American Journal of
Agriculture
(AJA)

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American Journal of Agriculture
ISSN 2790-5756 (online)
Vol.3, Issue 1, pp 42 - 54, 2021

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Abstract

Purpose: Stone as a natural resource has always been highly recognized as an income generating activity worldwide. The study on the contribution of natural resource exploitation of stone, impact on livelihood and rural development was conducted in the West Region of Cameroon with the used of purposive random sampling technique.

Methodology: The target population for this study were the inhabitants around the quarries involved in the mining and the farmers' activities. From the number of workers, the researchers chose a sample size of 400 miners assuming that the miners in the West region are more than 100000 distributed within four divisions. The study used both primary and secondary data sources. The methods used for the study were interviews, focus group discussions sources, documents analysis and participatory observations. SPSS version 22 and Microsoft Excel were used to analyse data.

Finding: Results indicated that 41.61% were artisanal miners while 31.88% were industrial miners. More so, results further revealed that 76.66% were quarry operators and 33.34% were farmers.

Unique contribution to theory and practice: The study therefore recommends that the state through the local authorities such as the council could improve on the livelihood of these inhabitants by assisting and respecting their limit areas of stone exploitation, also compensate the villagers whose lands are being exploited especially moderately, upon what they request as terms of compensation not what they offer to them as gift.

Key words: *Mining, Quarry, Farmers, Stone Exploitation, Inhabitants, Natural Resource, Rural Development.*

1. Introduction

According to the Centre for Distance Education (CDE) (1998), natural resource of stone is a source of wealth to the world for it plays an enormous role in providing rock and stone materials for commercial and industrial use like in the Carrara, Italy, Portland England, Paros and Pentellic quarries in Greece. When the resources are prudently extracted and environmentally protected against other alternative disasters. Natural resource exploitation of stone is a gate way for intensive development in a country's economy as a source of revenue, a source of wealth, more especially to be felt by those living prominent to sources surely, to improve measure of living standards in the respective constituencies via the mines. A house hold expenditure will increase by 2% while output of the constituency increase by 40%. Natural resources that are illegally carried out often are times become very costly. Those who exploit these stone care very little about the future consequences of the inhabitants and consequently the need for environmental protection, as they leave after extraction of the stones for whatever purpose they deem in the world. "If the endogenous potentials of rural regions are to be properly developed, local initiatives must be stimulated and mobilized.

Rural development according to Kim (2005) is the process of improving the quality of life and wellbeing of the people living in the rural areas, often relatively isolated and sparsely populated areas, education, entrepreneurship, physical infrastructure, and social infrastructure which all play an important role in rural development. Tovey (2006) reported that rural development economy can create wealth for themselves as declining agriculture create space for consumption of the country side converting agricultural lands into recreational facilities, nature reserves areas for sub urbanization or site for factories.

Walser (2002), further report that mining plays a vital role in the economic development of many countries, to improve the environment and innovation of the country side, through support for land management to improve quality of life in rural areas and encouraging diversification of economic activities. It has been observed in many studies that indiscriminate mining of stone leads to severe damages to the environment. However stone mining is critical to infrastructural development around the globe, because it is used in the manufacture of abrasives, concrete, cement and most buildings, road repairs and roads construction. Sustainability is therefore the ability to be maintained at a certain rate or level. The sustainability of economic growth, avoidance of the depletion of natural resources in order to maintain an ecological balance, the pursuit of global environmental sustainability being environment, economics and social life.

A livelihood is sustainable when it can cope with or recover from stresses and shocks and maintain or enhance its capabilities and assets both now and in the future. Livelihood move along with food security which rest on four pillars: Availability of diverse and nutritious foods, physical, economic and social access to nutritious foods, adequate utilization of food items consumed to maintain a healthy nutritional well-being. To sustain livelihood requires more

income, increase wellbeing, reduce vulnerability, improve food security, more sustainable use of the natural resource base, and recovered human dignity (Jiao, 2017).

According to the Butlin (1989) the UN report on the world commission on environment and development, sustainable development meets the needs of the present without compromising the wellbeing of the future generations. This phenomenon has brought in the mind of the researcher the need to verify and find out if other lucrative activities from the natural resources like stone quarrying can be exploited out in this area sustainably to improve upon the livelihood of the people. Stone mining is critical to infrastructural development around the globe. World Bank *et al* (1997) on the other hand reported that sustainable rural development can make a powerful contribution to four critical goals of poverty reduction, wider shared growth, household, national, global food security and sustainable national natural resources management.

In cultural tourism some gain employment by having a unique qualification by "locally tied economic achievements such as the ability to speak a local language, in-depth knowledge to act as guards and local craft skills. The ways through which the local community can be involved, in developmental activities that can fetch money and improve on the livelihood of the local inhabitants which is very pertinent to this area is involving in the mining and farming activities. However this study aimed at finding the contribution of the natural resource exploitation on the livelihood of the inhabitants and its impact on rural development in the west region of Cameroon.

2. Literature Review and conceptual framework

In this study literature was reviewed in areas of mining, quarrying, farming, sustainability, development. Meanwhile on the conceptual framework**,** this study examines the innovation decision theory by Rogers and the Social cognitive theory (SCT) by Bandura. According to Sahin (2006), the Rogers's innovation decision theory states that diffusion is a process that occurs over time and can be seen as having fine distinct stages. These stages in the process are knowledge, persuasion, decision, implementation, and confirmation. Countries have moral commitments to future generations to conserve the existing diversity. According to this theory, potential adopters of an innovation must learn about the innovation, be persuaded as to the merits of the innovation, decide to adopt, implement the innovation, and confirm (reaffirm or reject) the decision to adopt the innovation.

According to Bandura, (1986) who states that learning occurs in a social context with a dynamic and reciprocal interaction of the person, environment ,and behaviour .The unique feature of SCT is the emphasis on social influence and its end its emphasis on external and internal social reinforcement. Here being a new idea that has to be introduced to the people on how to go ahead with other businesses using the natural resources (stone) at their reach which they never knew or thought of have to undergo this education using the social cognitive theory of Bandura, Considering the fact that the SCT is psychology, educative and communication holds that protection of an individual's knowledge acquisition can be directly related to observing others within the context of social interactions, experiences, and outsides media.

3. Methodology and data collection

The study was conducted in the west region of Cameroon. The West Region occupies 14000km^2 of the territory located with the Central western portion of the Republic of Cameroon. It borders the North West Region to the North West, the Adamawa Region to the North East, the Littoral region to the South west, and the South West region to the West. The West region is the smallest of Cameroons ten regions in area, yet it has the highest population density coordinates, 5`30`N 10`30E. The head quarter is Bafoussam with eight (8) divisions namely the Bamboutos, Haut Nkam, Haut Plateaux, Koun-Khi, Menoua, Mifi, Nde and Noun. The population as of census conducted in 2015 was 1921590 inhabitants. The region apart from food crop production which is highly carried in the region both at local and industrial levels, the people are blessed with diversified activities like trading business and natural resource (stone) exploitation in the various divisions of the West region both industrial, public and artisanal exploitation of the natural resource.

The target population for this study were the inhabitants around the quarries involved in the mining and farming activities and from the number of workers and farmers around the quarries we got our sample size of four hundred (400) assuming that the miners in the West region are more than 100000 distributed within 4 (four) divisions. Table 1 shows the various divisions, subdivision, villages and number of respondents.

Table 1: Distribution of respondents according to division, sub-divisions, and villages

Division	**Sub Division**	**Village**	**Respondents**
MIFI	Bamoungoum	Tchouo, Tchipou, Lafi 1 and 2	100
Khong-Khi	Bandjoun	Pete, Tesse	100
Bamboutos	Mbouda	Bantane	100
Menoua	Dschang	Foreke, Chualle	100
Total			**400**

American Journal of Agriculture
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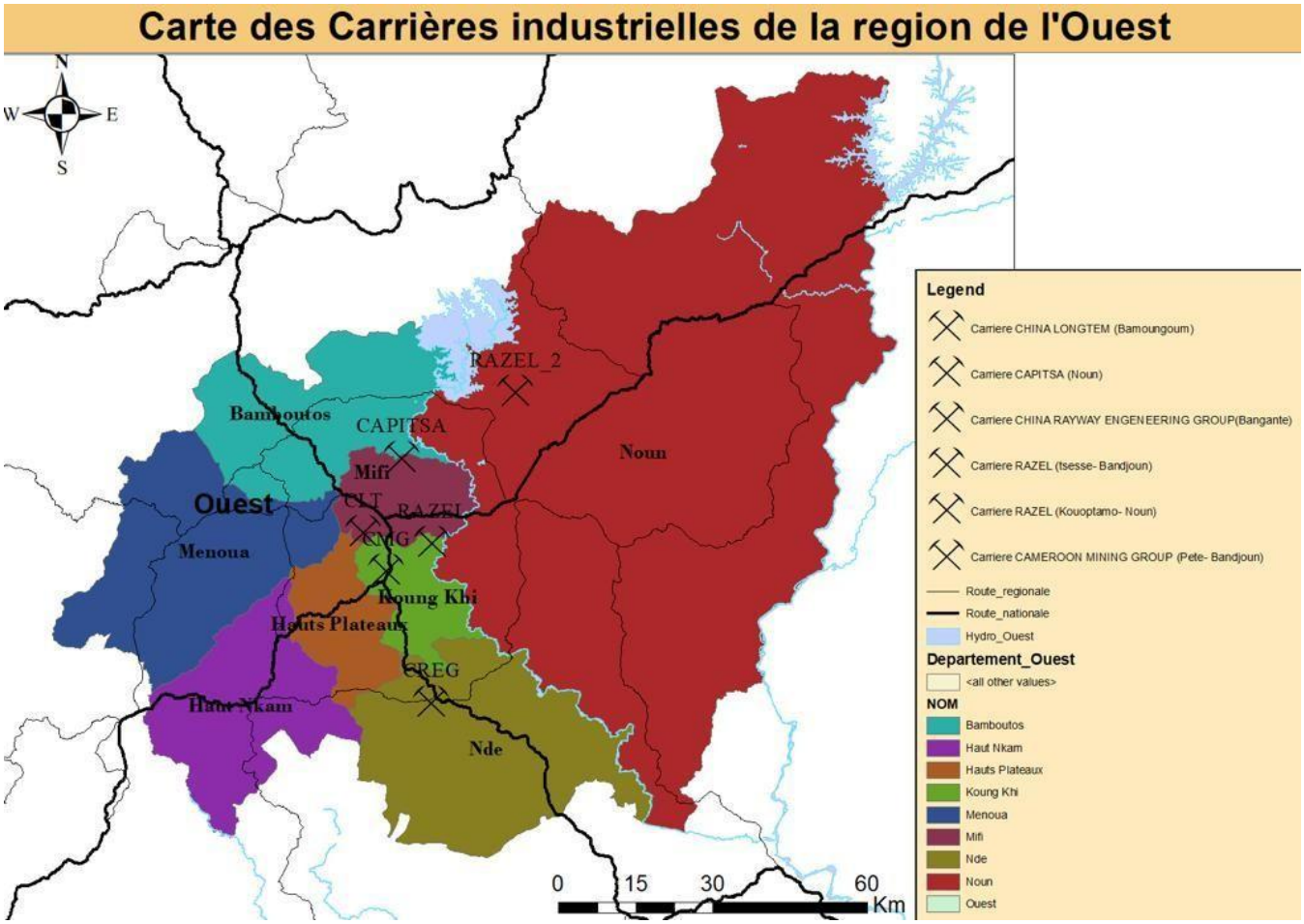
Source: Field survey 2020



Map 1: Map of the study area involved with stone quarry

Source: Ministry of Mines, Power and Energy, West Region of Cameroon.

Primary and secondary data were used for this study. The primary data was collected from all key actors with the use of interview guides, focus group discussions, and participatory observation to collect qualitative data concerning natural resource of stone exploitation.

Meanwhile, secondary sources of information were gotten from journals, internet articles, newspapers, documented materials, text books past thesis and dissertations related to mining and quarry management. A purposive sampling technique was used to select four divisions known for its mining and quarry activities (Bamboutus, Koun-Khi, Menoua Mifi,). Approximately 100 actors were randomly selected from each division using a purposive random sampling technique, making a total number of 400 actors. Descriptive statistical methods of data analyses were employed with the use of Statistical Package for Social Science (SPSS), and Microsoft Excel, and the analysed results were presented using descriptive methods, pie charts, histograms and tables.

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4. Results and discussions

From the study conducted on the contribution of natural resource exploitation of stone, and impact on livelihood and rural development in the west region of Cameroon, results revealed that stone operation activities are exploited by both the industrial and artisanal operators and are mostly for commercial purpose. The villages concerned with the activities are as shown in figure 1.

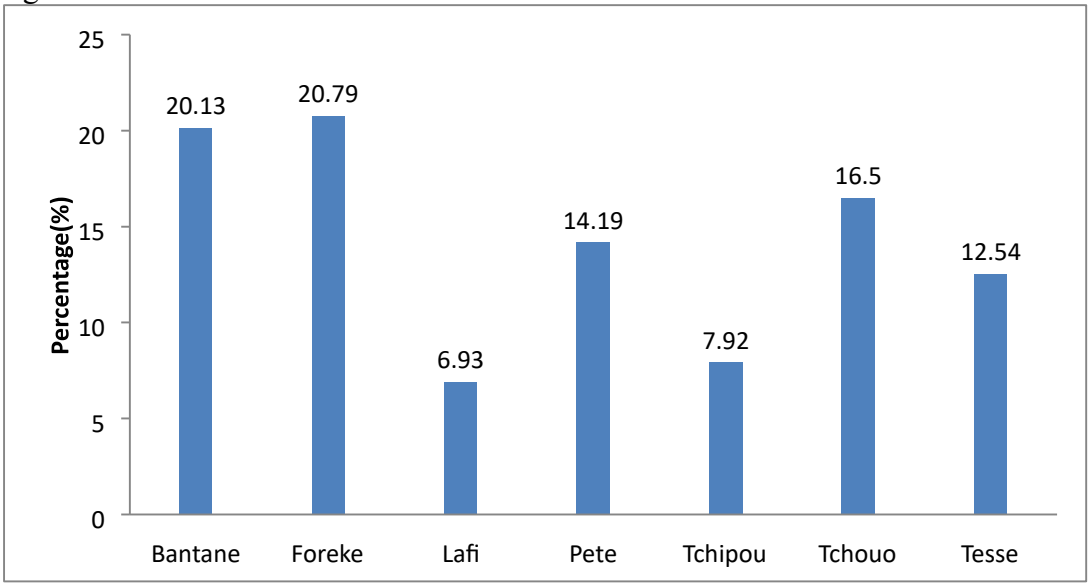

Figure 1: Villages concerned with surveyed of stone exploitation

Following figure 1, it was seen that stone mining is a very lucrative income generating activity in the West region especially in Foreke Menoua division where the highest artisanal stone quarry is found with 20.79% stone exploiters, Bantane in the **B**amboutos Mbouda with 20.13% where both the artisanal mining and industrial mining is being carried out. In Bamougoum sub division both industrial and artisanal natural resource exploitation of stone is being carried out in the villages of Tchouou with 16.5%, Tchipou recorded 7.92%, Lafi with 6.93%. In Bandjoun results indicated that both the industrial and the artisanal quarry in Pete had other artisanal quarry, industrial quarry making a 14.19% while Tesse has an industrial quarry with 12.54%.of the population involved in the quarry and villages concern.

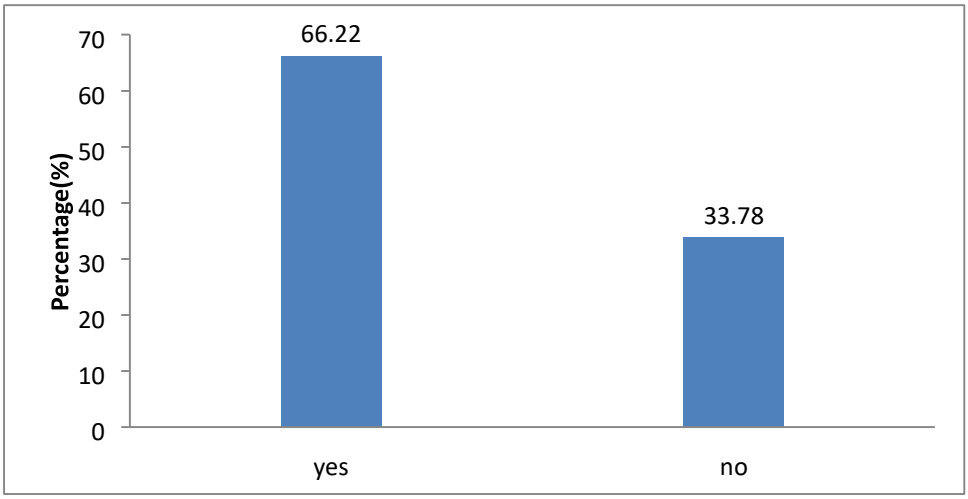

Figure 2: **Sustainability of livelihood through stone quarrying**

Most of the villagers are highly involved in the artisanal exploitation of the natural resource of stone in the area they asserted that they can sustain their family livelihood through the exploitation of this natural resource of stone. The rate of stone production has risen according to 66.22% respondents .These percentage of the inhabitants asserted that they can sustain their family livelihood through the production of natural resource exploitation of stone even though they are artisanal miners of this N.R. approximately 33.78% declared it was just part time for them because it cannot sustain their families. They cultivate food crop which they sell part and eat part but yet can hardly meet up with high demands from family. According to World Bank (2019), natural and locally available resources are properly utilized to increase both availability and options of livelihood throughout the year while conserving these natural resources through enhancement of their quality and quantity. At first one company Razel invested in this area of Foreke where the artisanal quarry operators were laid out from the field of stone exploitation but when the company left five years of exploitation, they came back and continue to ”testifying that they can sustained their families with stone business at the quarry and will never let go again”. They will prefer to pay the taxes directly to the government as they have been doing for the past years now through the council.

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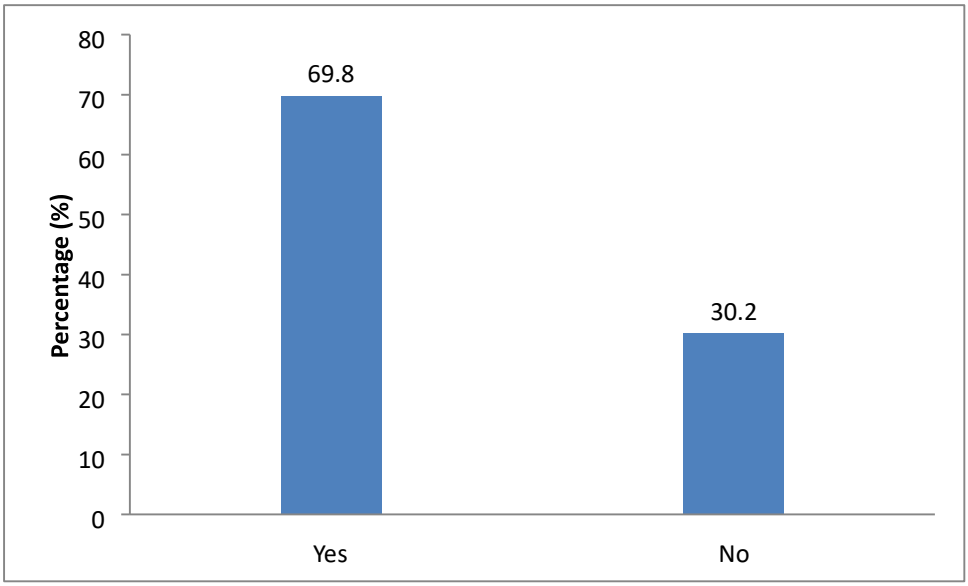

Figure 3: Improvement of rural development through stone exploitation.

The objective here was to present the rate at which developmental activities were progressing as a result of stone quarry and stone availability in the west region more especially with the introduction of high technology by industries. Rural development in the west region is positively being carried on following the results approximately 69.8% of the respondents asserted that rural development activities have drastically improved, while 30.2% says no that developmental improvements have not been progressively felt. The state, the council, the delegation of mines, taxation and the artisanal stone exploiters, the village heads are those who are highly concerned with the village quarry. Taxation is where all the dues for exploitation of the natural resource are deposited and from there transferred to the various destinations for developmental purposes.

Legal exploiters of natural resource of stone and procedure in the west region of Cameroon

The recognized and official exploiters in the name of, China Longteng Sarl and RAZAL companies officially exploits and sale the product of "STONE" (*aggregate de tourgenre*). This China Longteng Sarl started its activity in May 2015 through an authorization for exploitation of stone in Tchipou, Tchouo and Lafi 1 and 11 villages in Bamougoum sub division of Bafoussam 11 in MIFI Division of the West Region of Cameroon by decision No 00929/MNMIDT/ SG/DM/SDCM of 05 march 2015 delivered by His Excellency. The Minister of Mines, after all necessary requirements had been fulfilled. In the year 2017 the society put in place a strategy to satisfy those whose land are being used, the company employed two drivers and eight other workers at different levels like security guards, translator, cleaners, who are sons and daughters from this villages (inhabitants) train them and they are drivers for the company, they were also trained on the use of explosive and 'detonates' for stone exploitation.

All these were carried out under the supervision of the competent service of mines the quarter heads of the village whose job were also to sensitizes the population on the date and time of the explosive introduction under the supervision of the regional chief of service for mines,

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assisted by the divisional delegate of mine, MIDT, MIFI and the Brigade chief of service for the Region in charge of control of the mines and also in charge of the explosives and 'detonates'. The society takes all the necessary security measures in collaboration with the technical service and gendarmes to minimize any possible risk and subsequent accident. They have planted pole and barb wire around their areas of operation to avoid any incident of trespass and accident. A foot path of ten to twelve meters was cleared for pedestrians. Like any other profession, risk prevention can never be completely ignored considering the fact that these enterprises are situated around the indigenes where there are lots of inconvenience that follows developmental livelihood improvement.

Rate of stone production and food crop production in the area

The natural resource of stone carry out in this region continue to grow high by 76% while 34% rate for farming activity in the areas concerned. Some of the stone exploiters carry out food crop production alongside. The inhabitants had proven that they carry on food crop and stone quarry to be able to break even of their daily family responsibilities, like the education of their children, health, feeding can be taken care of if the two possibilities are carried on. The artisanal stone operator especially in Foreke and Pete asserted that they will not want the industrial operator or companies to operate on their quarry saying that when they come they will be forced to leave and this will destabilize their family livelihood and other provisions will not be taken care of sustainably. They prefer to operate as artisanal miners at their quarries. Livelihood can be 67% sustainable if their quarry is allowed to them and being supported with local tools like harmer, gloves eye glasses, shades, boats.

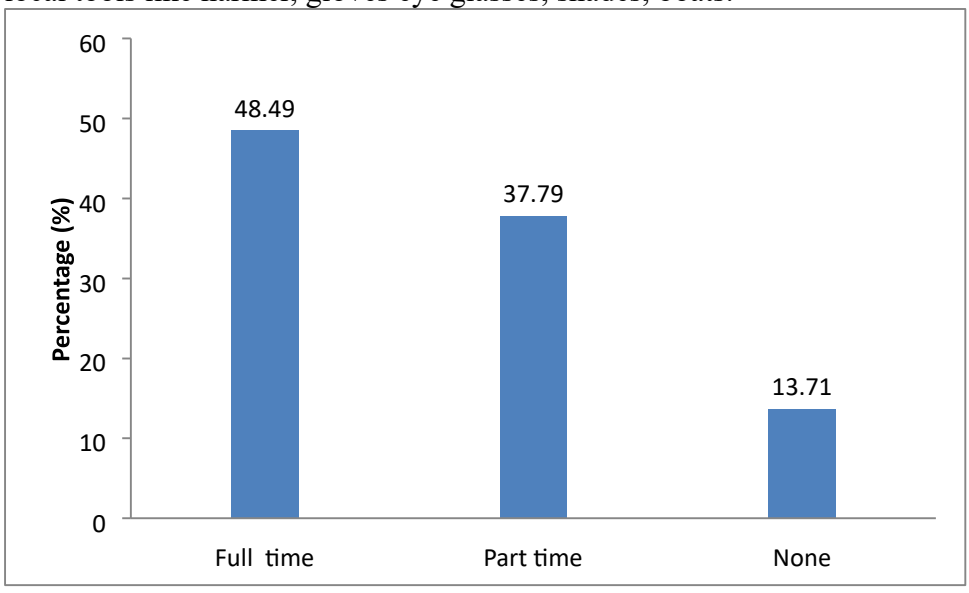

Figure 4: The main categories of stone exploiters and farmers of the region

Approximately 48.49% of the inhabitants as shown in figure 4 identified themselves as full time workers at the quarry. Approximately 37.79% are part time occupants at the quarry and most of these part time workers are involved in food crop farming and carry out food crop production in fertile lands of Santchou. The full time workers sustain their family livelihood by working in the quarry year in year out. Children conveniently attain school, feed well, cloth

well and leave in moderate houses. It was realized that most of these inhabitants who work as full time workers in the quarry were those whose parents got hold of the land and successfully pass it on from one generation to the other. In this wise they give part as rents to strangers, from other villages or same village. The inhabitants are self-employed at the quarry and solve their family problem and even carry on the quarry activities as full time business unlike in Mbouda and Bandjoun where the industrial exploiters are highly involved in the business than the artisanal operators. The indigenes have divided the quarry and each family knows their limit. 13.71% of these inhabitants in these villages know nothing concerning the quarry. This is because their houses were constructed totally with mud bricks from foundation to roofing point and they are total food crop farmers and petit traders. Their roads are not tar so they know nothing about the use of the stones and where they are taking the stones to. Ottman *et al* (2006), reported that most crucially, people need to know fully the development process and how they fit in, and this "diverse modes of learning, interpretation, and creative solutions are required. As part of development strategy this inhabitants as citizens will need to be clarified in the environment, an uncertainty reduction through a door to door communication to ensure that developmental information and decisions on how to increase their income, the marketing of their produce, important decisions to be taken with regards to employment, education, health should be a point of communication to the inhabitants. In this respect the promotion of community radio stations is needed.

For women, 37.79% are part time occupants at the quarry and most of these part time workers are involved in food crop farming and carry out food crop production in fertile lands of Sanchou. Some of them rear pigs and cultivate food crops some business men and women who still carry out stone quarry depending on their programs. Most of them asserted that the stone quarry is a source of quick money to reinforce their other businesses investments since they have a readymade supply of stones to the public who come to the site on daily bases to load their trucks for construction work. Some of the part time workers are university students who come there during the weekends and work on the quarry to have money for their rents and feeding with no stress because the trucks are ever ready to collect stones or gravel.

Approximately 62% of the inhabitants are farmers with their farms near quarry where they suffer from Noise, dust, land slide, Erosion, which affects their crops. The dust from the quarry settles on the leaves of crops especially on plantain, potatoes, Coco yams leaves and destroys them. During bomb blasting the soil gets loose and is easily eroded. The farmers often complain of poor harvest CED,(1988) said if the endogenous potentials of rural regions is to be properly developed, local initiatives must be stimulated and mobilized "Local partners have to be involved in the future building of their areas"

Stone productivity

There has been a drastic increase in the rate of stone production in the area due to high increase in the construction of houses, roads, and bridges in the west region of Cameroon. The forth coming world cup tournament that is going to be hosted partly in this region, has also contributed to the high demand for stones, making a 66% increase rate of this natural resource of stones exploitation. Dennis al Ecosoc (2003), reported that all countries foster development programs claiming there are designed to support sustainable livelihoods. Tschiilery *et al, (*2015), land and near landless households everywhere depend heavily on non-farm income for

their survival .The rate of stone production has risen as the inhabitants of Foreke asserted they can sustain their family livelihood through the production of natural resource exploitation of stone even though they are artisanal miners of this N.R about 66% of the artisanal of NR of stone stood for livelihood sustainability while 34% said they cannot live on stone quarry alone. Those who relied on the quarry alone were the early settlers who own the quarry and take much money from the quarry and even hire labourers who work for them at the quarry. Those who have little or nothing to do with the quarry are many 54% made up of those who are farmers and also business men and women.

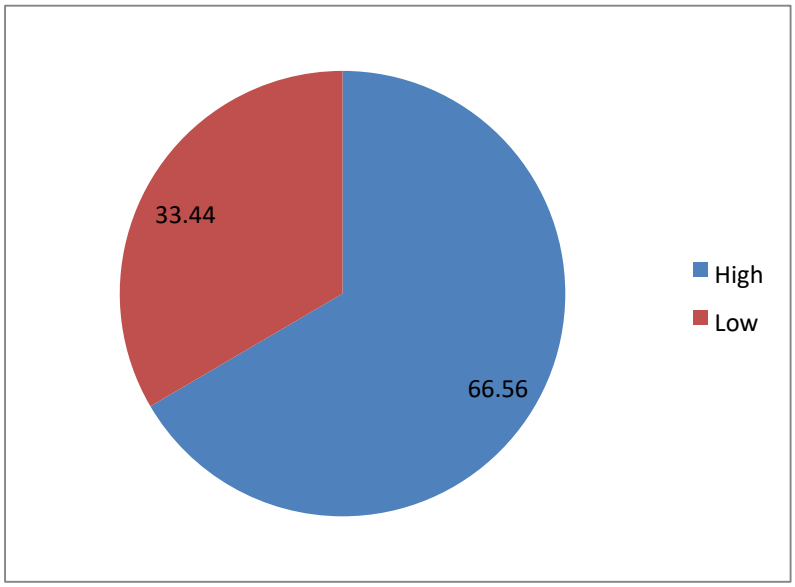

Figure 5: Productivity rate of stone production in the quarry

The high demand for stone for the construction of roads, buildings of the stadia and bridges in the region have actually provoked the high exploitation of this natural resource. Be it by the industrial commercial exploiter or the artisanal all boils down to high demand. From figure 5 it seen that 66.56% declares that stone production in the region has actually increased due to high demand for stones for the construction of roads, bridges, houses due also to the high population increase in the region especially with the preparation for African cup that is hosted by Cameroon and Bafoussam happens to be one of the hosting or sports ground.

(CAN) where stadia's are constructed while 33.44% said the rate of stone production has reduce. This is due to the fact that those in the suburbs can hardly appreciate what is going on in the cities in terms of development. It can be due to the fact that the artisanal stone exploiters leave for other seasonal jobs or when they are replaced by industrial exploiters who automatically reduce manual force with machines, the local inhabitants sees this like a weakness in stone production in the villages Dennis (2003). All countries foster development programs claiming there are designed to support sustainable livelihoods. Tschiilery *et al* (2015), Land and near landless households everywhere depend heavily on non-farm income for their survival. Despite all the odds some of these farmers supplement food crop production through part time stone quarrying. The break the stones to produce gravel which they sell using buckets and wheel barrow and transport the gravel to trucks for payment.

Critical costing of manual natural resource of stone crushing in the area

A bucket of gravel cost 200 francs One

wheel barrow cost 800 francs.

1 ton cost 200000 francs

50 tons is exploited per day

50 ton times 7 days, (a week)

Therefore, 350 ton =350 x 200000= 70.000000 a week.

Frame work management scheme for sustainable exploitation of natural resource.

The aim of presenting the stone exploiters is to enable us understand the rate at which these product is exploited alongside food crop production for the improvement of the livelihood

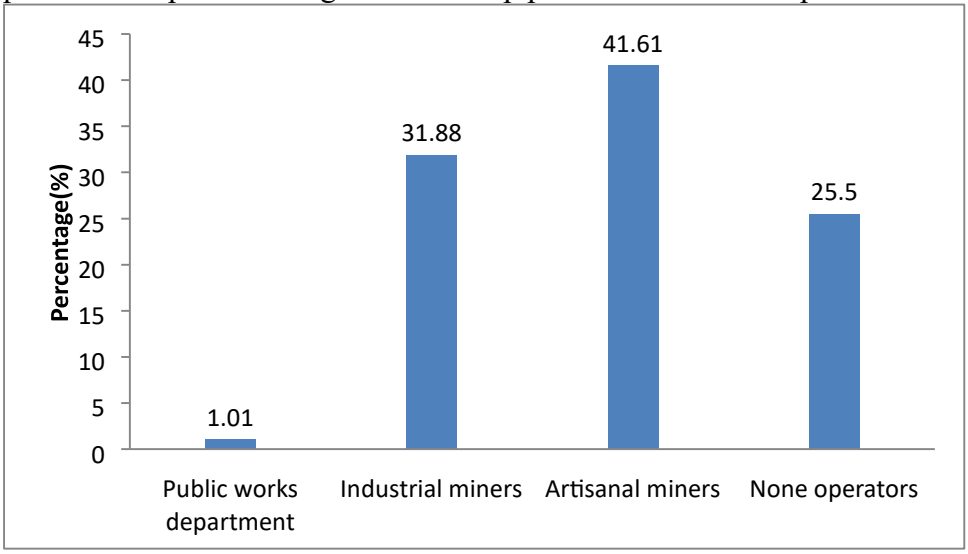

Figure 6: Frame work management scheme for sustainable exploitation of natural resource.

From figure 6, it was noticed that 1.01% of the quarry is being exploited by the public works department for road, bridges and culverts maintenance in the region since it is the state base exploiter. They use any quarry of choice to carry out these projects. Approximately 31.88% is made up of industrial quarry operators, 41.61% are artisanal operators while 25.5% are for none of the above mentioned operators. Some of this women at the artisanal quarry only come in to break the stones into gravel manually which is being sold to the public. They come to the site break up the stones and the owner of the stone passes by measure the gravel in buckets, or wheel barrow and pay them off before supplying in large quantities to trucks that comes to the site to buy. During holidays fathers and children move to the quarry where they break the stones to gravel for sale ”child labor” here you find the father , mother and children work on the quarry promoting child labor . The owners of the quarry hire labor and pay them every Saturday that is four times payments a month. The inhabitants rent the parcels of quarry and carry out the natural resource exploitation of stone. Approximately 52% rent the plot, 42.33% are the inhabitants of the parcel of land where the rocks are found. Their forefathers owned the land

from the quarry, some of the operators bought parcels of this quarry on which they are exploiting while 1% hold it as mortgaged for a loan involvement.

The public works is a government base company that carries out constructions and repair on national roads. This company build bridges repair some of the national roads within the region. The public works company exploits the quarries for free to be used for rural developments and repairs within the regions. Considering the rate at which developmental projects are growing up in the west region of Cameroon is a cause for concern to appreciate the rate at which natural resource of stone is being exploited to about 66% high for instance bridges, houses, roads, gutters are under heavy construction. Considering the activities of natural resource exploitation of stones, it will be realized that 73% of the natural resource of stone is being sold to the public, 1% is being used for general repairs and 0.333% of the stone is consumed in the privileged stone owned villages while 25.33% of the population has nothing to do with these stones in the villages.

5. Conclusion

Stone mining is thus a lucrative business and fuels illegal extraction Illegal and unscientific stone mining which is turning out to be one of the biggest ecological disasters. The corrective steps are too small to neutralize the ever-increasing footprint of the illegal stone extraction.

Natural resources are actually nature's gift to man to help him live a comfortable and peaceful life, but at the same time we as human beings have the responsibility of conserving natural resources by taking the right steps. This will help us maintain the environmental balance and satisfy our needs to the fullest. This can be achieved if we conveyed to people by arranging seminars and conferences and having lectures of renowned environmental experts. Using natural resources in an efficient manner, a planned and prudent use of the resources alone can be protected against landslides, soil degradation, and erosion and even extinction.

6. Recommendation

Since the inhabitants of these villages depend highly on the benefits of the exploitation of the natural resource of stone from their area for development, more effort should be made to improve upon their developmental demands which will give them a significant felt impact of benefiting from this natural resource exploitation of stone in their area. Instead of looking for ways to stop the artisanal miner, it is good enough to organize them and coordinate them to operate while also follow the rules and regulations governing artisanal mining because economically they sustain livelihood through stone mining but at lower levels.

Community development in the past had been adversely affected by top-down approaches to development and has become "supply-drivers" Recent development in decentralization advocate" demand drivers" strategy and have merits of considering the specific demands and potential of each locality. Local government institution and local community organizations could establish a collaborative partnership in undertaking the responsibility for developing a local "vision" and strategy, design, planning, allocating resources, implementing and motivating evaluating of development activities that would better cater for the local needs.

A few states are exploring options like manufactured stone, produced by crushing of rocks and quarry stones, to meet the ever-increasing demand of the construction industry. The new stone

mining framework suggests the use of geo-fencing and GPS-enabled transportation to check illegal mining. Price control, the involvement of women self-help groups and regular audits of stone reserves have also been recommended.

For effectiveness, IRAD and Local communities should organize themselves to undertake planning and managing development and are expected to take over the management of support services. Also to achieve sustainability, the challenge is to facilitate and institutionalize a process through which rural communities themselves would evolve local capital can be sighed out as the most important role of local communities in IRD.

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