

PROJECT

THE EFFECTS OF MINING ON ENVIRONMEMTS A CASE STUDY OF NASARAWA LOCAL GOVERNMENT AREA OF NASARAWA STATE.


BY:

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CERTIFICATION

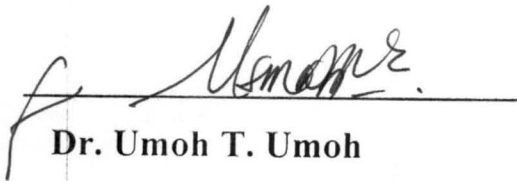
I certify that this work was carried out by AHMED ABUBAKAR GORINGO a PGD student of Geography Department in partial fulfillment of the requirement for the award of PGD in Environmental Management.



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DEDICATION

This project is dedicated to Sir, Alhaji Abubakar Tafawa Balewa the first Prime Minister of Nigeria.

ABSTRACT.

This report concludes the study of the Effects of Mining on the Environment A case study of Nasarawa L. G. A. This is in partial Fulfillment for the requirement for the award of PGD in the Department of Geography of the F.U.T. Minna.

The study takes a look at the effects of mining on the environment in Nasarawa town which includes their location. This project aims at identifying specific effects of mining on the environment and socio-economic life of the people.

The major problems encountered in the work is mainly of inaccessibly to old mining records which would have gone a long way in giving an insight to what transpired during the periods of active mining. However, enough have being collected and on these, recommendations are made to alleviate the suffering of the inhabitants of the mining area.

Above all, the government should think of the Mining Industry in terms of sustainable development but not exploitation

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The aim of this Research

The aim of this research work is to find out the effects of mining on the land and socio-economic activities of the Nasarawa people with a view to suggesting workable proposal to minimizing the adverse effects on the areas.

Objectives

The objectives of this research are as follows:

- a. To identify the concepts and principles of mining in the study area.
- b. To examine the positive and adverse effects of mining on the social and economic life of the people.
- c. To identify the adverse effects on land topography with its environmental effects.
- d. To suggest ways and means of ameliorating the problems.

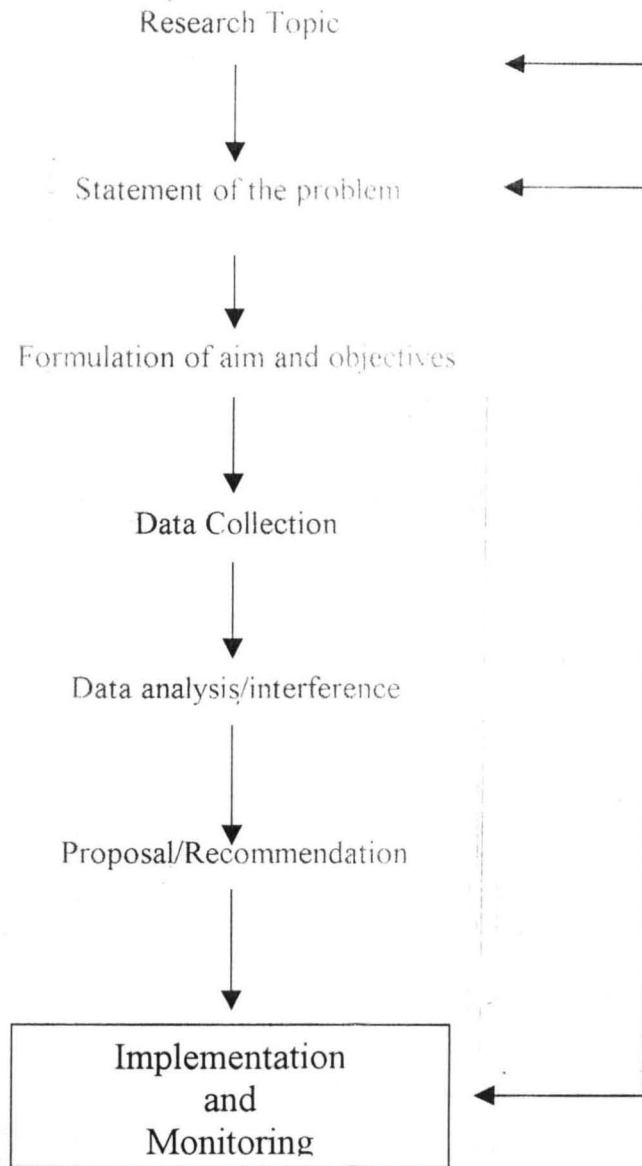
Scope and Limitation

The study is principally concerned with the identification of the effects that mining has on Nasarawa, its effect on the social and economic life in the area with special reference to Nasarawa Local Government Area. Access to old mining records was hindered due to the fact that many were lost during the time of merger of the companies and creating of Nasarawa State from Plateau State.

Table 3.1 Methodology Chart

Objectives	Data Required	Source of Data		Collection Technique	Data Analysis	Relevance of Data
		Primary	Secondary			
To examine the concept and principles of mining	Development of mining policy on mining activities	Journals Text			Literature	To trace the evolution of mining and identify guidelines on mining activities
To examine effect of mining on the socio-economic life of the people of Nasarawa LGC	The social and economic characteristics of the areas	Field survey	Journals and texts	Questions and interviews	Charts and tables	To know the existing social and economic life of the area
To examine the effects of mining on the environment	People that are prevalent within the mining areas	Questionnaires	Journals and texts	Questionnaires, field survey	Pictures	To determine the effect of mining on the area
To suggest ways of solving the prevalent problems in the mining areas						

Table 3.2 **Conceptual Framework**



Geographical Background

Nasarawa town is situated at the confluence of River Haderi and River Kurafe which are main tributaries of the Benue River. A by-pass has been constructed to the Northwest of the town between the core town and River Kurafe which was earlier a natural barrier towards the west and, presently becomes the major access to the town.

The main access to Nasarawa town is the Keffi-Nasarawa-Toto road, which continues to Koton Karfe. About 2 kilometres north of the old town center, a road stretches towards Loko. An eastwest road going through the core area connected the main roads. Together, the road from the main road networking Nasarawa town reference to base map.

The triangular area between the Keffi-Loko road and the North of the core area is now being developed. A new motor park, a market, a secondary school and a bank, a party secretariat and Federal institutions have been developed.

The area to the east of the Loko are also been developed that is, the lowcost houses, students hostels, residential accommodations etc.

West of the Keffi road, a Federal Polytechnic, Government College and a Dam, to the south, a primary school and local government secretariat and polytechnic temporary site have been constructed. West of River Kurafe, which forms a natural boundary for the township, government secondary school and a comprehensive health center, the district veterinary office, the farm institute and a party secretariat.

CLIMATE

Temperature

The highest temperature always tends to occur at the end of the dry season, close to the spring equinox. Thus, March has the highest temperature of about 30 degree centigrade. The lowest temperature occur in the middle of the dry season in December/January with an average of about 25.50c, when out going radiation is encouraged by the low humidity, clear sky and longer nights. The lowest monthly mean temperature is low.

Rainfall

Nasarawa town experiences a marked seasonal rainfall as will be illustrated below.

It has a dry season without or with very little rain from November to March of about 95mm.

A wet season from April to October, the mean annual rainfall is 1,300mm.

Wind

The Nasarawa town is dominated by the seasonal movement of the intertropical convergence Zone (ITCZ), which represents the moving frontier between the moist air from Atlantic ocean and the dry air from the Sahara. These are the southwest monsoons and the northeast trades respectively. In winter (from September to April) winds are northeasterly bringing extreme aridity and harmattan. For the remaining months of the year southwestern winds are prevailing. Generally the wind velocity is relatively low, a velocity exceeding 68 km/hr (average over a 10 minute interval) has only been recorded once during an 11 year period at Makurdi.

Humidity

In the dry season, there is a decrease in relative humidity from south to north in Plateau State caused by the higher elevation in the north. In the rainy season thus variations disappear.

In Nasarawa town, the relative humidity shows a marked decrease from the early morning to the afternoon throughout the year. For example, in the month of January, in the mornings the relative humidity is 80% compared to the afternoons of about 30% throughout the year, in afternoon recorded of about 1600 h while in the morning is 0700 h.

Associated with the high relative humidity, the cloudiness over the area is usually extensive. The daily average sunshine hours show the lowest values in the wet season.

Topography

The topography of the Nasarawa town cannot be examined fully without comparing with the highest part of the central Plateau including Nasarawa State. The Jos plateau is the highest part of the central plateau including Nasarawa State and is the geographical and hydrographical center of Nigeria forming a central water-divide. From elevation of about 1500 – 1800 in the plateau descends in a series of steep slopes to the wide Benue through Nasarawa State and Nasarawa town in particular.

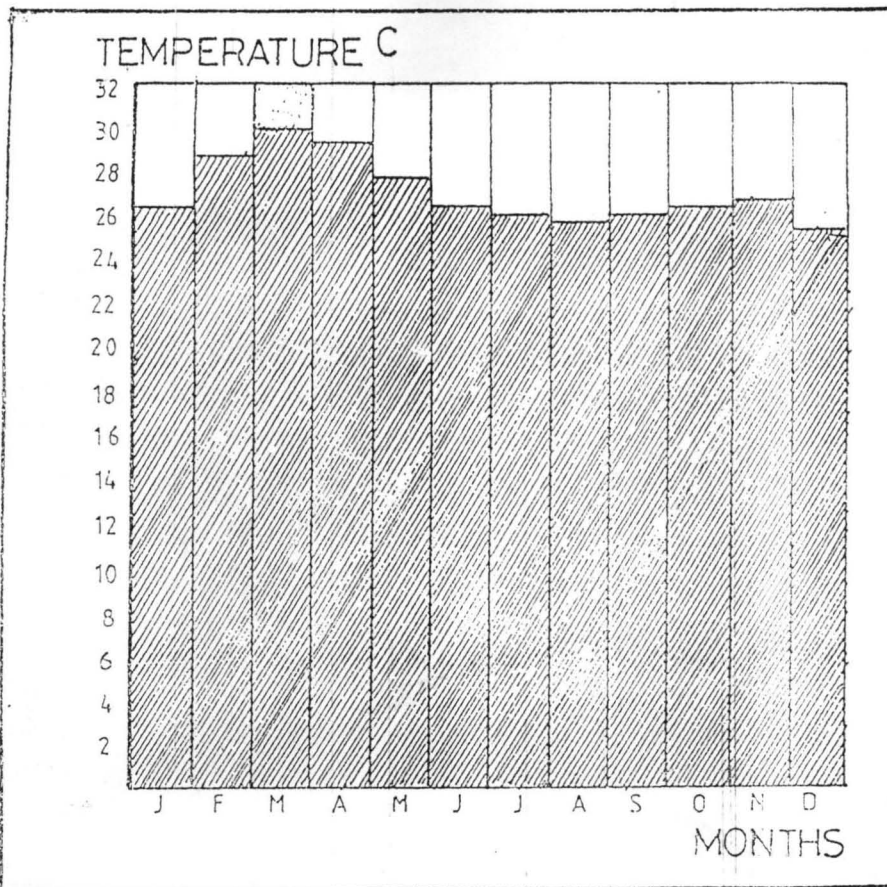


FIG. 2

MEAN MONTHLY TEMPERATURE

Source: Nasarawa Master Plan (1978)

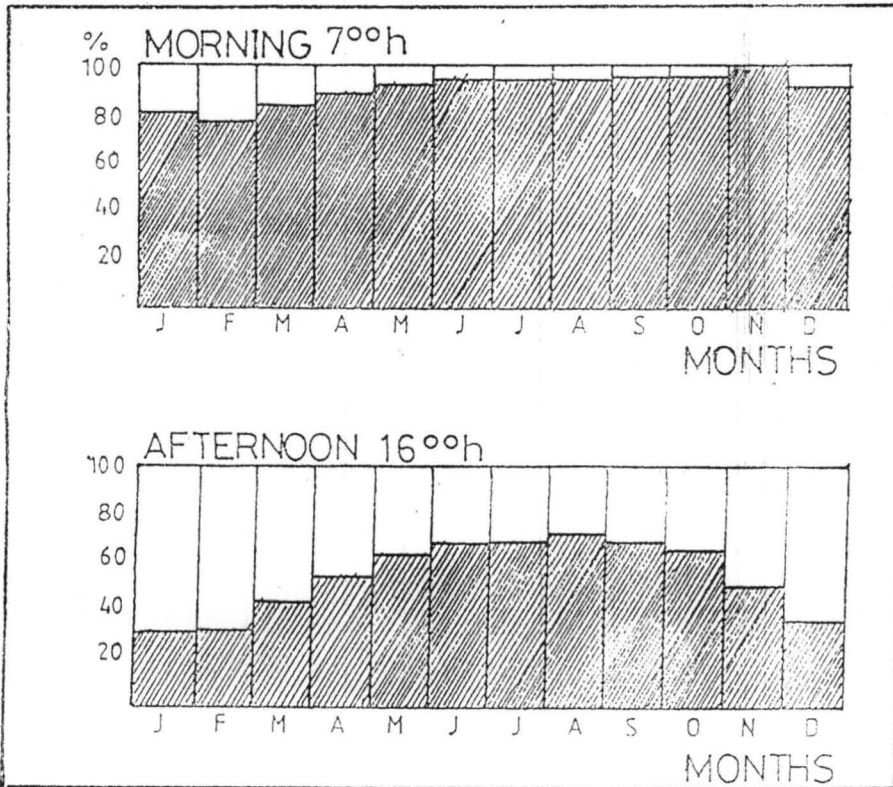
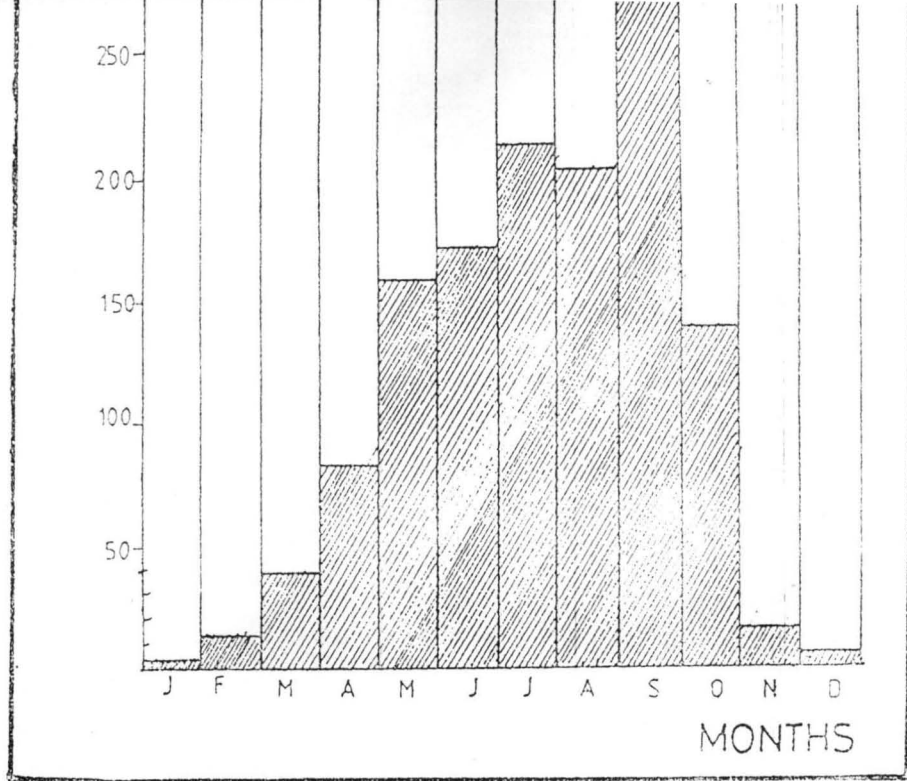


FIG. 3

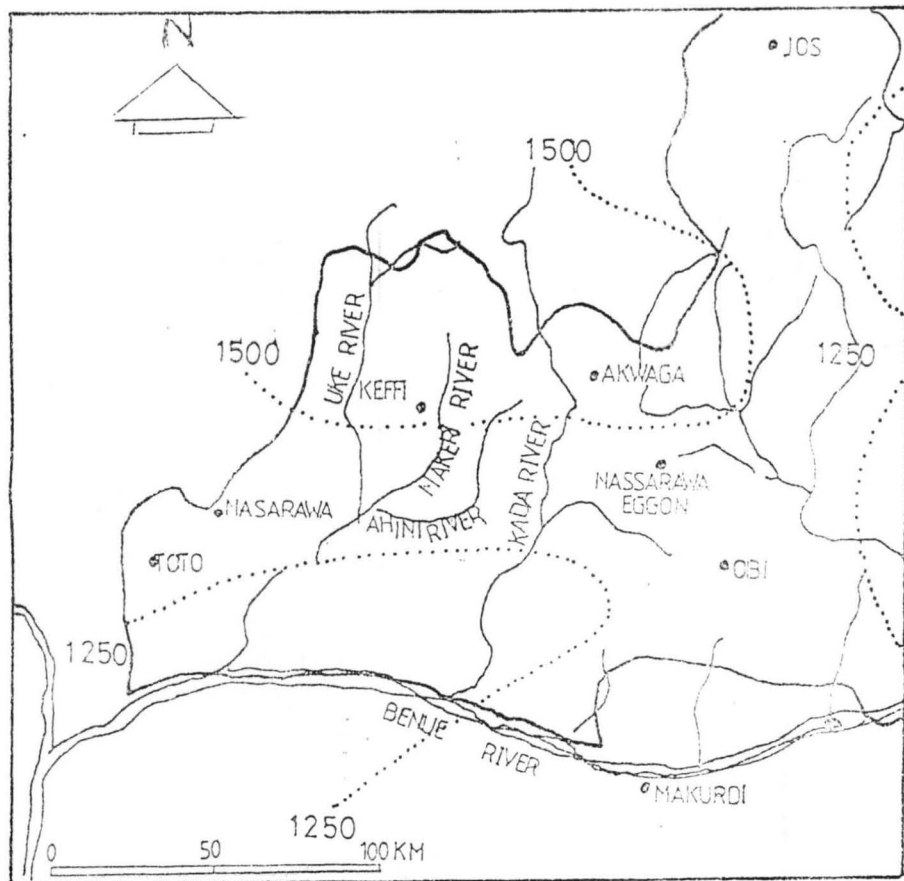
RELATIVE HUMIDITY



MEAN MONTHLY RAINFALL

FIG.1

Source: Nasarawa Master Plan (1978)



AREAL DISTRIBUTION OF MEAN ANNUAL RAINFALL (MILLIMETRES)

The northern part of the Benue through the northern low lands, forms a continuous plain about 100 km wide which gradually slopes from the foot of the plateau towards the slightly steeper slopes, descending from the foot of Plateau escarpment. South of the North lowlands follow the Benue River flood plains.

The western part of the northern lowlands of the Plateau State is where Nasarawa town is situated, is an area transition. Only part of it can be regarded as belonging to the most section is a broken country of steep hills reaching elevation of up to 840 m, and narrow valleys. At the foot of these lies the Keffi plain at the elevation of 350-500m, the southern half belongs to the Benue plain. It is generally somehow higher in the east. Nasarawa which represent the southernmost outwears of the Plateau.

Nasarawa is situated between River Haderi (Alheri) and River Kurafe (River Uke) which forms eastern and western borders of the town. The rivers have their confluence about 3km southwest.

Geology

From the Jos Plateau, which is an assemblage of basement complex metamorphic rocks, granite and basalt of two or more ages, the crystalline rock surface drops in steep steps to the northern part of the northern low lands. This consists of rocks of the basement complex covered by shallow soil and shows a number of 'Icebergs' or outlines of granite. The evaporation is derived from the crystalline rock a laterization has often occurred. An accumulation of iron and aluminum has taken place and the soil type is generally impervious to water, and it hardens by exposure to the surface.

Soils and Vegetation

The town is situated in the Benue valley between the Benue and the Jos Plateau. This area is part of the southern Guinea Savanna. The vegetation has to a large extent, resulted from extensive agricultural use of the land.

The predominant vegetation type is park savanna, which is characterized by a discontinuous canopy, shades and natural fires during dry season, which has forced the vegetation to develop characteristics enabling it to resist fires.

Among the common trees are the oil bean trees, the sheabutter tree, the locust bean tree and the Isoberline tree. A large part of the vegetation is crops and pasture land. The most important crops are yams, maize, sorghum, cassava, guinea corn and cowpea etc.

CHAPTER TWO

Literature Review

History of Mining in Nigeria

George R. Nicholas and Col. H. W. Laws first sighted tin ore in an open market both of whom were mining engineers. Thus, suggesting its usage by blacksmiths long before the advent of colonial era. The two mining engineers later traced the source of tin ore to Jos Plateau in the late 19th century.

By the year 1902, the royal Niger company, a major trading company of the colonial government had started prospecting for tin. This followed by the establishment of mining companies in 1903. These included major companies like Bisichi Tin Company, Kaduna prospectors, Amalgamated Tin mines of Nigeria, Gold and Base metal Nigeria limited, United Areas of Nigeria Ltd, and Jantar Nigeria company.

The Anaguta tin settlement of Naraguta became the headquarters of the Nigerian Tin Fields and area of operation of the Royal Niger company. By 1914, Jos replaced Naraguta as headquarters due to increasing growth in mining and the construction of rail line to the town. As mining activities continued to expand and grow, so did the number of settlements and people increased.

In 1903 the initial quantity of tin produced was 5 tones and by 1913, it had reached 4,000 tones. Over the years, production experienced rises and falls and by 1943, it reached its peak with 17,400 tones. This was followed by a gradual decline in production such that by 1965 it had reached 4,600 tones which marked the beginning of the decline in the industry.

Method of Mining

In mining, the method employed in extraction is dependent on the concentration and depth at which the ore occurs. Generally, there are two types of mining which are surface and deep mining. In each of these, various methods are used to mine the ore.

Surface Mining

This involves the use of simple implements like picks, shovels and head-pans in the digging and excavation of alluvial tin deposit usually found along river channels, tributaries and creeks. This method was the earliest method employed in shallow mining using the stream of river water in washing of the alluvial soils and leaving the ore behind ready extraction. This produced a landscape of small mounds of spoils, irregular gorges and isolated remains of unworked sediments.

Deep Mining

This involved the use of heavy equipment like bulldozers, draglines, water monitors and pumps. As minerals deposit went deeper in the ground the normal simple implements became unsuitable hence the introduction of these heavy equipment made it possible for extracting greater depths were reached in Nasarawa where tin was mined at 36 metres.

Government Policies on Mining Activities

At the beginning of commercial mining there were provisions for prospecting rights, registration and operation of mining leases which were strictly and rigidly controlled by law including the payment of compensation to the local people. Unfortunately, there was no legislature to reinstate or reclaim the mined land to restore it for agricultural purposes. Such legislature did not come into force until 1946 (journal of environmental science, 1998). By then a lot of damage had been done, as it was not feasible to enforce the law with retrospect. It is for this reason that most of such devastated land had remained unrestored, one cannot but appreciate the Federal Government's efforts to the reclamation exercise. Trees have been planted but these areas are far from regaining their natural fertility. For full text of the government policy on mining see the mineral Act of 1946 chapter 121 marked as appendix 1.

Safety Mining Standards for Tin Mining

Safety within mining area as laid down in the safe mining regulations which is aimed at guiding operations to mine without causing or likely to cause harm or danger to workmen.

This law is found in the Mineral Act of 1946 chapter 121. The regulation covers machinery, electricity, explosives handling methods, open east and mining, workmen, which will be discussed with emphasis on mining activities in the Nigerian mines fields.

a. **Machinery**

On machinery, the safe mining regulation provides that the lease or his agent shall report to the inspector of mines, before bringing a plant (machine) into use after 12 months. Also the horsepower is to be used must be stated.

These helped the Ministry of Mines and Power know the type of plant being used in a lease and to be in a better position to advise the lease on how to handle such plant with a view to ensure the safety of the workmen.

All exposed machinery that are deemed dangerous when in motion must be fenced. Loose clothing is prohibited on persons working close to such moving machinery. Répairing of such moving vehicles under risk be prohibited. Safety valve for air compressors must be changed constantly.

Dangerous areas such as elevated platforms, pits and trap holes shall be fenced off so as to safeguard effectively those persons authorized to be in the vicinity. Also notice prohibiting entry to dangerous machinery area should be pasted up at all entrances.

b. **Explosives**

In the case of explosives, mining blast certificate is issued by the area mines officer to any person who has prove to the officers satisfaction that they are competent to take charge of blasting operation.

The explosives must be supplied only by the employee of lease should be stored in stoutly built wooden boxes sufficiently water proof containing not more than 100bs of explosives, 100 detonators or copper fused.

c. **Safety in open cast mines**

According to the Safe Mining Regulation, open cast mining is working in which excavation is performed from the sur or the air. It stipulated that, excavations that exceed 6 feet vertical height and 4 feet in diameter, should have a safety man posted or stationed on top of the bank. This also applies to every gang exceeding 20 workmen. He is to check for surface cracks and barring down loose and over hanging ground. While the states that spoils or waste should not be deposited within 3 feet at the top, vertical or slope.

When working hydraulic monitors, adequate provision is made to restrict the using of the monitor. This ensures that when unattended to the jet or water is confined to the position of working.

d. **Protection of Mine Surface**

This aspect is very important especially in areas where subsidence of excavations is likely to occur. Also prospecting workings or disused shafts and mine should be filled, fenced, or otherwise protected as required by the regulations. These regulations are meant to ensure safety before, during and after mining operation to ensure that no harm is done to life.

e. **Underground Mining**

This enables underground mining specifically for extraction alluvial deposit situated not more than seventy feet vertically below the surface. The safe mining Regulation has provision aimed at ensuring safety of life in these type of mining. The provision prohibits the bringing of inflammable materials such as thatch or wood to the mouth of the shaft.

The regulation also stipulates that the distance between shafts should not be less than 30 feet. Also underground of abandoned working should be protected or be fenced. Other regulations aimed at ensuring safety which guard on loose material near unprotected edges approaching material or gas in a mining examining discussed

working before being used again, sufficient ventilation and the provision of manholes respectively.

f. **Workmen**

Workmen for whom these regulations are made to ensure their safety have some regulations to observe that will further enhance their safety. Records of all employees must be kept and a first aid box and cyanides antidote be provided within the minefields. Forbids sleeping within the minefields or work area and bans intoxicated persons from entering into a mine respectively. Persons suffering from tuberculosis and leprosy if known must not be employed in a mine area.

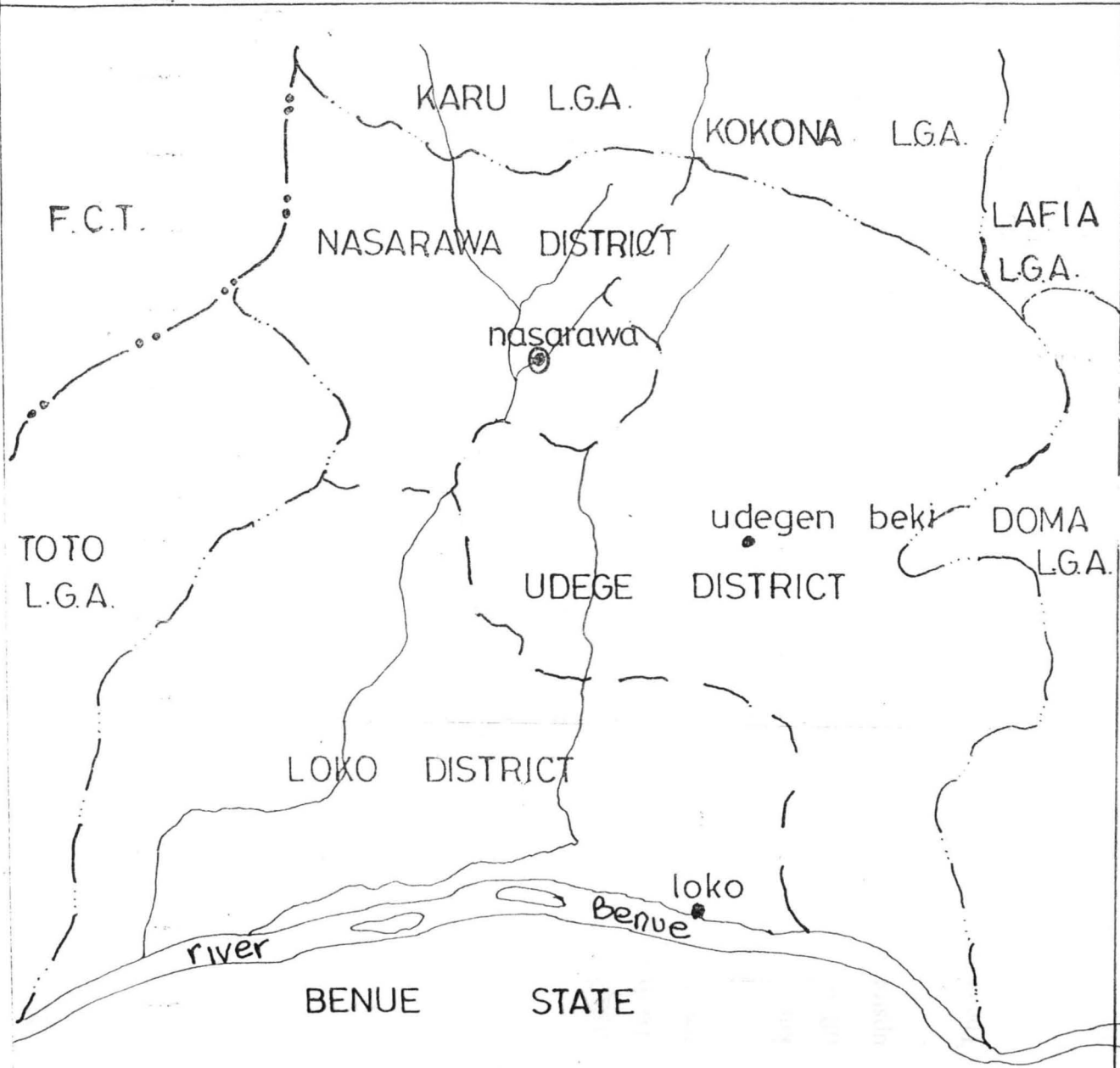
g. **Responsibilities of Ensuring Safety in Mine Fields**

This responsibility for working a mine is safety discipline, accident rest on the manager. The manager is also required to be in charge of storage and supplies of explosives, sufficient supply of material and appliances.

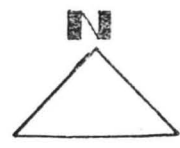
h. **Accidents**

The safe mining regulations are meant to ensure that accidents are averted but accidents do occur. When this occurs the lease should in compliance define the nature of the accident to the nearest officer. The chief inspector should decide if enquiries should be held by mines department or in certain cases by magistrate to ascertain the true cause of the accident.

MAP OF NASARAWA L.G.A. SHOWING THE THREE DISTRICTS



- STATE BOUNDARY
- - - DISTRICT BOUNDARY
- LOCAL GOVT. BOUNDARY



scale 1 : 500,000

Primary Data

Direct questions were administered to the residents in the study areas. The questions were designed strictly towards the collection of vital information and statistical data required for the achievement of the measurable objectives of the study areas. Example of vital information designed for the questionnaire is:

- A - Name -----
- B - Age -----
- C - Date -----
- D - Sex -----
- E - Occupations -----
- F - State -----
- G - L.G.A. -----
- H - Income Level -----
- I - How many tones of tin you make in a day -----
- J - What is the effect of mining in your environment

Sample Selection

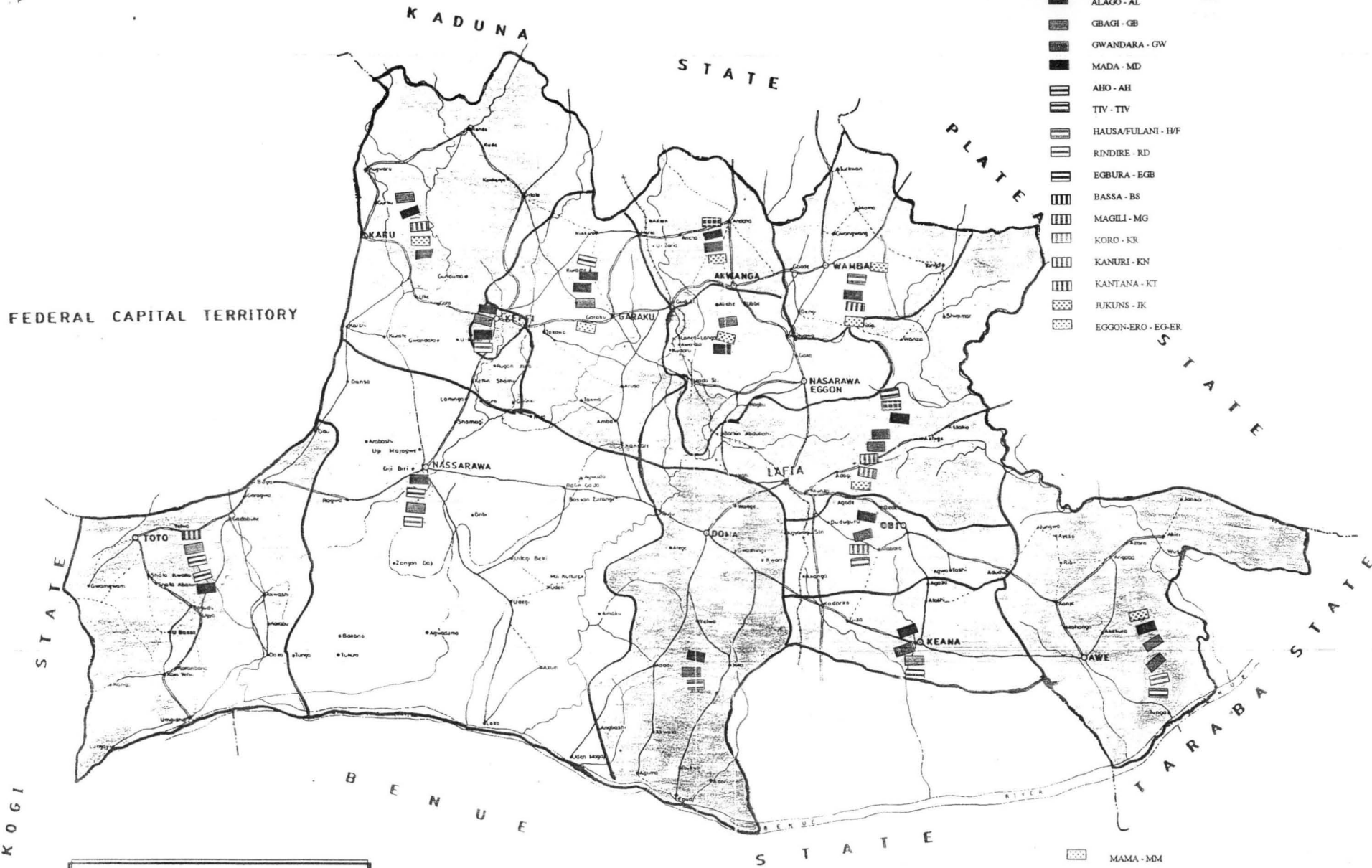
The study area cover the whole developed area of Nasarawa town consists of about 4-6 neighbourhood. Each has low, middle and high income groups. Although, in any social research, one is expected to cover ten percent (10%) of the total population but due to the scope of the study, a sample selection was randomly chosen. In all, three hundred (300) questionnaires were randomly administered in the study are.

Secondary Data

This data has been obtained through master plan, relevant text both published.

Method of Data Analysis

Data has been analysed with the use of maps and photographs.



Nasarawa State
Local Government Areas

CHAPTER FOUR

SOCIAL AND ECONOMIC CHARACTERISTICS OF STUDY AREAS

POPULATION OF STUDY OF NASARAWA LOCAL GOVERNMENT AREA

The population was affected by mining activities. The general trend was that population growth was proportionate to the extensiveness of mining activities. Based on the 1991 census, which is considered as most reliable, Nasarawa is said to have had a population of 26,879,000. At the moment the figure would be very different, if we apply a percentage projection of the 1991 census figures. It is important that in planning for such areas, it is necessary to examine the social and economic activities and characteristics of the areas, it is necessary to examine the social and economic activities and characteristics of the area at the aftermath of commercial tin mining.

To establish this, questionnaires were served to a number of respondents.

Ethnicity of Respondents

As earlier stated, tin mining had attracted people from different parts of the country thus affecting the ethnic composition of the study area.

Table 4 : 1

ETHNICITY	PERCENTAGE
Hausa	30
Igbos	35
Afo	47
Others	15

From the table above, Hausa comprises of 35% are settlers who have been taken to vegetable gardening as an alternative to tin mining and Afo 47%.

Table 4:2

Table shows the marital status.

STATUS	PERCENTAGE
Married	75
Single	20
Widow	5

It is evident that most of the areas have more married due to the mining activities that take place.

Length of study of Responsibilities

To determine how long the respondents have lived in these areas their responses are tabulated below:

Table 4:3

YEARS	PERCENTAGE
0-10	20
11-20	7
21-30	10
31-40	30
41-50	13
51-60	17
61 above	3
Total	100

This was further grouped into those that have been there since birth and those that recently migrated there. This mainly was for then on-indigenes,

the Hausas, Igbos and other tribes. On the whole, most of the respondents have been living in the area for a long time. Thence, they regard the mining areas as their only home. In effect their parents must have lived and died in the area. This is clear from the fact that those who have lived there for over 60 years are fewer in number.

Educational level of Respondents

The table shows the responses on the educational level of respondents.

Table 4:4

TABLE	PERCENTAGE
Primary	32
Secondary	24
Tertiary	13
Arabic	23
Adult Education	7
Total	100

The above analysis shows that most of them have some form of education right from primary, secondary, tertiary to Arabic education.

This shows that illiterate miners sent their children to schools and religious education. It can be said that only a few could not read or write.

Table 4:5

OCCUPATION	PERCENTAGE
Farming	33
Trading	13
Mining	13
Civil Servant	13
Others	27
Total	100

From the above, you can see that most respondents are either Farmers or fall among others, where they are enjoyed in farming.

A comparatively small percentage still carryout some surface mining in already mined area. These could best be described as addicted tin miners as it has become part of their life.

Income Level

To determine the respondents income level was a difficult task as they readily made the information available without the usual secrecy around individuals income. Most respondents bracket is N3,000 – N4,000 per month. This could be rightly said to have been earned from farming or other manual work rather than mining.

Problems that Ponds and mining pits constitute

As a result of mining activities various forms of land deformation are created in the process resulting into different kinds of problems.

In general, the drainage pattern ranges from dendrites to rectangular and is widely spaced, although there are considerable variations associated with different rock types. Where the steams are cutting through granites, their alignment is controlled by jointing, giving rise to some strongly linear, often rectilinear, patterns. Despite the degree of degradation of the vegetation, it is possible to observe some relationship between the plant communities and adaptic factors. This relationship can invariably be attributed to the soil and water regime, although direct impedance of root growth may occur on

some extremely thin soils on rock and iron pan. The degree and intensity of cultivation is also related to these adaptive factors.

Effects of Tin Mining

Tin mining has had various effects which has brought upon the inhabitants of the Nasarawa, most especially those who reside in the mining areas, which have their roots from mining activities. It has also led to the provision of facilities in the mining areas. There are some 216 sq km of land on the Nasarawa that have been disturbed by opencast mining. In 194, the mining company introduced Legislation requiring at least 70 per cent reclamation before a lease could be relinquished. The main surface is virtually treeless as the trees and shrubs have been removed by mining activities.

After the decline in mining activities, these lands which were to be reclaimed according to the Mineral Act 1946, section 34(c) still unclaimed. This has lead to the continuous degradation of the land. The highly affected by mining in the following ways:

- a. The landscape is disfigured by mounds of spoils gorges, ponds and tailing clumps.
- b. The vegetation cover of the area has been greatly reduced due to clearing during mining operation.
- c. With the clearing of the vegetative cover, the land has been made highly susceptible to erosion.
- d. The erosion of the land has led to infertility of the land, which greatly affects agricultural activities. The topsoil is washed away leaving the infertile soils.

- e. Another effect left behind by mining is the presence of ponds. They were created by damming rivers to hold water used by giant monitors and slice boxes for training the tin bearing soil to slurry and separation of the tin from the soil. This has left the land with eleven ponds.
- f. These ponds left by mining even though provide water in dry season it has also claimed a lot of lives due to drowning.
- g. This also has caused disruption of river course as the river is channeled to a different direction for the purpose of mining.
- h. Deaths also occur in the minefields as a result of drowning in ponds.

CHAPTER FIVE

SUMMARY OF FINDINGS AND RECOMMENDATIONS

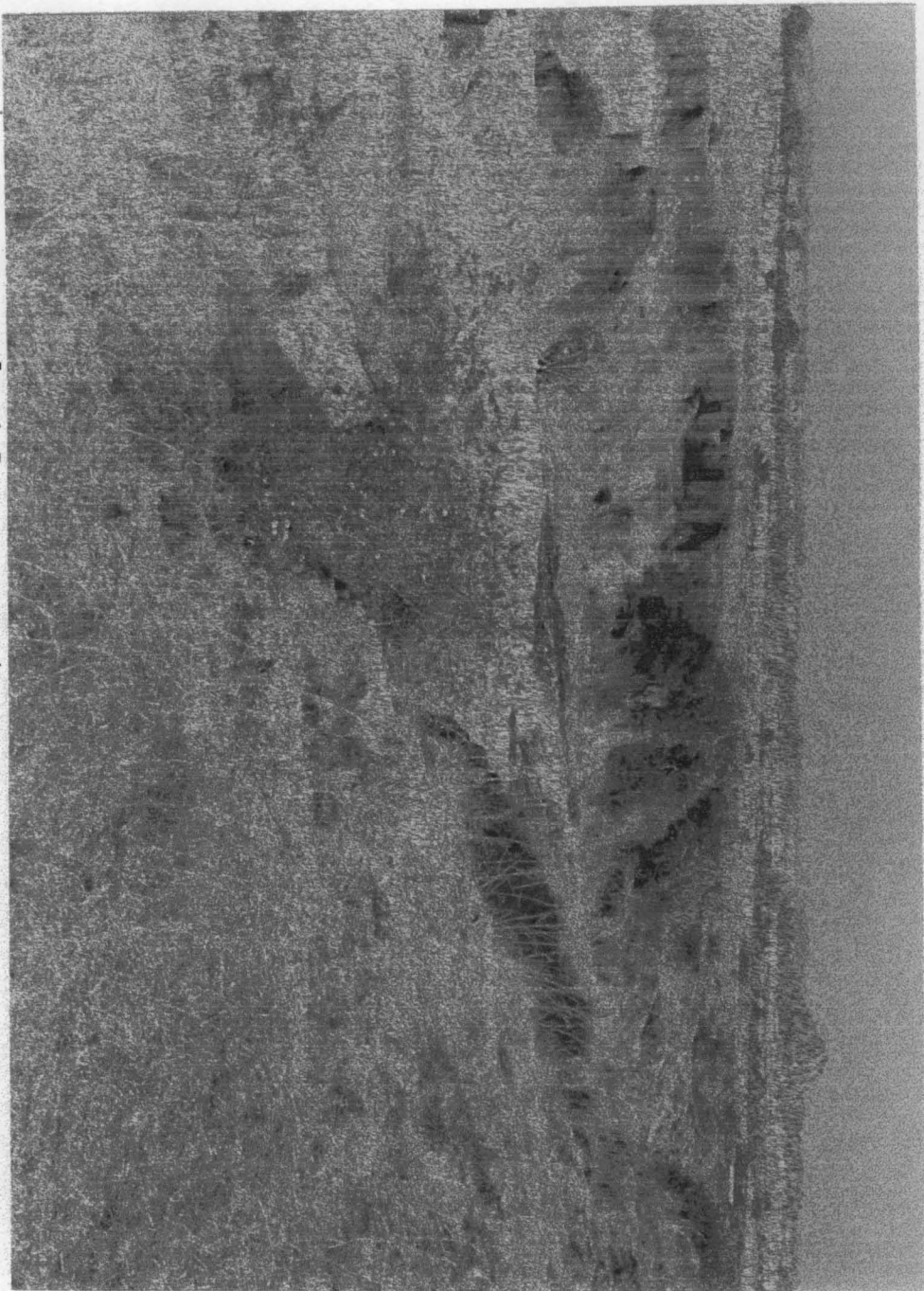
Summary of Findings

After such an exhaustive study, it is necessary to give a summary of findings and law that guide the mining. These are given under appropriate headings.

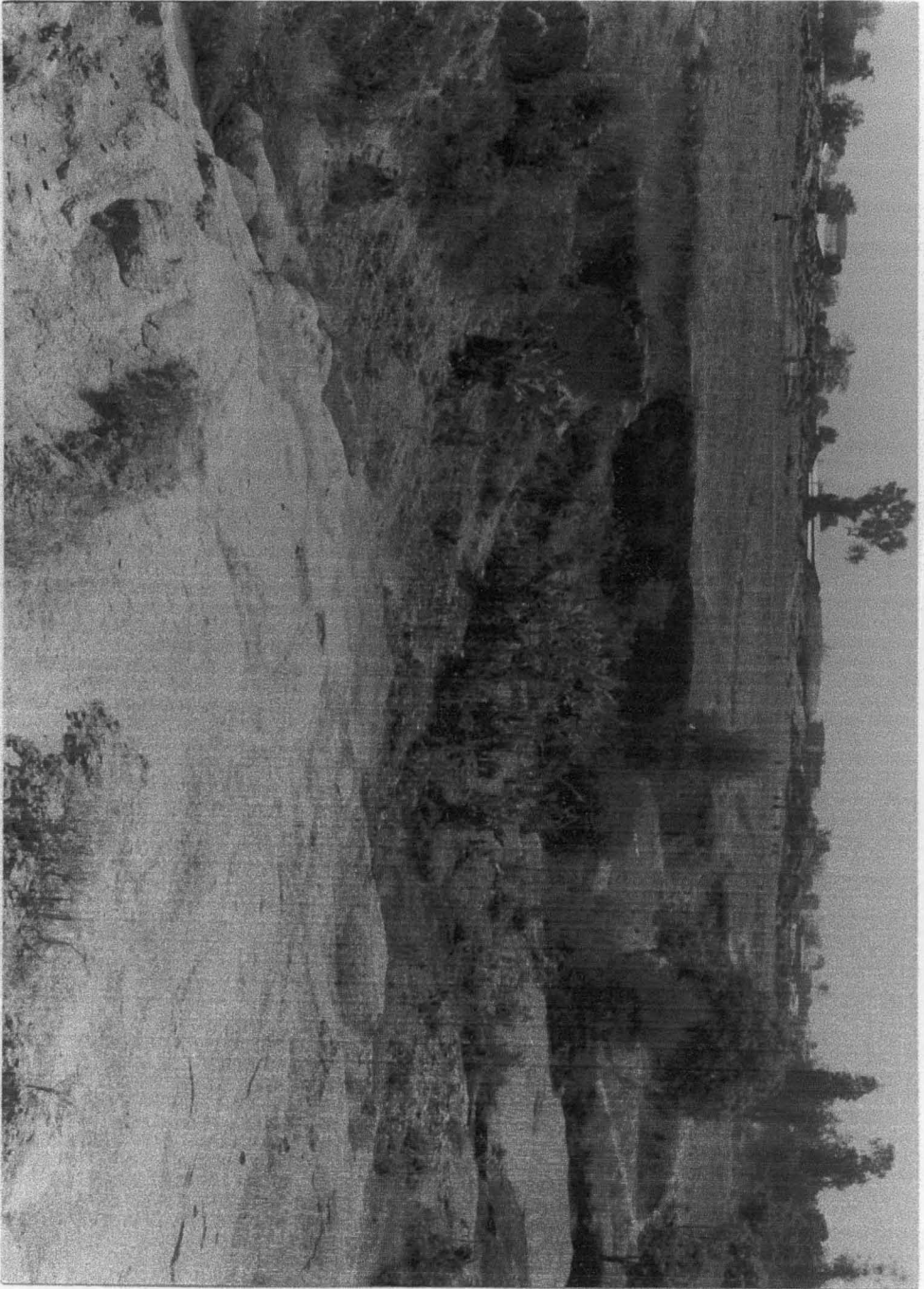
- i. The study has shown that a wide expanse of land has been degraded and rendered infertile due to mining activities.
- ii. The land topography has been greatly scared and disfigured. The undulating plains have given way to mounds of spoils, pits, ponds and tailing dumps. In a nutshell the ecological set up of the area has been changed completely.
- iii. The mined areas suffer from both surface and gully erosion thereby reducing the soil fertility.
- iv. The cutting down of trees and grasses apart from exposing the land surface has destroyed the people's only source of firewood. As a result of the dwindling vegetation small animals like rabbits will soon disappeared.

Government Policies

- i. The need to control the activities of miners necessitated some form of legislature to give some legal status through the securing of mining rights.
- ii. By this law, mined areas are expected to be reclaimed but the law came into being only in 1946 after a lot of damage had already been done to the soil.
- iii. Besides, there was no adequate legislature for the enforcement of the clause on reclamation.



Land Devastation/Loss of Land



Loss of Forest/Soil Erosion



Ponds

- iv. Attempts to restore the devastated land however were not very successful as the relevant government agencies charged with the responsibility of monitoring the restoration work failed in the discharge of their assigned responsibility.
- v. With the decline in mining, the companies started disposing of their mining leases and expected by the mining act. This as discovered has created a lot of problems between the mining companies and the indigenous landowners.

Recommendations

It is considered crucial that having ascertained the numerous effects, mining activities have inflicted on the Nasarawa some recommendations have been made towards making life meaningful on the already mined land.

Therefore the following recommendations are made:

1. Government should make deliberate efforts to reclaim all the mined areas and see that their original fertility is regained or restored through tree planting and grass.
2. In this wise the Environmental Protection Agency or the Mined Areas Reclamation Unit charged with this responsibility should be properly and adequately funded.
3. Mining ponds that are found to be viable for irrigation/agriculture should be left intact for that purpose.
4. Government should assist both dry season and rainy season farmers by providing necessary farming inputs at subsidized rate.
5. Farmers should be encouraged by the Ministry of Agriculture to embark on fish farming using some of the ponds. The 10% of total revenue from tin mining given to the area should be used in developmental projects.

6. Apart from irrigation some of the ponds could become a useful source of rural water schemes.
7. Government in collaboration with the local community should set up mine rangers unit that will check the activities of illegal miners which is the present cause of deforestation in mining area.
8. Government in collaboration with the local community should set up mine rangers unit that will check that will check the activities of spillage on their farms and fishing industry.
9. There is the need to review the Mining Act to contain clause that makes land reclamation mandatory and a reclamation plan as a preconditioned for the issuance of mining lease.
10. More should be done on erosion control.
11. Government should see that the practice, where mining companies resort to selling their lease on expiration is stopped.

It is my firm belief that if the recommendation are accepted and implemented they would go a long way towards improving the situation in the affected areas.

CONCLUSION

It is an undeniable fact that the survey has been able to make one appreciate the various effects Tin Mining has had on the land and the social and economic life of the people for almost a century.

One is also able to see precisely what went wrong with the practice in the mining Industry with attendant effects on the lives of the Labour Force then and their offsprings today. As we can see it is not surprising that the oil producing area of this areas of this country are rising a lot of dust for a special allocation for their area in view of the adverse effects of the oil spillage on their farms and fishing Industry.

It is my firm belief that if the recommendations are accepted and implemented they would go a long way towards improving the situation in the affected areas.

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