

CHAPTER XS U M M A R Y A N D C O N C L U S I O N SLIMESTONE DEPOSITS IN GUJARAT:

The author's survey of the limestone wealth of Gujarat State reveals that the resources of this mineral raw material, are practically inexhaustible, and they hold a promise of prosperity to the State in particular, and the country at large. A brief review giving summary of the findings and observations, and conclusions drawn are given in the following paragraphs.

GRADING:

Applicability of a limestone in the commercial field mainly depends upon its chemical composition and thus, taking this as basis, the author has classified the rock into seven grades given below in the table No.69.

TABLE NO.69

Percent

Grade	CaCO ₃ content	CaO	Uses
Grade-Super	Above 95	Above 53	Chemical industries, colourless and optical glasses, paper, soap, rubber and allied industries, etc.
Grade-I	95-90	53-51	Flux grade, soda ash making, in silica bricks, glass, paints, textile industry, etc.
Grade-II	90-85	51-48	Caustic soda, sugar, and glass industries, disinfectant, etc.
Grade-III	85-78	48-44	Portland and other cements, fat, lime, fertilizer etc.
Grade-IV	78-60	44-35	Building limes - best quality.
Grade-V	60-50	35-30	Hydraulic limes - good quality. Rock and Mineral wool.
Grade-VI	Below 50	Below 30	Building material.

Note: In the case of higher MgO content, it is to be indicated as Grade-I(Mg) and is inclusive of MgCO₃, and higher Fe₂O₃ content is to be indicated as Grade-II(Fe).

This commercial classification of the limestone will help in grouping and the proper utilisation of limestone deposits.

DISTRIBUTION:

Limestones occur practically in all the stratigraphical horizons in the Gujarat State, in variable quantities and qualities.

ARCHAEOAN

Baroda district has good dolomitic limestones Grades - super (Mg) and I (Mg) near Chhota Udepur, while a group of variegated limestones near Sandara village, and serpentinous marbles (Verde antique) near Chhuchhapura are of value as ornamental stones.

Tremolitic limestones of Gandhara and Poyelli in Panchmahals district, too, are of interest from their mineral assemblage point of view. They may find use in building works.

Magnesian limestone near Bhetali in Sabarkantha district is a good source for the manufacture of 'Natural cement'.

Archaean limestones are nowhere exposed in Saurashtra and Kutch regions.

PURANA

Purana limestones belonging to Ajabgarh Series of Delhi System occur as calc-gneiss, and marbles in the districts of Banaskantha, Sabarkantha and Mehsana. Marbles of Ambaji area are being used for centuries in construction of temples such as at Dilwara (Mt.Abu), Palitana, Girnar, etc. These are of Grades-Super and I.

Crystalline limestones in Banaskantha district at Diwania, Pasuwal, Ganguwada, Khunia, Atal-Mahudi, Karamundi, etc., vary in Grades from I to IV.

Posina-Sandoshi limestones band extending from Sabarkantha to Banaskantha district is of Grade-III, and is important, as it can be utilised in the manufacture of cement.

Calc-gneisses near Vadali, Babsar, and other places in Sabarkantha district are of Grade-IV to VI.

The variation in chemical composition is too large in short distances to make use of the same. However, selective quarrying may facilitate lime manufacture to some extent.

Crystalline limestone near Jitpur in Mehsana district is of Grades-I to III; the deposit is comparatively small.

JURASSIC SYSTEM

The rocks belonging to this system are restricted to the Kutch district only.

Light grey or yellowish limestones and marls, and oolitic and coralline limestones occur in islands of Patcham, Khadir, and Bela in Rann, in Wagad area, and in Jarra, Kira, Jura and Halaman hills.

CRETACEOUS SYSTEM

Limestones among Bagh inliers in Deccan Trap area occur extensively in Narmada valley in Broach and Baroda districts of mainland Gujarat. The thickness of these limestones as seen in a section is over 200 m.

These limestones are mainly of Grade-IV and were investigated quite in detail in areas around Gora-Limdi with a view to establish a cement factory. However, the beneficiation experiments on these limestones indicated that the cost of floatation would be high on account of very fine grained structure of these limestones. The author has recommended to blend these limestones with a chalk, a byproduct from Gujarat State Fertilizer Corporation so as to make use of these limestones in the manufacture of Portland cement.

Lameta limestones, spread over in parts of districts of Kaira, Panchmahals, and Sabarkantha are of Grade-II to VI, however, those of Grades-II and III are limited in quantity.

TERTIARY

Nummulitic limestones of Eocene age occur on the western fringe of Deccan Traps in the Broach and Surat districts of mainland Gujarat. The other extensive deposits of these limestones are there in the western part of the Kutch district.

Kand limestones of Miocene age are found in Kand (Kondh) area near Ankleshwar in Broach district. Small scattered patches of similar limestones belonging to Gaj Beds occur in the coastal area of Saurashtra.

Pliocene limestones among Dwarka Beds (equivalent to Manchar Beds of Sind) occur in Okhamandal area in Jamnagar district of Saurashtra. These are associated with gypsiferous shales.

QUATERNARY

Narrow but long and discontinuous belts of Miliolitic limestones (Porbandar stone) belonging to Pliostocene age along the Saurashtra sea-board for about 300 km form important deposits from the economical point of view.

In Kutch, only small deposits of Miliolitic limestone occur at the foot of Katrol hills, in Wagad region, at Baladia, Jhumka, etc.

Tufa and kankar (a nodular limestone) of Recent age, the extent of which is limited, occur almost in all parts of the State.

A chalk is formed as a byproduct during the process of manufacturing fertilizers in the Gujarat State Fertilizer Corporation near Baroda.

UTILISATION OF LIMESTONES:

The present utilisation of the limestone wealth of the Gujarat State, and their potentialities for future development of industries are summarised in the table No.70, giving their locations, reserves, grades, etc. As seen from this table, it is very clear that there is a good scope for exploiting this natural raw material in establishing and developing wide range of industries, and also to meet the demands of the neighbouring States.

The industries consuming limestones are chemical, steel, glass, paper, soap, rubber, sugar refining, textile, etc.

The flux grade limestone (Grade-I) required for steel plants occur in large quantities in Saurashtra and Kutch areas. With the establishment of several steel plants elsewhere in India, there is

Sr. No.	District	Stratigraphical Horizon	Type of limestone	Location	Reserves in million tonnes	Grade of limestone	Utilisation	
							Present	Recommended
1	2	3	4	5	6	7	8	9
3. Mehsana								
		Delhi System	Crystalline limestone	Jitpur	2.0	I to III	-	Manufacture of building lime.
4. Panchmahals								
		Lameta beds	Limestone	(a) Dohad	6	II, III & IV	Lime manufacture, building stone, guard stones, etc.	Manufacture of building lime, building stones etc. cement plant possible with beneficiation by floatation.
				(b) "	50	IV & V		
				(c) Devgaun Baria	5	IV		
		Champaner series	Tremolitic limestone	(c) Jambughoda	96	Tremolitic	-	Building stone, guards & boundary stones, etc.
					Total	157		
5. Kaira								
		Lameta beds	Limestone	(a) Balasinor	800	II & III - Limited quantity IV to VI - large quantity	One cement factory at Sevalia with 2.30 lakh tonne annual capacity - beneficiation of limestone - floatation and blending, building stones for highways etc.	Lime manufacture, building stone, guard & boundary stones, etc. industry can be expanded.
				(b) Parabha	5	II, III & IV	Building stone.	Can be utilised for blending with Balasinor limestones in Sevalia Cement works.
					Total..	805		
6. Baroda								
		Aravalli System	Dolomitic	(a) Chhota Udepur	1000	Super (Mg) & I (Mg)	Mosaic tile, glass and chemical industries.	Can also be used as ornamental stone.
			Serpentineous	(b) Chhuchha-pura	10	-	Ornamental stone	-
		Present day	Chalk (By-product)	(c) Baroda (G.S.F.C)	0.117/year	II	-	Blending with Gora-Limdi limestone (Broach dist.) for the cement manufacture.

Contd..

Sr. No.	District	Stratigraphical Horizon	Type of Limestone	Location	Reserves in million tonnes		Grade of Limestone	Utilisation	
					Present	Recommended		Present	Recommended
1	2	3	4	5	6	7	8	9	
7.	Broach	Bagh beds	Limestone	(a) Gorch-Limdi (b) Mohhod (c) Vandri (d) Vanji	20 10 50 5	IV and V	(i) Road Metal (ii) Building Lime-very limited.	(i) Can be used for Portland cement with blending of chalk from Gujarat State Fertilizer Corporation, Baroda (ii) In making mosaic tiles. (iii) Building lime-need be expanded.	
		Miocene	Limestone	(e) Kandh	18	III (Fe)	Road material for soling purpose.		
		Eocene	Nummulitic limestone	(f) Dinod-Kanrao area	5	III(Fe) & IV(Fe)		Also building lime manufacture, and using in public gardens for models etc.	
8.	Surat	Eocene	Nummulitic limestone	Tarakeswar area	5	III(Fe) to V(Fe)	Road material for soling purpose.		
				Total	108				
(B) Saurashtra:									
1.	Amreli	Pliocene	Miliclitic limestone	(a) Jafrahad area (b) Kodinar area	169 50	II to IV II	(i) Fine cement factories. Chemical plants	More cement factories can be established and capacities of present plants can be expanded. Chemical, glass, and in other industries like paints, textile etc. Whiting can be made. Also flux grade limestone available. Building stones-Forbandar stone.	
2.	Bhavnagar			Gopnath, Mahuva to Gujarat along sea-coast.	525	II & III	(ii) Building Stone-Forbandar stone.		
3.	Jamnagar	Pliocene Miocene	Marl Coral, marl	(a) Gop, Narara island (b) Dwarka (c) Mithapur	50 20 30	III I Grade-Super			
4.	Junagadh	Pleistocene	Miliclitic limestone	(Veraval, Chorwar, Mangrol Porbandar	100	Super & I			
				Total	944				

Contd..

Sr. No.	District	Stratigraphical Horizon	Type of Limestone	Location	Reserves in Million tonnes	Grade of Limestone	Present	Utilisation	Recommended
1	2	3	4	5	6	7	8		9
	(C) <u>Kutch</u> :	Eocene	Mammulitic limestone	(a) Lakhtpat Dhedha, Fulra, Koriyani, Mori, Vaghapadar Ramania, etc.	7765	I & II		Chemical industries, flux glass limestone, glass, paints, textile industry, caustic soda manufacture, sugar refining, disinfectant.	
		Pleistocene	Milicilitic limestone	(b) Katrol hills Wagod region Baladia Jhunka	15	?	Building stone	Also building lime manufacture.	
Total..					7780				

always an acute shortage of this quality of limestone, and thus, Gujarat can spare the same for these steel plants. The limestone can be transported by sea route to these steel mills, as it is favourably located along the sea coast.

There is a need of conserving limestones of Grades-Super and I for their proper, legitimate and judicious use. Jhingran (1965) has rightly pointed out that it is very shocking to see that large quantities of pure, flux-grade limestone with as little as 2 to 4 percent insolubles being calcined in a cement kiln, while some of the steel mills are obliged to be contended with material containing 5 to 6 percent insolubles, i.e. nearly one and a half times as much as the quality control would permit.

The work on limestones reveals that this important industrial raw material is available in various parts of Gujarat State in a sufficiently large quantities, and thus, it is imperative to make its use for development of industries for prosperity.