



UNIVERSITY OF LEEDS

This is a repository copy of *The plight of Amazonia's oldest peatland*.

White Rose Research Online URL for this paper:
<http://eprints.whiterose.ac.uk/132028/>

Version: Accepted Version

Article:

Swindles, GT orcid.org/0000-0001-8039-1790 (2018) The plight of Amazonia's oldest peatland. *Geology Today*, 34 (2). pp. 59-61. ISSN 0266-6979

<https://doi.org/10.1111/gto.12222>

© 2018 John Wiley & Sons Ltd, The Geologists' Association & The Geological Society of London. This is the peer reviewed version of the following article: Swindles, GT (2018) The plight of Amazonia's oldest peatland. *Geology Today*, 34 (2). pp. 59-61, which has been published in final form at <http://dx.doi.org/10.1111/gto.12222> . This article may be used for noncommercial purposes in accordance with Wiley Terms and Conditions for Self-Archiving. Uploaded in accordance with the publisher's self-archiving policy.

Reuse

Items deposited in White Rose Research Online are protected by copyright, with all rights reserved unless indicated otherwise. They may be downloaded and/or printed for private study, or other acts as permitted by national copyright laws. The publisher or other rights holders may allow further reproduction and re-use of the full text version. This is indicated by the licence information on the White Rose Research Online record for the item.

Takedown

If you consider content in White Rose Research Online to be in breach of UK law, please notify us by emailing eprints@whiterose.ac.uk including the URL of the record and the reason for the withdrawal request.



eprints@whiterose.ac.uk
<https://eprints.whiterose.ac.uk/>

NEWS ITEM

The plight of Amazonia's oldest peatland

Graeme T. Swindles

School of Geography, University of Leeds, UK

g.t.swindles@leeds.ac.uk

Telephone: +44 01133 439127

Peatlands are globally important ecosystems in terms of biodiversity, hydrology, and for the role they play in the carbon cycle. They store approximately one third of the carbon contained in the terrestrial biosphere, whilst covering only approximately 3% of the land and freshwater surface. Tropical peatlands represent an important component of this carbon store and can be found in Asia, Africa, South and Central America. However, tropical peatlands are also under severe threat of destruction from human activities including deforestation, agricultural expansion and resource exploitation. In South America, the Pastaza-Marañon foreland basin (PMFB) in NW Peru represents the most carbon dense landscape in Amazonia owing to an abundance of peatlands, including nutrient-poor ombrotrophic peat domes and river-influenced minerotrophic swamps. The Aucayacu peatland in the PMFB is a nutrient-poor peat dome and represents the oldest peatland yet reported in Amazonia. It is a relatively large peatland – it is estimated that Aucayacu has maximum dimensions of 33 km (NW-SE) × 15 km (NE-SW) (Fig. 1). The vegetation of the site is characterized by stunted vegetation owing to low nutrient status, known as “pole” and “dwarf” forest, which at Aucayacu grows above a patchy understory of grasses and ferns (Fig. 2). Recent research has shown that Aucayacu has laid down peat up to 7.5 m deep in ~8,900 years.

Aucayacu has acted as a carbon store for nearly 9000 years, and represents a unique archive of past ecological and climatic data. Palaeoecological analysis of cores taken from Aucayacu show how this ecosystem has developed through time from a pond with aquatic plants, to a flooded forest swamp, until finally it became a domed peatland with little influence of river flooding. The palaeoecological data also show how hydrology and carbon accumulation of Aucayacu responded to phases of climate change in the past, which has implications for understanding how this system may respond to future climate change. The presence of charcoal in the record shows that the site has been burnt on a small number of occasions in the past. The peatland has also preserved microscopic volcanic ash layers that provide much-needed information about the poorly-understood volcanic history of this region. Furthermore, an entirely new species of microbe (testate or 'shell-forming' amoeba) has been found living in surface pools at Aucayacu (Fig. 3). The peatland's distinct pole forest also supports many threatened bird species.

However, like many tropical peatlands, Aucayacu is under threat from human activities. Alarmingly, there are plans to build an electricity transmission line and service road this unique site which could have devastating consequences on its ecology, hydrology and structural integrity. There are also increasing threats to all the peatlands in this region from agricultural expansion (e.g. creation of oil palm plantations), new road development, and oil prospection/extraction. Every effort should be made to protect Aucayacu as it is a unique site of major international scientific importance.

Figure captions

Fig. 1. Location of Aucayacu in Peruvian Amazonia. The yellow dots outline the edges of the peatland. The location of the study site is shown on a Landsat TM RGB false colour image (NASA Landsat Program, Orthorectified, WRS-2, Path 007, Row 063, downloaded from <http://earthexplorer.usgs.gov/>). Band 4 was assigned to red, band 5 was assigned to green and band 7 was assigned to blue.

Fig. 2. Pole forest vegetation in Aucayacu (top). Ground surface and pool in Aucayacu (bottom).

Fig. 3. *Arcella peruviana* – a new species of testate amoeba from Aucayacu (photo taken by Monika Reczuga).

Suggestions for further reading

Lähteenoja, O. & Page, S. 2011. High diversity of tropical peatland ecosystem types in the Pastaza-Marañón basin, Peruvian Amazonia. *Journal of Geophysical Research: Biogeosciences*, v. 116, G02025.

Lähteenoja, O., Reátegui, Y.R., Räsänen, M., Torres, D.D.C., Oinonen, M. & Page, S. 2012. The large Amazonian peatland carbon sink in the subsiding Pastaza-Marañón foreland basin, Peru. *Global Change Biology*, v. 18, pp. 164–178.

Reczuga, M.K., Swindles, G.T., Grewling, Ł. & Lamentowicz, M. 2015. *Arcella peruviana* sp. nov. (Amoebozoa: Arcellinida, Arcellidae), a new species from a tropical peatland in Amazonia. *European Journal of Protistology*, v. 51, pp. 437–449.

Roucoux, K.H., Lawson, I.T., Baker, T.R., Del Castillo Torres, D., Draper, F.C., Lähteenoja, O., Gilmore, M.P., Honorio Coronado, E.N., Kelly, T.J., Mitchard, E.T.A. & Vriesendorp, C. 2017. Threats to intact tropical peatlands and opportunities for their conservation. *Conservation Biology*, v. 31, pp. 1283–1292.

Swindles, G.T., Lamentowicz, M., Reczuga, M., & Galloway, J.M. 2016. Palaeoecology of testate amoebae in a tropical peatland. *European Journal of Protistology*, v. 55, pp. 181–189.

Swindles, G.T., Morris, P.J., Whitney, B., Galloway, J.M., Gałka, M., Gallego-Sala, A., Macumber, A.L., Mullan, D., Smith, M.W., Amesbury, M.J., Roland, T.P., Sanei, H., Patterson, R.T., Sanderson, N., Parry, L., Charman, D. J., Lopez, O., Valderamma, E., Watson, E.J., Ivanovic, R.F., Valdes, P.J., Turner, T.E. & Lähteenoja, O. 2018. Ecosystem state shifts during long-term development of an Amazonian peatland. *Global Change Biology*, in press. <https://doi.org/10.1111/gcb.13950>.

Swindles, G.T., Reczuga, M., Lamentowicz, M., Raby, C.L., Turner, T E., Charman, D.J., Gallego-Sala, A., Valderrama, E., Williams, C., Draper, F., Honorio Coronado, E.N., Roucoux, K.H., Baker, T. & Mullan, D.J. 2014. Ecology of testate amoebae in an Amazonian peatland and development of a transfer function for palaeohydrological reconstruction. *Microbial Ecology*, v. 68, pp. 284–298.

Watson, E.J., Swindles, G.T., Savov, I.P. & Bacon, K.L. 2015. First discovery of Holocene cryptotephra in Amazonia. *Scientific Reports*, v. 5, 15579.





