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Gold Mining in Prey Lang Wildlife Sanctuary, Cambodia

Evolution from Small-Scale Artisanal to Large-Scale Commercial & Its Environmental and Human Impacts



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Summary of Findings

- The Prey Lang Forest Landscape (PLF Landscape) in central Cambodia is the largest and one of the most biologically significant lowland evergreen forests remaining in Southeast Asia. The Prey Lang Wildlife Sanctuary (PLWS), over 400,000 hectares in size, was established in 2016 to protect the heart of this Forest Landscape (Figure 1). See Section 1.
- The PLF Landscape and PLWS face a multitude of human-caused threats including illegal deforestation, limestone mining, transmission line development, poaching and gold mining (Section 1). Together these threats have resulted in the loss of thousands of hectares of forest and untold biodiversity. Numerous reports and newspaper/online articles have documented the rampant deforestation and other threats. This report focuses on gold mining and its impacts.
- *This report traces the evolution of gold mining in Prey Lang Wildlife Sanctuary from primarily small-scale artisanal in the vicinity of Snang An Village and Phnom Chi Mountain as recently as 2018-19 to large-scale commercial, culminating in the extensive commercial mining development in multiple areas within a 15,000-hectare concession area of the Late Cheng Mining Development Company (Figure 2).*
- *This evolution has been extensively documented by the Prey Lang Gold Mining Investigation Team (Investigation Team or Team) through: (1) an evaluation of readily-available satellite imagery (Google Earth, Sentinel, Planet); (2) ground-truthing of satellite imagery during site visits in 2018 and 2019; (3) further evaluation of satellite imagery plus collection of drone images in 2022-present; and (4) evaluation of Cambodian media reports on gold mining in PLWS (Figure 3). Methods are described in detail in Section 2.*

GOLD MINING EVOLUTION:

- GOLD MINING has been occurring in the PLF Landscape for many years, primarily in the vicinity of Snang An Village and Phnom Chi Mountain within PLWS (see Figure 2). With the exception of a small, primitive hard-rock mine near Snang An Village, that gold mining has been small-scale, artisanal¹ mining of alluvial stream deposits (Figure 4). Many of the artisanal gold mining areas around Phnom Chi and Snang An were visited by the Investigation Team in 2018 (described in Section 3) and 2019 (described in Section 4).
- Beginning in 2018-19, commercial-scale hard-rock gold mining began at two locations within PLWS: a shaft mine to the northeast of Snang An Village (2018) and an open pit/shaft mine complex immediately east of Snang An Village (2019).
 - The shaft mine was first identified during the 2018 site visit and later in satellite imagery (Figure 5), and was named the “Chinese” hard-rock mine. The shaft mine

¹ Artisanal = Artisanal mining is characterized by low capital intensity and high labor intensity and relatively simple methods for exploration, extraction, and processing (World Gold Council).

was active when visited in 2018, and workers told the Investigation Team that the mine was Chinese-owned. This so-called “Chinese” hard-rock mine has not developed substantially since then, although these original developed areas are still visible in current satellite imagery. This lack of development may be due to the fact that this mine is outside the boundaries of the Late Cheng concession area (it is within a separate concession). Details of this mine are described in Section 3a.

- The open pit/shaft mine complex was first identified in Planet imagery and then visited during the 2019 site visit (Figure 6), and was named the “new Chinese” mine.
 - Development of the open pit/shaft mine complex ended abruptly and the mine was abandoned in 2019, for reasons unknown to the Investigation Team. The Team could not determine the owners of the mine, and it is not certain if the Late Cheng Mining Development Co Ltd. was involved at this time. Details of this mine development are described in Section 4a.

LATE CHENG MINING DEVELOPMENT CO. LTD. MINING:

- Beginning in August 2020, a new large-scale commercial gold mine began developing on the exact site of the 2019 open pit/shaft mine complex described in Section 4a. This new open pit gold mine (herein called the main mine complex) is owned by Late Cheng Mining Development Co Ltd. (also called “Late Cheng” in this report) (Figure 7a, b). Late Cheng’s main mine complex likely began producing commercially in January-April 2021, based on mine features visible on satellite imagery (Figure 8), and has continued to develop rapidly throughout its 15,100-ha concession area (herein called the Late Cheng concession area) ever since (Figure 9a (satellite imagery) and 9b (drone imagery)). Open pit mines have been developed in three principal locations to the north, southeast and south of the main mine complex (herein called the peripheral mining areas) (Figure 10a (satellite imagery) and 10b (drone imagery)). Existing artisanal gold mining areas south of Snang An and at Phnom Chi have also developed and expanded rapidly and are likely being co-opted by Late Cheng because they are within its concession area (Figure 11). A new road has been developed from the southernmost peripheral mining area to the main Phnom Chi mining area (Figure 12). Details of mine development in the Late Cheng concession area are described in Section 5.
 - Late Cheng’s rapid development includes the construction of one long straight channel that appears to be diverting a stream into one of the open pit mining areas south of Snang An near a location called O Pha Ao by locals (Figure 13a, b, c, d). In addition, another stream appears to be diverted within the main mine complex, including a straight-line channel similar to the one in Figure 13 (Figure 14a, b, c). The rapid expansion of artisanal gold mining (using hydraulic methods) immediately south and west of Snang An Village has taken place in very close proximity to the Porong/Chinit River, and mine tailings can be seen eroding into

the river on satellite imagery (Figure 15). In addition, artisanal mining around Phnom Chi has destroyed another tributary stream (Figure 16). Co-opting the streams for these purposes poses an extraordinary threat not only to these streams, but to the entire Porong/Chinit River which receives the flow from these streams, because of the risk of toxic chemical and silt contamination (Figure 17).

- It is virtually certain that CYANIDE is being used for gold extraction in the Late Cheng's main mine complex and possibly in the peripheral mining areas within the concession area. This is based on satellite and drone imagery showing the presence of both cyanide leach tanks and cyanide leach fields (heaps)/ponds which are typical of cyanide use (Figure 18a, b), as well as the knowledge that modern commercial gold mining uses cyanide extraction processes almost exclusively.
 - Cyanide use in gold mining poses clear and well known environmental and human health risks, especially if used improperly and allowed to enter the environment (especially surface water and groundwater) through a spill or leakage. It is imperative that cyanide use be documented in the Late Cheng mining operation in PLWS.
- It is uncertain if MERCURY is used in the artisanal gold mining areas. The Investigation Team talked to one group of artisanal miners in the Phnom Chi area during site visits in 2018-19 and the miners claimed not to be using mercury because of its cost. However, if Late Cheng has appropriated the artisanal mining operations as is suspected, then there is a chance that mercury has been introduced to the gold extraction process to increase gold recovery.
 - Mercury use in gold mining poses clear and well known environmental and human health risks. It is imperative that mercury use (or the lack thereof) be documented in PLWS.
- With regard to Late Cheng Mining Development Co Ltd. itself, a report in *CamboJA News* on December 27, 2022, states:
 - "Ministry of Commerce records show Late Cheng is run by four Chinese nationals — Dong Shuangyong, Feng Zhirong, Yin Guozhong and Zhao Ying Ming — and Zhao's Cambodian wife, Soeun Pisey. Dong, Feng and Yin all became naturalized Cambodian citizens in 2020, according to rights group Licadho."
 - "Another gold mining company connected to Late Cheng, Cambodia K88 Industry Co. Ltd, received "metallic mineral exploration" approval in 2020 in an area adjacent to Late Cheng's concession, comprising 9,394 hectares. Ministry of Commerce records show the company is run by Chun You, who serves as Ministry

of National Defense General Department of Technical Equipment Deputy Director...”

TIMING OF LATE CHENG MINE DEVELOPMENT:

- The Investigation Team compared Cambodian government statements in the media against readily-available satellite imagery for the same time period and determined that commercial development of the Late Cheng’s main mine complex began in 2020 within a few months of the issuance of the permit/permission to *explore* for gold in the 15,100-ha concession area the company received, and almost 18 months ahead of the issuance of the permit/permission to begin commercial production. A detailed comparison can be found in Section 6.
- At each step, mine development has been much further advanced than what was reported to the media by the by the Cambodian government:
 - Commercial development of the Late Cheng mine main complex began in August 2020; only exploration permits had been issued by the Cambodian government at that time (Figure 19).
 - The Cambodian government issued a license to Late Cheng for commercial gold production in September 2022 and stated that the company would begin a “trial operation” in August 2023; by that time the main complex of the Late Cheng mine was fully operational and been in commercial production since the January-April 2021 timeframe (Figure 20).

QUESTIONS ABOUT THE LEGALITY OF GOLD MINING IN A WILDLIFE SANCTUARY:

- Questions remain over the general legality of gold mining development in wildlife sanctuaries and other national protected areas relative to Cambodia’s Protected Area Law of 2008, and specifically about the Late Cheng Mine. One report in CamboJA News states that “Mining can be allowed in protected areas if regulations such as an environmental impact assessment are followed.” However, many activities associated with gold mining are prohibited by the Protected Area Law. And the environmental impact assessment (EIA), if one was produced at all, is clearly inadequate given the environmentally-destructive activities that have already taken place within the concession area. Thus, the legality of Late Cheng’s mining concession is open to challenge.
- Commercial development of the Late Cheng Mine clearly proceeded well in advance of the issuance of exploration permits/permissions and development permits/permissions. Penalties for such apparent violations would appear to be warranted.
- Late Cheng’s main mine complex has expanded well beyond the northern boundary of its concession area (Figure 21). This development may be associated with another company’s

concession area, but the relationship is unclear. Penalties for such an apparent violation of the concession area boundary would appear to be warranted.

- It is unclear whether a post-mining restoration plan and restoration fund are required under the EIA or under interpretation of the law, but these are necessary in order to restore the post-mining landscape and reduce long-term environmental risk.

ENVIRONMENTAL & HUMAN HEALTH ISSUES

- There are many questions regarding the environmental and human health impacts of the Late Cheng Mine operation as well as the artisanal gold mining near Snang An Village and Phnom Chi. More details are provided in Section 7.
 - Cyanide is almost certainly being used to separate gold in Late Cheng's main mine complex, based on the presence of leach fields (heaps)/ponds and leach tanks. Cyanide has well known environmental and human health risks that remain undocumented within the Late Cheng concession area. Further documentation of the extent of these impacts is needed, in particular surface and groundwater contamination and exposure of mine workers and their families.
 - Mercury use has not yet been documented in artisanal mining areas within the Late Cheng concession area. Mercury has well known environmental and human health risks. It is imperative that mercury use (or the lack thereof), be documented within the Late Cheng concession area.
 - The Late Cheng mining area is in the immediate vicinity of the Porong/Chinit River and small tributaries thereof. Two tributary streams have already been diverted for mine use; artisanal gold mine tailings are entering the Porong/Chinit River itself; and artisanal mining around Phnom Chi has destroyed another tributary stream. See Figures 13-17. Dozens of kilometers of stream have already been affected. Were biodiversity surveys conducted on the streams that have been diverted, destroyed and/or contaminated? The Porong/Chinit River is used by Snang An villagers as well as many villagers downstream. A wastewater pond spill or cyanide leak could pose a very serious threat to the aquatic environment of these streams as well as to the humans who use the streams for food and water. Downstream impacts have not yet been assessed.
 - Development in the Late Cheng mine concession area has required the clearance of hundreds of hectares of forest and construction of access roads has opened up PLWS to further human encroachment (with concomitant poaching of wildlife and illegal logging) and habitat fragmentation (Figure 22). The impacts of these activities require further documentation.
 - The EIA for the Late Cheng mine development is not publicly available, according to Cambodian media reports. This EIA, if one was produced at all, would likely be

considered inadequate by independent reviewers, given the environmentally-harmful activities that have already taken place within the concession area. This EIA needs to be made available.

KEY CONCLUSIONS

- Cambodian authorities have ignored destructive artisanal gold mining operations within Prey Lang Wildlife Sanctuary for years. Particularly destructive artisanal gold mining continues around Snang An Village and Phnom Chi Mountain.
- The Cambodian Ministry of Mining has granted numerous mining concessions within the Kingdom's protected areas, including for the Late Cheng Mine in PLWS, which may be in conflict with the Protected Area Law of 2008.
- The Late Cheng Mine began commercial gold mining operations prior to issuance the proper permits.
- The Late Cheng Mine has likely co-opted all the artisanal gold mining within its concession area, as this mining has expanded greatly in synchrony with development of Late Cheng's hard-rock mine(s)
- The Late Cheng Mine has expanded beyond the boundaries of its concession area.
- The Late Cheng Mine is operating without a publicly disclosed Environmental Impact Assessment (EIA).
- The Late Cheng Mine has engaged in environmentally-destructive practices, including the total diversion of two streams, clearance of hundreds of hectares of forest and construction of access roads that has opened up PLWS to further human encroachment. The construction of cyanide leach fields (heaps)/ponds and wastewater/tailing ponds within a nationally-designated protected area and without a publicly available EIA is of grave concern environmental and human health.
- Readily-available satellite images (e.g., Sentinel, Google Earth) are useful to identify artisanal and commercial gold mining operations and to guide ground truthing of gold mining sites.

RECOMMENDATIONS

- The legality of large-scale mining concessions within national-designated protected areas in Cambodia should be challenged in Cambodian courts, as these mining developments are clearly incompatible with the purposes of the protected areas.
- The Late Cheng Mining Development Co Ltd. should be sanctioned for engaging in apparently illegal actions, including developing its mine in advance of obtaining the necessary permits, expanding its operations beyond its concession area boundary, diversion of streams for mining use, and not publicly disclosing its Environmental Impact Assessment.

- The Environmental Impact Assessment (EIA) for Late Cheng should be made available to the public.
- Further expansion of the Late Cheng Mine should be halted pending review of the EIA and permit issuance.
- The possible leaching of highly toxic chemicals into local waterways and groundwaters, in particular cyanide, arsenic and mercury, should be investigated and monitored.
- Human health impacts of cyanide use at Late Cheng Mine should be investigated and monitored. A plan to restore the Late Cheng Mine and concession area post-mining must be developed and approved, and a restoration fund established.

Figures Cited in Summary of Findings

(Figures 1-22)

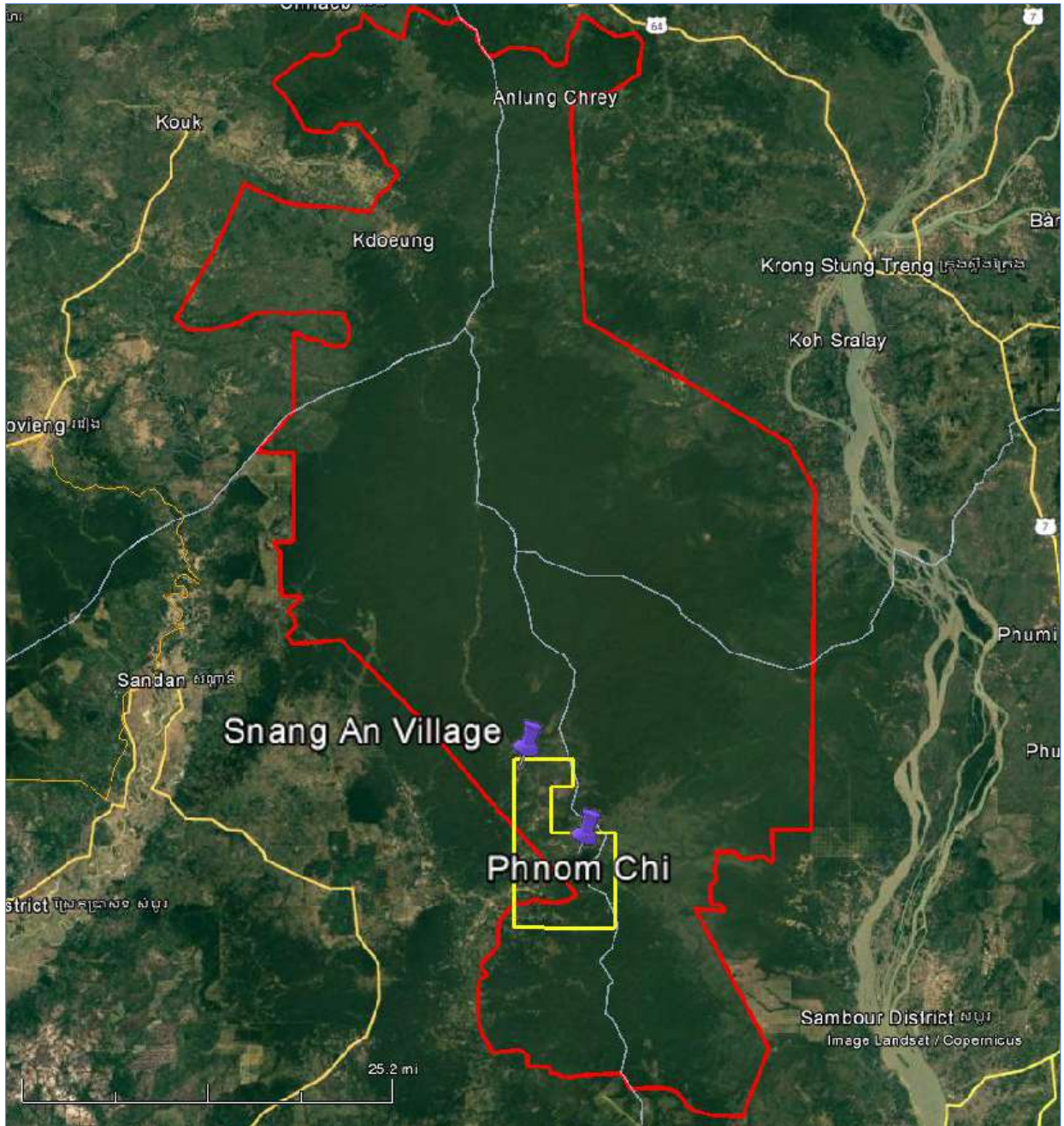


Figure 2. Prey Lang Wildlife Sanctuary (red boundary), showing locations of Phnom Chi Mountain and Snang An Village (purple pushpins) and Late Cheng Mining Development Company's 15,000-ha concession area (yellow boundary).



Figure 3. Collage of images illustrating methods used in this report. Upper left shows Google Earth image with possible gold mining locations identified by INVESTIGATIVE TEAM prior to any fieldwork. Upper right is a photo of artisanal gold mining infrastructure visited by INVESTIGATIVE TEAM during 2019 site visit. Middle left is Sentinel satellite image of Late Cheng main mine complex and artisanal gold mining near Snang An. Lower right is drone image of Late Cheng main mine complex. Lower left is image of media report on approval of Late Cheng Mining Development Company, Ltd. to mine gold commercially in its concession inside PLWS.



Figure 4. Photo illustrating artisanal gold mining of alluvial stream deposits using hydraulic (high-pressure jet of water) methods. This stream is located just northwest of Phnom Chi Mountain (shown in Figure 16).



Figure 5. Gold hard-rock shaft mine to the northeast of Snang An Village (“Chinese mine”). Planet satellite image of mine area, late January 2019 (above). On-the-ground photo of mine shaft headframe, December 2018 site visit (upper left).



Figure 6. Open pit/shaft mine complex immediately east of Snang An Village (“new Chinese mine”). Planet satellite image of mine area, February 2019 (above). On-the-ground photo of open pit, May 2019 site visit (right).

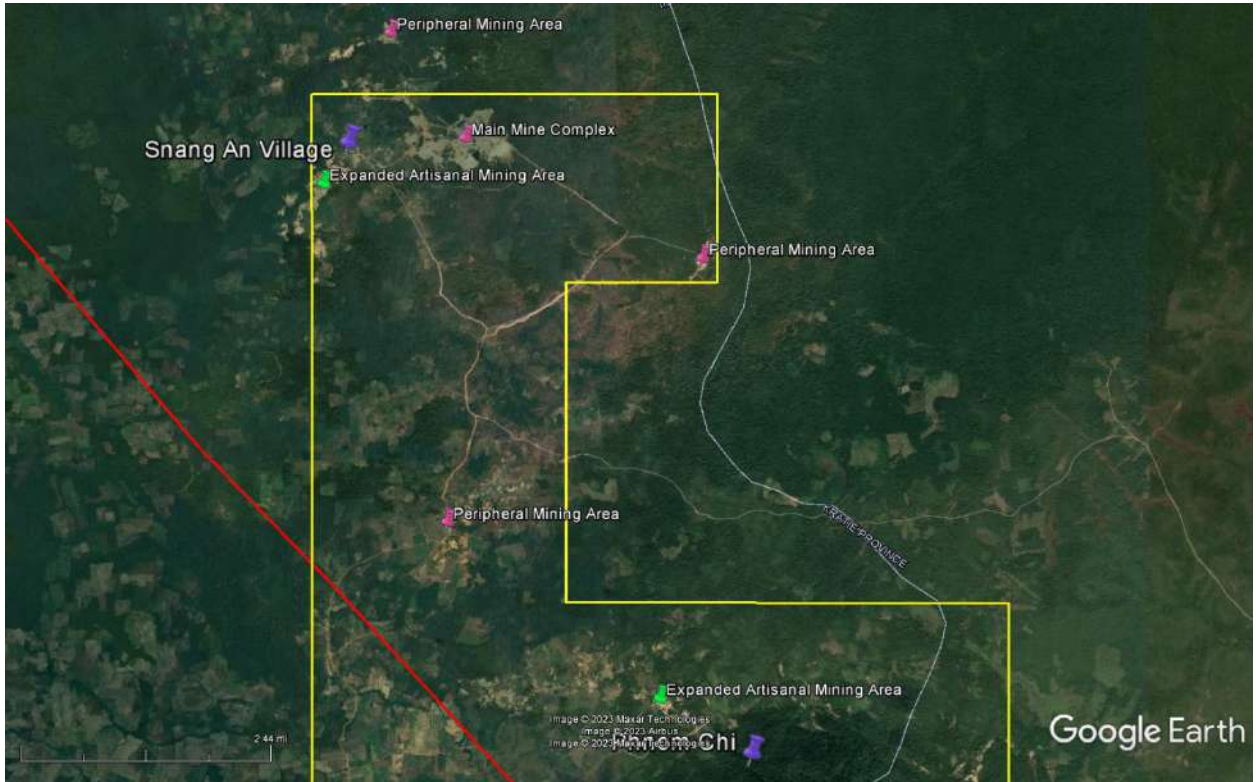


Figure 7a and 7b. 7a. Above -- Google Earth imagery from January 2023 showing extensive development throughout the Late Cheng Mining Development Company, Ltd. concession area (yellow boundary line) within PLWS (red boundary line). 7b. Below – Closer view of main mine complex near Snang An and artisanal mining area just south of Snang An.

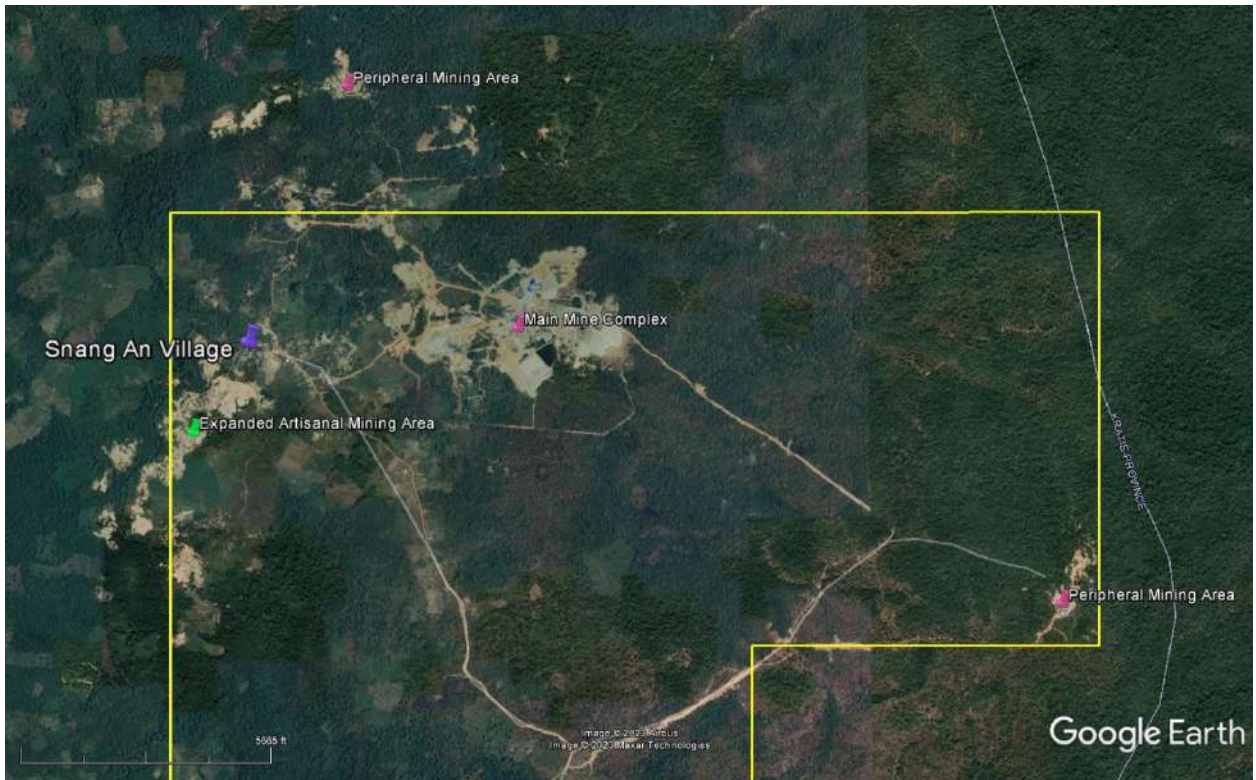




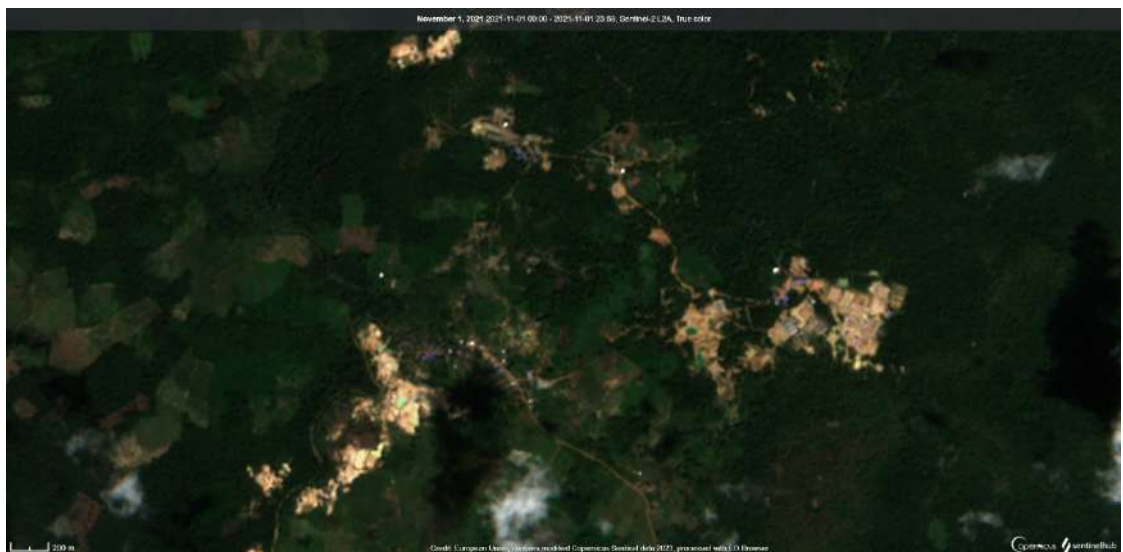
Figure 8. Sentinel satellite image from January 10, 2021, showing leach fields and wastewater ponds already developed at the main mine complex of the Late Cheng Mining Development Company, Inc.

Figure 9a.
Sentinel
imagery.

Apr 15,
2021.



Nov 1,
2021.



Mar 31,
2022



Figure 9a
(cont.).

Oct 12,
2022.



Mar 26,
2023.



July 9,
2023

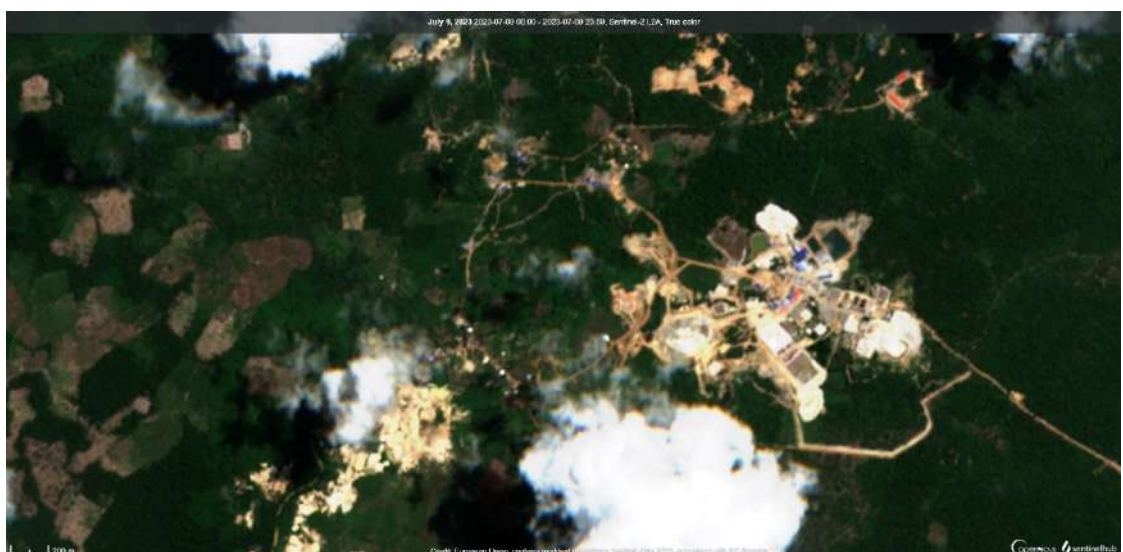
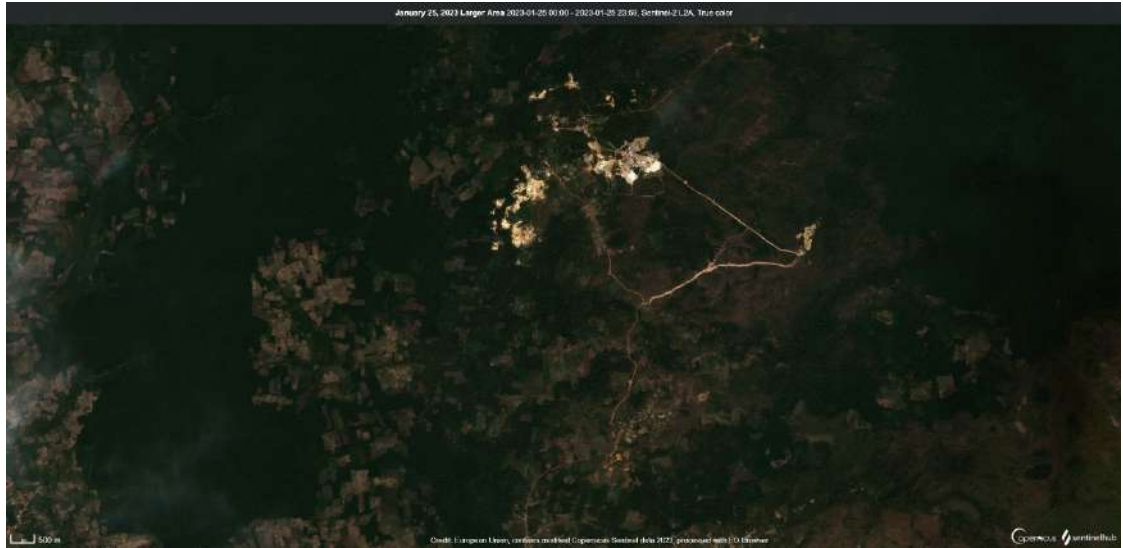
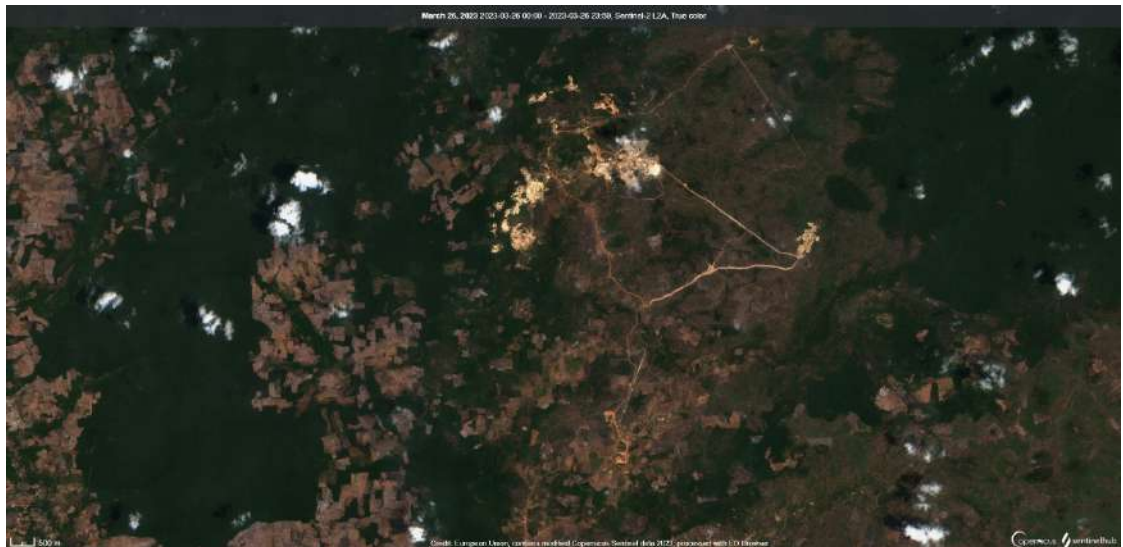


Figure 9a
(cont.).

Jan 25,
2023



Mar 26,
2023



Aug 13,
2023.

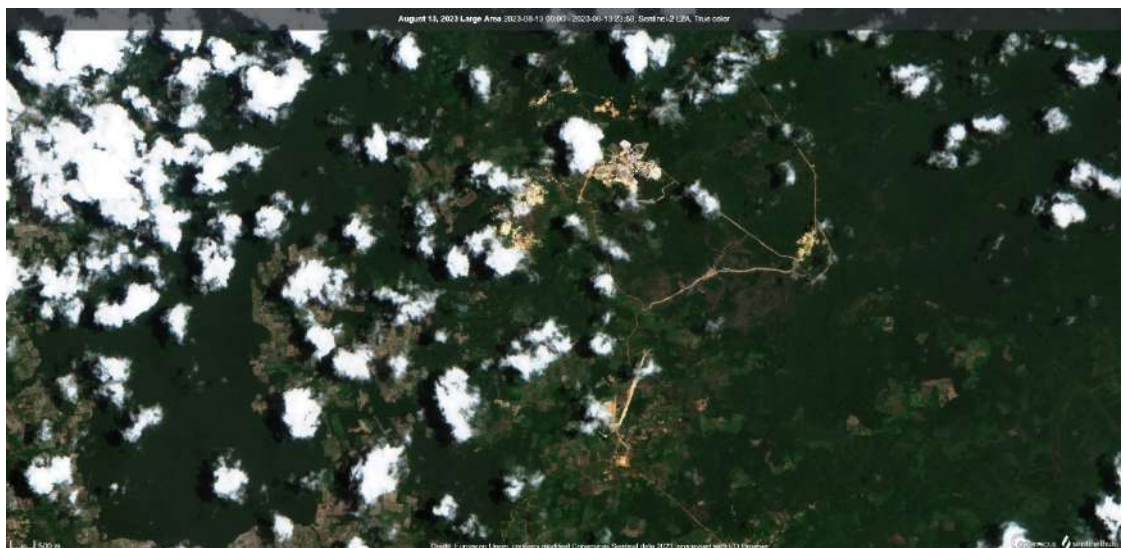


Figure 9b (top and bottom). Drone imagery of Late Cheng main mine complex (Autumn 2022).



Figure 9b. (cont.). Drone imagery of Late Cheng main mine complex (Summer 2023). In the image below, mine features shown include the open pit mine (red arrow), cyanide leach tanks (blue arrow), cyanide leach fields (heaps)/ponds (yellow arrows), tailing heaps (green arrows), wastewater ponds (orange arrows), and retaining wall for tailings (purple arrow).



Figure 9b. (cont.). Drone imagery of Late Cheng main mine complex (Summer 2023).



Figure 10a.
Sentinel
imagery.

Peripheral
mining area
north of
main mine
complex.
Aug 13,
2023.



Peripheral
mining area
E of main
mine
complex.
Aug 13,
2023.



Peripheral
mining area
south of
main mine
complex,
near O Pha
Ao. Aug 13,
2023.



Figure 10b. Drone imagery of peripheral mining area south of main mine complex, near O Pha Ao (Summer 2023).

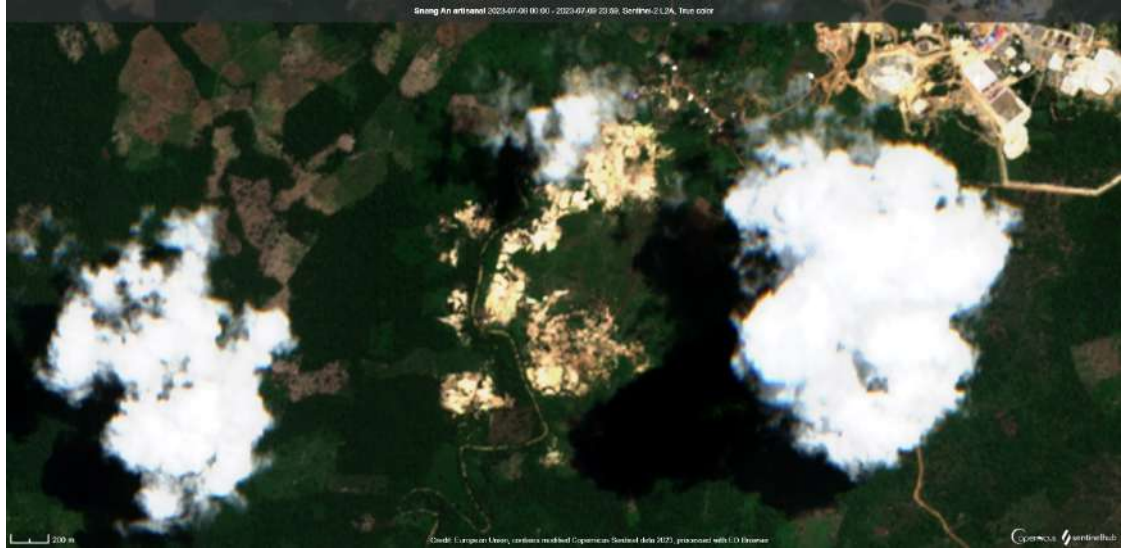


Figure 10b (cont.). Drone imagery of peripheral mining area south of main mine complex, near O Pha Ao (Summer 2023).



Figure 11.
Sentinel
imagery.

Artisanal
mining
area just
south of
Snang An.
July 9,
2023.



Artisanal
mining
area near
O Pha Ao
(east of
main mine
&
diagonal
line). July
9, 2023



Artisanal
mining
area just
NW of
Phnom
Chi. Aug
13, 2023

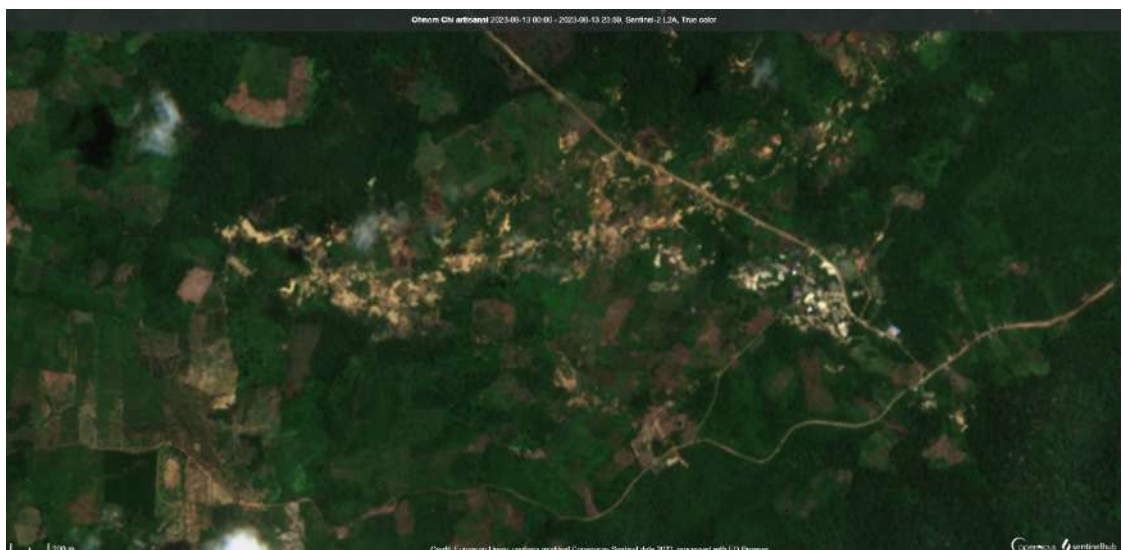


Figure 12. New road (diagonal line) connecting Phnom Chi artisanal mining area (bottom right of image) with artisanal mining area near O Pha Ao (top left of image). August 13, 2023.

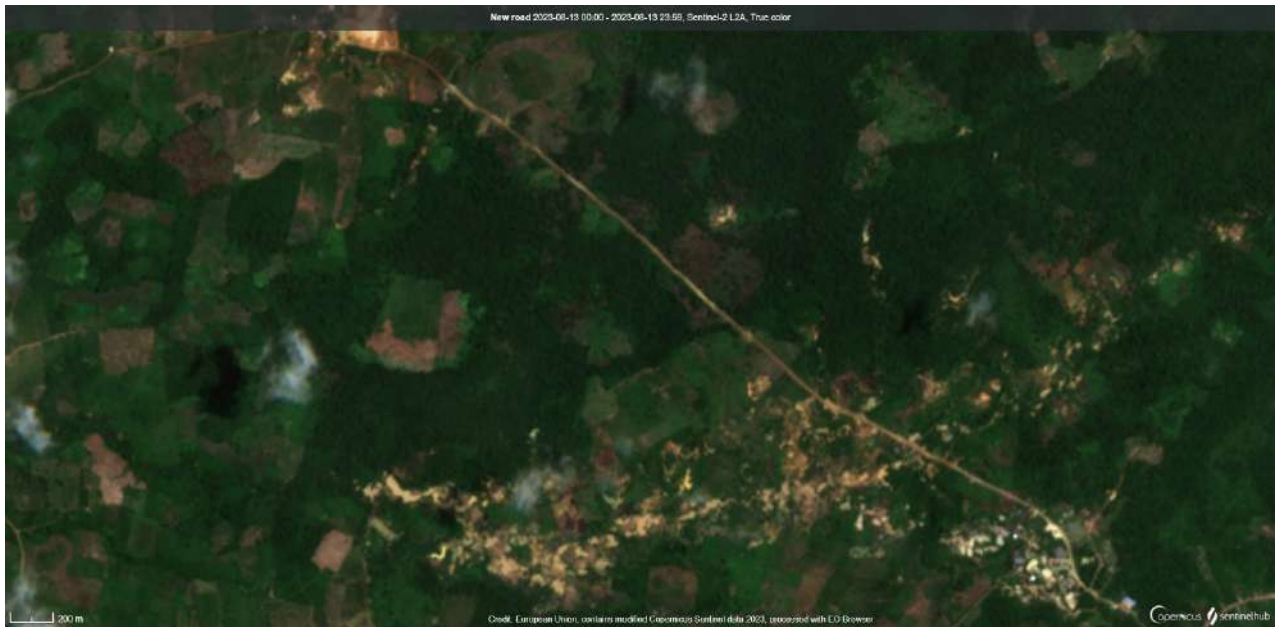


Figure 13a. Straight canal that diverts water from a stream to the mine area at O Pha Ao. Top image is Sentinel imagery providing a complete view of the canal. August 13, 2023.



13b. At left, Sentinel image shows yellow pin which is the approximate northern end of land clearing, and red star which indicates location where the canal intersects the stream.

13c. At right, Google Earth image shows yellow pushpin which is in the same location as yellow pin in above image, and blue pushpin which is in the same location as red star in the above figure. Stream is visible at blue pushpin, indicating that the canal intersects the stream at this point.



Figure 13d. Peripheral mining area at O Pha Ao, showing southern terminus of canal that diverts water from the stream at the location shown in 13b. and 13c (August 2023).



Figure 14a. What appears to be a straight canal that diverts a stream to the open pit mine area at the Late Cheng main mine complex. August 13, 2023.



Figure 14b (below left) and 14c (below right). The yellow pin indicates where the canal intersects a stream.

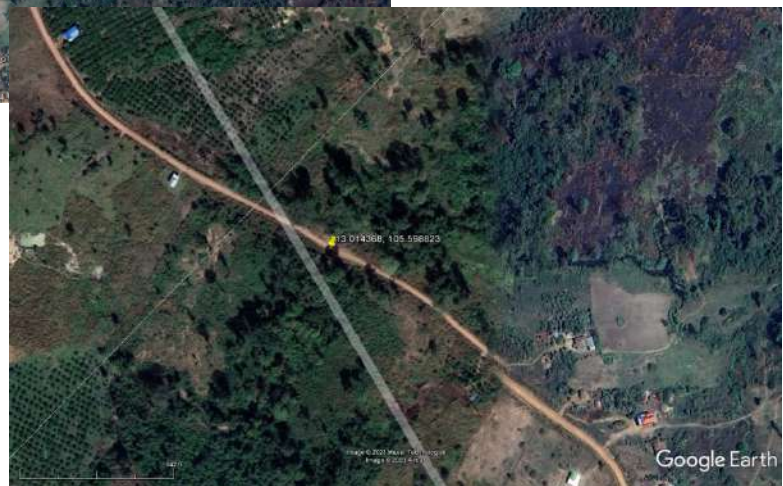


Figure 15. Google Earth image from January 2023 showing artisanal gold mine tailings eroding into the Porong/Chinit River just downstream of Snang An Village. Red arrows show locations where tailings are entering the river.



Figure 15 (cont.). Google Earth image from January 2023 showing artisanal gold mine tailings eroding into the Porong/Chinit River just downstream of Snang An Village.



Figure 16. Google Earth image from January 2023 showing artisanal gold mining (hydraulic) damage to a small stream just northwest of Phnom Chi (top image). Bottom image is a closer view of the damage done. Light white line is approximate location of the stream as depicted in the HYDROSHED spatial data base. Yellow line is boundary of Late Cheng concession area. Red line is boundary of PLWS.

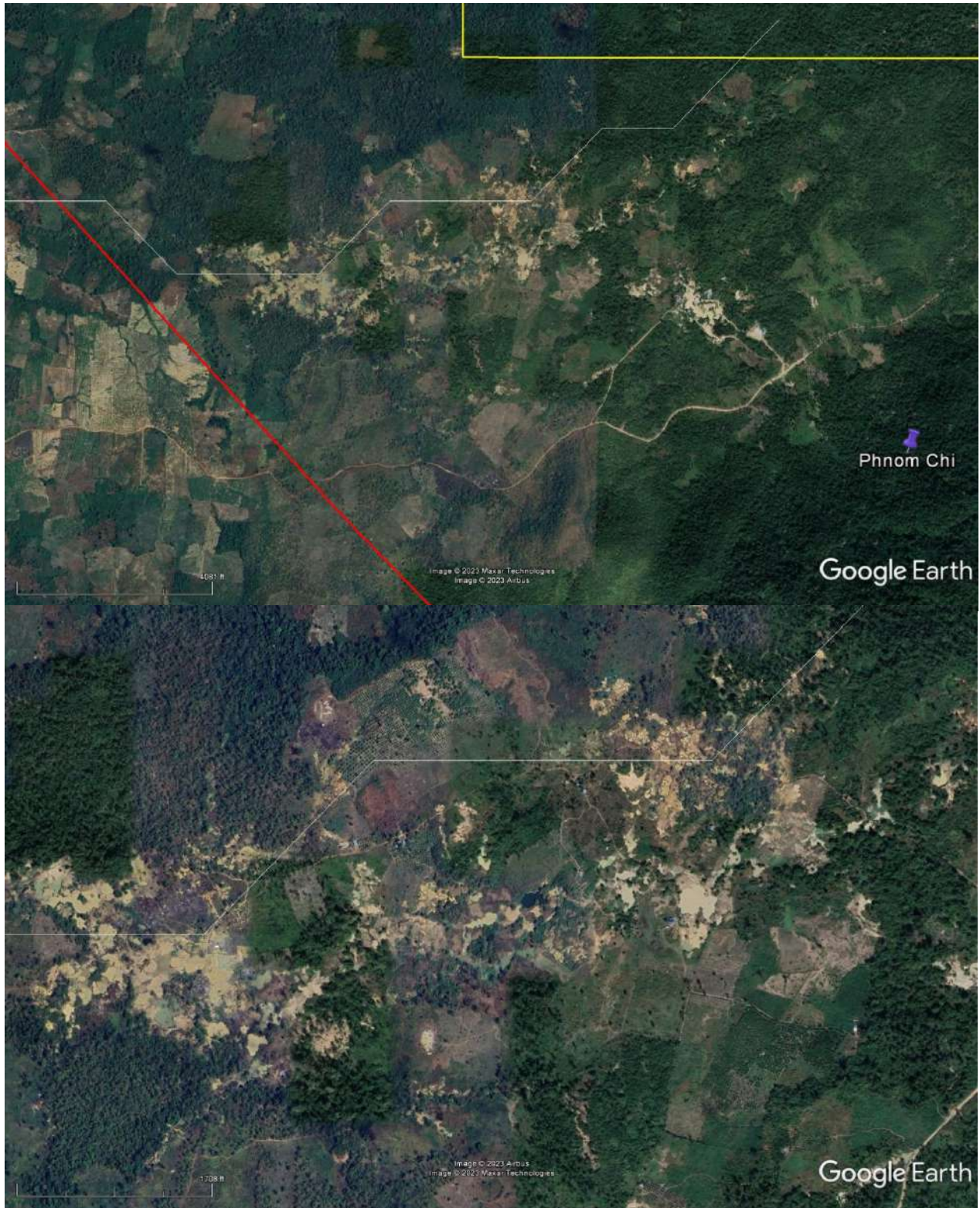


Figure 17. Map of Chinit River Watershed. The upper reach of the river within PLWS is locally called the Porong River. Map from Bresney et al. (2019).

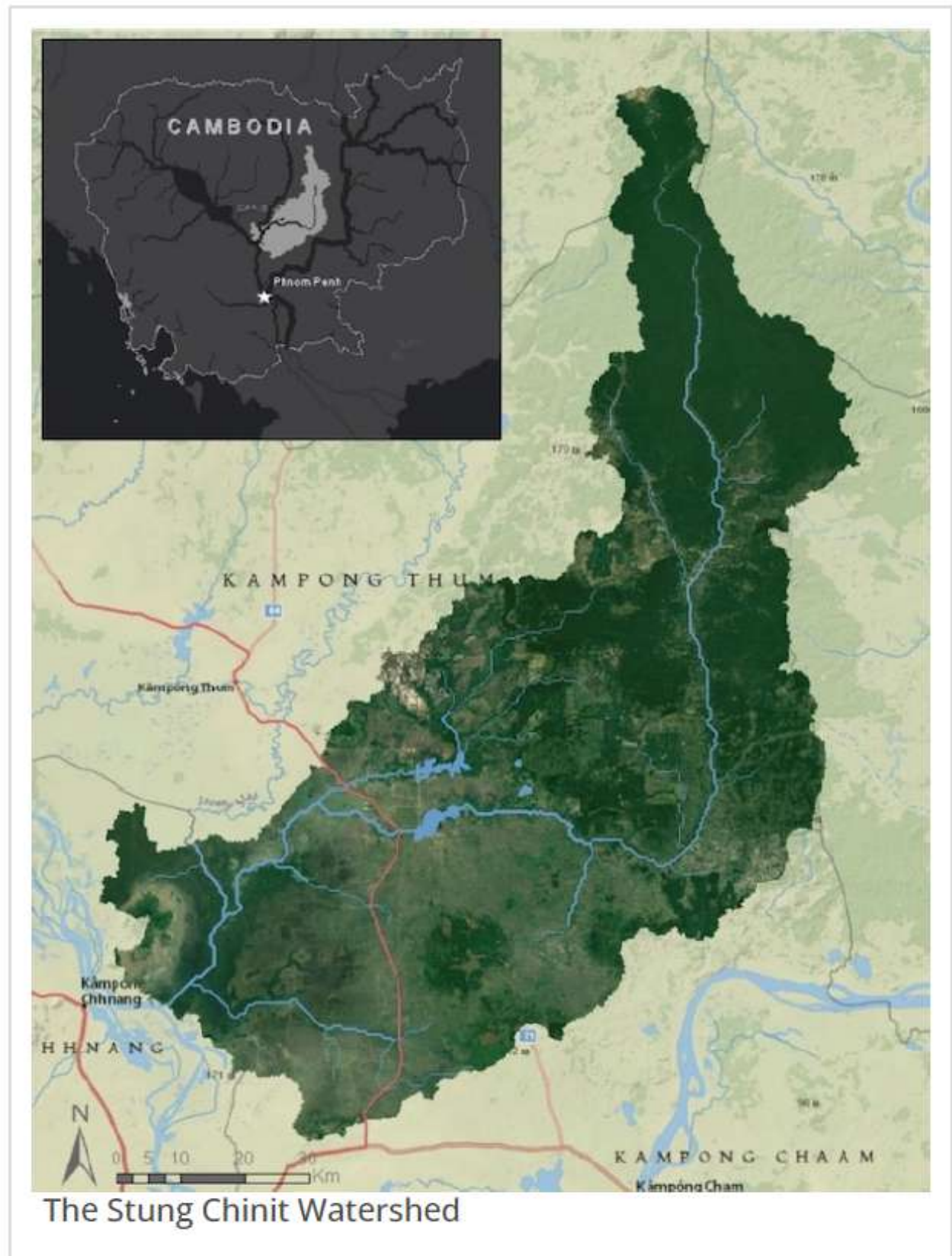
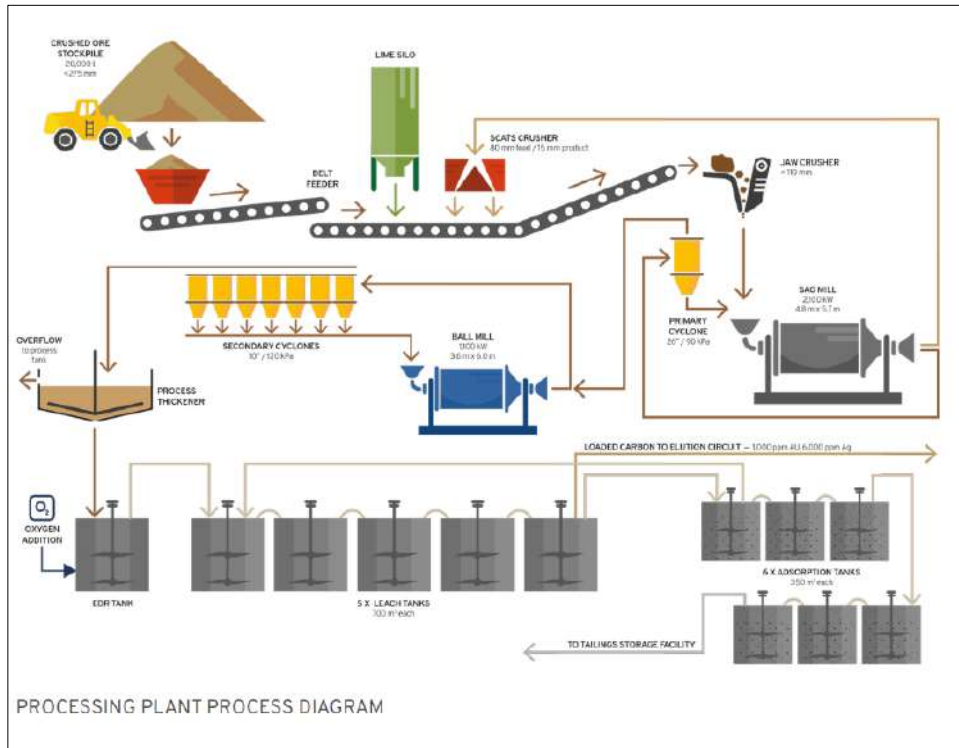


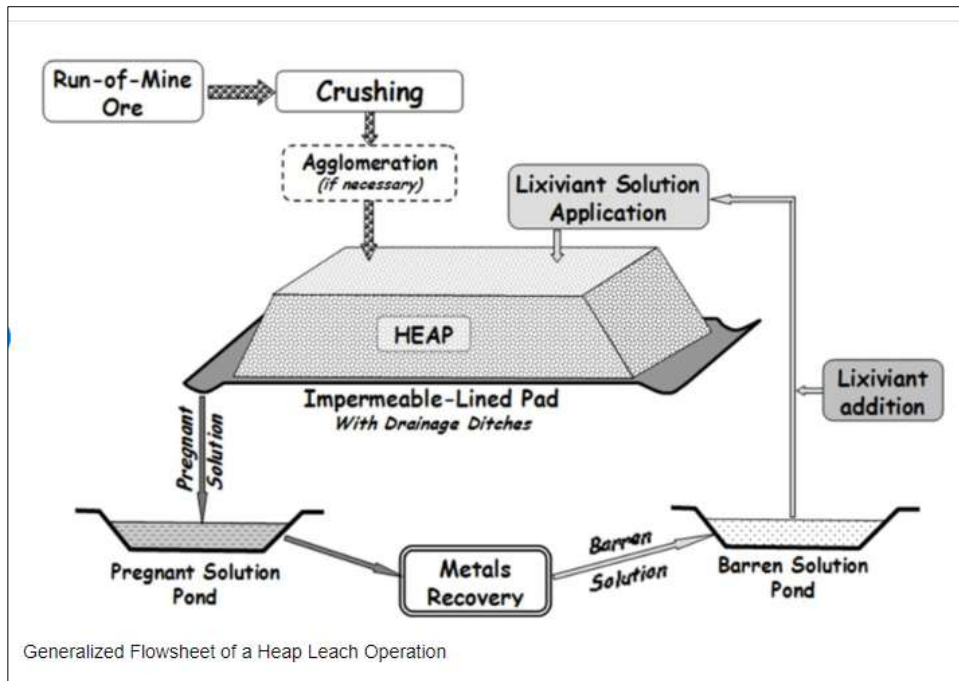
Figure 18a. Evidence of cyanide use at the Late Cheng Mine main mine complex includes leach tanks and leach fields/ponds. Top image is from Google Earth in January 2023 showing both leach tanks (yellow arrow) and leach fields (red arrow). Bottom image is from a drone, taken in Summer 2023, showing this same area, with leach tanks and leach fields/ponds identified with the same color arrows as the top photo.



Figure 18b. Schematic drawings of gold mine cyanide operations showing leach tanks and leach fields.



Above from: <https://www.waihi gold.co.nz/about-mining/the-mining-process/ore-processing/>



Above from: https://www.researchgate.net/publication/326480236_HEAP_LEACHING_TECHNIQUE_in_MINING_Within_the_Context_of_BEST_AVAILABLE_TECHNIQUES_BAT_-_Introductory_Statement_by_Euromines

Figure 19. Comparison of Cambodian media report in March 2020 with satellite imagery in the March-August 2020 time period. Commercial development of the Late Cheng mine main complex began in August 2020, but only exploration permits were issued by the Cambodian government by then (in March 2020).

Late March 2020 – The Ministry of Mines and Energy on Friday announced that three companies were granted initial approval to carry out copper and gold exploration in the Kingdom. The companies named include Late Cheng Mining Development Company Ltd. in Prey Lang. The story stated that “However, the three companies must submit additional documents before the licenses can be issued” according to the Ministry spokesperson. (Source: “Approval in principle for three companies to explore gold, copper” (The Phnom Penh Post; 30 March 2020; <https://www.phnompenhpost.com/business/approval-principle-three-companies-explore-gold-copper>)).



Sentinel imagery from March 26, 2020. Red circle shows remaining evidence of 2018-2019 hard-rock gold mine that was started east of Snang An Village.



Sentinel imagery from August 23, 2020. Red circle shows first evidence of commercial hard-rock gold mine (Late Cheng Mining Development Company) development at same location as image above.

Figure 20. Comparison of Cambodian media report from September 9, 2022 and satellite imagery from January-April 2021 and September 2022. Commercial production at the Lang Cheng main mine complex began in the January-April 2021 timeframe; however, the Cambodian government issued a license to Late Cheng for commercial gold production only in September 2022.

The Chinese company Late Cheng Mining Development has been licensed to mine gold in Kampong Thom province's Sandan district. The company will conduct the \$13 million project for 15 years and generate 300 jobs, according to the Council for Development of Cambodia. Ministry of Mines and Energy director-general for mineral resources Ung Dipola said the company has a production capacity of 180 kilos of gold per year and plans a trial operation in August 2023. (Source: "Chinese Firm Gets Gold Mine Green Light" (Cambodianess; September 9, 2022; <https://cambodianess.com/article/chinese-firm-gets-gold-mine-green-light>)).



April 15, 2021.

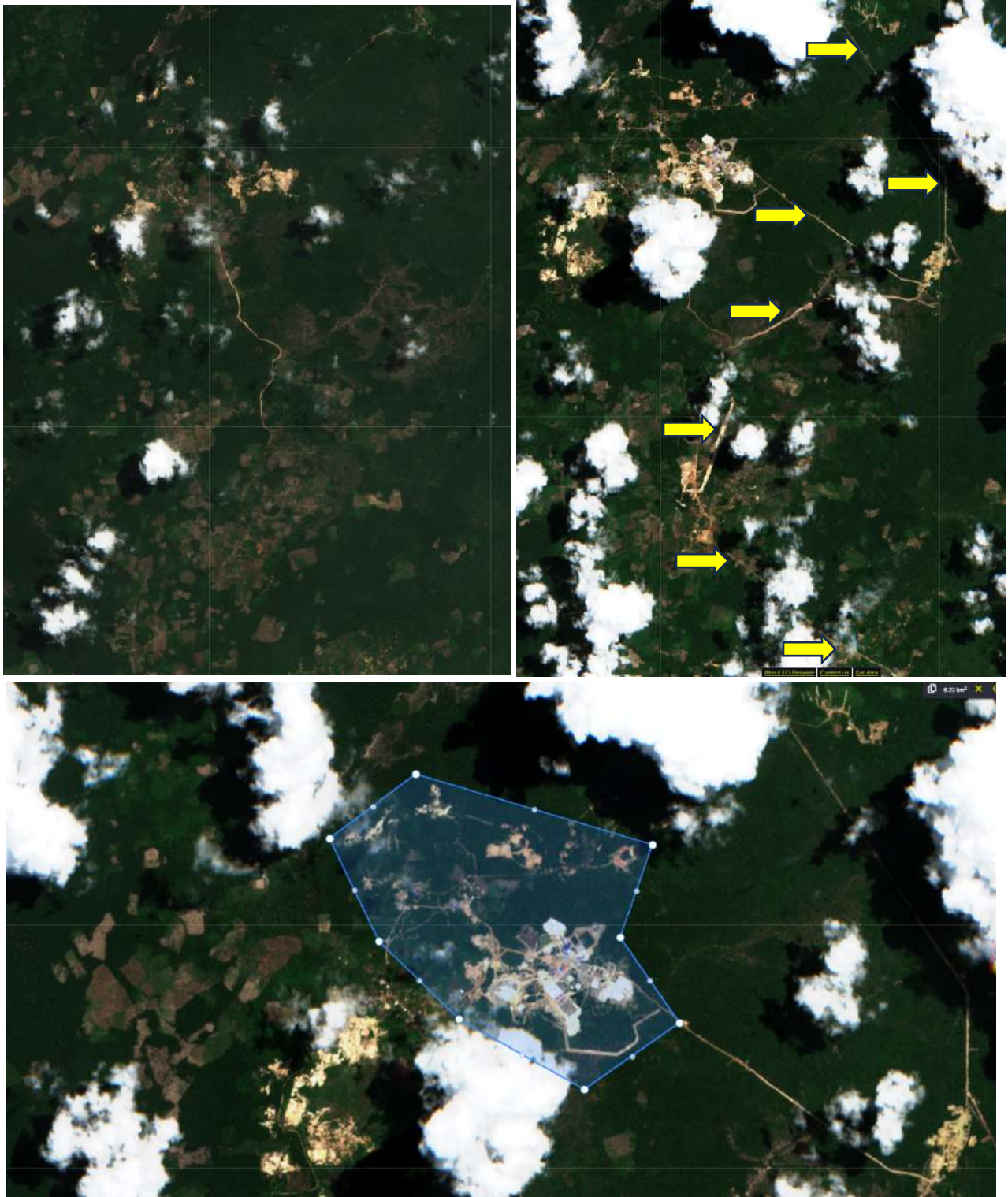


September 2, 2022. Commercial, hard-rock gold mine (Late Cheng Mine) already fully developed and under commercial production. Gold placer mining south of Sngang An Village has been greatly expanded.

Figure 21. Satellite imagery documenting that Late Cheng’s main mine complex has expanded well beyond the northern boundary of its concession area. Top image is a Google Earth image from January 2023; the concession boundary is the yellow line. Bottom image is a Sentinel image from July 2023, showing further development of mining operations outside the concession boundary, including new development at the “Chinese” hard-rock mine northeast of the Late Cheng main mine complex.



Figure 22. Development in the Late Cheng mine concession area has required clearance of hundreds of hectares of forest, while construction of access roads and canals has opened up PLWS to further human encroachment and habitat fragmentation (Figure 22). Below left is a Sentinel image from July 2021; below right is a Sentinel image from July 2023, showing proliferation of roads and canals (yellow areas). At bottom is a Sentinel image of the Main mine complex; the polygon encompasses 6.23 sq km (623 ha).



Supplemental Information

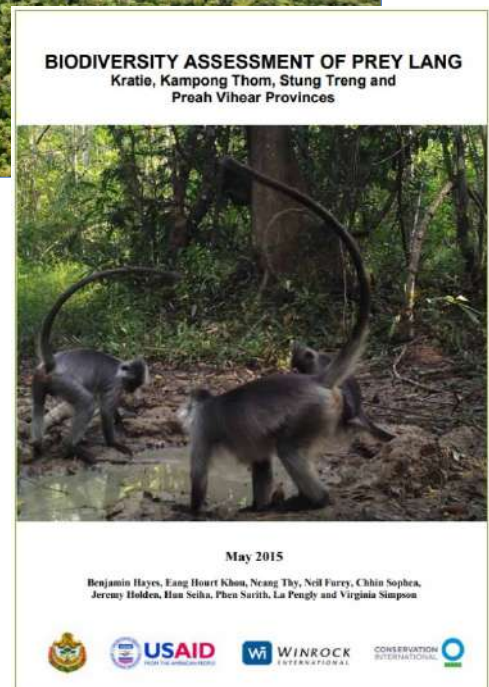
Section 1. Background

Prey Lang Forest Landscape & Prey Lang Wildlife Sanctuary

The Prey Lang Forest Landscape (PLF Landscape) in central Cambodia is the largest and one of the most biologically significant continuous, lowland evergreen forests remaining in SE Asia. Following 10 years of campaigning by NGOs and local indigenous Kuy communities who depend on the forest, the Cambodian government declared the PLF Landscape a national protected area (Wildlife Sanctuary) in 2016.² The Prey Lang Wildlife Sanctuary (PLWS) encompasses more than 400,000 hectares (ha) (Section 1, Figure 1 below).

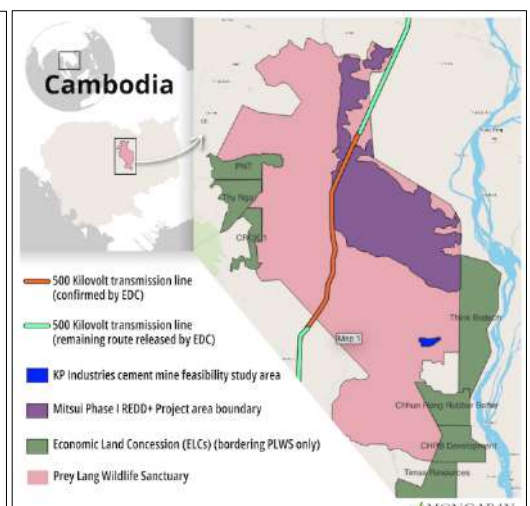


Photo source: U.S. Embassy in Cambodia



²https://data.opendevelopmentcambodia.net/laws_record/subdecree_no74_on_establishment_of_preylang_wildlife_sanctuary

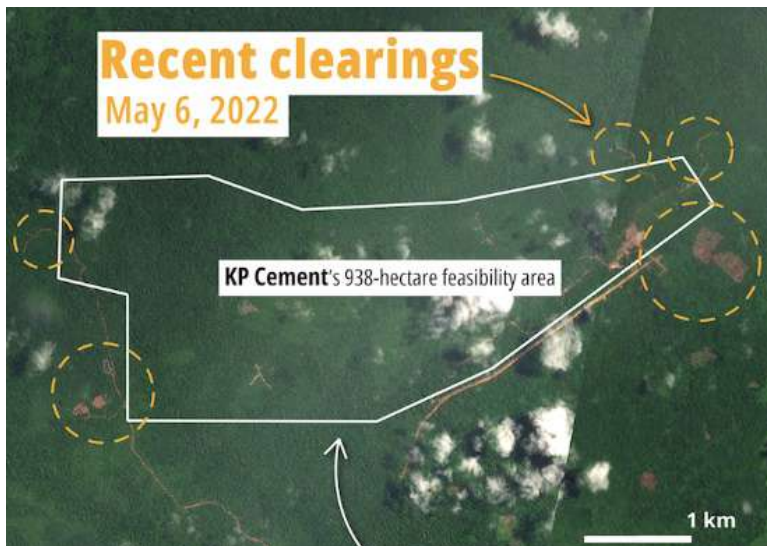
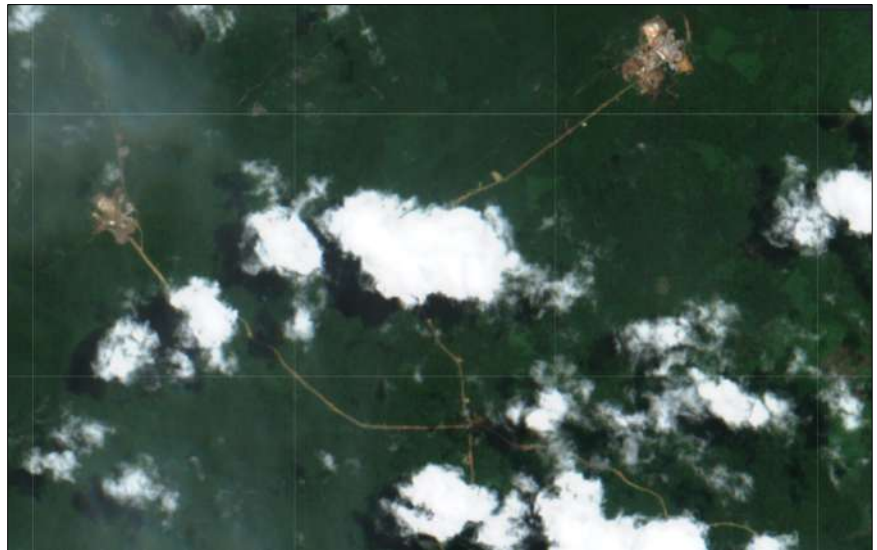
The PLF Landscape and PLWS face a multitude of human-caused threats including illegal deforestation, limestone mining, transmission line development, poaching and gold mining. Together these threats have resulted in the loss of thousands of hectares of forest and untold biodiversity. Numerous reports and newspaper/online articles have documented the rampant deforestation and other threats (Section 1, Figure 2 below and on next page).



Large-scale logging in Cambodia's Prey Lang linked to politically-connected mining operation

by Gerald Flynn | Andy Ball | Vutha Srey on 26 May 2022

f in [social media icons]



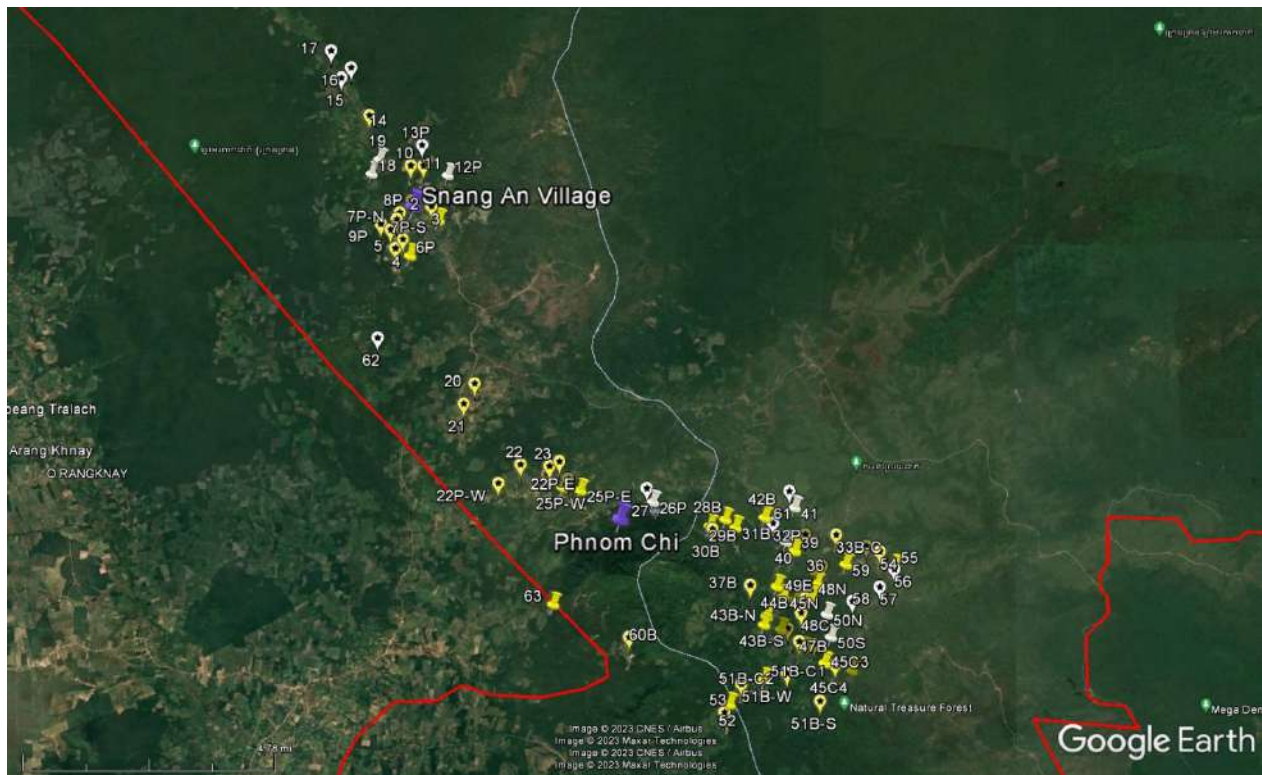
Section 2. Methods (Satellite Imagery, Site Visits, Drone, Media Reports)

Satellite Imagery

In 2018-19, Investigation Team members became interested in identifying the extent of gold mining in the Prey Lang Landscape and its possible impacts to human and environmental health

Team members began looking at satellite imagery to identify location that showed signs of possible gold mining (these signs are readily visible in good satellite imagery). Readily-available satellite images in Google Earth, Bing, and Planet Explorer were analyzed to document potential gold mining areas. Google Earth imagery dating back to the 2011 timeframe was the oldest imagery examined.

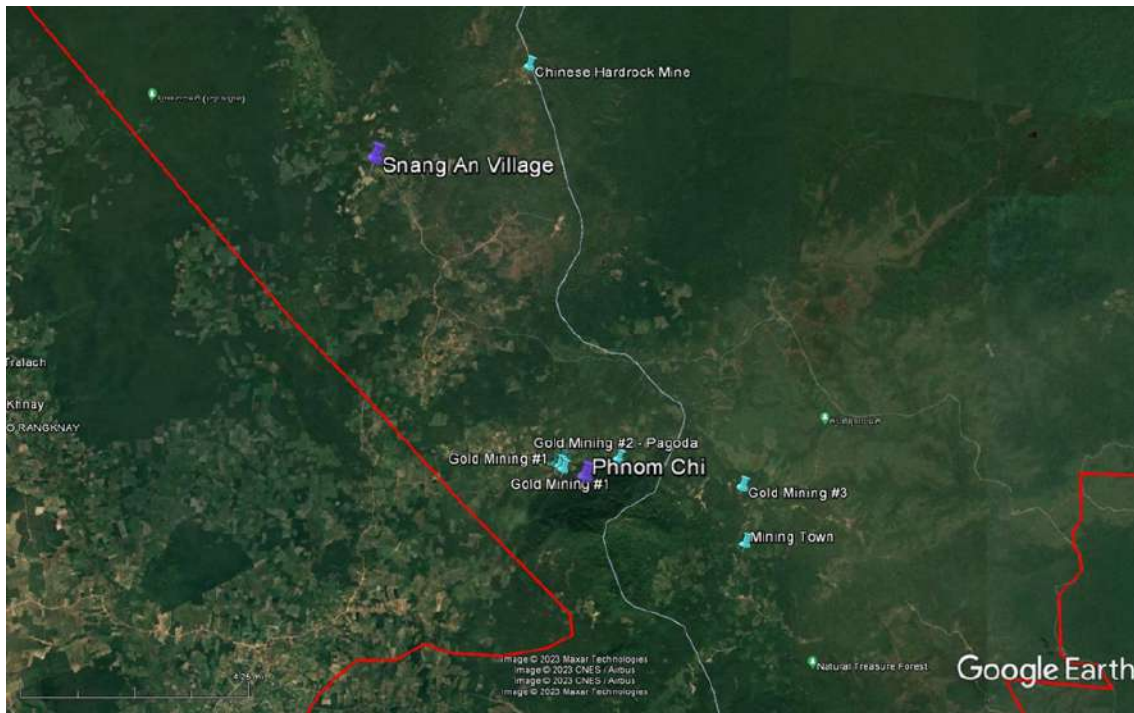
Utilizing this readily-available satellite imagery, investigators identified 63 locations within the Prey Lang Landscape that appeared to have the key characteristics of gold mining (either placer-style or hard-rock) (Figure 1). Locations with medium to high confidence based on characteristics visible in the imagery were marked with yellow pushpins; locations with lower confidence were marked with white pushpins. A subset of these locations was selected for ground truthing; they are marked with a yellow or white “balloon” with black star inside (Section 2, Figure 1).



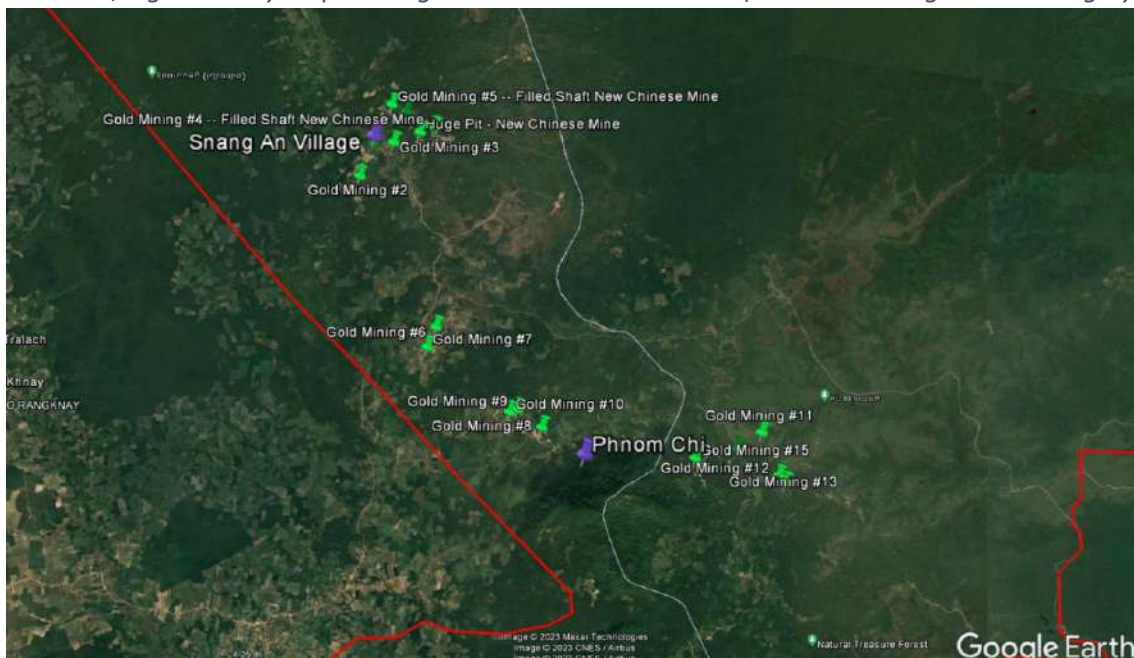
Section 2. Figure 1. Locations of possible gold mining activity identified in readily-available satellite imagery. Pushpin and “balloon” descriptions are in the paragraph above. Purple pushpins show the locations of Phnom Chi Mountain and Snang An Village. Prey Lang Wildlife Sanctuary boundary is in red.

Site Visits

Investigation Team members visited PLWS in 2018 (December) and in 2019 (May) to confirm the satellite analyses and attempt to ascertain: (1) which areas were active gold mining areas; and (2) if mercury and/or cyanide were being used in any of the gold mining there. These site visits were documented in two separate unpublished reports. Routes taken by the Team members are shown by pushpins in Section 2, Figures 2 & 3.



Section 2, Figure 2. Key stops during December 2018 site visit. (Dec. 2021 Google Earth imagery)



Section 2, Figure 3. Key stops during May 2019 site visit. (Dec. 2021 Google Earth imagery)

Subsequent Satellite Analyses

Investigation Team members used Google Earth and Sentinel images to conduct a variety of analyses, with results posted both in the Executive Summary and subsequent Sections.

Drone Imagery

Investigation Team members flew a drone over PLWS in Autumn 2022 and again in Summer 2023 and captured the images in this report.

Media Reports

Investigation Team members documented the chronology of permit issuance and mine development as portrayed by the Government of Cambodia in the public media. The following news articles are accompanied by Sentinel satellite imagery from that time period, which tells the true story. Drone imagery presented earlier in this report corroborate the satellite imagery.

Section 3. Site Visit Results, 2018

During the **December 2018** visit to Prey Lang (4 days) Investigation Team members made multiple stops in PLWS, as shown in Section 2, Figure 2. They documented:

- Three locations of active artisanal, placer-style gold mining around Phnom Chi Mountain (north, east and southeast) – Mining Locations #1-#3 in Section 2, Figure 2. Only locations #1 and #3 are discussed in detail in this report.
- A large-scale, commercial hard-rock gold mine under development northeast of Snang An Village. Investigators were told by mine workers that this mine was owned by a Chinese company, but investigators were unable to ascertain the company’s name. The mine consisted of a single shaft being actively worked, with buildings and equipment to support development of the shaft (See Section 3a. “Chinese” Hard-rock Gold Mine).

Gold Mining Location #1, 2018

Mining Location #1 (12°56'15.3"N 105°38'28.2"E), an artisanal, placer gold mining site (Figure 6), was not identified “a priori” in any imagery. Instead, it was first identified by the color of the stream crossed by motorbikes (pushpin labeled “Gold Mining #1 – Stream” in Figure 1 below, and shown in upper left-hand photo on following page). Mining at this location used hydraulic methods (high-pressure water jet) to extract sediments, and sluice boxes to separate the gold.



Section 3, Figure 1. Gold mining location #1, 2018. (December 2021 Google Earth imagery)

Photos on this page show Gold Mining Location #1, 2018.



Discolored stream water at road crossing.



Outwash from former sluice box operation.



Hydraulic alluvial mining in streambed.



Gas motor for hydraulic pump.



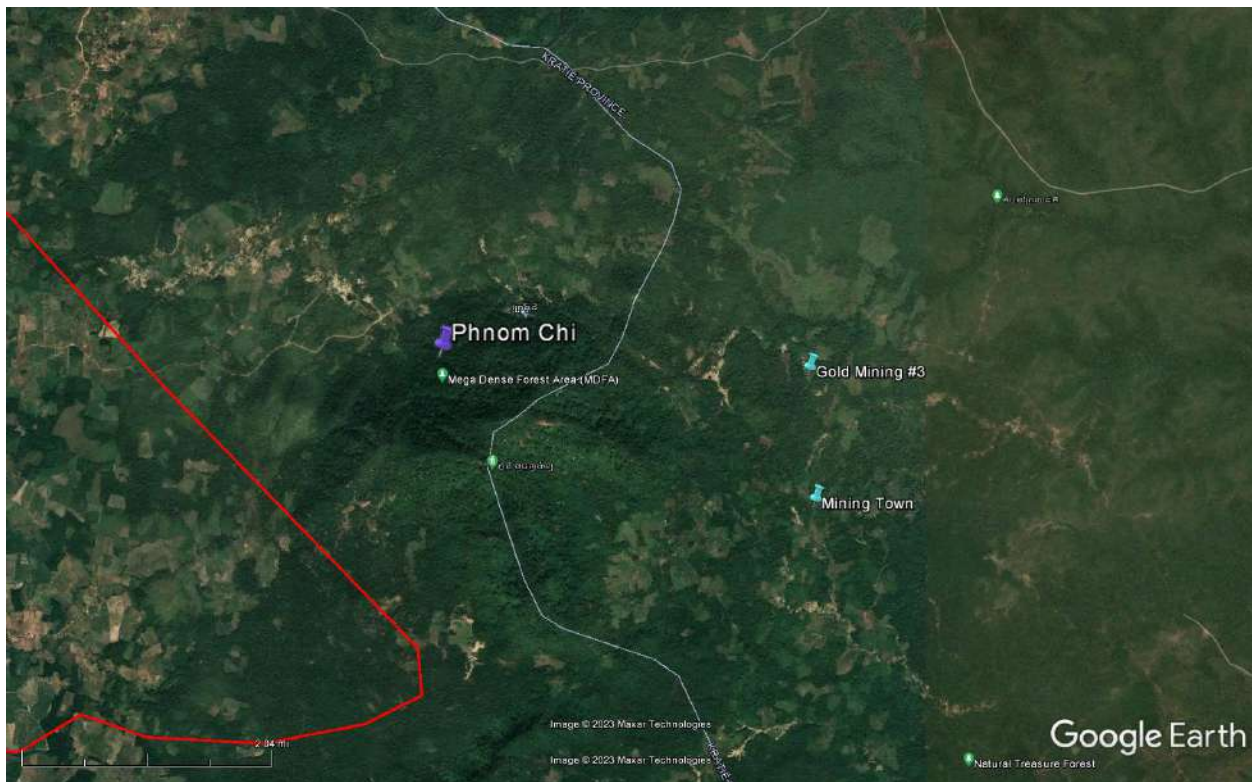
Upstream extent of mining.



Miner's house.

Gold Mining Location #3, 2018

Mining Location #3 (12°55'52.5"N 105°41'35.4"E) is east of Phnom Chi and at the north end of a large complex of current and past artisanal, placer gold mining, much of which follows stream courses (Figure 13). This area was active at the time of the 2018 site visit (Figures 14-19); it was visited again in 2019 but was not active then, perhaps due to a lack of water (dry season). Several miners were present during the 2018 visit. When asked about mercury use they claimed not to use it to extract gold, using sluicing and panning instead to separate gold gravimetrically. Mining at this location consisted of the use of used hydraulic pumps to extract placer/alluvial sediments, and sluice boxes to separate the gold from the sediments.



Section 3, Figure 2. Gold mining location #3, 2018. (December 2021 Google Earth imagery)

Photos on this page show Gold Mining Location #3, 2018, including hydraulic mining equipment (hoses, engines) and sluice boxes used for gravity separation of gold.

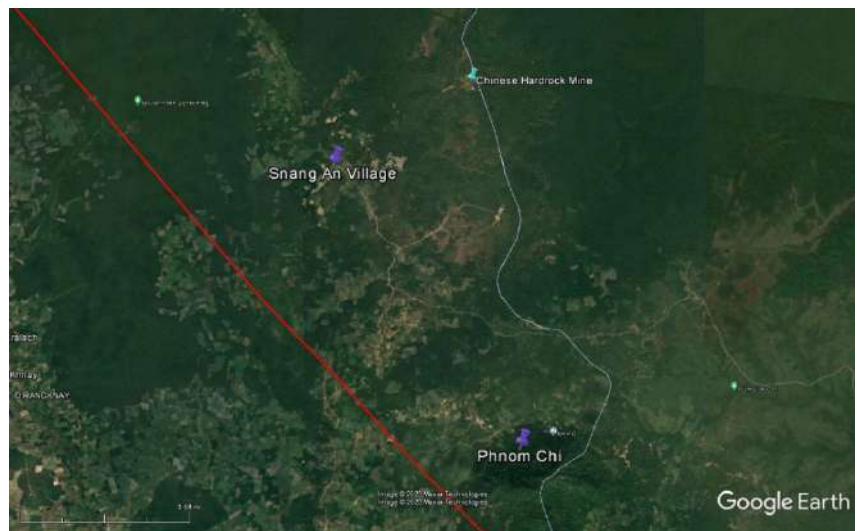


Section 3a. “Chinese” Hard-rock Gold Mine (2018)

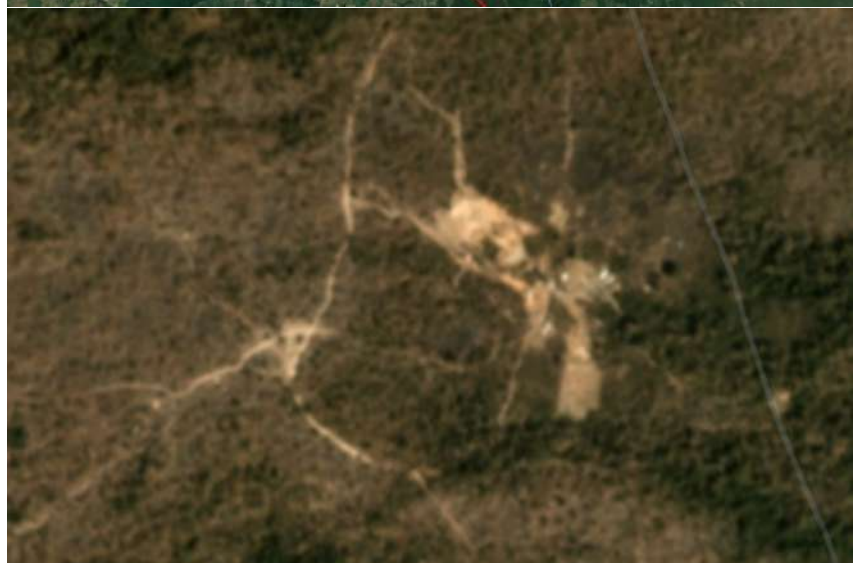
This mine, dubbed the “Chinese” hard-rock mine (13°02'41.7"N 105°38'03.1"E), is northeast of Snang An Village (Section 3a, Figure 1). This location was not identified “a priori.” Instead, Investigation Team members were made aware of the mine by their guides. The location was identified in Planet Explorer imagery post-trip (Section 3a, Figure 2).

This is a hard-rock shaft mine that appeared to be in early stages of development, judging from the moderate size of the tailings pile. A solid headframe was present and multiple additional buildings were associated with the site. Images of the mine are on the following pages. The mine was active during the site visit, with miners actively excavating in the shaft and other workers on the surface. Investigation Team members did not speak to any of the workers in great detail, because of potential sensitivities associated with unplanned inquiries. However, the workers did mention that this mine was Chinese owned, thus the name.

Section 3a, Figure 1. Location of "Chinese" hard-rock mine (Mining Location #4, 2018). (December 2021 Google Earth imagery)



Section 3a, Figure 2. "Chinese" hard-rock mine in Planet Explorer imagery. (circa January 2019)



Photos of “Chinese” hard-rock gold mine (Gold Mining Location #4, 2018). Shaft shown in photos in middle row on this page.



Section 4. Site Visit Results, 2019

While preparing the report for the 2018 trip, Investigation Team members reviewed recent satellite imagery and documented what appeared to be the early stages of a commercial, hard-rock gold mine just east of the Snang An Village. A return trip was planned to visit this site plus other sites of artisanal placer mining near Snang An Village and around Phnom Chi.

During the **May 2019** visit to Prey Lang (5 days) Investigation Team members made multiple stops in PLWS, as shown in Section 2, Figure 3. They documented:

- The commercial, hard-rock gold mine east of the Snang An Village, which had substantially developed but recently completely abandoned. Investigators were unable to ascertain the company name.
- An inactive artisanal, hard-rock gold mine near Snang An. Locals referred to this as the “Mother Lode” mine where gold mining began in the area. Investigators also visited Snang An Village itself.
- Twelve locations with old or active artisanal, placer/alluvial mining.

The 12 locations mentioned above are identified in Section 2, Figure 3 as follows. Locations in bold are described with photos on the next several pages:

- **Gold Mining #1 – Old artisanal, placer/alluvial gold mining**
- **Gold Mining #2 – Active artisanal, placer/alluvial gold mining (hydraulic mining)**
- **Gold Mining #3 – Inactive hard-rock mine near Snang An (commercial “Mother Lode” mine where mining began in area)**
- **New “Chinese” Hard-rock Mine (commercial)**
 - Huge excavated pit
 - **Gold Mining #4 -- Closed shaft mine**
 - Possible Cyanide Leach Field
 - **Gold Mining #5 -- Closed shaft mine**
- Gold Mining #6 – Old and regenerating artisanal, placer/alluvial gold mining
- Gold Mining #7 – Seasonally active artisanal, placer/alluvial gold mining (hydraulic mining – inactive during site visit because miners waiting for wet season)
- **Gold Mining #8 – Active artisanal, placer/alluvial gold mining (hydraulic mining)**
- **Gold Mining #9 – Active artisanal, placer/alluvial gold mining (hydraulic mining)**
- **Gold Mining #10 – Active artisanal, placer/alluvial gold mining (hydraulic mining)**
- Gold Mining #11 – Old and regenerating artisanal, placer/alluvial gold mining
- Gold Mining #12 – Old and regenerating artisanal, placer/alluvial gold mining
- Gold Mining #13 – Old and regenerating artisanal, placer/alluvial gold mining
- Gold Mining #14 – Old and regenerating artisanal, placer/alluvial gold mining
- **Gold Mining #15 – Active artisanal, placer/alluvial gold mining (hydraulic mining)**

Mining in Vicinity of Snang An Village on Porong River – Locations #1 - 3, 2019 (Section 4, Figure 1)

- Gold Mining #1 – Inactive artisanal, placer/alluvial gold mining (see photos on next page).
- Gold Mining #2 – Active artisanal placer/alluvial gold mining (hydraulic excavation and sluice box separation) (see photos on next page).
- Gold Mining #3 – Hard-rock mine (commercial “Mother Lode” mine where gold mining is said to have begun in area); inactive at time of site visit (see photos on page after next).



Section 4, Figure 1. Gold mining locations #1 - #3 in the vicinity of Snang An Village, 2019. (December 2021 Google Earth imagery)

Gold Mining Locations #1 - #2, 2019.



Gold Mining #1 (inactive).



Gold Mining #2. Active artisanal mining using hydraulic means (high-pressure water jet).



Gold Mining #2. Active artisanal mining using hydraulic means (high-pressure water jet).



Gold Mining #2. Active sluice box in back center of photo.



Gold Mining #2. Evidence of hydraulic mining.



Gold Mining #2. Evidence of hydraulic mining.

Gold Mining Location #3 – “Mother Lode”, 2019.



Gold Mining #3. Oblique shaft hard-rock mine dubbed “Mother Lode” because this is where gold mining is said to have begun in region.



Gold Mining #3. Tailings above mine entrance.



Gold Mining #3. Tailings above mine entrance.



Gold Mining #3. Another view of mine entrance.



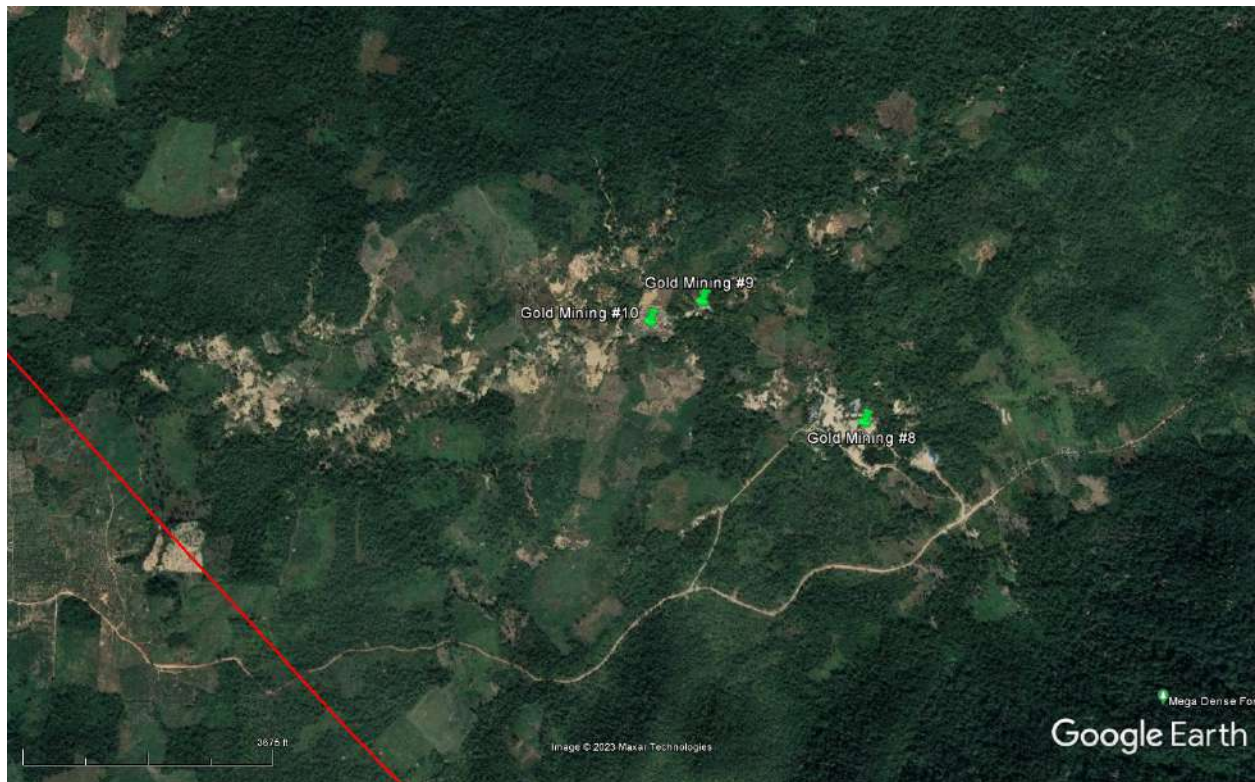
Gold Mining #3. Another view of mine entrance.



Gold Mining #3. Ground littered with drilled hard-rock core samples, near the shaft hard-rock mine. Samples were collected to test for gold.

Phnom Chi North – Gold Mining Locations #8 - #10, 2019 (Section 4, Figure 2)

- Gold Mining #8 – Active artisanal, placer/alluvial gold mining in stream (hydraulic mining) (see photos on next page).
- Gold Mining #9 – Active artisanal, placer/alluvial gold mining in stream (hydraulic mining) (see photos on page after next).
- Gold Mining #10 – Active artisanal, placer/alluvial gold mining in stream (hydraulic mining) (see photos on third page after this).



Section 4, Figure 2. Gold mining locations #8 - #10, 2019. (December 2021 Google Earth imagery)

Gold Mining Location #8, 2019.



Gold Mining #8. Active alluvial artisanal gold mining in stream (hydraulic mining) just north of Phnom Chi.



Gold Mining #8. Active alluvial artisanal gold mining in stream (hydraulic mining).



Gold Mining #8. Active alluvial artisanal gold mining showing impact of hydraulic mining on stream.



Gold Mining #8. Active alluvial artisanal gold mining showing impact of hydraulic mining on stream.



Gold Mining #8. Active alluvial artisanal gold mining (sluice box visible in distance).



Gold Mining #8. Active alluvial artisanal gold mining (closer view of sluice box).

Gold Mining Location #9, 2019.



Gold Mining #9. Active alluvial artisanal gold mining in stream (sluice box visible in distance).



Gold Mining #9. Active alluvial artisanal gold mining in stream (closer view of sluice box).



Gold Mining #9. Active alluvial artisanal gold mining.



Gold Mining #9. Active alluvial artisanal gold mining (impacted streambed).



Gold Mining #9. Active alluvial artisanal gold mining (nearby house, possibly of miner).

Gold Mining Location #10, 2019.



Gold Mining #10. Active alluvial artisanal gold mining (hydraulic mining active in pit).



Gold Mining #10. Active alluvial artisanal gold mining (hydraulic mining active in pit).



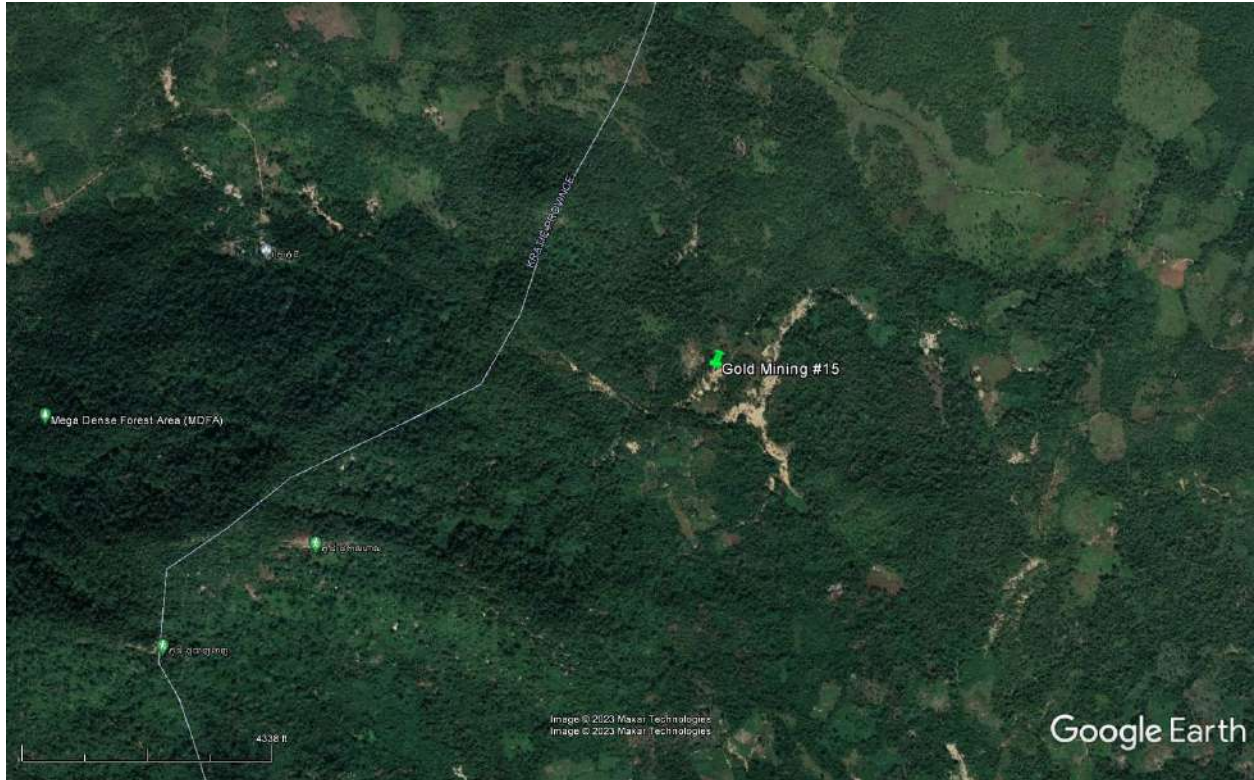
Gold Mining #10. Active alluvial artisanal gold mining (sluice box associated with hydraulic mining in above images).



Gold Mining #10. Active alluvial artisanal gold mining (sluice box).

Phnom Chi East – Gold Mining #15, 2019 (Section 4, Figure 3)

- Gold Mining #15 – Active artisanal, placer/alluvial gold mining (hydraulic mining) (see photos on the next page).



Section 4, Figure 3. Gold mining location #15, 2019. (December 2021 Google Earth imagery)

Gold Mining Location #15, 2019.



Gold Mining #15. Active alluvial artisanal gold mining (hydraulic mining). Sluce box visible in distance.



Gold Mining #15. Active alluvial artisanal gold mining (hydraulic mining). Sluce box.



Gold Mining #15. Active alluvial artisanal gold mining (hydraulic mining). Sluce box visible toward back of Photo.



Gold Mining #15. Active alluvial artisanal gold mining (hydraulic mining). Sluce box.



Gold Mining #15. Active alluvial artisanal gold mining (hydraulic mining). Further along stream as above four photos.



Gold Mining #15. Active alluvial artisanal gold mining (hydraulic mining). Further along stream as above four photos.

Section 4a. New “Chinese” Hard-rock Gold Mine, 2019

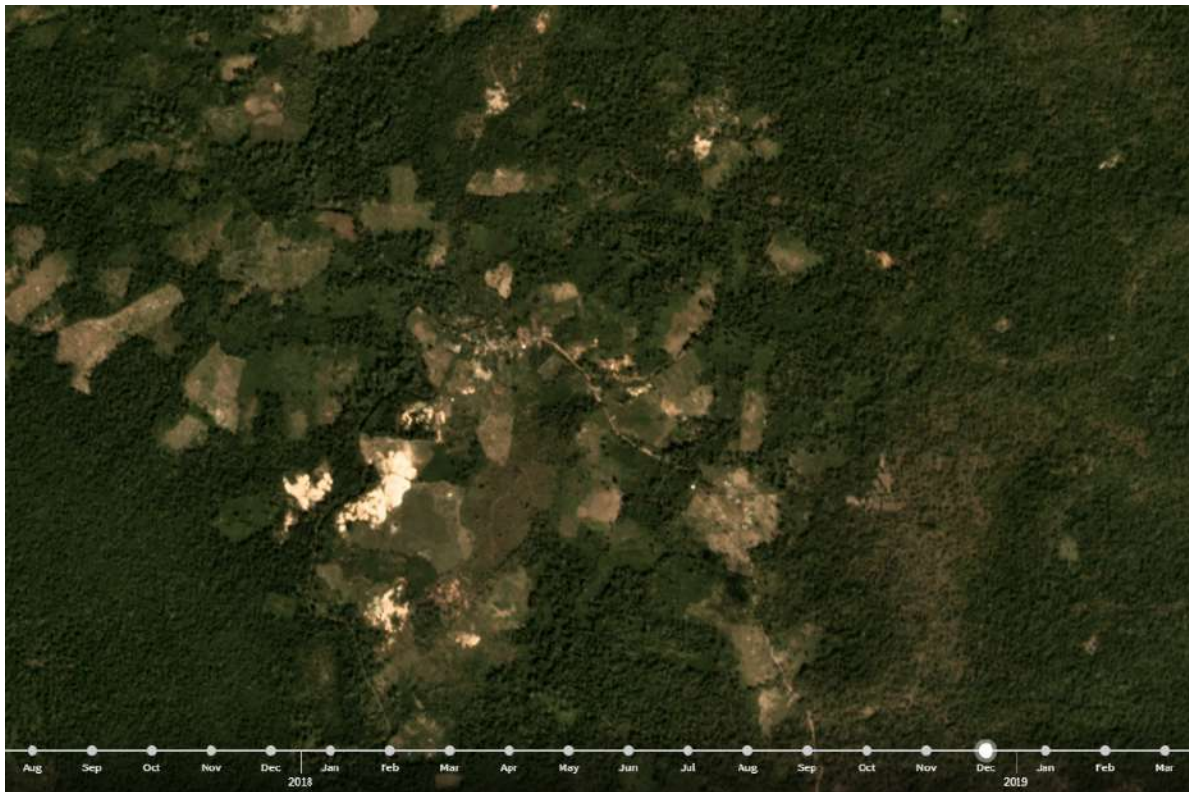
As mentioned previously, while preparing the report for the 2018 trip, investigators reviewed recent satellite imagery and documented what appeared to be the early stages of a commercial, hard-rock gold mine east of the Snang An Village (Section 4a, Figures 1 and 2). A return trip was planned to visit this site plus other sites of artisanal placer mining near Snang An Village and around Phnom Chi.

Investigators visited this mine on May 5, 2019, dubbed the new “Chinese” hard-rock gold mine, and documented all areas identified in satellite imagery. The mine was no longer active, with two shafts filled in and buildings abandoned/demolished. Investigators were told that the Cambodian Courts had shut the mine, but they were unable to learn any details regarding the basis of the decision or the possible future of the mine. One area of concern associated with this mine is the possible cyanide leach field that was encountered. If further testing/analysis indicates that this actually is a cyanide leach field, it might still pose a threat to the environment as well as human health.



Section 4a. Figure 1 (left). Development as of October 2018. Figure 2 (right). Development as of February 2019. Readily visible is rapid road development and expansion of potential mining disturbance. Planet Explorer imagery.

- The new “Chinese” hard-rock gold mine developed very rapidly between December 2018 and February 2019, with continued expansion through April 2019. The following two Planet Explorer images show the rapidity with which the mine was developed. The top image (Section 4a, Figure 3), from December 2018, shows no development. The bottom image (Section 4a, Figure 4), from February 2019, shows the possible leach field, excavated pit, roads and structures.



Section 4a, Figure 3. No mine development showing. December 2018.



Section 4a, Figure 4. Extensive mine development February 2019.

The following features of the new “Chinese” Hard-rock Gold Mine were visited during the site visit in May 2019 (Section 4a, Figure 5)

- Huge excavated pit (see photos on next page)
- Associated mine building infrastructure (see photos on next page and second page after this)
- Gold Mining #4 -- Closed shaft mine (see photos on second page after this)
- Probable Cyanide Leach Field (see photos on third page after this)
- Gold Mining #5 -- Closed shaft mine (see photos on fourth page after this).



Section 4a, Figure 5. New “Chinese” hard-rock mining locations Planet Explorer image from February 2019. Arrow points to Snang An Village and bridge over Porong River. Chinese mine locations are: Pentagon is huge pit and associated infrastructure; Diamond is Gold Mining #4; Hexagon is probable cyanide leach field; Rectangle is Gold Mining #5.

Other locations are: Star is Gold Mining #1 and #2; Oval is Gold Mining #3 (“Mother Lode” hard-rock mine).

New "Chinese" Hard-rock Gold Mine, 2019.



Large excavated open mining pit associated with new Chinese mine dev. (location marked with pentagon in Sec. 4a, Fig. 5.) This area is now the large open pit mine in the main mine.



Large excavated open mining pit. This area is now the large open pit mine in the Late Cheng main mine complex.



Large excavated open mining pit. This area is now the large open pit mine in the Late Cheng main mine complex.



Large excavated open mining pit. This area is now the large open pit mine in the Late Cheng main mine complex.



Building (what appears to be a dormitory for workers) associated with new Chinese mine development.



Wooden building associated with new Chinese mine development.

New "Chinese" Hard-rock Gold Mine, 2019.



Incomplete (and now collapsed) metal frame building associated with new Chinese mine development.



Incomplete (and now collapsed) wooden building associated with new Chinese mine development.



Gold Mining #4 (new Chinese mine). Rockpile (perhaps excavated from mine shaft). Location marked with diamond in Section 4a, Figure 5.



Gold Mining #4 (new Chinese mine). Rockpile (perhaps excavated from mine shaft).



Gold Mining #4 (new Chinese mine). Filled in mine shaft.



Gold Mining #4 (new Chinese mine). Filled in mine shaft.

New "Chinese" Hard-rock Gold Mine, 2019.



Probable cyanide leach field. Roadway (at right of photo) leading to top, flat surface of field. Location marked with hexagon in Section 4a, Figure 5.



Probable cyanide leach field. Note people on top of field.



Probable cyanide leach field. Ponds in front of field.



Probable cyanide leach field. Ponds in front of field.



Probable cyanide leach field. Top, flat surface of field.



Probable cyanide leach field. Top, flat surface of field.

New "Chinese" Hard-rock Gold Mine, 2019.



Gold Mining #5. Shaft with concrete casing toward back right of photo. Location marked with rectangle in Section 4a, Figure 5.



Gold Mining #5. Shaft with concrete casing toward back left of photo.



Gold Mining #5. Shaft with concrete casing.



Gold Mining #5. Shaft with concrete casing.

Section 5. Late Cheng Mining Development Co Ltd. Concession Area 2020-2023

In 2022, Investigation Team members were examining Sentinel satellite imagery and identified the very rapid development of a large-scale, commercial gold mine east of Snang An Village on the exact site of the new “Chinese” hard-rock gold mine visited in May 2019 (Section 3a of this report).

According to a variety of sources, this commercial mine belongs to the Late Cheng Mining Development Co Ltd., a Chinese-owned mining company.

According to CamboJA News (December 27, 2022): “Ministry of Commerce records show Late Cheng is run by four Chinese nationals — Dong Shuangyong, Feng Zhirong, Yin Guozhong and Zhao Ying Ming — and Zhao’s Cambodian wife, Soeun Pisey. Dong, Feng and Yin all became naturalized Cambodian citizens in 2020, according to rights group Licadho....Through donations, Zhao and Pisey have reinforced connections to Cambodia’s ruling elite and military and local law enforcement officials.”

Investigation Team members documented the chronology of Late Cheng Mine development (following pages). This imagery indicates that work on the Late Cheng Mine began during August 2020 and expanded quite rapidly (Section 5, Figures 1-10). Commercial production likely began in January-April 2021 timeframe.

The same excavated pit documented in May 2019 was expanded for the new Late Cheng Mine. The Late Cheng Mine also has extensive leach heaps, spoil piles and waste ponds, along with a number of structures. In addition, during this same time period, placer-style gold mining immediately south of Snang An Village began expanding quite rapidly; this mining had previously been artisanal, but appears to have been co-opted by the commercial gold mine. Finally, roads have been constructed to two outlying areas to the east, one of which is “Chinese” Hard-rock Gold Mine (description starting on Page 10 of this report). These areas appear to be exploratory in nature. See Figure 100 for detailed features of the Late Cheng Mine in satellite imagery.

Section
5.
Figures
1-10.

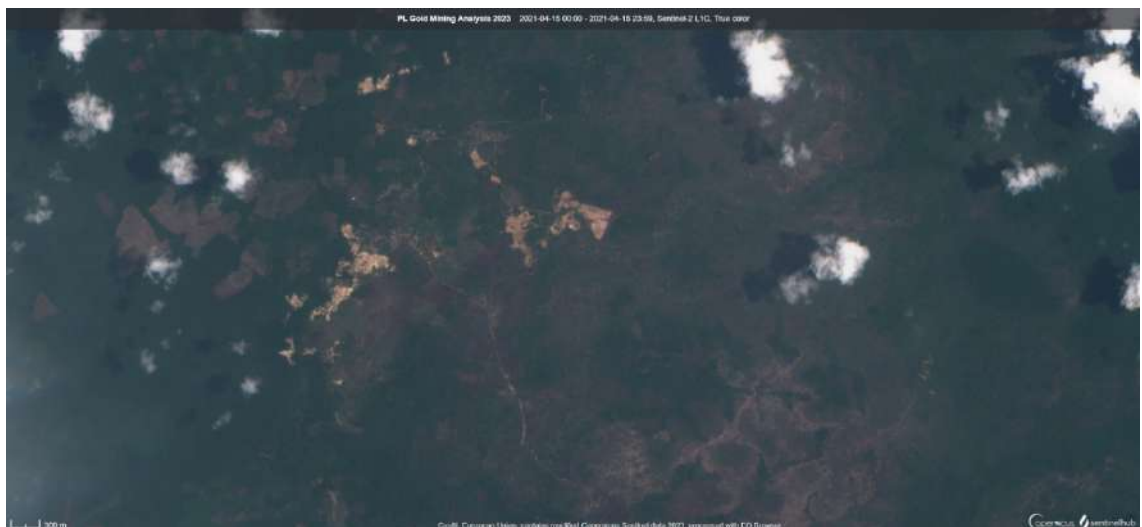
11-16-
2020.



01-15-
2021.



04-15-
2021.



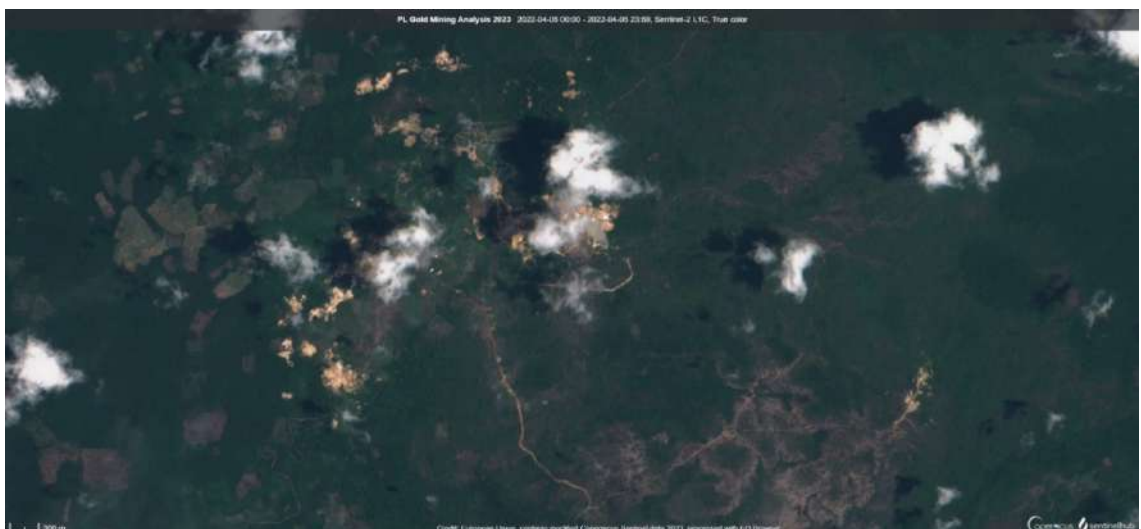
11-01-
2021.



03-11-
2022.



04-05-
2022.



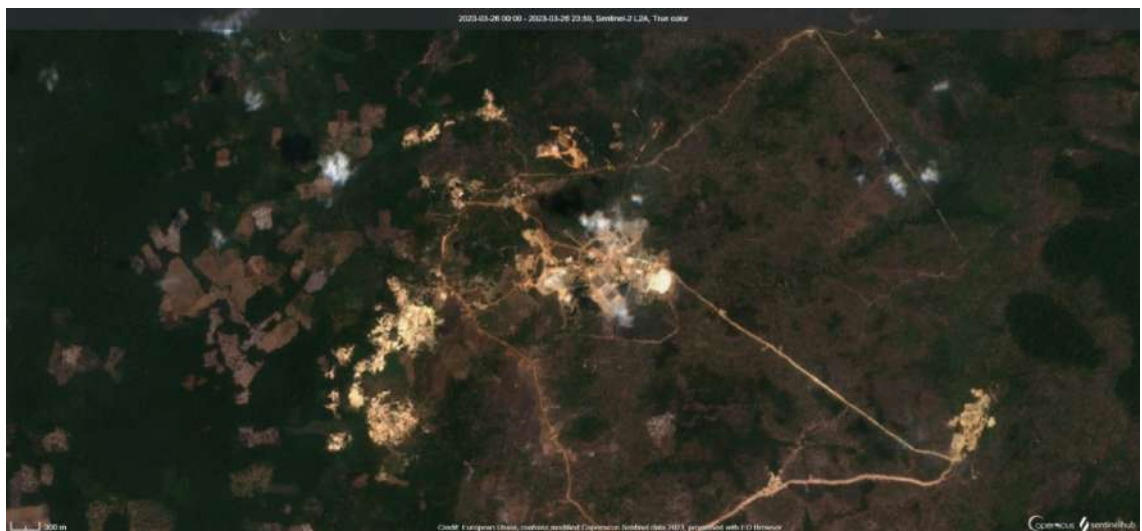
10-12-
2022.

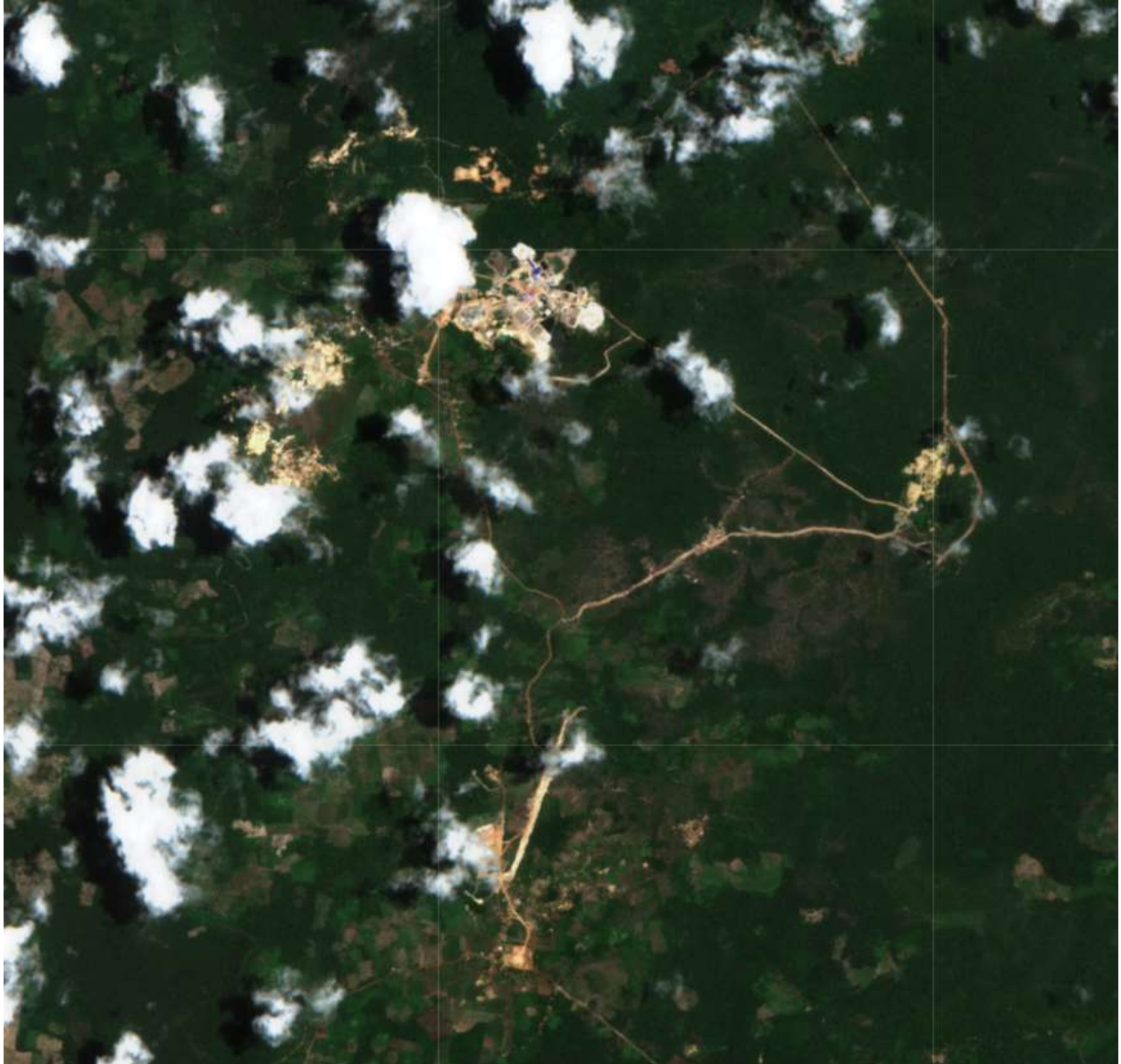


12-31-
2022.



03-26-
2023.





08-13-2023.

Section 6. Late Cheng Mine Development Chronology – Media Reports vs. Satellite Imagery

Methods: Team members searched for Cambodian media reports online to track the progress of Late Cheng Mine development as reported in the media. A comparison of media report dates with Sentinel satellite imagery dates clearly indicate that mine development was much further advanced than what was reported in the media on the same date, and that mine development proceeded in advance of permit issuance. Following is a comparative chronology of events.

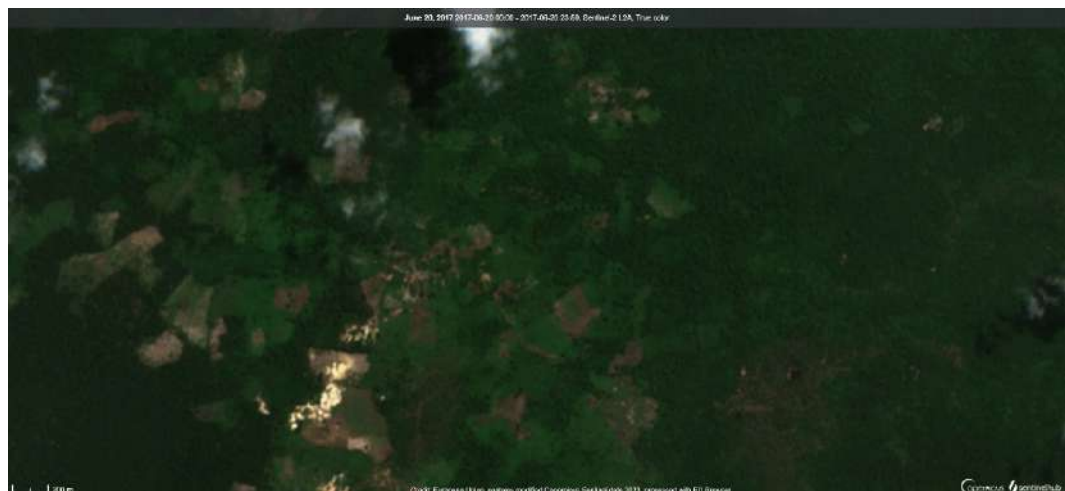
Summary of Results:

- (1) Exploration permits for PLWS first tendered in May 2017.
- (2) Development of the Late Cheng main mine complex mine began in August 2020, although only exploration permits had been issued by then.
- (3) A license for commercial production was issued in Late August 2022, however the mine was fully developed and commercial production had been well under way since January-April 2021.
- The Cambodian Government stated that a “trial operation” would be undertaken in 2023; whereas commercial production began.

Chronological details:

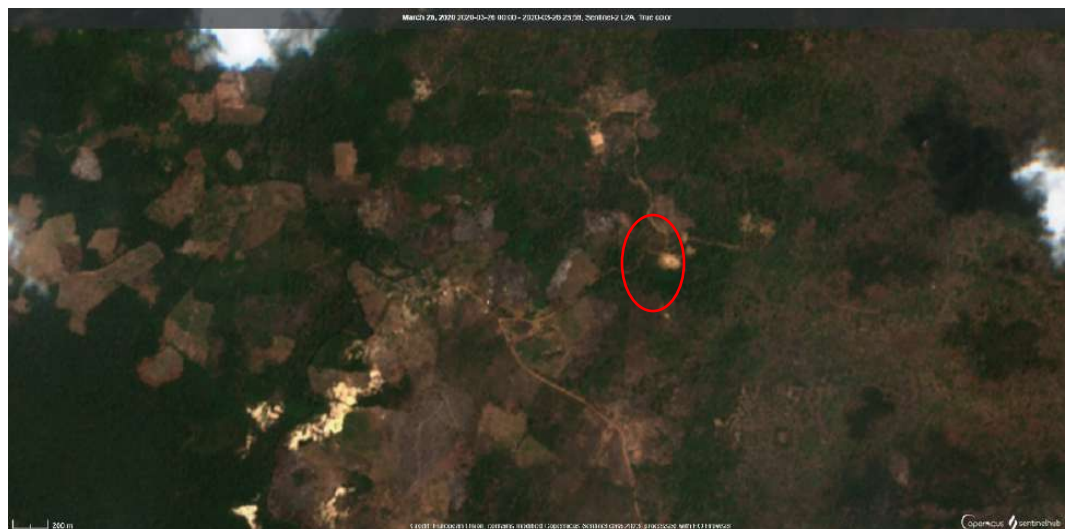
- **(1) 12 May 2017** -- One of four new mining exploration permits publicly tendered during this week is within the Prey Lang Wildlife Sanctuary map. This sparked concern among activists and community members about the strength of the forest’s recently-acquired protected status.
 - “Mineral exploration permits offered for protected Prey Lang” (The Phnom Penh Post; 12 May 2017; <https://www.phnompenhpost.com/national/mineral-exploration-permits-offered-protected-prey-lang>)

Section 6, Figure 1. June 20, 2017. No evidence of commercial, hard-rock gold mining. Artisanal gold mining visible south of Snang An Village.



- **(2) 30 March 2020** – The Ministry of Mines and Energy on Friday announced that three companies have been granted initial approval to carry out copper and gold exploration in the Kingdom. The companies named include Late Cheng Mining Development Co Ltd. in Prey Lang. The media story stated that “However, the three companies must submit additional documents before the licenses can be issued” according to the Ministry spokesperson.
 - “Approval in principle for three companies to explore gold, copper” (The Phnom Penh Post; 30 March 2020; <https://www.phnompenhpost.com/business/approval-principle-three-companies-explore-gold-copper>)

Section 6, Figure 2. March 26, 2020. Evidence of the commercial, hard-rock gold mine east of Snang An Village developed in 2018-2019 but abandoned.



Section 6, Figure 3. August 23, 2020. Initial evidence of commercial hard-rock gold mine (Late Cheng Mine) development at same location as the first mine.



- **(3) Early September 2022** -- Council for the Development of Cambodia (CDC) approved the plan of Late Cheng Mining Development Co Ltd to invest \$13 million in the mining business in Sandan district of Kampong Thom province. The company is expected to provide jobs for 300 people.
 - “Investment projects worth \$83 million to create 2K jobs” (Khmer Times; September 2, 2022; <https://www.khmertimeskh.com/501143278/investment-projects-worth-83-million-to-create-2k-jobs/>)
- The Chinese company Late Cheng Mining Development has been licensed to mine gold in Kampong Thom province’s Sandan district. The company will conduct the \$13 million project for 15 years and generate 300 jobs, according to the Council for Development of Cambodia. Ministry of Mines and Energy director-general for mineral resources Ung Dipola said the company has a production capacity of 180 kilos of gold per year and plans a trial operation in August 2023.
 - “Chinese Firm Gets Gold Mine Green Light” (Cambodianess; September 9, 2022; <https://cambodianess.com/article/chinese-firm-gets-gold-mine-green-light>)

Section 6, Figure 4. September 2, 2022. Late Cheng Mine main complex already well developed and in commercial production.



- **December 2022** – A story in Cambojanews includes the following text, as well as satellite imagery of the fully developed mine. Underlined text is most important: “Yet the land’s conservation status did not stop the Council for the Development of Cambodia from legally granting commercial exploitation rights on August 31 to Late Cheng. Mining can be allowed in protected areas if regulations such as an environmental impact assessment are followed. The company’s operations encompass 5,800 hectares, according to a map from an environmental impact assessment seen by Camboja.” “The Ministry of Mines and Energy had previously issued a permit for the company to explore 15,100 hectares in March 2020, mostly inside the Prey Lang Wildlife Sanctuary.” “The \$13 million Late Cheng project is

expected to produce 180 kilograms of gold per year beginning in August 2023, according to the Council for the Development of Cambodia.”

- “In Protected Prey Lang Forest, Communities Pushed Out But Mining Companies Welcomed In” (CamboJA News; 27 December 2022; <https://cambojanews.com/in-protected-prey-lang-forest-communities-pushed-out-but-mining-companies-welcomed-in/>)

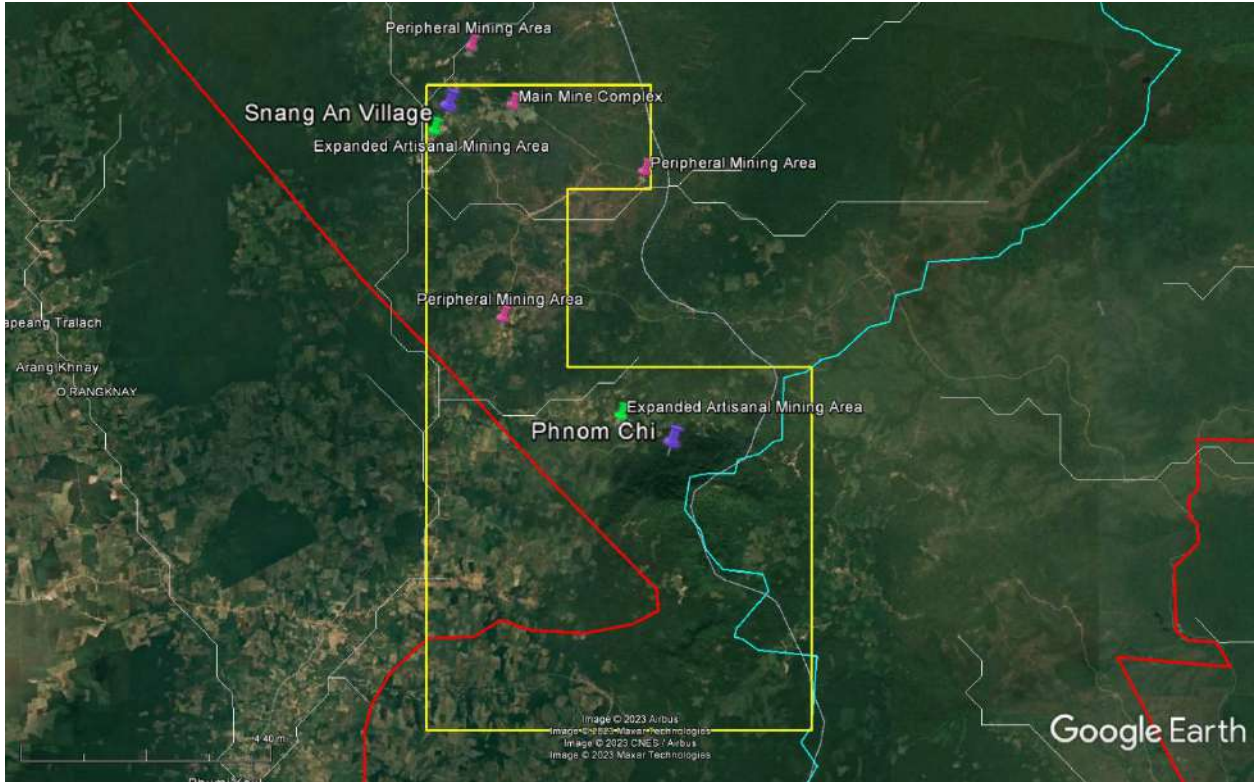
Section 6, Figure 5. December 26, 2022. Late Cheng main mine complex in commercial production. Greatly expanded placer mining south of Snang An Village.



Section 7. Environmental and Human Health Impacts of Gold Mining

- Serious questions remain regarding the environmental and human health impacts of the Late Cheng Mine (main mine complex and peripheral mining areas) as well as the artisanal gold mining near Snang An Village and Phnom Chi.
- The Environmental Impact Assessment (EIA) for the Late Cheng mine development is apparently not publicly available, according to Cambodian media reports. The public has no understanding of how impacts were assessed, what biodiversity was assessed, what contingency plans for a spill or other contamination are in place, or what clean up and restoration work will be required after the mines close. This EIA, if one was produced at all, is clearly inadequate given the environmentally-harmful activities that have taken place within the concession area.
- Development of the Late Cheng Mine has required clearing of hundreds of hectares of forest (although the exact amount has not been quantified, we estimate that at least 2,000 ha have been destroyed) and extensive road construction which has opened up Prey Lang Wildlife Sanctuary to further human encroachment. It is well known that road construction associated with forestry and extractive industries provides access for humans to engage in illegal activities such as poaching and illegal timber harvest, as well as clearing land for agriculture and settlements. It is unknown what plans are in place to combat this encroachment.
- Cyanide is almost certainly being used to separate gold in Late Cheng’s main mine complex, based on the presence of leach fields/ponds and leach tanks. Cyanide has well known environmental and human health risks that remain undocumented within the Late Cheng concession area. Further documentation of the extent of these impacts is needed, in particular surface and groundwater contamination and exposure of mine workers and their families.
 - “Cyanide hazards to plants and animals from gold mining and related water issues”
<https://pubmed.ncbi.nlm.nih.gov/15369321/#:~:text=All%20these%20cyanide%2Dcontaining%20water,fish%20and%20other%20aquatic%20biota>.
 - “A critical review of the effects of gold cyanide-bearing tailings solutions on wildlife”
<https://www.sciencedirect.com/science/article/abs/pii/S0160412007000815?via%3Dihub>

- “Determination and detoxification of cyanide in gold mine tailings: A review”
<https://pubmed.ncbi.nlm.nih.gov/31603399/#:~:text=The%20cyanide%20species%20in%20the,concentrations%20in%20gold%20mine%20effluents>
- The use of mercury in artisanal gold mining in Prey Lang WS has not been demonstrated. Mercury has well known environmental and human health risks. If this substance is being used, it adds another significant threat to both the environment and human health.
 - “The Mercury Problem in Artisanal and Small-Scale Gold Mining”
<https://chemistry-europe.onlinelibrary.wiley.com/doi/10.1002/chem.201704840>
 - “Mercury Pollution from Artisanal and Small-Scale Gold Mining in Myanmar and Other Southeast Asian Countries” <https://www.mdpi.com/1660-4601/19/10/6290>
- The Late Cheng Mine is in the immediate vicinity of the Porong River and small tributaries thereof. The Porong River is a tributary to the Stung Chinit River, which itself flows into the Tonle Sap River. The Porong/Chinit is used by Snang An villagers as well as villagers downstream. A wastewater or tailing pond spill or cyanide leak from Late Cheng could be a serious threat to the environment and human health both in Snang An and further down the Porong/Chinit. Artisanal mining immediately south and west of Snang An is already contaminating the Porong River with sediments that are potentially toxic. Artisanal mining north of Phnom Chi is destroying the streams in which it takes place (streams which are also tributaries to the Porong River), contaminating the water with potentially toxic sediment. Dozens of kilometers of streams have already been directly impacted, but downstream impacts have not been assessed. See Section 7, Figure 1.



Section 7, Figure 1. Principal gold mining areas within the Late Cheng concession area (yellow boundary line) in relation to watercourses (white line segments) defined in the HYDROSHEDS data set. The Porong River is the vertical white line just west of Snang An Village. The boundary of the Porong/Chinit River watershed is the light blue line (also from HYDROSHEDS). The boundary of Prey Land WS is the red line.