

Massive erosion likely due to hydropower dam causes oil spill on Ecuador's Coca River

by Antonio José Paz Cardona on 6 May 2020 | Translated by Romina Castagnino

- *Almost two months ago, Mongabay reported on the disappearance of the San Rafael waterfall, the highest in Ecuador. Geologists and hydrologists at the time warned that a phenomenon known as "regressive erosion" could affect upstream infrastructure.*
- *On April 7, two oil pipelines broke due to landslides along the river, and there is growing concern over the high rate at which the erosion is occurring.*
- *Oil has reached the Napo River and contaminated the water for downstream populations. If containment operations fail, it could reach the Amazon River in Peru.*
- *One expert interviewed by Mongabay said she believes the waterfall's collapse and subsequent heavy erosion event are linked to the Coca Codo Sinclair hydroelectric plant, which was built and financed by Chinese companies.*

Ecuador is in a deep economic and health crisis due to the COVID-19 pandemic that has spread seriously in the city of Guayaquil, in the province of Guayas. Amid that crisis, at 7:15 p.m. on Tuesday, April 7, part of the riverbed of the Coca River, located on the San Rafael sector and on the border between the provinces of Napo and Sucumbíos, sank. The resulting sinkhole caused the collapse of upstream infrastructure belonging to the Trans-Ecuadorian Oil Pipeline System (known by its Spanish acronym SOTE) and the heavy crude pipeline (operated by private company OCP), which then caused an oil spill on the Coca.

Video: The story in 1 minute

As the incident occurred in an area with abundant water, the oil quickly reached the Napo River. If containment operations there fail, the oil could reach the Amazon River in Peru. Kichwa indigenous communities living downstream of the spill have already denounced the contamination of the tributary and have expressed concerns about the possible death of fish and the impact on fishing, one of their only available subsistence activities during the pandemic.

This disaster is not an isolated event, but is related to the collapse of the San Rafael waterfall (<https://news.mongabay.com/2020/03/why-did-ecuadors-tallest-waterfall-suddenly-disappear/>) on Feb. 2. This was caused by an erosion phenomenon that happened upstream of the waterfall; hydrologists and

Video recorded with a drone showing the erosion process of the Coca River, upstream from what was the San Rafael waterfall. Landslides continue to occur. This erosion event was responsible for the sinkhole that broke the OCP and SOTE pipelines.

A predicted tragedy

"They said it would happen, but nothing was done about it. The country should start talking about the future of the oil pipeline bases, the highway, and the catchment dam of the Coca Codo Sinclair hydroelectric plant," said Emilio Cobo, coordinator of the IUCN's South America water program. In the report (<https://news.mongabay.com/2020/03/why-did-ecuadors-tallest-waterfall-suddenly-disappear/>) published by Mongabay, Cobo said "very serious" impacts may be registered on infrastructure in the Coca River channel between the waterfall and the dam that could compromise the future of the hydroelectric plant. The SOTE and OCP pipelines are just two pieces of infrastructure found along this channel.

See related: Why did Ecuador's tallest waterfall suddenly disappear?

(<https://news.mongabay.com/2020/03/why-did-ecuadors-tallest-waterfall-suddenly-disappear/>)

"The magnitude of the regressive erosion is much stronger than I imagined," Cobo said. "I thought it was going to be 4 or 5 meters [13 or 16 feet] deep, but the pictures show at least 15 meters [49 feet]. Also, the rainy season that just began further accelerates the erosive process in the river."

Carolina Bernal, a geologist with a Ph.D. in hydrosedimentology, knows in depth the dynamics of sediments in water bodies. For years, she has studied the mechanisms of the Coca River, especially the area where the San Rafael waterfall and the Coca Codo Sinclair hydroelectric plant are located. When the waterfall collapsed, people were not sure if the natural phenomenon was related to the presence of the hydroelectric plant. "I had doubts that the Coca Codo Sinclair plant influenced what happened with the San Rafael waterfall [on Feb. 2], but now, after seeing the aggressiveness of the phenomenon, it can be linked with the sediment management of the project. Hydroelectric plants must be planned very carefully," Bernal said.

Mongabay contacted the dam operator in February to ask about the erosion of the San Rafael waterfall but received no response. After the collapse that broke the OCP and SOTE pipelines on April 7, the company used its social media platform only to repeat messages sent by Petroecuador and the Ministry of Energy and Non-Renewable Resources.

Bernal said the regressive erosion occurring upstream of the waterfall is also very aggressive and fast-paced. "In my opinion, this phenomenon will not stop until the river recovers the dynamic equilibrium altered by the project. If this is the case, I think that hydrosedimentological studies are necessary, and a long-term sediment management plan should be created. Things like this happen when project [developers] don't conduct good studies before starting construction," she says.

Alfredo Carrasco, a geologist, natural resources management consultant and former secretary of natural capital at the Ministry of Environment (MAE), said he believes the collapse of the San Rafael waterfall to be a natural phenomenon. However, on Feb. 18 he shared with Mongabay his concerns regarding the inaction of the authorities following the severity of the regressive erosion process.

"As I told you a month and a half ago, the speed of the regressive erosion was too serious for it to not have been analyzed. The OCP and SOTE should have done it. I hope that Coca Codo Sinclair is now analyzing it," Carrasco said.



The bases and pipes of the Trans-Ecuadorian Oil Pipeline System and the heavy crude pipeline operated by OCP collapsed on April 7. Photo via private archive.

In short, he said, the waterfall has already receded to the area where this new collapse occurred, which ended up affecting the pipelines.

Cobo from the IUCN said the original waterfall was 150 meters (492 feet) high, so now the river is aiming to gain back that height difference. "It begins to eat its riverbed, from the waterfall upward. It is accentuated more due to the current height difference and the rainy season," he said.

Hydro dam and other infrastructure now at risk

Experts agree that stopping the erosion will be extremely difficult. "We cannot remove the hydroelectric plant. They need to manage the sediment, study the equilibrium profiles of the river, make bathymetrics — topographic surveys of the relief of land surfaces covered by water, that is, mapping the riverbed — and perhaps sacrifice the generating power potential of the hydroelectric plant so that more water and sediment flows [to] prevent these events from occurring again," Bernal said. "If this is not controlled, erosion could threaten the catchment dam itself."

Carrasco said he continues to be astounded by the speed of the erosion; in less than two months it has already affected about 1.5 kilometers (0.9 miles). He said he calculated that if that rate is maintained, the effects could be devastating: the community of Manuel Galindo, 5 km (3.1 mi) upstream of the site where the erosion is currently happening, could be at risk in about seven months; the hydro dam, 16 km (10 mi) away, could itself be in danger in 20 to 24 months; and the SOTE pipeline's El Salado pumping station, 17 km (10.5 miles) away, in about 27 to 30 months.

Carrasco said there's a solution, but the cost could be very high. "It's necessary to seal the base where the original waterfall was; however, urgent work is needed to lower the hydraulic dynamics," he said. That would be a "super-emergent" solution and would have to be studied in depth. He added this would represent an investment of millions of dollars, but compared to the possibility of losing more money due to the disasters that the erosion continues to generate, "it would be worth considering and analyzing it."

Oil-contaminated water affects communities

Addressing the regressive erosion process of the San Rafael waterfall is vital to avoid further tragedies, but the severity of the crisis generated by the rupture of the pipelines has garnered most of the attention.

State oil company Petroecuador said in a statement that it has closed the flow of crude oil and that its engineers went to the area of the collapse to determine the exact cause. Experts consulted by Mongabay say the cause is already known: it is due to the erosion of the Coca River that became evident with the collapse of the emblematic San Rafael waterfall on Feb. 2.



Fishing has been affected by the oil spill. Image courtesy of the Pandayacu community.

The minister of the environment and water, Juan DeHowitt, ordered the creation of an emergencies and contingencies committee to establish immediate actions to control and implement remediation plans in sites affected by the sinking of land that affected the SOTE and OCP's infrastructure. He also announced an overflight to verify the damage (https://www.ambiente.gob.ec/ministro-dehowitt-crearemos-un-comite-de-emergencias-y-contingencias-para-atender-de-manera-integral-lo-ocurrido-en-san-rafael/?w3tc_note=flush_all) caused.

The Ministry of Energy and Non-Renewable Resources says hydrocarbon and oil exports will continue. Minister René Ortiz said there's "sufficient stock of fuel for the domestic market, given a drop in demand as a result of the shutdown in response to the COVID-19 pandemic. The ministry says pipeline repairs could take between two and three weeks.



The new collapse occurred in the area marked with the red circle. Image from Google Earth.

"The private company OCP Ecuador, which owns the heavy crude pipeline, reported that on April 7 erosion was detected in the Coca River channel that triggered the rupture of its pipeline. It should be noted that the breakdown of these infrastructures was caused by issues external to the operation of the oil companies," the ministry said in a statement (<https://www.rekursosyenergia.gob.ec/el-gobierno-nacional-garantiza-el-abastecimiento-de-derivados-y-exportaciones-de-petroleo-tras-la-paralizacion-del-sote-y-ocp/>).

Petroecuador and officials from the municipality of Coca are now working on an alternative aqueduct for the Payamino River, so that the supply of drinking water to the city can resume.

Holger Gallo, president of the Kichwa indigenous community of Panduyacu, of the Gonzalo Pizarro parish in the province of Sucumbios, said his community has suffered from oil spills in the past but has never seen anything of this magnitude.

Since the shutdown began, the Kichwa communities in this area have been unable to go out to the cities, so now they rely on fishing. "Oil can be found all over the banks. We want to know who is responsible. And we want environmental remediation actions and restoration of the affected areas. Nature has rights," Gallo said.

A statement (https://ddhhecuador.org/sites/default/files/documentos/2020-04/Alerta_19.pdf) signed by the Alliance of Human Rights Organizations, says Petroecuador and the government "have not disclosed the information on the amount of oil spilled, the containment measures taken and the alternative remedies in place for the affected indigenous and rural communities that will guarantee their minimum subsistence rights. This further aggravates the vulnerability of communities already struggling with the current COVID-19 pandemic."

Across the border, the ombudsman of the Peruvian city of Iquitos, Julián Soplín, said that in the city of Francisco de Orellana (Peru) and in Nuevo Rocafuerte (Ecuador), containment barriers were installed to prevent the advance of crude oil. "What has been confirmed so far is that the oil spilled has not yet reached the first barrier. It takes six hours on average to reach Peru from the second barrier," he said.



The Panduyacu community was one of the first to see oil slicks in the Coca River. Image courtesy of the Panduyacu community.

Soplín added that in the worst-case scenario, if the oil flows past the second barrier, the immediate action plan states that the nearest oil company, in this case privately held Perenco, "has to help contain the oil."

The IUCN's Cobo said they need to keep the oil from reaching the Amazon River. The magnitude of the spill and its damage is not yet known, but he said he hopes to find out soon. He said he believes that what is happening to the Coca and Napo rivers started when the San Rafael waterfall collapsed. According to him, the Ecuadoran government knew about it: "This is negligence."

Banner image: *The erosion of the Coca River has accelerated in the rainy season. Image courtesy of Petroecuador.*

This article was first published by Mongabay Latam (<https://es.mongabay.com/2020/04/cascada-san-rafael-derrame-petroleo-ecuador/>) on April 9, 2020.

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