Scientists explore Amazonian biodiversity's role in society

Much like oil before it, realising the economic potential requires research, investment and oversight

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The magnitude of Amazonian biodiversity can sometimes defy comprehension. Two hectares of rainforest contain more species of trees than all of North America — and there are more ant species on one of those trees than in the whole of England.

Composed of 600 types of freshwater and terrestrial habitat, the Amazon basin accounts for at least 10 per cent of the earth's biodiversity. This includes 40,000 species of plants, 1,300 species of birds and 300 species of mammals — and that is just what we know so far.

Scientists admit there are gaping holes in our knowledge of the world's complex life forms. They also say that this biodiversity has the potential to be immensely valuable, even transformative, for human society.

Each organism plays a crucial role in maintaining the ecosystems that sustain life in the basin. This biodiversity offers vast commercial possibilities, too, in everything from food and cosmetics to medicine and energy.

"Biodiversity will be for the 21st century what oil was for the 20th century," says Paulo Roberto Feldmann, a professor of economics at São Paulo university.

Unlike oil, which has long been commoditised, realising the potential

contained in the world's biodiversity requires research, investment and oversight.

The problem is that such ventures are already being undermined by the destruction of the environment, particularly in the Amazon.

"The Amazon basin is being burnt slowly and surely to sell meat to the world," says Juan Castilla-Rubio, a Cambridge-educated bioscientist, referring to the role of cattle ranchers in deforestation. "Biodiversity is extremely valuable. Much more valuable than any extractive economy. How could you trade the solutions for humanity's problems for meat?"

Examples of such solutions are already bountiful. The Pacific yew tree, once treated as trash by loggers, was found to contain taxol in its bark, a compound that was then discovered to be effective in fighting cancer.

Likewise, the bark of the Peruvian cinchona tree has long been used to treat malaria.

Advances in technology including genomic sequencing and synthetic biology mean scientists have an even deeper understanding of the genetic compounds of complex life and how they can be harnessed for human benefit. One example is the sequencing of the Chinese sweet wormwood plant, which was used to produce an effective antimalarial drug called artemisinin, according to Mr Castilla-Rubio, the founder of Pivotal Genomics.

He believes the application of genomic mapping to industries such as pharmaceuticals, chemicals and energy will spur new products and multitrillion-dollar sales.

By contrast, he adds, the estimated gross domestic product of the Amazon's extractive economy, built on logging and mining, is about $250bn.

"People are thinking of biodiversity as something magical that will cure cancer and Aids and I do not doubt that," says Alfredo Homma, a scientist at Embrapa, a Brazilian agriculture research group.

"But we must not forget that the greatest opportunities are in the biodiversity of the present, which is given little attention," he adds.

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>
> ***Juan Castilla-Rubio, bioscientist***

Mr Homma points to the Amazonian açaí berry as an example. Once consumed only in remote Amazonian communities, the nutritious fruit has exploded in global popularity as a so-called superfood and as a result has become a key source of revenue for rainforest inhabitants. The challenge now facing scientists is to convince governments of the merits of biodiversity and to persuade them to redouble efforts in the fight

against environmental destruction.

"This wave of biotechnology [development] needs raw material, which means biodiversity, which means the knowledge that is inside fauna and flora. And where is a quarter of the earth's biodiversity? In the Amazon," says Prof Feldmann.

In Brazil, concern is particularly acute. Since the inauguration this year of rightwing president Jair Bolsonaro, deforestation has spiked in the Brazilian portion of the rainforest.

Many fear that if the pace of destruction continues unabated, the rainforest will soon hit a "tipping point" at which it will be unable to maintain its vast water recycling ecosystem, leading to a change in weather patterns that will dramatically affect agriculture and wildlife.

Meanwhile, scientists fear the earth is in the midst of a "sixth mass extinction", where human activity is driving the extinction of animals at a rate of more than 1,000 times the background level, which is deemed to be the normal ebb and flow of species.

Carlos Nobre, a professor at São Paulo university and one of the world's foremost experts on the Amazon, points out that since Europeans arrived in the Americas, the main priority was removing trees rather than recognising the economic potential of the forest, "but now, with modern technologies, we can dream about exploring this biodiversity and bringing economic value alongside the maintenance of ecosystems and standing forests".

Such endeavours, however, require long-term planning from companies and governments, as well as advanced education programmes in the region that needs them most — the Amazon.

Additional reporting by Carolina Pulice