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Original article

A study of the practices and processes and benefit sharing of limestone mining in the Banour-Shiva Mining Region in Himachal Pradesh, India

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ABSTRACT

Mining is essentially an important income generating activity in the developing countries of the world. This is beneficial for their social and economic development and thus developing countries place a great dependence on their exploitation of mineral resources. The focal points for discussion in this article are the process of limestone mining, growth trends in limestone production, allocation of royalties, benefit sharing between limestone miners and local communities. The article undertakes an income-expenditure analysis of limestone contractors and transporters and considers local environmental issues including land degradation, rehabilitation, and compensation problems connected with the mining process. This study has been carried out in the Banor-Shiva limestone mining region which is located in the Sirmaur District of Himachal Pradesh State in India. The study calculated compound annual growth rates and benefit sharing between the miners and local people, and made a calculation of transport costs based on the mining rules in force and the actual practice prevailing in the region. The overall compound annual growth rates for limestone production are 16.2%, 1.6 % and 3.9% and for royalties are 14.1%, 8.5%, and 7.8 5 respectively for the State, District, and Banor-Shiva mining region over the study period. However, these growth rates have continuously decelerated and even found to be negative between the periods following the National Mineral Policies Act of 1993 and 2008. There is a sizeable divergence between the benefits from limestone mining shared between the indigenous communities and limestone miners highlighting the poor land acquisition practices in the study area. The financial benefits awarded by the miners in 2016-17 to the local communities are 1.22% whereas miners have appropriated the lion's share with 81.37% of total limestone value. The revenue to the Government is 4.30% of market value of limestone. The transportation of limestone from quarry sites to the point of final sale is the largest cost factor in limestone miners' expenditure which is 10% of the total market value of limestone. Adverse impacts of limestone mining operations in the vicinity such as public health problems, change in land use and cropping patterns, water pollution, lack of rehabilitation of the abandoned mines and unjust division of limestone receipts are the main contentious issues in the study area which are affecting the production and process of limestone mining. These have been reflected in the declining growth rates in production and royalties accrued from limestone produce.

KEY WORDS: limestone production, royality, benefit-sharing, socio-economic issues

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1. Introduction

The exploitation of minerals is a major thrust of development strategies of all countries across the world. It is a source of employment, income, raw materials for the manufacturing sector, construction, agriculture, and energy industries. Minerals are amongst the most important natural resources that dictate the industrial and economic development of a country because they provide raw materials to the primary, secondary and tertiary sectors of the economy (PURI ET AL., 2019). Besides this, minerals also play an important role in capital investment in social and economic overheads, generation of multiple employment opportunities in the vicinity of mines and processing industries, fiscal revenues to the government and per capita income generation (LEI ET AL., 2013). The households

in the vicinity of the mineral quarries also receive income in the form of compensation, wages, and petty business and their standard of living is improved by the expectation that miners not only mitigate negative environmental impacts but also promote local development through revenue sharing. However, the lack of coherence between policies, laws, regulations, and other actions of the government undermines the environment, livelihood, people's rights, and the potential of the country to earn fiscal revenue from mining (UNDP, 2018). Such exploitation is not without a cost to the environmental damage, in the form of water pollution, land degradation and changing land use and cropping patterns. The mineral extraction process is largely accountable for the contamination of water bodies, landslides, health hazards and air pollution. The mineral extraction process contaminates water bodies and land in the surrounding areas is rendered barren and prone to increased erosion. The fertility and organic component of the soil is lost adversely affecting the agricultural activities, the primitive source of living for the people living in these areas. In the long term it may pose food insecurity problems in the affected regions (MENSAH ET AL., 2015). The open cast mining of limestone rocks and their excavation in the study area has a negative impact on the water properties. The transformation of land through mining elevates the total dissolved solids in water bodies and disrupts the water retention capacity of soil. Acid mine drainage continues even after rehabilitation (HERMANUS ET AL., 2015). The disruption of irrigation channels causes an increased risk of crop failure and the massive profit is the only inducing factor for limestone mining which is at the cost of the collapse of ecological balance and primitive village economy (BANDYOPADHYAY, 1985).

Undesirable changes in the land utilization pattern due to open cast mining are the most prominent environmental problem due to limestone quarrying in the mining region. The existing agricultural, pasture and forest land shrinks with the emergence of wasteland due to mining and there is a migration of the people out of the area in search of a livelihood (AREEPARAMPIL, 1996). The production and productivity of traditional crops such as ginger, paddy, chilies, wheat, potatoes and turmeric fall drastically due to the erosive impact of mining (GOVERNMENT OF INDIA, 1999). The problem is exacerbated without rehabilitation or reclamation of abandoned mines, in the study area, and poses serious threats to the livelihoods post closure of the mines.

A critical issue confronting miners and local communities is the compensation for loss of land rights through involuntary acquisition and thus revenue distribution between the stakeholders affecting limestone production. The indigenous people in India have been subject to constant unrest and protests due to the large scale exploitation of natural resources in their ownership on account of poor land acquisition practices following the liberalization of mineral sector which is in pursuance of the provisions of the National Mineral Policy Act, 1993 (SAHOO, 2015). There are also many people who depend on common property resources that might no longer be available and others whose livelihood will be compromised. The legal process requires faire process and just compensation by involving land owners in consultative discussion in order to understand their concerns and payment of mutually acceptable compensation rates and these are rarely undertaken (MAHALINGAM ET AL., 2011). There are often controversies between miners and communities that payment of compensation rests with mining companies negotiating with the expropriated (BUGRI ET AL., 2018).

Limestone, CaCO3, the focal point of this article, is a major mineral as defined in the "Mines and Minerals (Development and Regulation) Act, 1957", and is used as a raw material in the manufacturing industries, principally in the cement, iron and steel, glass and ceramic industries, and as a rectangular slab in lithography (SHARMA ET AL., no data). Whitening (chalk and precipitated limestone) is used as a filter in rubber, oil cloth, paint, cosmetic, tooth paste, shoe polish etc. (GOVERNMENT OF INDIA, 2013). In India, as of 01.04.2015, a total of 2015 leases covering an area of 1.56 lakh hectares having 203 225 million tones of total reserves (remaining reserves 186 889 MT) have been approved with largest in Tamil Nadu (209), Madhya Pradesh (117), Gujarat (105) and Telangna (29) (GOVERNMENT OF INDIA, no data). The district wise scenario of limestone in Himachal Pradesh State is depicted in Tables 1 and 2.

Out of 43 total leases approved up to 2016 in Himachal Pradesh State, 38 limestone leases, the largest in any District in Himachal Pradesh, have been sanctioned in District Sirmaur alone, and thus making the study area and the District of Sirmaur contentious both for the miners and local people. In this article, an attempt has been made to examine trends in the growth of limestone production and its associated royalties in the Sirmuar District of Himachal Pradesh. It examines benefit sharing from limestone mining, the business of limestone transporters and the

process of limestone mining in the Shiva-Banour mining region in Sirmaur District.

1.1. Data collection methods

Primary, as well as, secondary data have been used in this research. Secondary data pertaining to mineral reserves, limestone production, the rates of royalties, royalties accrued to the State and other levies imposed by the Government were obtained from the Geological Wing, Department of Industries, Government of Himachal Pradesh, various Mining Acts and Rules of Ministry of Mines, Government of India. In the study area, the data for limestone production and royalties accrued there of pertaining to four mining contractors were obtained from the Mining Officer, in the District of Sirmaur.

Primary data have been collected on the basis of purposive cum random sampling which was carried out in the four revenue villages of the Shiva-Rudana Patwar Circle. A list of households was prepared purposively who either leased out their land to quarrying or are being affected by mining operations or are receiving compensation for loss caused to their land and then a sample of 45 household was taken randomly. In addition, the transporters were also interviewed to learn about the business of transportation of minerals. The primary data that have been used in this article relate to compensation rates granted by the limestone miners to the indigenous people, human and machine costs in the extraction of limestone, average load carried by a truck (called full truck load), operating costs of transportation, market prices of limestone, and the salaries and wages of salaried workers and daily workers.

Table 1. District wise details of limestone reserves in Himachal Pradesh (in million tons) (Source: Geological Wing, Department of Industries, Government of Himachal Pradesh, India

District	Proved	Probable	Possible	Total
Bilaspur	370	150	500	1020
Chamba	400	850	100	1350
Kangra	10	20	10	40
Kullu	Neg.	Neg.	120	120
Mandi	500	20	600	1120
Sirmour	150	200	1200	1550
Shimla	Neg.	50	1600	1650
Solan	550	100	1000	1650
Lahaul & Spiti	Neg.	Neg.	1000	1000
Kinnaur	Neg.	Neg.	100	100
Total	1980	1390	6230	9600

Table 2. District wise area under limestone quarrying up to 2016 (Area in hectares) (Source: Geological Wing, Department of Industries, Government of Himachal Pradesh)

District	Working mines		Non working mines		Total mines	
	Number	Area	Number	Area	Number	Area
Sirmaur	18	296	20	180	38	476
Bilaspur	1	231	Neg.	Neg.	1	231
Solan	2	793	1	233	3	1026
Mandi	Neg.	Neg.	1	726	1	726
Total	21	1320	22	1139	43	2459

1.2. Practice, policies and process of limestone mining

The Indian Mineral Rules have defined the mining operations as being any operations undertaken for the purpose of wining any mineral (GOVERNMENT OF INDIA, 1957). The rules and legislation for the regulation of major minerals concessions in force in India are the Mines and Minerals (Development and Regulation) Act, 1957, the National Mineral Policy 1993, the National Mineral Policy 2008, National Mineral Exploration Trust Rules, 2015, Mines and Minerals (Contribution to District Mineral Foundation) Rules, 2015, and

Minerals (Other than Atomic and Hydrocarbons Energy Minerals) Concession (Amendment) Rules, 2016 (INDIAN BUREAU OF MINES, 2019). The State Government grants licenses to miners in compliance with these rules after submission of detailed mining plan which outlines the mineral to be extracted and consequential impacts and measures to mitigate them.

1.3. Description of study area

The study was carried out in the Banor-Shiva Mining region of the District of Sirmaur, in Himachal Pradesh State in India. The Banor-Shiva limestone mining region is one of the limestone mining areas in the District of Sirmaur in Himachal Pradesh which is at a distance of 33 km from Poanta Sahib on the Poanta Sahib-Rajpur-Nageta-Shiva-Banor link road in the Trans Giri region. The Banor- Shiva mining region is located between 77^0 43'20" and $77^044'39$" E longitude and $30^034'30$" and $30^035'7$" N latitude. The limestone quarries in this region are located in four revenue villages, namely: Bharli, Shiva-Rudana, Banor and Bag, and are all constituents of the Shiva-Rudana Patwar circle of Poanta Sahib Tehsil, District of Sirmaur, and Himachal Pradesh. The total reported areas, as per village papers of these four revenue villages, measures 1412 hectares. Since the mining methods, processes, altitude, topography, geology, and geography of the study area is akin to the other mining sections of the District under consideration, the results drawn from the study area are uniformly applicable to rest of the mining sections of the District and State.

In the study area, land leases of ten limestone mines covering an area of 60 hectares, have been sanctioned up to 2018 of which four mines during the reference year are in working mode and six mines are non-working temporarily for various reasons as outlined in this article. The location of the study area is depicted in Figure 1.

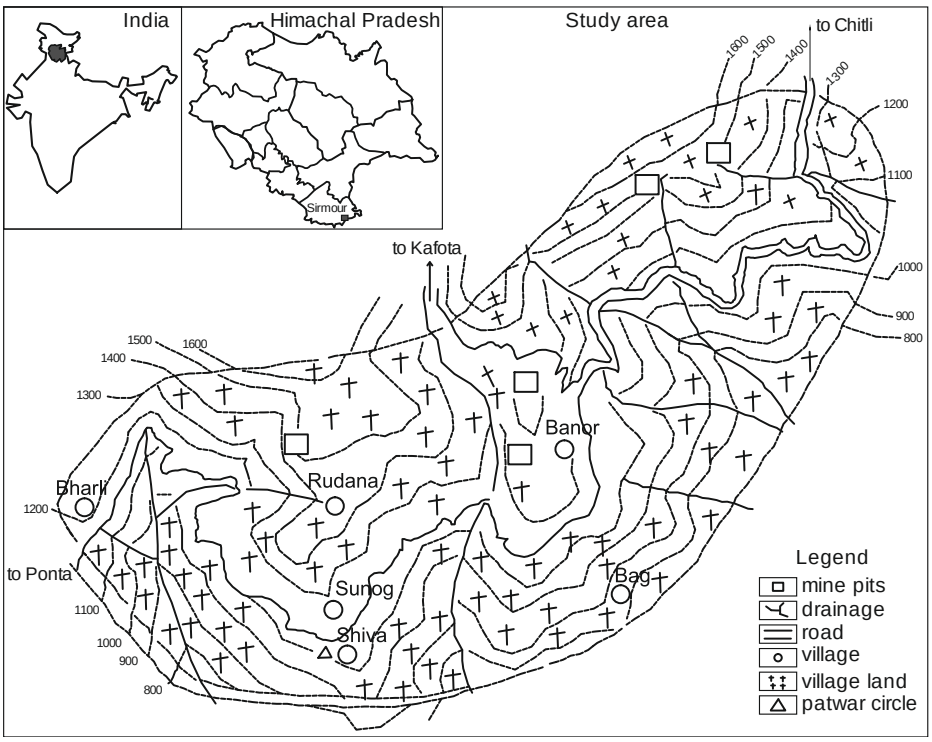

Fig. 1. Location of Banor-Shiva Micro Watershed

2. Research aims and methodology

This research work is centered on the following aims: 1) to study the trend in limestone production and resulting royalties accrued to the State; 2) to investigate benefit sharing from limestone receipts and income-expenditure analysis for limestone miners, and 3) to analyse income-expenditure for the limestone transporters. In order to fulfill the first aim, the compound annual growth rate has been calculated by fitting the exponential function of the formula given below.

$$\boldsymbol{Y = ab^t}$$

where: Y = variable for which compound annual growth is calculated i.e. limestone production in metric tons, royalties in crore rupees
b = 1+g and g is the compound annual growth rate
t = time variable in years
a = constant intercept

$$\beta_2 = \log_{10} b$$
$$ACGRg\ \% = \left[AL(\hat{\beta}_2) - 1\right] \times 100$$

The significance level of the regression coefficient 'b' has been tested by t- statistic as follows:

$$t = \frac{\hat{b}}{\sigma_{\hat{b}}}$$

where: $\hat{b}$ is the estimate of parameter 'b' and $\sigma_{\hat{b}}$ is the standard error of the parameter estimate $\hat{b}$.

In order to fulfill the second aim of this article, the various components evolved during the field inquiry and also from the mining officials have been outlined below and some idea about cost calculations for open cast limestone mines have been taken from previously published research work (HYSENI ET AL., 2012). The components involved are as under:

Compensation or financial benefits to land owners: The mine contractors award compensation to the local people for the loss caused to their land due to mine operations which has following two components: (i) Royalties on raw material which are paid to the local people at the rate of Rs. 0.50 per ton, and (ii) Regular Fixed Amount as compensation to the land owner which is negotiated between the miner and the individual whose land is leased out to the miner. The rates of such compensation vary between Rs. 20 to Rs. 35 per ton depending upon the quality of the mineral. Thus an average of Rs. 30 per ton regular fixed income from miner is earned by the local landowner. This fact of regular fixed amount has been supported by other studies in Kamrau limestone mining region in the District of Sirmaur, Himachal Pradesh (ENVIRONICS TRUST, no data).

The fees and levies to the Government: The various receipts obtained by the Government from the contractors are the royalties, tax collected at source, district mineral fund, national mineral fund, and dead rent which are imposed by the Government as per rules in force.

The salaried labour: These include work manager and supervisor at the mine sites and an accountant looking after the entire business and are being paid @ Rs. 15000/-, Rs. 10000/- and Rs. 35000/- per month.

Mechanized cost of extraction: This includes cost of a compressor used for drilling, JCB excavator and labour engaged in the machines and detonating the explosives. This amounts to Rs. 100/- per full truck load of 17 metric tons as revealed by the quarry workers. This cost is deducted from the payment for daily labour engaged in loading and grading of limestone at the quarry site. The contractors pay Rs. 28/- per ton to daily labourers for loading and grading and therefore daily labour cost of loading one full truck of 17 metric tons amounts Rs. 476/- and net daily labour cost after deducting Rs. 100/- per full truck is arrived at Rs. 376/- which is equal to Rs. 22/- per ton.

The explosive cost: This includes the cost of procuring material used in blasting. The materials used in the explosive are slurry explosive, ANFO (ammonium nitrate) with safety fuse and ordinary detonators. The cost of one blasts is Rs. 15/- and three detonators are needed to yield one ton of. limestone output as per response from mine manager.

Clearance of haul roads and mine pits: This includes expenditure for the clearance of mines roads connected to main road and mines pits after the monsoon season once a year and the estimated cost of Rs. 100000/- per mine is spent on such activities. There were four mines in operations during the reference year 2016-17 and thus this cost Rs. 400000/- in total.

Freight chargé: The per ton freight charge of Rs. 250/- has been taken by the transporters to carry the limestone from quarry site to the stock yard covering a distance of 52 km back and forth.

Total cost: In order to arrive at the minimum and maximum total cost from extraction to transportation, the various costs described above, except compensation, are added separately and to this minimum and maximum compensation awarded is added.

Market value of limestone: The sale price of limestone varies from Rs. 1000/- to Rs. 4000/- per ton depending upon the $CaCO_3$ content. The average sale price of limestone works out to be Rs. 2500 per ton.

The third aim regarding income-expenditure of the transporters in the study area has been analyzed in the following way:

Total transportation business during the year (T_b) = Total limestone lifted in metric tons during the year x average freight charge per metric ton

Number of full truck loads = Total limestone lifted in metric tons during the year divided by 17 metric tons limestone. One full truck load carries an average weight of 17 metric tons of limestone.

Total payment to drivers (P_d) = Number of full truck loads x Payment to driver in a single trip of one full truck load.

Operating cost (O_c) = Total number of full truck loads x Expenditure on wear and tear in a single trip. Operating cost includes expenditure on spares and the wear of parts, and normal wear and tear. It has worked out to be Rs. 3/-km and thus covering a distance of 52 km (to and fro), per trip operating cost happen to be Rs. 156/-.

Total fuel consumption = Fuel consumed in a single trip there and back x Number of full truck loads. Being a hilly mining area, Tata medium commercial vehicles (Tata SE1613) are used in the study area for transportation which have a mileage of 4-5 km per litre. Taking into account the minimum mileage, 13 litres of fuel are used in one trip covering 52 km.

Total fuel cost during the year (F_c) = Total fuel consumed x per litre average price of fuel. The average price of fuel has been taken for the National Capital for the years concerned.

Profit of transporters (P_t): $T_b - P_d - O_c - F_c$.

3. Results and discussion

3.1. Trends in limestone production

The data for limestone production is available for the period from 1983-86 to 2017-18. However, for the Banaur-Shiva mining region, the data is available only for the period 2008-09 to 2017-18. For calculation of CAGR, the entire period of 1982-83 to 2017-18 has been divided into three periods. Period 1 covers 1982-83 to 1992-93 prior to the liberalization of minerals. In pursuance of the economic reforms initiated by the Government of India in July 1993, the National Mineral Policy, 1993 was decreed to liberalize the mineral sector. The NMP 1993 aimed at encouraging the flow of private investment and introduction of state of the art technology in exploration and mining in addition to providing a level playing field for the private sector (GOVERNMENT OF INDIA, 2017). Period-II covers the time interval from 1993-94 to 2007-08 when in 2008, the National Mineral Policy 1993 was amended to further liberalize the mineral sector. It aimed at improving the regulatory environment to make it more conducive to investment and technology flow, transparency in the allocation of concessions, and to develop capital structure to invite risky investment into surveying and prospecting. Period-III covers the time gap from 2008-09 to 2017-18. The trend in limestone production is shown in Table 3 and it is evident that limestone production, in absolute figures over the years, has shown an increase.

Limestone production in Himachal Pradesh in 1983-86 was 692 145 metric tons and increased to 2 940 675 metric tons in 1993-96, to 7 270 081 metric tons in 2003-06, to 11 645 547 metric tons in 2013-16, and it was 12 600 148 metric tons in 2017-18. An increasing trend in absolute terms for District of Sirmaur has also been recorded over the same period except for the years 2013-16 and 2016-17.

In the study area, the limestone production increased from 204 933 metric tons in 2008-11 to 300 027 metric tons in 2013-16 and then decelerated to 228 633 and 212 712 metric tons in the years 2016-17 and 2017-18 respectively. The limestone production as stated in Table 4 has increased at annual compound growth rates of 10.2, 1.6 and 3.9% respectively in Himachal Pradesh, District of Sirmaur and the study area over the entire period.

However the pattern of annual compound annual growth rates in various the periods, as defined above, has turned out to be very differently as observed in the entire period. In Period 1 (Pre-Liberalization Period), the ACGRs for Himachal Pradesh and District of Sirmaur are 17.8 and 7.3% which are higher than the overall ACGRs. In the subsequent periods i.e. in Period II and Period III, the ACGRS have been continuously decreasing to 8.2 and 4.4% at the State level and negative growths to the tune of -0.2 and -0.3% for the District have been recorded. In the study area, the overall ACGR has remained less than the state average.

Table 3. Limestone production (in metric tons) (Source: Geological Wing, Department of Industries, Government of Himachal Pradesh)

Triennium average ending	Himachal Pradesh	Sirmaur District	Banour Mining Section
1983-86	692 145	558 844	N.A.
1993-96	2 940 675	1 106 530	N.A
2003-06	7 270 081	1 149 656	N.A.
2008-11	N.A.	N.A.	204 933
2013-16	11 645 547	892 802	399 927
2016-17	12 217 086	962 917	228 633
2017-18	12 600 148	1 249 974	212 712

N.A. - data not available

Table 4. Compound growth rates of limestone production (in percentage) (Source: Geological Wing, Department of Industries, Government of Himachal Pradesh and Mining Officer District Sirmaur)

Region	Period-I (1982-83 to 1992-93)	Period-II (1993-94 to 2007-08)	Period-III (2008-09 to 2017-18)	Over all (1982-83 to 2017-18)	β Value	t-Statistic
Himachal Pradesh	17.8	8.2	4.4	10.2	1.102*	170.228
Sirmaur District	7.3	-0.2	-0.3	1.6	1.016*	231.385
Banaur-Shiva Mining Section	N.A.	N.A.	3.9	3.9	1.039*	27.864

*Significant at 1% level of probability
N.A. - data not available

There are numerous factors responsible for the periodic decreasing trend noticed in the growth pattern of limestone production. It is evident from Table 2 that the largest number of mining leases has been approved in the District of Sirmaur, the State's major limestone belt. The limestone belt in Himachal Pradesh, geologically known as Krol Formation belt containing dolomite, shale and limestone reserves extends from Shimla, Solan, the middle portion of Sirmaur in Himachal Pradesh to Mussoorie, Dehradun, Rishikesh, Garhwal and Nainital in Uttrakhand State. The key factor for mining boom in Sirmaur District was the blanket ban imposed on the limestone mining in the Doon valley of Dehradun District, Uttrakhand in 1985. Upto early 1980's, there were only six limestone quarries in the Sirmour District. The ban on mining in Dehradoon in 1985, and the decontrol of cement marketing in 1986 boosted mining in the Sirmaur District which adjoins the Dehradun District of Uttrakhand State (GOVERNMENT OF INDIA, 1999).

The decrease in the ACGRs in the Post-Liberalization Periods can be accounted for by the several factors which have resulted in the temporary non-functioning of the limestone mines. There were 38 mines in the District of Sirmaur in 2017-18, of which 20 mines were temporarily not working. In the study area 6 out of 10 mines are not working. This miserable state of limestone mining in the post-liberalization periods has resulted in negative production growth rates in the Sirmaur District affecting production growth rates at the State level because Sirmaur is the major limestone producing district in Himachal Pradesh. Development in the limestone mining in Himachal Pradesh which was noticed in the post liberalization era is in contrast to the constitutional provisions enshrined in the National Policy 1993 and 2008 which were formulated in pursuance of economic reforms being infused into the mineral sector. It brings forth the failure of the National Mineral Policies and connected rules aimed at boosting the growth of mineral production through liberalization.

The principal reason for the malfunctioning of the limestone mines in the Sirmaur District and in the study area is the dispute between the contractors and the indigenous villagers which in some cases culminate in a court matter. The disputes are due to the adverse impacts of mining operations such as blasting, transportation of minerals through overhaul roads and the resultant environmental pollution. The consequential impacts on grazing land, farm land, cropping patterns, water sources, and livestock populations due to a lack of assured fodder supply have also been observed and as such were also revealed by the respondents. The environmental issues consequent upon limestone quarrying were raised belatedly by Kinkri Devi in 1987 in Sangrah-Bhootmari mining section of the District of Sirmaur through Writ Petition CMP No. 1344/90 in CWP No. 82/ of 1987 - Kinkri Devi and Others V/s State of Himachal Pradesh in H. P. High Court which brought all the mines in the ambit of case which was one of the country's most controversial environmental legal battles. The Honourable High Court of Himachal Pradesh in its judgment on 9th April, 1991 directed the State Government that an Expert Committee be constituted to study the whole issue. The Committee recommended the preparation of an Environmental Impact Assessment (EIA) report for each mining lease for environmental clearances (GOVERNMENT OF INDIA, 1999). The EIA is prepared to ensure that the adverse impacts are minimized if these cannot be prevented together. In 2017-18, nines mines were in-operative in Sirmaur District on account of EIA clearance.

The other important issue concerning mine owners is the disputes in awarding compensation to the land owners for the damage done to their land in any form due to mining operations from excavation to transportation. The minimal rates of compensation for damage to various types of land have been given in the MDMR Act, 1957 but

the actual compensation being paid by the contractors depends upon the bargaining power of the land owners whose land is being subjected to quarrying and excavation and compensation to land owners giving passage to the overhaul transportation of the limestone mineral. The compensation is also justifiable to those whose land is being indirectly impacted but such indirect costs are borne absolutely by the land owners. In some cases the rates of compensation demanded by the land owners are exorbitantly high as revealed by the contractor. The disputes regarding awarding compensation results are due the absence of any precise mechanism but are a combination of administrative methods within the framework of court rulings and orders (UPADHYAY, no data). There hardly exists any precise mechanism for the resolution of mining disputes between miners and local land owners. The fact that high rates of compensation might have been given is supported by field observations. These field observations have revealed that every household in the study area has a pucca house and has almost all modern household durables. Almost every household has a car, some others have more than one car and commercial vehicles, despite the observation that they are less employed in Government and private service and education profile of the study area is far less than the State average. The living standard of the villagers in the study area is better than the non-quarrying area residents. The traditional practice of the agricultural farming and livestock rearing is found to be very reduced as income patterns have shifted from agriculture to the mining operations. This suggests that every household gets a handsome income from the mining contractors.

The various factors that have emerged from the published sources and from the field survey which are hampering the operations of 20 mines in the Sirmaur District are the lack of EIA clearance, court matters, dependency of the renewal for want of consent of land owners, disputes between the parties and in the division of faire compensation, high rates of royalties, procedural complexities in approval of mining plans, poor land acquisition practices resulting in conflicts, and substantial cost burdens to the mining contractors. In the absence of a disputes resolution mechanism, the people either resort to forceful resistance which is often mitigated by criminal legal procedure by the miners against local people or local people peruse the matter in civil courts.

3.2. Trends in royalties

The trends and growth in royalties accrued to the State Government is depicted in Table 5 and Table 6. The trend and growth rates of royalties are linked with the limestone production and royalty rates, but there is a mismatch between limestone production and royalties accrued in a particular year due to rising royalties and the payment of royalties by mining contractors intermittently, either in advance or residual, in the subsequent year of production.

The royalty generated by the State Government has continuously increased from Rs. 96.08 crores in 2003-06 to Rs. 431.10 crores in 2013-16, whereas the royalty obtained from the District of Sirmaur has increased continuously up to the period 2008-11 from Rs. 0.7 crores in 1983-86 to Rs. 14.06 crores whereas for the study area, it has marginally increased from Rs. 2.83 crores in 2008-11 to Rs. 5.31 crores in 2013-16. A declining trend in royalties has been recorded for the years 2016-17 and 2017-18. However, the compound annual growth rates of royalty for State and District have been continuously falling in various periods (Table 6). The CAGR for State was 16.2% in Period 1 which has come down to 15.8% and 14.1% in Periods II & III. The District of Sirmaur recorded a 5.5% growth rate in Period I which turned into negative growth to the tune of 19% in Period III. An overall CAGR of 14.1%, 8.5% and 7.8% have been achieved for all the three regions over the entire period.

The base for the growth of royalties is the growth rate of limestone production (the later has been observed to have fallen continuously (Table 4), and thus falling growth rates for the collection of royalties for the Sate can be explained by falling growth rates for the production of limestone despite the fact that the royalty rates have increased massively over the years. The royalty rates were Rs. 4.50/-per ton in 1981, Rs. 10/- per ton in 1987, Rs. 25/- per ton in 1992, Rs. 32/-per ton in 1997, Rs. 40/- per ton in 2000, Rs. 45/- per ton in 2004, Rs. 63/- per ton 2009 and Rs. 80/- per ton w.e.f. from 01.09.2014. This shows the miserable situation of limestone mining in Himachal Pradesh.

Table 5. Trends in royalty (in rupees crores) (Source: Geological Wing, Department of Industries, Government of Himachal Pradesh and Mining Officer District Sirmaur)

Triennium average ending	Himachal Pradesh	Sirmaur District	Banour Mining Section
1983-86	N.A.	0.74	N.A.
1993-96	N.A.	9.29	N.A.
2003-06	96.08	16.72	N.A.
2008-11	210.86	24.03	2.83
2013-16	431.10	14.06	5.31
2016-17	168	1.97	1.67
2017-18	136.60	1.52	1.45

N.A. - data not available

Table 6. Compound growth rate of royalties (in percentage) (Source: Geological Wing, Department of Industries, Government of Himachal Pradesh and Mining Officer District Sirmaur)

Region	Period-I (1982-83 to 1992-93)	Period-II (1993-94 to 2007-08)	Period-III (2008-09 to 2017-18)	Over all (1982-83 to 2017-18)	β Value	t-Statistic
Himachal Pradesh	N.A.	16.2	15.8	14.1	1.141*	63.569
Sirmaur District	13.6	5.5	-19	8.5	1.085*	72.127
Banaur-Shiva Mining Section	N.A.	N.A.	7.8	7.8	1.078*	26.486

*Significant at 1 % level of probability
Note: Period –II for State covers the period from 2000-01 to 2007-08; N.A.- data not available

Table 7. Benefit sharing and income-expenditure pattern of the miners (2016-17) (Source: Primary data and secondary data obtained from Geological Wing, Department of Industries, Government of Himachal Pradesh and Mining Officer District Sirmaur and Various Mineral Rules of Government of India)

	Particulars	Rate per unit	Expenditure and returns (in Rs.)
1	Quantity of limestone extracted, area and number of miners	228633 metric tons, 16 hectares, 4 miners	
2	Royalty to land owners	Rs. 0.50 paisa per ton	114 317 (0.02)
3	Regular compensation to land owners	Rs. 30 per ton	6 858 990 (1.2)
4	Royalty to State	Rs. 80 per ton	18 290 640 (3.2)
5	Tax collected at source	2.06% of royalty	376 787 (0.06)
6	District Mineral Trust Fund	30% of royalty	5 487 192 (0.96)
7	National Mineral Trust Fund	2% of royalty	365 813 (0.06)
8	Dead rent every year	Rs. 2000 per hectare	32 000 (0.006)
9	Salary of permanent employees	Rs. 60000 per month	720 000 (0.13)
10	Mechanized extraction cost	Rs. 100 per full truck load	1 344 900 (0.24)
11	Explosive cost	Rs. 45 per ton	10 288 485 (1.8)
12	Clearance of haul road and preparation of pits	Rs. 100000 per mine	400 000 (0.086)
13	Daily labour cost	Rs. 22 per ton	5 029 926 (0.88)
14	Freight up to stock yard	Rs. 250 per ton	57 158 250 (10)
15	Total expenditure		106 467 300 (18.63)
16	Expenses per ton		466
17	Value of limestone	Rs. 2500 per ton	571 582 500
18	Total net returns (17-15)		465 115 200 (81.37)
19	Net returns per ton		2034

Note: Figures in parenthesis are percentage of limestone value

3.3. Benefit sharing and income-expenditure analysis for limestone miners

The operating costs of mines and the sharing of limestone produce valued at market price for the Banor-Shiva mining region have been assessed for the year 2016-17 and are based on both secondary and primary field observations (Table 7). There were four mines in operation in 2016-17 in the study area spread over an area of 16 hectares and total limestone extracted was 228 633 metric tons.

Table 7 indicates that the total limestone business done by four miners in the study area in value terms happens to be Rs. 57.15 crores at 2016-17 prices. Out of the total value of limestone generated, Rs. 69.73 lakhs have been awarded to the local communities in the form of royalties and regular fixed compensations which are 1.22% of total limestone value whereas the miners have been able to obtain a net profit of Rs. 46.51 crores which is 81.37% of limestone value during the reference year. This wide difference between compensation for local people and miner's profit shows the poor condition of indigenous people, with a major chunk of their income being taken away by the miners, and poor land acquisition practices prevail in the study area.

Despite the cost-benefit pattern of miners and benefit sharing, Table 7 also shows that employment, to the value of Rs. 57.50 lakhs, including salaried and daily wages, was created at the mine sites during 2016-17 and Rs. 2.46 crores (4.3%) have been earned by the Government in the form of royalties, tax collection, mineral funds and dead rent. The miners have spent 10% of the value of limestone on its transportation to the point of final sale which is the major cost component of miners. The total cost of operating limestone mines from extraction to the point of final sale happens to be Rs. 10.65 crores (18.63%).

3.4. Transportation business and income-expenditure analysis of the transporters

Mining is a profitable economic activity and diverse economic activities are generated during its operation. There is therefore a great deal of transportation business for limestone in the study area. Limestone is to be taken to the stock yard from the mine sites which is 26 km away. The transit of the mineral carrier vehicles in the Banuar mining section was observed on 4th April 2019 at the Rajpur mining check post. A total of 32 trucks carrying limestone that belonged to 24 transporters passed through the check post. Of these, four transporters were from outside the State. The income-expenditure pattern and resultant profit to the transporters is outlined in Table 8.

Table 8. Income-expenditure analysis for transportation of limestone in the study area (Source: Primary data and secondary data obtained from Geological Wing, Department of Industries, Government of Himachal Pradesh and Mining Officer District Sirmaur and Various Mineral Rules of Government of India)

	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018
Total limestone transported (in metric tons)	336034	341743	522004	228633	212712
Average freight charge per metric tons (in Rs.)	200	200	215	250	250
Total transportation business (in Rs.) (T_b)	67206800	68348600	112230860	57158250	53178000
Number of full truck loads	19767	20103	30706	13449	12512
Payment to driver per full truck load	350	350	400	450	450
Total payment to drivers (P_d)	6918450	7036050	12282400	6052050	5630400
Total fuel consumption (in liters)	256984	261339	399178	174837	162656
Price of fuel per litre (in Rs.)	48.63	55.48	49.71	48.33	67.38
Total fuel cost (F_c) (in Rs.)	12497132	14499088	1984314	8449872	10959761
Operating cost (O_c) = number of full truck loads x 156	3083652	3136068	4790136	2098044	1958172
Profit of the transporters (in Rs.) (P_t=T_b - P_d - F_e − O_c)	44707566	43677394	93174010	40558284	34629667

During the years 2013-14, 2014-15, 2015-16, 2016-17, and 2017-18, 336 034, 341 743, 522 004, 228 633, and 2 122 712 metric tons of limestone was transported in the study area through 19 767, 20 103, 30 706, 13 449, and 12 512 full truck load trips. This has created employment for the truck drivers to the tune of Rs. 69.18 lacs, Rs. 70.36 lacs, Rs. 1.23 crore, Rs. 6.05 lacs and Rs. 5.63 lacs respectively during study years (Table 8) whereas Rs. 30.84 lacs, Rs. 31.36 lacs, Rs. 47.90 lacs, Rs. 20.98 lacs, and Rs. 19.58 lacs of business in respect of repair and maintenance of carrier vehicles considered as operating costs have been created in the respective years. After deducting all expenses from the total value of the transportation business, Rs. 4.47 cr (66.52%), Rs. 4.37 cr (63.90%), Rs. 9.32 cr (83%), Rs. 4.06 cr (70.95%), and Rs. 3.46 cr (65%) a net profit of the total transportation business to the limestone transporters have been generated during the study years.

4. Conclusion and suggestions

Several findings have emerged from the discussions of this research which need to be addressed and which are of paramount importance for all the stakeholders. A decelerating trend in the growth rates of limestone production and royalties in contradiction with the main provisions of the National Mineral Policies has emerged for the entire study period. This has been due to the temporary hampering of mining operations on account of poor land acquisition practices, inappropriate distribution of compensation, and the undesirable impact on the land resulting in conflicts and disputes between indigenous people and mine contractors. There must be a mechanism for awarding compensation for local communities from mineral extraction. The local people have surface rights for the land and therefore land acquisition for quarrying must be in accordance with the "The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013" as the land use and cropping pattern is transformed consequent upon quarrying posing serious threats to livelihood in the long term for the local people. Land after the closure of mines becomes unsustainable and cannot be utilized further except at an exorbitant cost which cannot be borne by the local residents. The compensation rate which is the main contentious issue must be faire enough to compensate the local people for the damage being caused to their land i.e. compensation must be above the cost of post closure rehabilitation and reclamation of the abandoned land and should include a share in economic rents and project benefits which is lacking in the study area.

In order to enhance the growth of limestone production and royalty accrued to the State, there must be an alternative dispute resolution mechanism and the royalty regime has to be shifted from a specific basis to an *ad valorem* basis as a wide variation in the price of limestone has been observed from the price of limestone as recorded by the Ministry of Mines, Government of India. The actual market price of limestone being received by the miners is very high whereas the royalties to the Government and compensation to the local people are awarded on the basis of the physical output of limestone. This has resulted in a sizeable amount of limestone proceeds in value terms being mis-appropriated by the mines contractors and thus causing loss of compensation to local people and royalties to the State. The administrative formalities at the Government level in sanctioning limestone leases have also to be minimized in order to facilitate the limestone miners. Devices such as CCTVs and electronic weigh scales must be installed at the mine check posts to eradicate any possibility of illegal mining. For the benefit of entire community in the vicinity of these mines, the mine contractors must be persuaded to create community infrastructures such as community centers, public hospitals, schools, water supplies etc. to the greatest extent possible.

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