

Natural resources of Southern Khyber Pakhtunkhwa and FATA regions (Kohat sub-basin and part of northern Sulaiman Basin and Western Indus Suture), Pakistan: A review

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The Mesozoic and Cenozoic tectonics orogeny and geodynamics of Indo-Pakistan subcontinent (Khan et al. 2003; Malkani 2011) is responsible for the existence of economic mineralizations. The reported area includes different tectonometallic and sedimentary basins like the Kohat sub-basin (western Upper Indus basin), northern Sulaiman basin (upper part of Middle Indus basin and northern part of western Indus Suture). The mineral resources of Kohat sub-basin and adjoining **western Indus Suture** include **uranium** from Parachinar (Kurram Agency), Qabul Khel (Bannu Basin); **fire clay** from Paniala (D.I.Khan); **silica sand** from Nowshera and D.I.Khan; **rock and potash salts** from Eocene Bahadur Khel Salt Formation in Kohat and Karak; **bituminous alum shale** from Jatta and in a gorge near Dozha Banda in Kohat area; **antimony** from Zaimukht hills of Kurram valley; **chromite** from Boya (Waziristan); **talc/soapstone** from Kharwala Nala (Gujarghuna; Sufaid Koh-Parachinar; Kurram Agency); **copper** from Shinkai (Boya) and Mami Rogha Waziristan; complex, multiphase, ophiolite associated massive sulphide (Boya, Mami Ragma and Spin Kamar in Waziristan); Gujarghuna Parachinar (Kurram) Agency; **asbestos** from Boya and Kaniguram (Waziristan); **gypsum** from Lachi, Mamikhel, Jatta, Bahadur Khel and Panoba of Karak and Kohat, Saiduwali, Paniala, Domanda and Drazinda (D.I.Khan); **sulphur** from Kohat (Panoba, Jatta and Dandi); **iron, laterite and bauxite** from Mazari Tang and Marai Bala (Kohat), Samana Range 16km from Hangu, Nizampur and Pezu; **manganese ore** from Thal, Shinkai Waziristan; **bentonite** from Karak; **decorative limestones/marble, dolomite, cement, construction, dimension stones** deposits from Kohat-Karak and Khisor ranges and **coal** from Hangu, Cherat, Dara Adamkhel and Karak areas.

The mineral resources of **northern Sulaiman basin** (Shirani area, F.R. D.I.Khan) represents **millstone** from the hard and compact quartzite/sandstone of Pab formation; various types of **clay deposits** from Chamalang/Ghazij, Kahan and Vihowa groups; thick immense reserves of **fuller's earth** expected in Domanda and Baska formations; **silica sands; ochre, limonite, iron, fire clay** from Chitarwata, Rakhi Gaj, Vitakri, Drazinda formations and Vihowa group; **phosphate, uranium/metatuyamunite** in the coal and sandstone bearing formations like Mughal Kot, Pab, Vitakri, Sangiali, Rakhi Gaj, Toi and Kingri formations and Vihowa group; expected **uranium and iridium** anomalies in the Cretaceous-Tertiary/K-T boundary laterite, muds and coal especially in the Vitakri Formation; Paleocene Dungan **limestone as marble; coal; and huge cement raw materials** like limestone, clays/shale and gypsum. The Shirani area shows huge deposits of easily minable (200m depth to exposed surface) **limestone** which are being estimated as round about 58 billion tons with breakup as Jurassic 50 billion tons, Cretaceous 1 billion tons, Paleocene 2 billion tons, and Eocene 5 billion tons; vast resources of **clays/shale** in the Cretaceous Sembar, Goru and Mughalkot formations, Paleocene Rakhi Gaj, Eocene Shaheed Ghat, Toi, Kingri, Drug, Baska, Domanda and Drazinda formations, Oligocene Vihowa and Chaudhwan formations, etc. show huge deposits of easily minable (200m depth to exposed surface) shale estimated as round about 511 billion tons with breakup as Cretaceous 10 billion tons, Paleocene 1 billion tons, Eocene 400 billion tons and Oligocene-Pliocene 100 billion tons. The present investigations represent 3 billion tons **gypsum** estimated (surface and subsurface) deposits from Shirani areas of D.I.Khan district and 0.1 billion tons expected further north from South Waziristan. Easily minable

(upto 50m depth) resources of gypsum are 77 million tons (mt) in D.I.Khan (Khyber Pakhtunkhwa) and about 5 mt in South Waziristan (FATA). The quality of Sulaiman gypsum is good as impurities are less. The chemical analyses of Baska gypsum show that CaO content varies from 29.44 to 33.65%, SO₃ from 44.65 to 47.78%, H₂ O from 16.30 to 18.99% and other impurities are less than 2%. There are 12-15 beds of gypsum in Baska Formation of Chamalang (=Ghazij) group with cumulative thickness of 20 to 25 metre. Main environments of gypsum beds show platform type supratidal environments. Considering 50 meters very easy mining depth, the Mughalkot-Ragha Sar-Khowara Khel (D.I.Khan) gypsum deposits show 44 mt and are located on western limb of Drazinda syncline and accessible from D.I.Khan. Domanda-Drazinda-Drabin (D.I.Khan) gypsum deposits show 33 mt and are located on faulted eastern limb of Drazinda syncline and accessible from D.I. Khan, while South Waziristan gypsum deposits may show about 5 mt which are the extension of Shirani gypsum and are located on foothills of eastern Sulaiman foldbelt and accessible from D.I.Khan. The deposits of gypsum and cement resources of Shirani areas of northern Sulaiman foldbelt are feasible due to availability of inexhaustible gypsum and cement resources, and favorable central locations in Pakistan. Further its suitability will be strengthened by the close occurrence of cement raw materials which will be provided to industry by belts and not by trucks. Vast areas of saline land in Khyber Pakhtunkhwa and Pakistan can economically be made productive again.

The water and agricultural land resources of the D.I. Khan, Laki Marwat, Karak, Bannu (North Waziristan) and Tank (South Waziristan) areas are too much but needs its utilization. Surface water resources wasting as flood suggests for small dams constructions which hold its vast plain and barren areas. Further exploration in southern areas of Khyber Pakhtunkhwa is promising for celestite in Eocene limestone, fluorite and trackways of reptiles (dinosaurs, pterosaurs, crocodiles, etc) and birds in Jurassic Chiltan, Loralai and Samanasuk limestones due to vicinity occurrences. The inexhaustible deposits of construction and dimension stone resources are found in areas. Petroleum developments in northern Sulaiman foldbelt and Kohat sub-basin are also encouraging. In short, Khyber Pakhtunkhwa and FATA may be a prince or pauper with respect to development of his natural resources. The natural resources like mineral, petroleum, vertebrate fossils (dinosaurs, whale, Baluchitheria, etc), solar, forest, wind, water, land, agriculture, etc can play significant role for the development of southern Khyber Pakhtunkhwa and FATA, and ultimately for Pakistan.

References

- Khan, M.A., I.A. Abbasi, A.W. Qureshi and S.R. Khan. 2003. Tectonics of Afghan-India Collision zone, Kurram-Waziristan region, N. Pakistan. ATC 2003 Conference and oil Show, 3-5 October, Islamabad, Pakistan, 1-15.
- Malkani, M.S. 2011. Stratigraphy, Mineral Potential, Geological History and Paleobiogeography of Balochistan Province, Pakistan. *Sindh University Research Journal (Science Series)*. 43 (2), 269-290.