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Xekaman 3 hydroelectric plant in Laos: a very major landslide in December

<https://blogs.agu.org/landslideblog/2017/01/21/xekaman-3/>)

Posted by *Dave Petley* (<https://blogs.agu.org/landslideblog/author/dr-dave/>).

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The Xekaman 3 hydroelectric power station (<https://cdm.unfccc.int/Projects/DB/SQS1324398658.36/view>) in Laos is a 250 MW dam, tunnel and associated infrastructure located at 15.375N 107.407E, close to the border with Vietnam. Built between 2006 and 2010 at a cost of US\$273 million, 90% of the electricity generated is exported to Vietnam. Fairly soon after completion the dam started to be plagued by landslide problems, not at the dam site but at the penstock, which it appears was constructed on an ancient landslide without adequate measures being taken to provide stability. There is a nice paper providing details of the landslide affecting the Xekaman 3 penstock online here (<http://vietrocknet.org/app/webroot/img/files/Vietrock2015%20Proceedings/S064.pdf>) (NB this is a PDF).

Problems appear to have started soon after the reservoir was filled, and the paper reports multiple movement events, mostly with reasonably small displacements, that caused major damage to the penstock and associated pipelines. At one location it appears that a sinkhole has opened up, and there is also a reference to a new channel being formed. The paper notes that work was ongoing to try to solve the landslide problem; in the meantime a telescopic section of pipe was installed into the pipeline to try to accommodate movement. The paper includes the photograph below of the site. Note the re-engineered walls and structures. Note also the red-roofed powerhouse at the toe of the slope – this is a key structure in the most recent event:





The penstock site for the Xekaman 3 HEP station, via the [ISRM](http://vietrocknet.org/app/webroot/img/files/Vietrock2015%20Proceedings/S064.pdf)
(<http://vietrocknet.org/app/webroot/img/files/Vietrock2015%20Proceedings/S064.pdf>)

At 8:45 am on 16th December a major failure occurred on this slope, which has destroyed the penstock infrastructure. [Radio Free Asia](http://www.rfa.org/english/news/laos/laos-xekaman-dam-12222016155523.html) has a report (<http://www.rfa.org/english/news/laos/laos-xekaman-dam-12222016155523.html>) about the landslide, which states that:

A break in a critical waterway shut down a hydro-electric dam in southern Laos and raised questions about the quality of construction at the facility that sends most of the power it generates to Vietnam. While officials said the Dec. 16 break in the Xekaman 3 facility's penstock posed no threat to people living downstream, it marked the second breakdown in the tunnel that channels water to the power turbine, RFA's Lao Service has learned.

"The broken portion of the pipe is about 100 meters from the power house," said an official who spoke on condition of anonymity. "Rocks and mud flowed into the power house."

According to the official, the damage is extensive as the power house and its equipment were inundated.

"The dam is no longer operational," the official told RFA's Lao Service. "Power production is stopped."

Perhaps the most interesting element though is a photograph of the site, also in the report:





The aftermath of the 16th December landslide at Xekaman 3, via [Radio Free Asia](http://www.rfa.org/english/news/laos/laos-xekaman-dam-12222016155523.html) (<http://www.rfa.org/english/news/laos/laos-xekaman-dam-12222016155523.html>). Photograph by Kamphon

The almost completely buried building is the power house at the toe of the slope. This was clearly an exceptionally serious, and expensive, landslide.

I have written both [here](https://blogs.agu.org/landslideblog/2013/11/20/landslides-and-large-dams/) and in a [paper](https://blogs.agu.org/landslideblog/2013/11/20/landslides-and-large-dams/) (<https://blogs.agu.org/landslideblog/2013/11/20/landslides-and-large-dams/>) about the evidence that many of the major hydroelectric schemes under construction across Asia are taking inadequate consideration of landslides. This event reinforces my view. I continue to fear that we are heading for a tragedy.

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COMMENTS

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3 Comments

1.  *Tor Bejnar* says:

22 January 2017 at 05:48 (<https://blogs.agu.org/landslideblog/2017/01/21/xekaman-3/#comment-213827>)

I'm curious where the mud and rock came from. In the "after" picture, we can see the penstock up the hill, apparently intact (where did it break?), and the alluvium didn't form a delta up the concrete slope. It must have come from the far side of the power house (away from photographer) as the power lines on the near side slope appear to be intact.

On the order of 6 to 10 meters of "rocks and mud flowed into the power house" – I guess they do need a dust mop and a broom before powering up the turbines.

[indeed, the whole story is a little perplexing as the sink hole and new channel don't seem to line up with the penstock slope either. My sense is that there is more than one landslide problem occurring here, but who knows. Fixing the power house is not going to be trivial. D].

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2.  *bib* says:

24 July 2018 at 12:09 (<https://blogs.agu.org/landslideblog/2017/01/21/xekaman-3/#comment-216053>)

Today, your warnings are sadly proving so right ...

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3.  *Tom* says:

2 April 2019 at 09:23 (<https://blogs.agu.org/landslideblog/2017/01/21/xekaman-3/#comment-217405>)

I'm looking at these pictures and thinking the after is actually the small structure in the back right on the before picture. Still count 3 bench to the transmission lines. Also I'm wondering if there is any update on from this project? This was the second failure, Did they try again?

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ABOUT DAVE

Dave Petley is the Pro-Vice-Chancellor (Research and Innovation) at the University of Sheffield in the United Kingdom. His blog provides a commentary on landslide events occurring worldwide, including the landslides themselves, latest research, and conferences and meetings.



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