Journal of Advances and Scholarly Researches in Allied Education
Vol. 19, Issue No. 6, December-2022, ISSN 2230-7540

Model based Environment Management Plan of mining activity: A study of Udaipur District

Dr. Hawa Singh Yadav[1]*, Pooja[2]

[1] Associate Professor of Geography, Govt. PG college, Narnaul

[2] Research Scholar

Abstract - The Udaipur is a big treasure trove of mineral of indescribable qualities. Rajasthan is blessed with 79 varieties of minerals. Markedly the area of under mining is approximately 1,846 sq. km. which is only 0.54 of total land cover in the Udaipur. The Udaipur has virtual monopoly in the production of minerals like Lead-Zinc, Gypsum, Soap Stone, Ball Clay, Calcite, Rock Phosphate, Feldspar, Copper, Jasper, Garnet, and Silver etc. The Udaipur is proud to possess huge reserves of Lignite, Crude Oil and High Quality Gas. It is also renowned for its deposits of Marble, Sand Stone and some unique decorative stones. Mining is not only a major source of employment in the rural and tribal area of the Udaipur, but also a major source of revenue to the Government and minerals playing an important role in the development of the Udaipur. In this context, this paper covers deposits of various minerals, mineral fuels and their position in Udaipur.

----------X----------

INTRODUCTION

The concept of environmental management which is broadly related to the rational adjustment of man with nature, the skillful utilization of environment without disturbing the ecological balance and the overall system. It is a compromise between ecological and human material progress taking into account the ecological principles on one hand and socio economic needs of the society on the other. There are two approaches to environmental management: preservative and conservative. Whilethe first approach pleads for non-interference by man in physic-biotic world and its complete adaptation, the second approach, on the other hand leaves room for man's adjustment and possible accomplishment through it. Thus last but not least and perhaps the most important issue is that of environmental management for the "stability of the biosphere in general and the survival and stability of individual ecosystem in particular". It is the moral responsibility of the present generation to conserve and protect the environmental resources for the posterity. It is therefore necessary that our plans and planning strategies ensure Eco development and help in maintaining and improving the quality environment.

The strategy of environmental management need to be determined and guided by the objectives of developmental planning emphasizing environmental considerations. In this basic premise environmental management models for the mining activity will vary not only spatially but from mineral to mineral. According to the nature of mineral, topography and the general land use pattern of the area consider the degradation of the mining areas; the following environmental management models can be adopted:

LAND MANAGEMENT OR RECLAMATION MODELS

Land reclamation, the seed of environmental rehabilitation is a well-recognized and established procedure for environmental management.

Land reclamation is specially the post mining preparation of land, preferably a qualitative improvement, even with reference to the pre mining conditions. Land that has suffered from man's industrial activities may be described as spoiled or degraded, disturbed or devaUdaipurd or damaged.

Attempts at the renewal of the degraded resources are given different names. Reclamation is often applied where some new use of the land is involved; rehabilitation is sometimes confined to improvement of a visual nature.

Restoration means recreating the original topography and to re-establish the previous land use. Whatever may the term used, the broad aim is to upgrade the damaged land or to recreate land that has been destroyed and to bring it back into beneficial

use in a form in which the biological potential is restored.

Land is an important natural resource that must be preserved. In India about 0.75% of the total land surface (304 million hect) is under mining lease. In Udaipur Mineral Basin 1065.5 hect of such a land is under mining activity, The reclamation of land is necessary to put it to some productive use: be it agricultural forestry or recreation: otherwise we have to face loss of land for every adverse effects its surrounding, in turn, leading to other disastrous environmental impacts. Maintain the aesthetic beauty and avoid the adverse visual impacts. Avoid accumulation of huge quantities of water in workout areas that poses damages to life andproperty.

In Udaipur Mineral Basin most of the mining areas are situated in hilly and undulating topographical regions. Most of the degraded land of mining activity is either barren or forest agricultural. Degradation of land depends upon method of mining, ore overburden ratio and the natural topography of the region.

MODELS OF LAND RECLAMATION

On the basis of ore & overburden ratio and size of mining pit. the following reclamation models can be adopted for physical restoration:

a. Deep mine with low overburden limestone and red ochre type mining areas:

Mining areas of limestone having low overburden ratio and deep mining pits can be convertedback into water reservoirs of varying sizes. In these mines, overburden is either absent or not enough to provide sustained fill back.

These artificial water lakes can be helpful in ground water recharge. Their stored water can be used for irrigation of the surrounding region.

In the basin this type of reclamation model is applicable in Daroli limestone mining area and Iswal redochre mining area where deep abandoned mining pits exist in Daroli mining area, DNB (Daroli north block) mining pit is abandoned which is about 10-12 m deep having an area ot about 15 hect. In the rainy season it can be filled up, by linking it with Berach river, hardly at a distance of 1/2 km in the N' This practice will be helpful in recharging of underground water of the region, specially it will be helpful in increasing the groundwater level of the En side because the geological setting of the rocks is having favorable dip of 700 to 850.

The same model can be applied for Iswal redochre abandoned mining pit having about 10 m depth with an area of 6 hect and surrounded by fertile agricultural fields. Thus, changing it into the form of a water reservoir can help in irrigation of surrounding agricultural fields.

b. Deep mines with high ore overburden ratio of Soapstone & rock phosphate type ofmining areas

Deep mining areas with high over burden ratio like rock phosphate are normally worked out with the help of bucket wheel excavator or draglines.

In such mines a concurrent concept of mining and reclamation can be adopted. In this system land reclamation is craned out simultaneously with mining in phased manner.

This type of model suits to Jhamar Kotra. Kanpur-Matocn and Kharwaria mining areas of rockphosphate, where a huge quantity of waste material is created dunng mining. This waste material has been dumped on the forest land or agricultural land. Here mining should be practicedin a preplanned manner by dividing the region into small blocks. so that the overburden of the active mining can be filled in the previously mined block (which now stands abandoned). This will help in preservation of land that is otherwise damaged by overburden dumping.

c. Dolomite and Masonry stone mining areas of shallow pits without overburden

This type of model is applicable for the mining pits of dolomite and masonry stone. The pits of these minerals are found shallow having no overburden spreader extensively. Reclamation of such pits depends upon their size and distance from the settlement. The abandoned pits near the City of any other settlement can be filled up by garbage.

In Udaipur Mineral Basin such type of reclamation can be adopted for the abandoned mining pits of Mulla Tala', Rebarion Ka Gurha. Chor Baort, Eklingpura and Madar mining areas. The garbage of Udaipur city can be dumped in such abandoned pits. In Udaipur city the dumping is also a serious problem. So, such dumping will automatically solve growing problem, though such solutions give rise to numerous other problems.

SOLID WASTE MANAGEMENT

Mining operations especially the opencast mining generates considerable quantities of spoils depending upon the nature of occurrence of the area of the deposit, method 01 mining adopted etc.

Thus solid waste management is an essential component of any mining operation. Disposal of overburden and waste is done in predetermined locations usually within the leasehold and they need proper design stabilization and vegetation to contain the degradation of land.

DUMP MANAGEMENT

External dumps are permanent source of land pollution through wash off with rain and air blown dust through wind action. They also present an ugly

and repulsive 100k to the viewer. ifnot duly afforested. The following measures are recommended to minimize land pollution due toexternal dumps:

The design of waste dumps should accommodate progressive rehabilitation to ensure a minimum area of disturbance at any one time and to establish final rehabilitation at the earliest opportunity. Alternative uses for part of the material, such as in land-fill or road construction may also be possible. It is advisable to acquire sufficient extra area over and above the mining leas area to cater to a planned external dump.

The following basic objectives for waste dump need be considered in the planning phase where possible waste-rocks should be returned to previously excavated areas.

The height, area and shape of the waste rock dump to be designed having regard to the area of land available, the general topography of the area and the vegetation in the area.

Top soil should be scraped out from the dump site in advance and preserved in low height dumps duly covered with grass and vegetal cover to increase its life.

The design and construction of the waste dumps should be such that the complete cut slopes do not exceed 200 from the horizontal level.

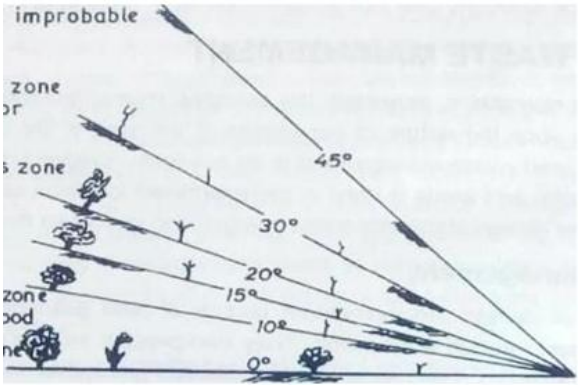
Drainage should be constructed to handle heavy rainfall events. Appropriate garland drain should be provided all around and specially to the ultimate boundary of the dump.

DESIGNS OF DUMPS

Since external dumps, which cannot be used for backfilling of old pits or otherwise must be afforested for greener and stability. Their outer slope must be very gentle, preferably not more than 200, as steeper the slope, more difficult it is for biological rehabilitation. Relationship between the angle of dump slope and efficiency of vegetation, as given in Environment Management Plan of Mining Activity the operation rather than the environments of the operation.

Being normally steep and always open to serious erosion in the form of gullies and rolls. such heaps were environmental hazards.

Severe erosion hazards Zone vegetation improbable Critical erosion hazards zone revegetaiion Success poor Moderate erosion hazards zone vegetation success fair Moderate erosion hazards zone vegetation success good Moderate erosion hazards zone vegetation success very good Slight erosion hazard slope influence minimal



INFLUENCE OF ANGLE OF SLOPE ON REVEGETATION & EROSION

It may be noted that long unbroken slopes, allow surface runoff to accelerate and produce rills and gully erosion. Therefore. even a gentle slope of 20 should be of short length. so that the verticalheight of individual bench is not more than 10 m and to obviate formation of gully along the slopesfor 10 m height of the bench, a berm of at least 4 m width Should be provided, having a gentle slope inwards into the dump. The rain water from these berrns IS drained through rock lined vertical drains provided at suitable interval. The number of vertical drains required is dependent on final slope angles. On steeper slopes, the catchment area for the vertical drains need to becomesmaller to ensure that runoff water does not exceed the design capacity of the drainage systems. Individual catchment areas should not exceed 2 hect on 14^0 slopes. 1.25 nect on 18" and 1 hect on 20^0 slopes.

Slope stabilization model of overburden dumping

As a part of mining practice, the overlying waste material is removed and dumped into mused out areas and sometimes it is heaped around the mine all along the lease property. These heaps areusually 20 to 100 m in height is in the form of large mounds and ridges.

(a) As a part of mine's reclamation programme the most important task is to stabilize these heaps and cover them with plant life. Failure to their stabilization, results into

Silting in the valley Jhamar Kotra, Babarmal, Kanpur-Matoon mining areas.

Run-off sediments destroy good cultivable land and forest regeneration Jhamar Kotra. Kanpur - Matoon, Babarrnal, Lakhawali mining areas

Mineral toxicity creates soil and water pollution in Jhamar Kotra, Lakhawali mining areas.

Land sliding may result due to dynamic soil movements visible in Jhamar Kotra and Kanpur-Matoon belts.

Unstabilized high waste heaps are dangerous to the safety ot man and animals.

Flash flooding and chocking of streams is a possibility due to the eros•on cf overburden dumps viz. in Babarmal. Jhamar Kotra and Daroli mining areas.

Factors like material slope and form of waste heaps affect their ability to support plant life the following manner.

(b) Rate of run off:

Surface runoff is regulated by the texture Of the surface layer and its slope. The extent of rain water erosion is largely a function Of the slope, but the length of slope is also equally important. The fast running water along the slopes removes the finer and nearly dispersed soil particles. leaving behind the hard pebbles of rock which makes a poor seed bed and provide little or no anchorage for the plant roots. High surface runoff leaves a condition of feeble ground percolation. and thus, the water retaining capacity of the slopes is extremely limited. Small fraction of way

Percolation in the slopes is also discharged from the bottom contact regions leaving heap surface dry and water free.

Intensive wind erosion takes place along the spoil heap surface and extensive amount of finer maternal lost in the process. This phenomenon IS more intensive along the high slope surfaces facing ground level.

(c) Stability Of slopes

The stabilization of a slope is the function of so many characteristics like type of overburden material, angle of repose (wet and dry) Particle size and distribution, slope age of dumps. Length, water retention capacity etc. small heaps composed of large fine particulate material. Mild slope and smaller lengths are susceptible to become stable; much sooner than larger heaps of steeper angles.

REVEGETATION MODEL OF MINING AREAS:

- Alternative belts Of close vegetation cover planted, below the ultimate level of mining. is practiced in hill top mines and helps in arresting mine wastes from downward movement. This type of model can be practiced in Babarrnal, Devimata, Kham Ki Madri.Debari and Ghashiyar mining areas.

- Close plantation around mining pits -This type of plantation is helpful for those mining areas which are taking place at ground contour e.g. Daroli limestone. 'swal redochre and Madar soapstone mining areas.

- Close plantation near by the transportation routes of mineral.

- Plantation on the mining benches- It is applicable for Jhamar Kotra, Kanpur-Matoon. Kharwaria and Daroli areas where benching method of mining is practiced. Revegetation or plantation on old overburden dumps.

MASTER PLAN, BASED ON DUMB-BELLS MODEL

To cultivate the Planned development While mining the minerals, Nestling of Sustainable Development" theory be exercised adopting the dumb-bells model. To prepare the master plan, whole threatened area comprising of mine and Commune is taken into consideration. The commune is treated as close-knit community of people who share common Interests of "Sustainable Development" to maintain reciprocal relationship between mining and environment: both natural and social.

The model emphasizes the two ends of the dumb-bells as most active; one end being the site of a particular mineral and the other end is the seat of the human being.

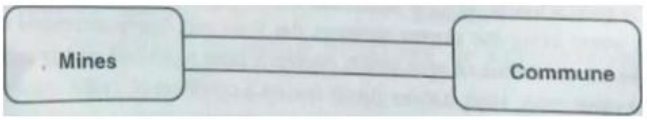


Figure 1: Dumb Bells Models

The region thus may turn a number of dumb-bells, depending on the number of settlements and the mining sites it has. For the mining, the first principal must be that the ownership of the mines mustbelong to the "Local". In case, It is not possible: than at least 40 per cent earning from the mines must be spent for the welfare/developmental activities of *The Mining including of those mentioned earlier". Due attention paid to the reclamation of the abandoned pits. Overburden Nesting, chemical pollution, different land uses etc. For this purpose, the whole threatened area is divided into following hierarchical sectors:

1. **Belt:** It is the surrounding area bends the area of immediate neighborhood of the both Minesand Commune. These are connected by cart-tracks or by the other roads.

2. **Ribbon:** It is the sub-route area reaching directly to the activity area, joining the main routesto the Belt.

3. **Secondary Route Sector:** It the area, connecting the Ribbon to the main route.

4. b Contains different land uses located away from the activity area including remotely located isolated activity areas.

At present, both are activity areas i.e. the mining areas and the area of human settlement. Both are almost in complete "Isolation" from each other need to be generated functional, Psychological and organic relationship between the both to harness the Sustainable Development.

It will cultivate the direct relationship between mine population and human settlement; leading towards the cultivation 01 harmony generating close relationship. It will lead nature and society both towards the sustainable development.

SOIL WATER QUALITY MANAGEMENT IN MINING AREAS

Soil quality management

In the acidic and alkaline soils both physical and chemical means are used to improve the plant growth.

a. Acidic soils

Physical treatment of the acidic soils includes addition cf organic matter. Top soiling also helpsin burying the acidic soils deeper.

In Chemical treatment of acidic soils, lime is applied to depth of soil disturbance to maintain a neutral soil. Lime is applied in its various forms like ground lime (calcium oxide), hydrated hrne or lime residue limestone is insoluble in water but it is soluble in acid. Thus for ensuring long range effect' ground limestone having varying particles size are mixed in sod reaching at a depth of at least 25 cms. Calcium Oxide and Calcium hydroxide are highly soluble to water providing immediate effect. However the effect of calcium oxide and calcium hydroxide is not long lasting. Besides correcting the acidic conditions, lime also helps in improving the physical conditions of soil supplying calcium to the soil accelerating decomposition of organic matter increasing.

CONCLUSION

Udaipur contributes appreciably in the production of Lead-Zinc and Copper. Reserves of oil and natural gas are found in Barmer and Jaisalmer districts by ONGC. A total of about 480 million tonnes of oil reserves have been estimated in 25 oil and gas fields in Barmer-Sanchor Basin. Udaipur is very much deficient in coal reserves. There is only some quantity of lignite coal found in Udaipur. There are various problems such as physical, economical, technological etc. in the sector of mineral in the Udaipur. So Central and Udaipur Government should conscious to resolve the problems in mineral sector in the Udaipur.

REFERENCES

1. Agrawal, M.C.. 1980. Environmental Pollution due to Surface Mining. Indian Milling and Engineering Jl.. 19. (102) : 13-18.

2. Agrawal, RK. (1990): Water management in Denuded and Degraded Hillocks Of Aravalli's - An Environmental need, proceedings of the National seminar on water management Techniques, Udaipur, PP 33-39.

3. Barr, W, 1979: TVA Strip Mine Aquatic Assessment Model-Benthic Invertebrate Models. Proc. Symp. On Surface Mining. Hydrology, Sedimentology and Reclamation. Univ. of Kentucky, Lexington, 4-7th Dec. : 243-250.

4. Barton. W .K. 1960: Dimention stone W .S. Bureu of mines Information circular No. 8391

5. Basu, D. 1943: Darjeeling Coals : Utilization possiblities. Calcutta Geographical Review.

6. Batman, A.G. and NL. Jenson 1981: Economic Mineral Deposqes. Jhon Willey and Sons, New york.

7. Bergstrom, R,E.196d: Disposal of Wastes Scientific and Admistrative Consideration. Environmental Geology Notes No. 20. Illinois Udaipur Geological Survey.

Corresponding Author

Dr. Hawa Singh Yadav*

Associate Professor of Geography, Govt. PG college, Narnaul