

# LIMITS TO GROWTH

Part 2–Numismatics: a study of dead and dying currencies and the true value of waste.

Limits to Growth forges interdependence between two monetary currencies: the contemporary crypto-currency, Bitcoin and the ancient Yapese currency, Rai. While Bitcoins are virtual and in a sense immaterial, Rai are made of stone and are often very large, weighing several tons. However possessing Rai involved a virtual exchange, established upon an aural ledger.

Known as Rai or Fei this curious medium of exchange captivated foreign voyagers who came into contact with the island of Yap in Micronesia. Foreigners were not so much enchanted by the Aragonite limestone itself, with its peculiar quality of glistening in the light, but by the voracious impulse that inspired the Yapese to travel between their home island of Yap and the Palauan islands where the resource originated from—up to 400-kilometer-wide stretches of ocean in small canoes and rafts. Spending years away from home acquiring the resource, the Yapese would whittle into the unforgiving limestone walls with nothing but hand-carved shell axes and reef stones fashioned into fire drills. With these rudimentary tools, they carved a currency of large stone disks resembling the shape of the full moon with a hollow center.

The exact date when the first stone was carved from the walls of one Palauan island is unknown but in 1843 the stones were a scarce resource and by 1929 Japanese government officials living on Yap during the Japanese occupation counted 13,281 stones on the island. By 1965 this number had been reduced by half due to typhoons, flooding, and the use of disks for anchors, defensive walls, and other general purposes during World War II.

The value of the medium of exchange was not determined exclusively on their size, which was nominally measured in hand spans (small finger to stretched-out thumb). Rather, their value was calculated by a complex formulation that included the stone's vintage, physical quality, the status of the village chief who had ordered the expedition to Palau, and the number of lives that had been lost in transporting them back to Yap. It is said each of the stones were named—many after the men who had died attempting to obtain the stone either whilst mining on Palau or during the perilous return across the sea; one anecdote tells of a stone named “The Stone Without Tears”—no lives were lost in its transit from Palau to Yap.

Though making it back to dry land after the taxing and treacherous passage from Palau, some of the larger coins, spanning three meters diameter, did not literally change hands when used in a transaction; rather they were usually propped upright by smaller stones or anchored into the soil in an open area outside a village, displayed in a tidy row and exposed to the elements where they would remain in perpetuity. The Earthen moorings was also said to keep the stories of ownership and place.

Bitcoin is minted with dedicated computer processors or ASICs (application-specific integrated circuits), which digitally mine using a procedure that is intentionally designed to be resource-intensive in order to produce a slow supply of currency or value into the network. In order to “mint” Bitcoin, vast quantities of energy are consumed by the ASICs as they labor to verify and record transactions. This process awards the miners with a payment, or subsidy paid in Bitcoin. Given the global scale of the network, ASIC processor farms must labor day in and day out to keep the network and currency alive.

As well as the electricity consumed to power the ASIC miners, the production of Bitcoin also draws heavily on energy for the air-conditioning of the processor farms to prevent the machines from overheating. Although Bitcoin is a virtual medium of exchange, nothing more than a long list of numbers, through its electrical mining processes it remains tethered to the physical world, like Rai—in the case of Bitcoin, by the power cord and Ethernet connection. Bitcoin has been compared to gold—a finite resource—as its supply is fixed to 21 million Bitcoin ever to be minted. At the time of writing there are 15,784,400 Bitcoins in circulation, each having a value of US \$567.33.

Touted as the first successful global digital/cryptocurrency, it was invented in 2008 by an anonymous individual or group. Bitcoin is a cryptocurrency that uses principles of cryptography to provide anonymity, allowing protected peer-to-peer online exchanges and the minting of digital coins for a decentralized network. Its arrival at the crux of the global financial crisis provided a utopian and salient alternative to what was perceived as a wholesale failure in the current banking financial system and questioning of the very nature of monetary exchange established on trust. Bitcoin substitutes human fallibility with numerical fact; Bitcoin has removed the need for trust through its blockchain and time-stamped technology. These technologies mitigate double spending; in a way it is an antisocial technology that befits our social fabric.

Limits to Growth consists of a Bitcoin mining rig in the exhibition hall along with a digital 44” plotter. Bitcoin mined by the rig has been used to pay for a continuous repetitive reproduction of the large-format photograph of Rai stones taken by the artist in 2016 on the island of Yap. The unremitting flow of images references an inflationary event in Yapese financial history, in which a foreigner by the name of David O’Keefe began circulating fake Rai. The stones represented in the digital prints are examples of O’Keefe’s stones:

It was the forces of nature rather than self-determination that caused a collision between the new world and the self-contained Yapese culture. It was a typhoon, or so it’s said, that threw up a desolate and

desperate Captain David O’Keefe onto the island of Yap in 1871. O’Keefe had taken to the seas to establish himself as a trader in the potentially lucrative but treacherous trade channels of the Asian market and Pacific region. Through means of barter he sought to extract labor and commodities from the islanders. However, they were unmoved by the strange new world trinkets and alien coinage that he attempted to lure them with in return for their copra (dried coconut meat). Besides, his new world money had no exchange value within their stone currency.

A baffled and frustrated O’Keefe departed Yap to Hong Kong on a passing steamer empty-handed only to return with a Chinese junk ship and a large supply of modern iron hand tools; if the Yapese wouldn’t accept his form of coinage then he would insert himself into the cycle of their own currency. However O’Keefe was not “buying” or “selling” with the stones. Instead he facilitated an infrastructure introducing the wholesale trade in transporting Rai, which he rendered in exchange for marketable goods, such as copra.

O’Keefe negotiated with several Yapese chiefs to haul laborers to Palau and bring stone money back to Yap in exchange for a set amount of copra based on the size of each disk measured in hand spans. In 1872, the Yapese began traveling to Palau on O’Keefe’s ship, resulting in a thriving business for O’Keefe. He would then sell his goods in Asian markets, return to Palau to fetch the stone money cargo, and then bring the disks back to Yap. For transporting Rai from the quarries to Yap, he was paid with copra enabling the Yapese to obtain Rai with much less risk or loss of stone. Captain O’Keefe obtained both power in the islands and wealth in the Hong Kong market through this device. After hewing out the precious stone on Palau, they “hocked” it to O’Keefe for transport back to Yap and then later reclaimed it with prepared copra.

The Yapese were induced by such a method that would ease the drudgery of quarrying out their unwieldy stone coinage with brittle shell implements as well as the secure mode of conveyance that diminished the chances of death and accelerated the process of transporting their coveted limestone coins back to yap. Thus importation of Rai to Yap burgeoned. While volumes of copra were flowing out of Yap, Rai stones were flowing in. However the very rate of production and increased size of the stones themselves that this technology enabled would as a consequence alter the value of Rai currency. Over time the individual worth of the Rai stones diminished, even as the stone sizes grew larger, their economy succumbed to rapid inflation. In retrospect stones produced during the time of O’Keefe without the original level of sacrifice and toil were devalued and branded O’Keefe stones. Products of technological development, these well-rounded and smooth-hewn stones were perceived as nothing more than cheap imitations of the original pre-contact money stones.

To coincide with this economic downturn of Rai currency the lucrative trade boom that O’Keefe had established brought many cargo ships to Yap’s shores and along with them came an infestation of leaf lice that would ultimately destroy the once thriving coconut plantations. A defeated O’Keefe departed Yap once again in economic ruin, only to be, once again, subjected to the forces of nature which unleashed yet another typhoon in his direction drowning him as he made his way back from here he came from.

The pile of photographs mounting in the exhibition space has an indexical relationship to the value created and energy consumed by the Bitcoin mining taking place live in the exhibition space. This iteration of Limits to Growth coincides with the recent Bitcoin “halving,” a rule built into Bitcoin code to mitigate against inflation by the miners, which today receive only half the reward for their labor regardless of their energy consumption. Limits to Growth enfold the logic of the halving supply of Bitcoin and oversupply of the O’Keefe stones to produce a precarious situation prompting both excretion and stagnation. The printed images will continue to accumulate over the exhibition duration as the rig continues to mine. Each image is inscribed with the time, date, Bitcoin value at the time of production, and energy consumed to permit the reproduction of each image.

Nicholas Mangan,  
Gwangju, August 2016

(1) Cora Lee C. Gilliland, *The Stone Money of Yap a Numismatic Survey* (Smithsonian Institution Press, 1975) (2) The secret writing enabled by the rotor cypher machines first World War I and the development of computer science of World War II for secure communication. (3) However it is not without its own flaws, hoarding, digital theft, loss of Bitcoins, and zombie coins, all of which of which are a result of human behavior/error. (4) Ibid. (5) Scott M. Fitzpatrick, Annie C. Caruso, and Jenna E. Peterson, “Metal Tools and the Transformation of an Oceanic Exchange Systems” in *Historical Archaeology* vol. 40, no. 2 (2006). (6) Cora Lee C. Gilliland, *The Stone Money of Yap a Numismatic Survey*, Smithsonian Institution Press, (1975)

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