

Geospatial Analysis of Afghanistan Gemstone Production Under the Taliban

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AFGHANISTAN



Latest



Increased
gemstone
mining activity

Impact



Taliban source
of hard currency
from gem
mining

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US withdrawal from Afghanistan in 2021, the current mining situation has not been broadly covered in open reporting. Gemstone deposits may be a lucrative source of income for the new Afghan government. This project, through geospatial analysis, assesses baseline and historical changes to major gemstone mining sites to find out if mining has increased, decreased, or stayed the same and establishes a monitoring protocol for future research.

Location of the Mines

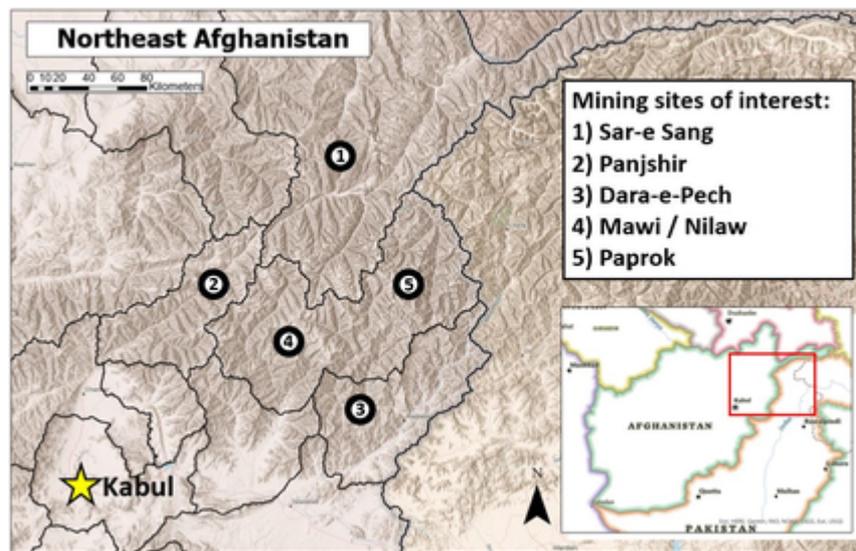


Figure 1: Overview of selected mining sites in Afghanistan – ESRI ArcGIS Pro

Critical Intelligence Questions

- What is the current status of activity in mining areas?
- Has mining activity increased, decreased, or stayed the same?
- What changes in local infrastructure can be observed?
- What changes in the population of local villages can be observed?
- What evidence of increased military activity can be detected near the sites?
- What indications of recently mined material making its way to global markets can be detected through social media, open reporting, or

other sources?

Executive Summary

What is the current status of activity in mining areas?

Four of five mining areas observed with recent imagery show active mining or newly constructed mining infrastructure.

Has mining activity increased, decreased, or stayed the same?

In four of five mining areas, mining activity has increased. At Sar-e-Sang at least one new mine portal has been opened. At Panjshir there are extensive new spoil piles and diggings. At Mawi there are new tailings. At Dara-e-Pech there are several growing spoil piles.

What changes in local infrastructure can be observed?

Mining infrastructure has visibility increased at four of five recently observed sites. At Sar-e-Sang there are several new mining buildings near mine portals. At Panjshir there are dozens of new mine buildings and a fenced-in structure near the village that may be mining related. At Mawi there are over a dozen new mine buildings and several restored buildings. At Dara-e-Pech there are foundations for new buildings.

What changes in the population of local villages can be observed?

There are local villages near four of the five recently observed sites, and three of those four villages show new additions and buildings, suggesting an increase in population. Moreover, this growth signals increased local wealth from mining. At Sar-e-Sang there are several buildings with new roofs, one completely new building, and one large building was razed. The changes suggest that people are planning to move into the village for year-round residency. There are also more vehicles in the town,

suggesting increased population and wealth. At Panjshir there are additions to several buildings, a new mosque, approximately double the number of new cars, and construction equipment. This suggests both an increase in population and an increase in local wealth.

What evidence of increased military activity can be detected near the sites?

There are no GEOINT signs of increased military activity. Gandhara, an Afghanistan-focused news site associated with Radio Free Europe reported in February 2022 that Taliban fighters were visiting emerald mines to see if new miners might be former police and military.¹ However, this was not observed on available imagery, nor are there obvious roadblocks or tolls present.

What indications of recently mined material making its way to global markets can be detected through social media, open reporting, or other sources?

Material from Afghanistan continues to make its way to world markets via Pakistan and can easily be found on Instagram, eBay, and at trade shows.



Note the province in Afghanistan listed, Pajnsheer.

Background

Afghanistan has been a source of gemstones for thousands of years. Through all the conflicts and changes in the past several decades, gemological minerals continue to be mined at many sites, often with proceeds going to various militant groups ranging from the Mujahideen, to local warlords, and the Taliban.^{2, 3} With the US withdrawal from Afghanistan in the summer of 2021, the country is once again in a state of change and its economy has been negatively impacted. The United States froze billions of dollars of Afghan government funds, which reduced the new Taliban government's ability to operate.⁴ Additionally, the Taliban have frozen all foreign currency exchange for Afghan citizens. This decision will increase commodity sales for income and taxation. The majority of foreign aid and World Bank-funded projects have ceased.⁵ With increasing poverty and a shortage in funds, it is likely that both the Taliban and citizens will look to lucrative gemstone mining (which could provide hundreds of millions of dollars a year) as a source of income.

Baseline and analysis of the sites

Sare-e Sang

Badakhshan Province, Afghanistan

Geo: 36.211, 70.801

Elevation: settlement at 2400 meters, mining sites at 2500-2750 meters.

Mining season: June to November, though may be longer if there are warmer temperatures

Production: Lapis Lazuli



Figure 1.0: Overview of Sar-e Sang - Copyright Maxar - 2022-04-15

Historical background

Sar-e Sang is the world's main mining site for the famed blue stone Lapis Lazuli and is likely the longest continuously mined site in the world, mined for over 9000 years. In recent times, the mines were controlled by whoever controlled the region. During the Soviet invasion from 1979 to 1989, the site was controlled by the Mujahideen where Lapis was taken by mule to Pakistan to be sold to raise money for weapons.⁶ When the Taliban took over the country in 1989, the site was controlled by anti-Taliban groups who continued selling Lapis Lazuli via Pakistan to raise funds.⁶ During the US war in Afghanistan from 2001 to 2021, control of the mines was mostly under regional warlords, although there were efforts made to create a more legitimate domestic market.⁶ In 2013, the Lajwardeen Mining Company won a contract to mine the site but was expelled by local militia in 21 days.⁷ The production was estimated to be worth \$125 million a year in 2014 and local militias were making up to \$18 million a year from leases and tolls, and splitting the proceeds with the Taliban.⁸

Mining information

Lapis Lazuli occurs as blocks in marble layers that run for several kilometers north-south to the east of the Kokcha River. Most of the mining occurs near the settlement of Sar-e Sang. The mining occurs as small 2-3-meter-wide adits dug into cliff faces. These lead no more than a hundred meters into the mountains due to a lack of ventilation. Dynamite is the preferred method of excavation when available. Sometimes generators are used to power drills. Miners carry freshly dug Lapis Lazuli on their backs down to the village, which is later transported by mules or vehicles.⁹ Material excavated from tunnels is tossed out of the portals, forming light-colored “tailings” which are visible in imagery (See Figure 2.1). Fresh tailings can be used as a way to monitor new mine activity. Mining portals are difficult to observe unless imaged at the right time and angle.

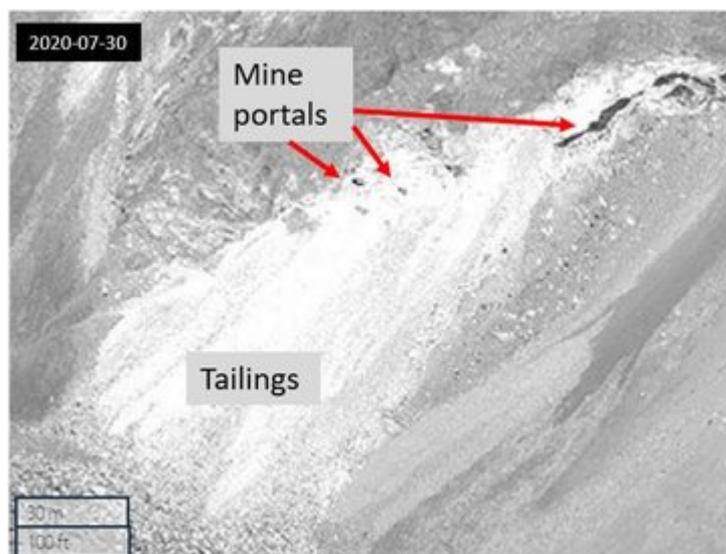


Figure 2.1: Example of mine tailings coming out of mine portals in the cliffs from 2020-07-30 (36.21113, 70.80256) Copyright Maxar

Mining baseline

It is difficult to establish a baseline regarding the number of active mines because both active and abandoned mining portals are scattered throughout the mountain. In 2013, it was reported that there were 23 active mines in the area.¹⁰ From imagery prior to 2021, new tailings and mine portals were observed. Between 2017 and 2021, one new tailings pile and two areas of active mining were observed (See Figure 2.2). There

is little visible mining infrastructure in the imagery although at one mining site to the south of the village there appear to be rudimentary stone structures (See Figure 2.3).

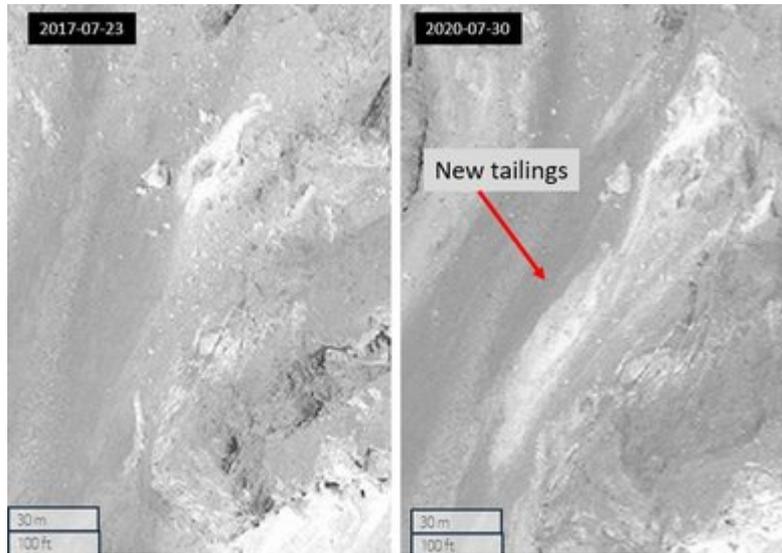


Figure 2.2 Example of mine tailings formed from new material pulled from a mine between 2017-07-23 and 2020-07-30 (36.21199, 70.80153) - Copyright Maxar



Figure 2.3: Example of mining-related buildings at the south mine area (36.20307, 70.802) Copyright Maxar 2022-04-15

Village baseline

It is unknown if Sar-e Sang has a permanent population. There are hundreds of small buildings in the village but the majority are in disrepair. Roof collapses are common and often not repaired (see Figure 2.4).

Imagery analysis up to 2021 showed one to four vehicles present in the village (see Figure 2.5).



Figure 2.4: Example of an area of the village where roofs have collapsed between 2017-07-23 and 2020-07-09 (36.20955, 70.79276) Copyright Maxar



Figure 2.5: Example of a vehicle, likely a car, on 2020-05-19 (36.20827, 70.79107) Copyright Maxar

Mining changes

In the south mine area (36.203, 70.802), several metal roofed buildings were constructed between 2020-05-19 and 2021-10-28. At that time a new mining portal was observed in the same area (See Figure 2.6). In the north mine area (36.211, 70.801), a new building measuring 4 x 3 meters was observed in imagery by 2021-04-15 (See Figure 2.7). The presence of

buildings at both mining sites is new for this area. The buildings may have multiple purposes: security to lock up finds, shelter so that miners do not have to traverse up and down the mountain daily, or to prolong the mining season by providing shelter.

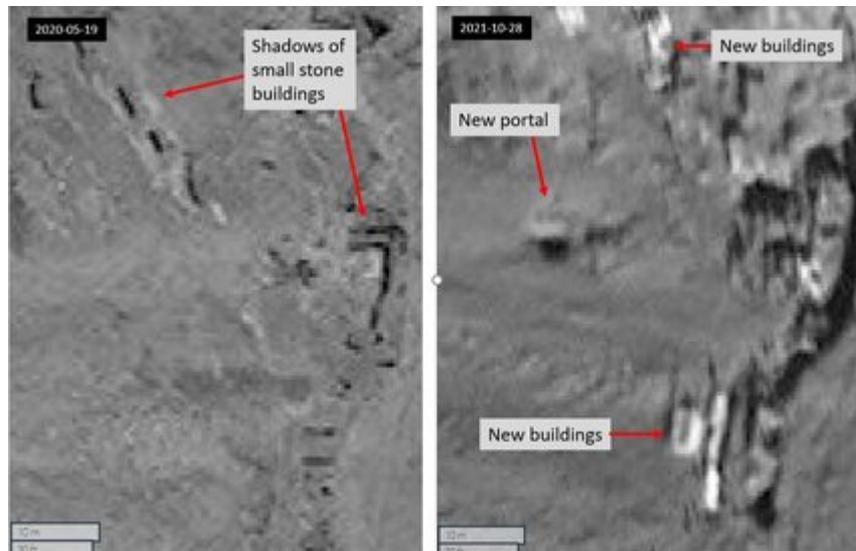


Figure 2.6: New buildings and a new portal constructed between 2020-05-19 and 2021-10-28 (36.203, 70.802) - Copyright Maxar



Figure 2.7: New mine building measuring 3 x 4 meters observed in imagery from 2022-04-15 (36.211, 70.801) Copyright Maxar

Town changes

The number of vehicles observed in town increased significantly in 2021/2022, ranging from five to thirteen vehicles of varied types and sizes (see Figure 2.8). Between 2021-12-10 and 2021-04-15, new roofs were

erected on several older buildings and a 13-meter building was constructed on the north side of the village (see Figure 2.9). On the south side of the village, a 20 x 20 meter building (36.208, 70.791) was torn down sometime between 2020-07-30 and 2021-10-28 (see Figure 2.10). This building was one of the larger ones in town and had stood for more than five years. It was also the largest metal-roofed building in town. The restoration of roofs and construction of new buildings during the winter season suggests that people are considering Sar-e Sang for year-round residency rather than just the mining season. It is not known what the large metal-roofed building was used for or why it was torn down, but four large trucks were parked where the building stood on 2021-10-28 and may have been used to haul off materials.



Figure 2.8: Multiple vehicles observed on 2022-04-15 (36.20915, 70.7923)
Copyright Maxar



Figure 2.9: A new building and a restored roof constructed between 2021-12-10 and 2022-04-15 (36.211, 70.79353) Copyright Maxar



Figure 2.10: Large metal roofed building removed between 2020-07-30 and 2021-10-28. Several large trucks are parked at the site on 2021-10-28 (36.208, 70.791) Copyright Maxar

Panjshir

Panjshir Province, Afghanistan

Geo: approximately 35.42839, 69.8072, running northeast and southwest on the east side of the Panjshir river

Elevation: settlements at 2200-2450 meters, mining sites at 2750-3000 meters.

Mining season: May – October for higher elevations, longer at lower elevations

Production: Emeralds



Historical background

The emerald deposits of Panjshir were discovered in the 1970s in the mountains east of the Panjshir river valley. Much of the mine ownership has revolved around tribal and family lines.¹¹ The villages of Khenj and Mikenj were "boomtowns" that supplied the labor for mining in the nearby mountains.¹² In 2016, CNN reported that Afghanistan sold about \$50 million in emeralds.¹³ In 2018, the gemstone industry estimated over \$100 million in emeralds was exported from the country.¹⁴ The valley itself was a stronghold for resistance fighters and withstood the Soviet invasion of the 1980s and the Taliban in the 1990s. With the US withdrawal in the summer of 2021, the Taliban seized Kabul, and resistance fighters gathered in the Panjshir valley as a holdout location. This was the last province to fall to the Taliban in September of 2021.¹⁵ Emerald mining continued after the resistance ended and many former combatants and policemen became miners in the area.¹⁶

Mining background

The emerald deposit covers an area of approximately 150 square kilometers, running northeast and southwest on the east side of the Panjshir River. In earlier decades, mining was accomplished with hand tools, dynamite, and hand-powered drills. This created narrow horizontal adits up to 50 meters into the mountain.¹⁷ In more recent decades, the mining techniques have modernized slightly with the use of excavators to create trenches and small open-pit mines. As of 2014, the Afghan government claimed all ownership of mining land and production rights but did not establish regulatory frameworks.¹⁸ When snow closes the digs at the higher elevations, miners work at lower elevations or sift through previously excavated rock for overlooked specimens.¹⁹ With the new Taliban rule as of fall 2021, dynamite for mining was no longer legal for purchase which makes mining more difficult.²⁰

Mining baseline

There are numerous mines and small-scale diggings throughout the mountain ranges. Mining portals are difficult to see on imagery, but the resulting tailings and spoil piles are easily recognizable on imagery. Likewise, trails going up to mining sites are also visible on imagery. One of the more notable aspects of Panjshir mining is the buildings constructed near the mine portals; these several-meters long rectangular buildings are built from rocks removed from the mines. (see Figure 3.2) These buildings are used for shelter and are usually close to mine portals. An examination of one area of mining (35.424, 69.787 - dubbed Site A) of approximately 0.125 square kilometers shows approximately six buildings built between 2017-08-02 and 2019-07-20 (see Figure 3.3).



Figure 3.2 Example of mining area with mine buildings and spoil piles. 2019-07-20 (35.42239, 69.78672) Copyright Maxar



Figure 3.3: Site A changes over time. Top image from 2017-08-02 shows tailing piles and road. Middle image from 2018-09-08 shows new mining buildings. Lower image from 2019-07-20 shows new buildings and excavations (35.424, 69.787) Copyright Maxar

Village baseline

Change in the larger towns of the Panjshir valley is constant. Therefore, it is more difficult to establish baselines. For example, the nearby Khenj district has a [population](#) of approximately 110,000 people.²¹ It was more manageable for this project to establish baselines for villages in small valleys closer to mining areas, for example, in the village of Deh Mikeni (35.42786, 69.80563). From 2017-2019 there were approximately 18 building complexes in the village, with only one new building constructed during that timeframe. The number of vehicles in the village ranged from three to six. There were also five to six half-sized containers in the village, which may have been used for storage or as small shops for mining supplies (see Figure 3.4).



Figure 3.4: Part of the village of Deh Mikeni from 2019-07-20 (35.42803, 69.80554) Copyright Maxar

Mining changes

Accessible imagery was limited between 2019-07-20 and 2021-10-31, but significant change was noted in the number of mining buildings and spoil piles. At Site A, the number of mining buildings went from seven in imagery from 2019-07-20 to over 64 in imagery from 2021-10-31. Likewise, there were many new spoil piles in the area (see Figure 3.5). While the imagery coverage cannot help note exactly when this increased activity occurred, it does show a substantial increase in mining activity compared to the baseline noted above.



Figure 3.5: A dramatic increase in mining buildings and spoil piles at Site A from 2019-07-20 to 2021-10-31 (35.424, 69.787) Copyright Maxar

Village changes

The village of Deh Mikenî experienced construction expansion from the period 2019-07-20 to 2021-10-31. The total number of buildings remained the same but many of the building complexes gained new additions and one small house was removed. A new mosque was constructed in the village during this time. On the northeast side of the village, there is an unusual excavation where part of the hillside was excavated then the material was hauled to a newly constructed walled-in area. Another new excavation is present on the southeast side of the village. The number of half-sized shipping containers in the village has increased (Figure 3.6). Thirteen cars were present in the village, more than double than previously observed. All vehicles were parked in a large parking area near the mosque (2021-10-31 was a Sunday, most mosque attendance is on Fridays).



Figure 3.6: Changes in Deh Mikenî between 2019-07-20 to 2021-10-31 (35.42786, 69.80563) Copyright Maxar

Additional notes

Fifteen kilometers to the southwest of the main emerald mining locations, some unusual excavations (35.35677, 69.61188) were observed in 2021. For example, a graded road threaded its way through four large excavations. Each excavation has four square pits set into a larger square

footprint (see Figures 3.7 and 3.8). These may not be related to mining but they are significantly large for the area and in the same mountain range as the emerald mines.

Another unusual excavation (35.36949, 69.6513) was observed by October of 2021. A well-graded road leads to a new excavation area (see Figure 3.9). This is 10 kilometers southwest of the main emerald mining sites, in the same range, which may be mining related. The rapid construction timeline and the well-cleared appearance of the road are notable and should be analyzed further from this initial baseline detection.



Figure 3.7: an overview of the unusual excavations at (35.35677, 69.61188) from 10/31/2021. Copyright Maxar



Figure 3.8: Closeup of one of the square areas of the excavations from 2021-10-31 (35.35677, 69.61188) Copyright Maxar



Figure 3.9: Unusual road construction and digging activity on 2021-10-07, 2021-10-19, and 2021-10-31 (35.36949, 69.6513) Copyright Maxar

Dara-e-Pech

Kunar Province, Afghanistan

Geo: 34.952, 70.818

Elevation: 1200 meters

Mining season: Year-round

Production: Spodumene (Kunzite), Morganite, Tourmaline



Figure 4: Overview of the Dara-e Pech mining area on 2022-04-15 (34.952, 70.818) Copyright Maxar

Historical Background

Tourmaline and kunzite were first found in the hills of the Pech Valley in 1959 and soon locals were collecting the crystals and selling them in street markets in Kabul. In the mid-1980s, specimens from the area started showing up in European and American mineral shows and began

entering collections.²² Some of the finer specimens from the site sell in the four-to-five-figure range to collectors with one of the finer specimens valued at \$250,000.²² In 2013, political instability slowed mining down in the area. However, in 2015, the government claimed all mining rights.²²

Mining background

There are multiple mines in the Pech valley with the majority located at lower altitudes near villages and the remainder located higher on ridge lines. Several of the mining areas have 20 or more tunnels that can span over 300 meters. Open reporting suggests that the mine lacks proper equipment and safety precautions.²³ Imagery shows tailings, spoil piles, and buildings near the mines.

Mining baseline overview

Mining activity is concentrated in the north mine area (34.953, 70.81973) and the south mine area (34.95166, 70.81869). Between 2017-08-24 and 2020-10-24 at the north mine, one new building complex was constructed and several additions were added to existing buildings. Two spoil piles grew larger during this time (see Figure 4.1). Moreover, five new buildings were built at the south mine and two new spoil piles formed (suggesting new mine portals), while two existing piles grew by up to five meters (see Figure 4.2).



Figure 4.1 New buildings and growing spoil piles at the North mine between 2017-08-24 and 2020-10-24 (34.953, 70.81973) Copyright Maxar



Figure 4.2: Many new buildings, new spoil piles, and growing spoil piles at the South Mine between 2017-08-24 and 2020-10-24 (34.95166, 70.81869) Copyright Maxar

Village baseline

There is a village 500 meters to the north of the mines with many buildings measuring up to 40 meters across. Between 2017-08-24 and 2020-10-24, the number of buildings in the village increased by three, the largest of which was 40 meters long (see Figure 4.3). Many buildings in the village also added additional rooms or new roofs during this time. There were one to three vehicles observed in the village (see Figure 4.31).



Figure 4.3: New buildings were constructed in the village near the mines from 2017-08-24 to 2020-10-24 (34.95408, 70.81479) Copyright Maxar



Figure 4.31: Example of a vehicle in the village on 2017-08-24 (34.95434, 70.81441) Copyright Maxar

Mining changes and analysis

It was noted in the baseline that from **2017** to **2020** there was continuous mining activity at the north mine area. However, between **2020-10-24** and **2021-09-12** there was limited change to the north mine area. The spoil piles at the north mine do not appear to have increased in size, indicating little or no new mining. The only new infrastructure is a newly constructed fenced-in area that may be used for securing materials. A small pit was excavated on the east side of the north mine and could be a test pit for future mining (see Figure 4.4).



Figure 4.4: A new pit and a new fenced in area built at the North mine between 2020-10-24 and 2021-09-12 (34.953, 70.81973) Copyright Maxar

In contrast to the north mine, mining activity at the south mine continued from **2020** to **2021** as indicated by the growth of multiple spoil piles, including one that increased by five meters in length. Furthermore, between **2021** and **2022**, spoil piles continued to increase in size, indicating continued mining activity (see Figure 4.5). At least one new building is under construction near these mines by early 2022. Additionally, a gridded structure was built on top of one of the largest spoil piles which could be solar panels (see Figure 4.6).

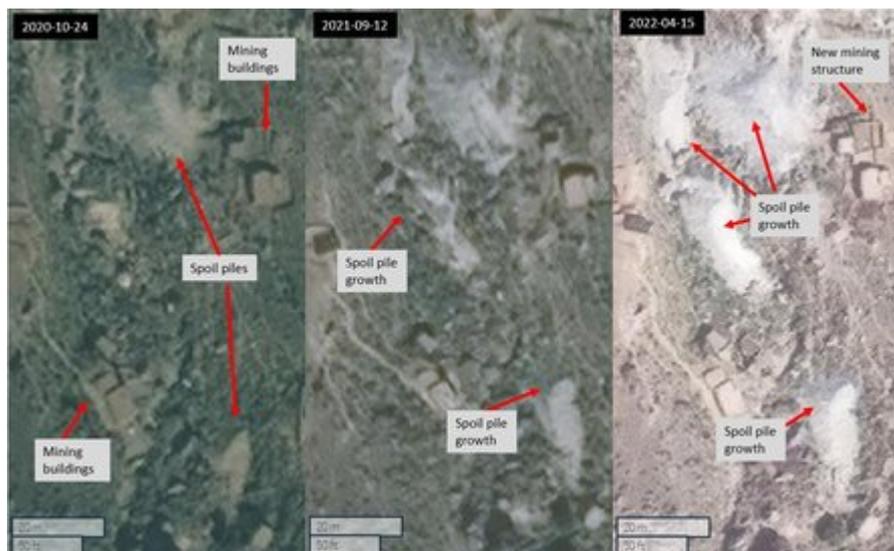


Figure 4.5: Spoil piles increased in size at the South Mine from 2020-10-24 to 2021-09-12 to 2022-04-15. New mining infrastructure was also built (34.95126, 70.81862) Copyright Maxar



Figure 4.6: Growing spoil piles and new structures that may be solar panels at an area of the South mine from 2021-09-12 to 2022-04-15 (34.95174, 70.81861) Copyright Maxar

Village changes

Between **2020-10-24** and **2021-09-12**, no new buildings were constructed. However, three buildings were expanded. The number of vehicles observed during the timeframe remained the same, three. From **2021-09-12** to **2022-04-15**, new construction included three new roofs and the foundation for two additions (see Figure 4.7). GEOINT suggests the town is continuously expanding its existing buildings, which suggests income generated from the nearby mines.



Figure 4.7: Construction and additions on buildings from 2021-09-12 to 2022-04-15 (34.95419, 70.81488) Copyright Maxar

Mawi

Nuristan Province, Afghanistan

Geo: main Mawi mine at 35.201,70.335, Kolum mines toward the northeast at 35.20789, 70.34902

Elevation: 2000 meters

Mining season: likely year-round

Production: spodumene (kunzite), morganite, tourmaline



Figure 5.0: Overview of the Mawi and Kolum mining area 2022-04-15 (35.201, 70.335) Copyright Maxar

Historical background

The Mawi pegmatite is part of an area with several gem-bearing pegmatites discovered by Soviet geologists in the 1970s. The Soviets hired local men to search for lithium, cesium, and other elements for military purposes.²⁴ The Mawi pegmatite measures 1.5 kilometers long and contains pockets of giant kunzite crystals that can yield tons of material per pocket. Thousands of kilograms of kunzite can be extracted annually. This kunzite is cut and shaped then sold to collectors.²⁴ Approximately 1.5 kilometers away from Mawi is another site called the Kolum pegmatite which also yields various crystals for collectors.²⁴ Crystals from Mawi and Kolum sell for thousands of dollars on the collector's market.²⁵

Mining background

Open reporting is limited regarding the mining background outside the core drilling and blasting under the direction of the Soviets in the 1970s.²⁴ Ground photography²⁶ suggests current mining likely consists of various adits with white crystalline tailings and spoil piles outside of the adits. Electrical wiring is noted extending into one of the audits in the ground photography, which is likely providing electricity for power tools and lighting.

Mining baseline

From 2018-04-30 to 2019-07-31, the majority of the buildings near the main Mawi mine deteriorated or were destroyed. However, two or three buildings were rebuilt or had roofs restored (see Figure 5.1). Limited spoil pile and tailings growth suggest limited mining activity. No vehicles were observed in the imagery. At the Kolum mine, some buildings were observed but the low imagery resolution makes it difficult to identify any changes to the buildings. There is one new mine tailing indicating new mining activity during this time period (see Figure 5.2). There are no significant nearby villages to help establish a village baseline.

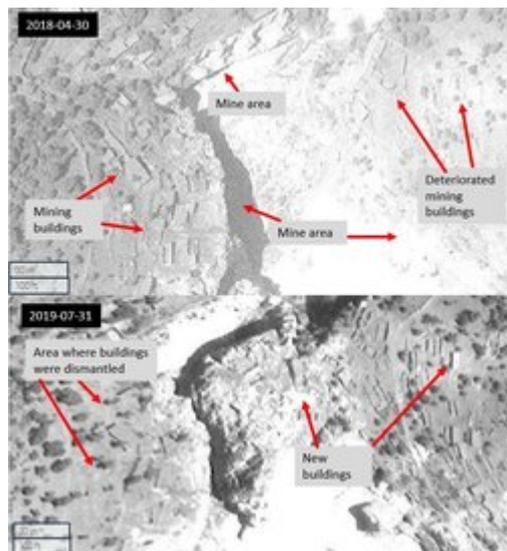


Figure 5.1: The main mining area at Mawi showing many buildings being dismantled and a few new ones built between 2018-04-30 and 2019-07-31 (35.20357, 70.33518) Copyright Maxar

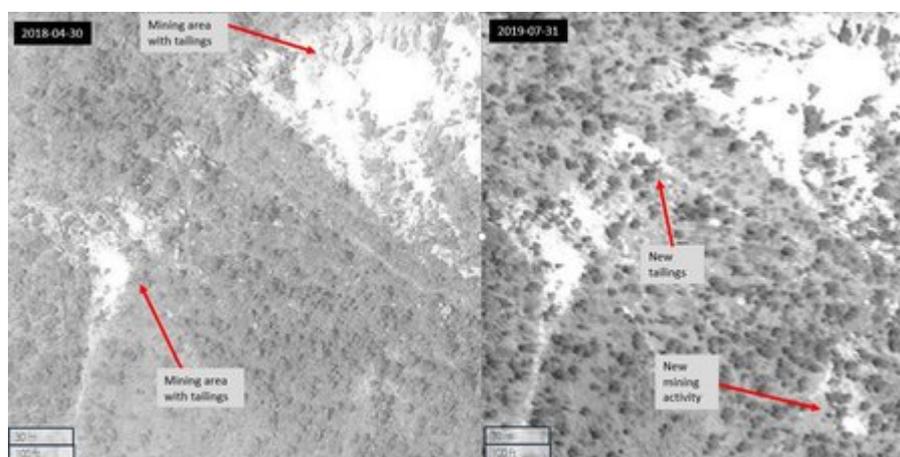


Figure 5.2: New tailings and mining activity appearing at the Kolum mine between 2018-04-30 and 2019-07-31 (35.20711, 70.34866) Copyright Maxar

Mining changes and analysis

Between **2019-07-31** and **2021-09-05**, substantial change was observed. By 2021, a graded road leading up to the Mawi mine and four vehicles parked near the top of the mine were observed. Four new buildings were built or restored, with construction started on several others (see Figure 5.3). Several new tailings formed on the south side of the Mawi mine and also toward the Kolum mine, indicating new mining activity. At the Kolum mine, new clearer imagery showed several deteriorated buildings next to the main mining area (see Figure 5.4).

Building activity greatly accelerated between **2021-09-05** and **2022-04-15** at both mines. At Mawi over 16 buildings were built in those months and foundations were laid for several more (see Figures 5.5). Several new tailings indicate new mines (see Figure 5.6). At Kolum, three new buildings were built in those months and three old buildings were rebuilt with new roofs. Some of the mine tailings have expanded, indicating that there is new mining activity (see Figure 5.7).



Figure 5.3: Between 2019-07-31 and 2021-09-05 several buildings roofs were restored while some other building's roofs collapsed, there are also now several vehicles in imagery (35.20403, 70.33578) Copyright Maxar



Figure 5.4: Deteriorated buildings at the Kolum mining area seen in imagery from 2021-09-15 (35.20828, 70.34944) Copyright Maxar



Figure 5.5: Over a dozen new buildings erected at the Mawi site between 2021-09-05 and 2022-04-15 (35.20318, 70.3341) Copyright Maxar



Figure 5.6: New mining activity and tailings between 2021-09-05 and 2022-04-15 (35.19968, 70.33673) Copyright Maxar



Figure 5.7: New buildings, restored roofs, and expanding mine tailings at the Kolum site from 2021-09-08 and 2022-04-15 (35.20817, 70.34932) Copyright Maxar

Paprok

Nuristan Province, Afghanistan

Geo: 35.62354, 71.16068

Elevation: 4400 – 4600 meters

Mining season: September to November or between snow season

Production: tourmaline

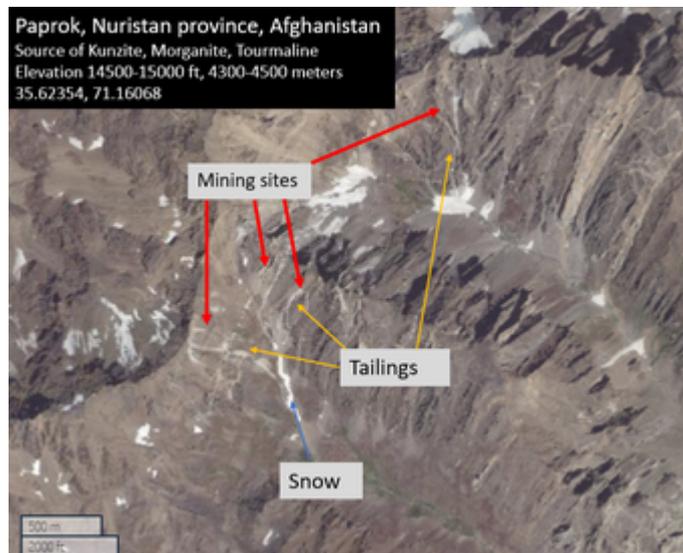


Figure 6.0: Overview of the Paprok mining area 2019-09-18 (35.62528, 71.16789)
Copyright Maxar

Historical background

Fine tourmaline crystals were first discovered in the mountains northwest of the village of Paprok in 1969. Following the initial discovery in the 1970s, large tourmaline crystals from the area started reaching western collectors and mineral dealers. The entire area is mountainous with peaks reaching up to 5800 meters. The nearest village is Paprok, approximately 16 kilometers from the mining area. Production at the site depends on the weather and the availability of dynamite.²⁷ It is unknown if recent bans on dynamite sales have affected mining because there are no reports from the area since 2017 and there is no usable imagery more recent than 2019. Tourmaline crystals from the site are in demand and can reach the [low five figures collector's markets](#).²⁸

Mining background

The mines consist of adits excavated into cliffsides. Some of the tunnels can be over 200 meters long. Approximately 100 people work in teams and often live inside the mines for up to 10 days at a time.²⁹ Little has been written about mining at the site since 2017 but according to mineral experts, there could be as many as 300 individual mines in the area.³⁰

Baselines

It was difficult to establish a baseline because harsh weather impacted imagery analysis. Most of the accessible imagery was taken during suboptimal seasons: snow covers the mountains for approximately nine months out of the year with cloud cover often impacting analysis. Snow can remain in gullies and valleys almost year-round, which can be confused with white crystalline mine tailings. In imagery from 2019-09-18 there are eight large mine tailings and numerous smaller tailings leading to possible mine portals (see Figure 6.1). At one location (35.63577, 71.17266), a probable mining area was expanded between 2017-09-28 and 2019-09-18 (see Figure 6.2). Imagery was not available for analysis after 2019-09-18.



Figure 6.1: Example of mines and tailings in the Paprok area from 2019-09-18 (35.62328, 71.15916) Copyright Maxar



Figure 6.2: Mine with tailings, showing possible expansion of mine, but may be an artifact of steep terrain and camera angles, from 2017-09-28 and 2019-09-18 (35.63577, 71.17266) Copyright Maxar

Nilaw

Nuristan Province, Afghanistan

Geo: 35.23677, 70.28785

Elevation: 2500 meters.

Mining season: during warm seasons

Production: tourmaline and others



Figure 7.0: Overview of the Nilaw mining area 2019-07-31 (35.23719, 70.28885) Copyright Maxar

Historical and mining background

The Nilaw pegmatite is a sub-set of the Mawi pegmatite. There is little open historical information on the site. The pegmatite was discovered and surveyed by Soviet geologists in the 1970s. Pockets of tourmaline were found as recently as 2008.³¹ Large tailings extending from mining sites stretched out over a kilometer suggest significant mining took place but GEOINT analysis shows no substantial mining activity at the Nilaw site in recent times.

Baseline

From **2017-07-08** to **2019-07-31** there were no changes to the mine or tailings. This suggests no significant mining activity (see Figure 7.1). The nearby village had few changes; only one new building and additions/improvements to three building complexes (see Figure 7.2).



Figure 7.1: Mining areas and tailings from the Nilaw mines 2019-07-31 (35.23687, 70.28804) Copyright Maxar



Figure 7.2: Local village near Nilaw on 2019-07-31 (35.23719, 70.29689) Copyright Maxar

Mining changes and analysis

Unlike most of the other mining sites mentioned previously, there were no changes at Nilaw in recent imagery. As with the baseline, more recent imagery from **2019-07-31** to **2022-04-23** showed no significant change to the mining area. Some of the tailings appear longer but this is likely due to erosion bringing material downhill (see Figure 7.3). There are no new mine-related buildings or infrastructure. There are no changes to the village.



Figure 7.3: Tailings became longer between 2019-07-31 and 2022-04-23 but it may just be due to erosion rather than mining (35.23859, 70.29211) Copyright

US Market and Social Media

Historically, significant quantities of Lapis Lazuli made their way to western markets by crossing the border to Pakistan rather than going through Kabul.³² Lapis Lazuli often appears in US markets from Pakistani mineral and gemstone dealers attending trade shows, specifically in Tucson Arizona where a large show takes place in late January and early February annually. In 2022, the selling of Lapis Lazuli continues at the Tucson shows with four different Pakistani dealers each bringing an estimated 500-1000 kilograms of Lapis Lazuli in trunks to sell at rented booths. The price of Lapis Lazuli in 2022 is \$150 per kilogram, which is similar to previous years.³³



Figure 8.1: Lapis Lazuli from Sar-e Sang at the Tucson mineral show in 2022 from a Pakistani dealer. Photo by Justin Z - February 2022.

With the rise of social media, many dealers overseas sell directly to clients instead of wholesale buyers. On Instagram, there are dozens of mineral dealers located in [Pakistan](#) who sell minerals from Afghanistan with tourmalines and emeralds being the most popular. Keywords and hashtags for Afghanistan material on Instagram include [#panjshiremeralds](#) [#lapislazuli](#) [#paprok](#) [#daraepech](#).

A search for the word "Afghanistan" in the Crystals & Minerals section of eBay brings up over 20,000 results, most from dealers in Pakistan (See Figure 8.3 as an example). A tourmaline mined in Paprok priced at \$49,800 is listed from Pakistan (see Figure 8.4).³⁴ It is not known if this production is recent or old but this sector is worth monitoring.

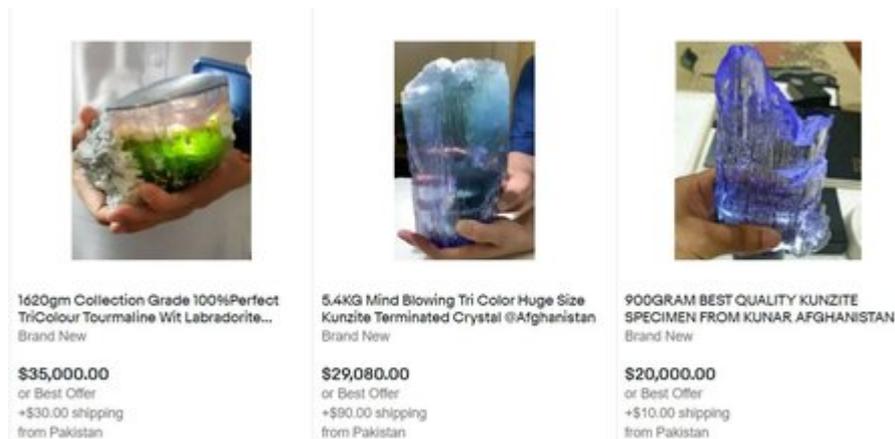


Figure 8.3: Examples of high-priced Afghanistan minerals sold on eBay from Pakistan, as seen on 2022-06-22

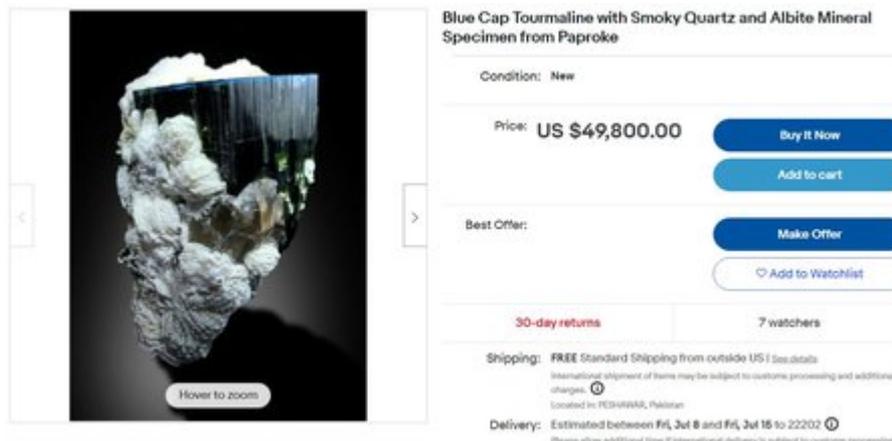


Figure 8.4: A \$49,800 tourmaline crystal mined in Paprok, for sale from Peshawar, Pakistan, as seen on 2022-06-29

Glossary:

Adit: a mining tunnel that horizontally enters a mountain

Lapis Lazuli: a deep blue gemologically-valuable rock composed of lazurite and other minerals

Pegmatite: a type of coarse-grained rock that often contains pockets of crystals

Portal: the mouth of a tunnel or adit

Spoil pile: a mound of waste rock from mining

Tailings: waste rock tossed out of a mine, often forming trails leading to the mine

Footnotes:

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Graphs

Mining Site Locations and Future Collection Suggestions

Site	GPS	Mining season
Sar-e Sang	36.211, 70.801 for 5 x 5 kilometers	June – November but might be year-round
Panjshir	35.4283, 69.8072 for 20 x 20 kilometers	May – October but may be longer
Dara-e Pech	34.952, 70.818 for 3 x 3 kilometers	Year-round
Mawi	35.201, 70.335 for 10 x 10 kilometers	Likely year-round
Paprok	35.62354, 71.16068 for 10 x 10 kilometers	September - November
Nilaw	35.23677, 70.28785 for 3 x 3 kilometers	May - October

Source: Original Work

Look Ahead

Gemstone mining activity in Afghanistan should continue to be monitored because its use as a source of wealth, for both residents and the government, will increase amid spikes in unemployment and poverty. The following sites should be imaged with high-resolution imagery multiple times a year during their mining seasons. Imagery signatures include new mine tailings, spoil piles, mining buildings, roads, and additions in local villages. SAR imagery could supplement electro-optical imagery searches to find mining portals which often can be difficult to see with electro-optical imagery, especially for areas like Paprok, where the mining season is short and the cloud cover is significant. Interferometric Synthetic Aperture Radar ([InSAR](https://www.usgs.gov/centers/land-subsidence-in-california/science/interferometric-synthetic-aperture-radar-insar)) could also be useful in determining changes in elevation by measuring the shifting height of spoil piles. In addition to SAR, multispectral imagery exploitation demonstrated in [2022 at Panjshir](https://www.tandfonline.com/action/showCitFormats?doi=10.1080%2F10106049.2020.1716394) that emeralds can be located and mapped with spectral signatures. Social media and eBay should be monitored to catalog the number of new specimens from Afghanistan for sale and how often new materials appear.

Things to Watch

- Site: Sar-e-Sang; Geocoords: 36.211, 70.801 for 5 x 5 km; Mining Season: June - November but could be year-round
- Site: Panjshir, Geocoords: 35.4283, 69.8072 for 20 x 20 km; Mining season: May – October but may be longer
- Site: Dara-e Pech, Geocoords: 34.952, 70.818 for 3 x 3 kilometers; Mining season: Year-round

- Site: Mawi, Geocoords: 35.201,70.335 for 10 x 10 kilometers;
Mining season: Likely year-round
- Site: Paprok, Geocoords: 35.62354, 71.16068 for 10 x 10
kilometers; Mining season: September - November
- Site: Nilaw, Geocoords: 35.23677, 70.28785 for 3 x 3 kilometers;
Mining season: May - October

Data Sources

KML [Locations of gem mining sites of interest](#)

SHP [Locations of gem mining sites of interest](#)

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