Damages to the natural environment i.e., air, water and land are eminent. The compliance to environmental standards during and post operation of mines and quarries lag behind the standard requirements owing to:
    - a. The nature of activity and location in the fragile Himalayan mountain ecosystems. Mining and quarrying are essentially damaging to the environment. Certain restoration requirements are not practically applicable in the rugged terrains.
    - b. The lack of capacity of the mine/ quarry operators to adopt required environmental standards
    - c. The lack of human resources and institutional capacity on the part of regulatory bodies resulting in lax compliance monitoring.
    - d. The Environmental Restoration Bond does not appear to meet the intended restoration requirements because:
      - i. The ERB rate is not derived from rational assessment of restoration requirements of specific projects.
      - ii. Ground observations show the investment in restoration is negligible.
  4. There is neither adequate reasons nor sufficient global experiences to suggest nationalization as the best option to optimize socio-economic and environmental benefits from mining and quarrying activity in the country:
    - a. There is no evidence that taking over of private business by government is the best option to maximizing social, economic and environmental benefit to the public.
    - b. Bureaucratic government procedures and vulnerability of government officials to corruption may result in inefficiency and high cost.
    - c. Nationalization may result in conflict of interest whereby the rightful role of government as regulator may be undermined by taking up the role of implementer also.
    - d. The act of nationalization is generally associated with autocracy and may not represent liberal democracy that Bhutan has just embarked upon.
    - e. There are adequate opportunities to strengthen the current system to optimize equitable social, economic, and environmental benefits from mining and quarrying activities.

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## **Annexure**