

How much of the Amazon rainforest would it take to print the Internet?

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Solimões, the section of the upper Amazon River. Image: Wikipedia.

Students from the University of Leicester have calculated how much paper would be required to physically print the Internet as we know it - and have found that, despite the Internet's enormous size, less than 1 per cent of the Amazon rainforest's trees would be required to accomplish it.

In order to work out how much paper would be required to print the Internet, students Evangeline Walker and George Harwood from the University of Leicester's Centre for Interdisciplinary Science investigated how many [trees](#) would be needed, using the Amazon rainforest as an example given its unprecedented scale on Earth.

The Amazon rainforest, situated in South America, is the largest

rainforest on Earth, spanning 5.5 million square kilometres and housing approximately 400 billion trees.

The students used the English version of the popular website Wikipedia as an example of a website containing a large amount of data. They took ten random articles from Wikipedia, which provided an average of 15 pages required to print each article. They then multiplied this by the number of pages on Wikipedia alone – estimated to be roughly 4,723,991 at the time of writing – which resulted in 70,859,865 paper pages.

Applying this to the Internet at large, the students suggest that approximately 4.54 billion pages of paper would be required to print the Internet as we know it.

To establish how many trees would be needed to print the required number of paper pages, the students worked on the assumption that all trees within the rainforest can be used to make paper, given the large amount of trees that can be used for this purpose.

Assuming that the trees of the Amazon are equally distributed across its entire area of 5.5 million square kilometres, there would be 70,909 trees per km².

It is possible to obtain approximately 17 reams of paper per usable tree, with 500 individual paper sheets in each ream. This results in a total of 8,500 sheets of paper obtainable per tree.

By dividing the number of paper pages required to print Wikipedia (70,859,865) by the amount of sheets of paper in each ream (500) the students suggest that 141,720 reams of paper would be required to print Wikipedia alone. With each tree yielding 17 reams of paper, printing Wikipedia would require 8,337 trees.

In terms of the Amazon rainforest, with 70,909 trees per km², English Wikipedia would only consume 12 per cent of a single km² if every type of tree could be used to make paper.

For the entire visible, non-explicit Internet, the students estimate that approximately 8,011,765 trees would be required – representing 113km² of the Amazon rainforest.

By making rough calculations about the size of the Internet, how much paper can be gained per tree, and assuming that all trees within the Amazon can be utilised for the production of paper, printing the non-explicit Internet would therefore require only around 0.002% of the Amazon rainforest.

Despite the small percentage of the rainforest required to print the visible Internet, it is believed that the non-explicit web is only a mere 0.2% of the total Internet, with the rest encompassing the Dark Web, which exists outside of regular search engines.

Therefore, to [print](#) the other 99.8% of the Internet would require many more trees – but still only equating to around 2 per cent of the entire Amazon rainforest.

The students presented their findings in a [paper](#) for the Journal of Interdisciplinary Science Topics, a peer-reviewed student journal run by the University's Centre for Interdisciplinary Science. Students from the University of Leicester (UK) and McMaster University (Canada) have contributed to this year's journal. The student-run journal is designed to give students practical experience of writing, editing, publishing and reviewing scientific papers.

Dr Cheryl Hurkett from the University of Leicester's Centre for Interdisciplinary Science said: "An important part of being a

professional scientist (as well as many other professions) is the ability to make connections between the vast quantity of information students have at their command, and being able to utilise the knowledge and techniques they have previously mastered in a new or novel context. The Interdisciplinary Research Journal module models this process, and gives students an opportunity to practise this way of thinking. The intention of this module is to allow students to experience what it's like to be at the cutting edge of scientific research.

"The course is engaging to students and the publishing process provides them with an invaluable insight into academic publishing. It also helps students feel more confident when submitting future papers. I find it a very rewarding module to teach and I am always pleased to see my [students](#) engaging so enthusiastically with the subject. I encourage them to be as creative as possible with their subject choices as long as they can back it up with hard scientific facts, theories and calculations!"

More information: "How Much of the Amazon Would it Take to Print the Internet?" *Journal of Interdisciplinary Science Topics*.
www.physics.le.ac.uk/jist/index.php/jist/article/view/100/57

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