THE BLUE PAPER

Raincube, Raincoin, and the Internet of Rain

RE-SYNCING THE WORLD TO RUN ON RAIN

v1.0

The Internet of Rain: A New Story

We are transitioning towards a world running on the **Internet of Things (IoT)**. From smartphones to smart cars and smart homes to smart cities, it sometimes feels that technology is making us less connected, replacing community with convenience. As the global economy stretches the limit of deficit spending, decentralized **Blockchains** are democratizing databases and driving the cost of minting digital money to near zero. With the planet heating up, we need to cool down by consuming less and growing more.

What makes us human is that each and every one of us has a gift to give. Service to others gives us our life purpose. This practice of **Interbeing** means that every one of us is fundamentally connected to each other, to all beings, and to the universe. That what we do unto another, we do unto ourselves. Our communities, our world, is a reflection.

What we are doing to Mother Earth is a result of separation. Our path forward requires healing ourselves through reunion. Can we envision and build a technology that enhances and deepens our relationship with Mother Earth? The simple answer is, yes. However, to properly design and build a technology in balance with our world of water, we need to embody water, and go with the flow.

Raincube is the open source, modular platform for building internet-connected rainwater harvesting systems for homes and businesses. The Raincube app allows individuals and communities to monitor, and control their rainwater from their phone or computer. Raincoin is a rainwater-backed digital utility token that runs the Raincube economy. **Raincoin** can can be used in the local water and food economy for peer-to-peer and machine-to-machine payments both as a store of value, medium of exchange, unit of account, voting right, and an open ledger of water transactions.

The Internet of Rain (IoR) is a network of Raincube nodes, each hosting a copy of Rainchain, the distributed rainwater ledger. Through the Raincube app, communities can cooperatively manage their local water and food supply in real time by harvesting, exchanging, and evaporating Raincoins. When each community around the world balances their watershed, we will have a planetary equilibrium of the water commons.

By combining connected devices, blockchain databases, permaculture, natural building, urban farming, and gift economies into a global game, we can creatively manage the commons in balance with Mother Earth. The goal of this game is to **deploy 10 trillion liters** of distributed global rainwater storage capacity for **10 billion** people **by 2050**. No one owns the rain. It is a gift to be enjoyed by everyone.

Cheaper, Faster, Smarter

The answer to creating balance when collecting and consuming rainwater requires real time and historic information combined with the ability to act on this information in a decentralized network. The Internet of Things is making physical goods and services cheaper faster and smarter by digitizing them.

“Internet of Things are sensors, valves, actuators and solenoids connected in a network to cloud computing systems. These systems can monitor or manage the health and actions of connected objects, machines, animals, people and the natural world.”
Mckinsey & Co June 2015

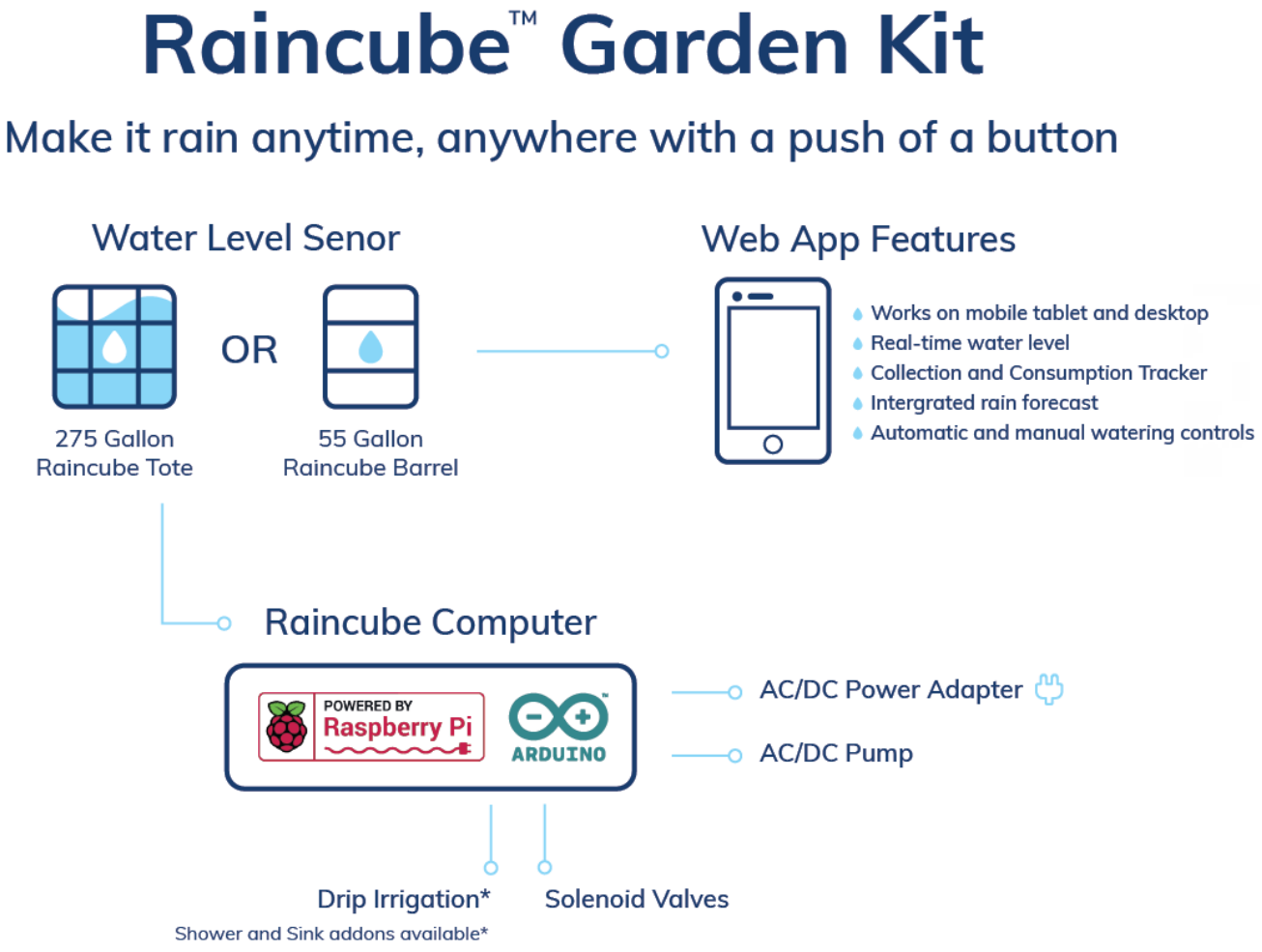

Figure 1: Raincube Garden Kit

Mobility and Modularity

Raincube uses IBC totes as the industry standard for transporting and storing rainwater. They are modular, and can be connected to form **cube stacks** which are daisy-chained IBC totes that can be connected side by side, or stacked on top of each other up to three high. Unlike cisterns, they don't need to be buried, reducing cost and labor. A single-family home can have anywhere from 2-20 cubes attached to the gutter and home plumbing system. It is best to start with a smaller system that can be expanded over time as the garden increases, and more data on rainfall helps balance the flow rate of captured and consumed rain.

Let's look at an example of how it could work in a residential home in Florida. A 1000 sq ft roof with 1 inch of rain can collect 2200 liters of water. That 1 inch is enough to fill two cubes. Those two cubes can water a 100 sq ft garden using drip and micro-spray irrigation using less than 100 liters a day lasting up to a month between rains.

Average Cost of DIY Raincube Garden Kit for 2000 Liters Storage Capacity	
Harvesting System Including Filtration	339.80
Irrigation	72.61
Electronics	274.69
Total	**$687.10**

Full DIY Bill of Materials and Instructions available here (Link)

App Features

Attached to the Raincube is a single board computer equipped with wifi and cellular, sensor, pump, and irrigation sprinklers. The sensor is installed to the top of the cube, and sends a sonic pulse that bounces off the surface of the water in the cube. This signal determines how much water is in the tank at any given moment. From this information we can tell three things.

1. How much water you *have*
2. How much water you *have collected*
3. How much water you *have been using*

User Interface

The volume sensor relays this information to the computer. The computer then sends that information to a cloud database and the information is then displayed on your phone or laptop.

The Raincube app is connected to a weather service that forecasts when and how much rain is expected. This information is critical for two reasons. First, it informs you when you should water your plants and if you should be generous, or conserve your water usage. The goal of the Raincube app is to make sure you and your plants have water, right when it's needed. You can water your plants by setting a timer manually, or having the app algorithm water for you.

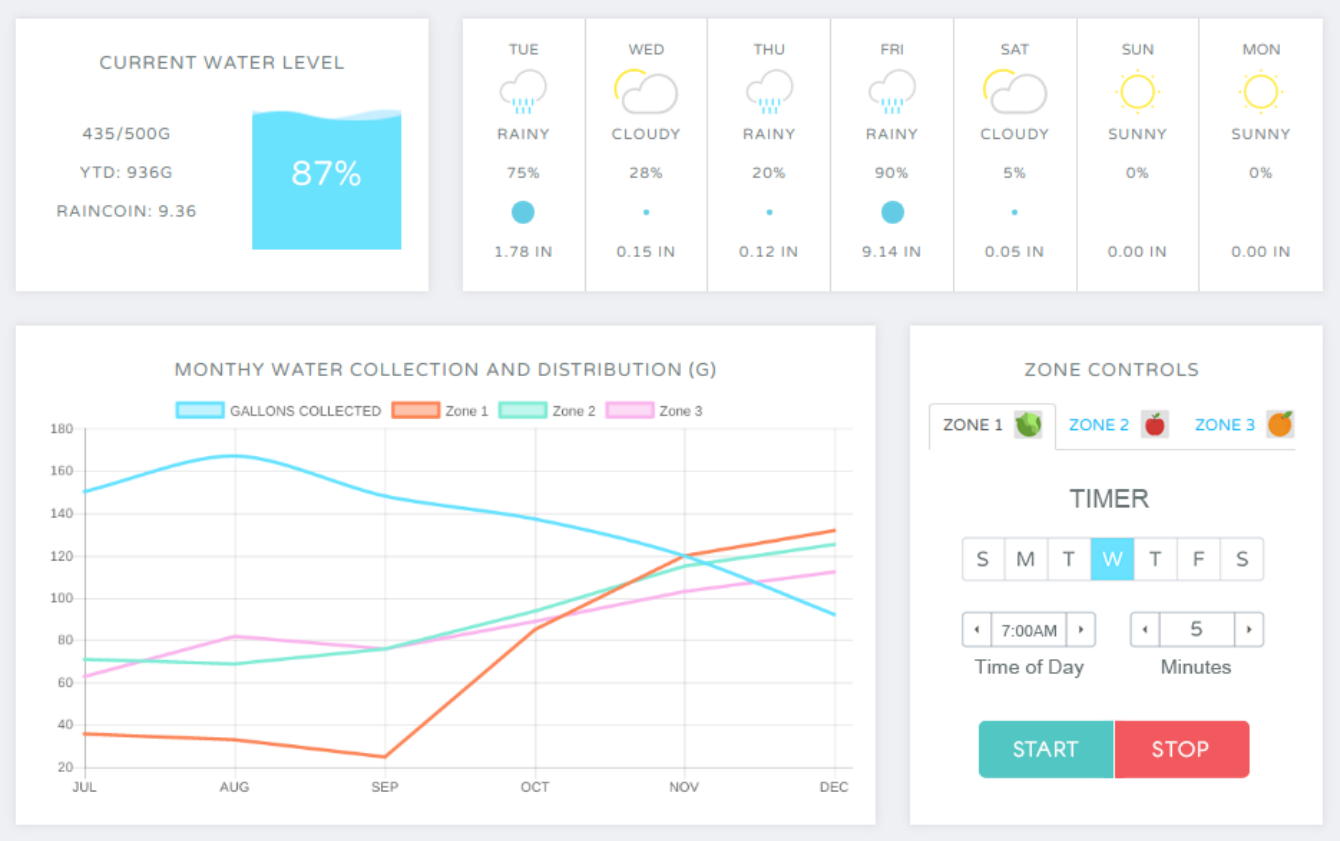

Figure 2: App User Interface

The app also provides a historical graph of rainwater collection, and individual zone consumption gives granular data points about supply and demand of water on site. This information can be used to forecast future consumption and also track past conservation during dry times.

The Conscious Home

Raincube's first focus is making rainwater irrigation smarter, and more responsive. Longer term, expanding the scope of rainwater to include the entire home opens up more opportunities for connected showers, sinks, and washing machines.Even potable water fountains can be connected online. Once online, homes can communicate with other homes in the neighborhood watershed. The **watershed** is the topography of all of the land and water areas that drain toward a particular river, lake, or sea. Shifting our thinking to encompass more than our backyard will increase the impact of our individual actions.

Micro-Grids, Tasks, and Bounties

With Raincube, Raincoin and the Internet of Rain, the tools and platforms provide for the trade of goods and services peer to peer, and neighbor to neighbor. What does a local labor economy look like and how can Raincube incentivize participation?

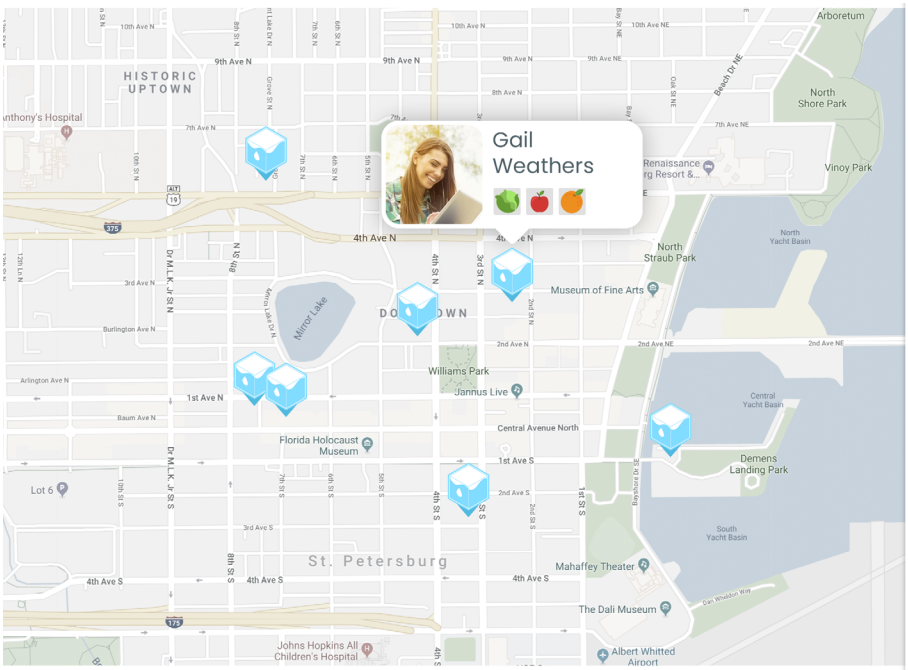

Figure 3: User Map Interface

Initial Coin Offering

The application and business model that will be tested on the Raincube platform is a partnership with the local moringa growers cooperative in Tampa Bay, Florida. Moringa is an incredibly nutritious and hearty tree that grows with little care and little water. By using the Raincube app, the moringa growers and homeowners can co-manage a distributed network of thousands of trees scattered across hundreds of backyards in a local watershed.

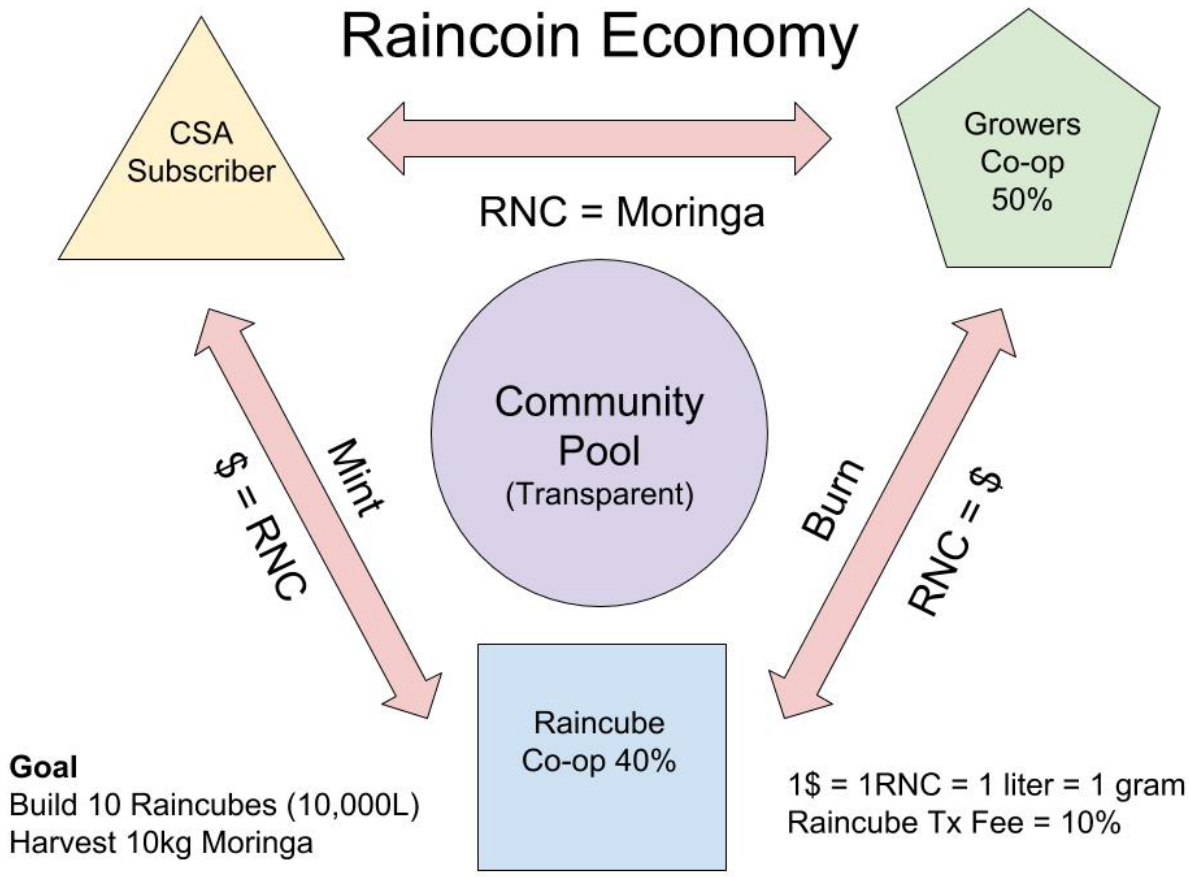

Figure 4: Raincoin Economy

Raincube Corp is offering the first 10,000 RNC as a proof-of-authority utility token to fund the installation of the first 10 Raincubes and to kickstart the local Raincoin economy. This money will go towards covering the fixed cost of bringing 10,000 liters of harvesting capacity online.

Regenerative Returns

1 Raincube can support at least 10 moringa trees throughout the year. Each tree can produce up to 1kg a year in various value added products such as moringa tea, oil, chocolate, nutritional supplement pills, energy balls, and powder. This is a superior nutritional supplement with anticancer and antioxidant properties. With cancer and heart disease as the leading cause of death among Americans, moringa is literally a life saver.

The cost to install 1 Raincube is $1000. This goes to cover parts and labor for bringing 1000 liters of rainwater harvesting capacity online. The exchange ratio is 1 dollar to 1 Raincoin to 1 liter of water to one 1 gram of moringa. For every dollar converted into Raincoin, the Internet of Rain grows by 1 liter of collection capacity expanding the “supply” of harvestable Raincoins. Over the lifetime of the system, 1 liter of harvesting capacity can flow 100-1,000 liters of water.

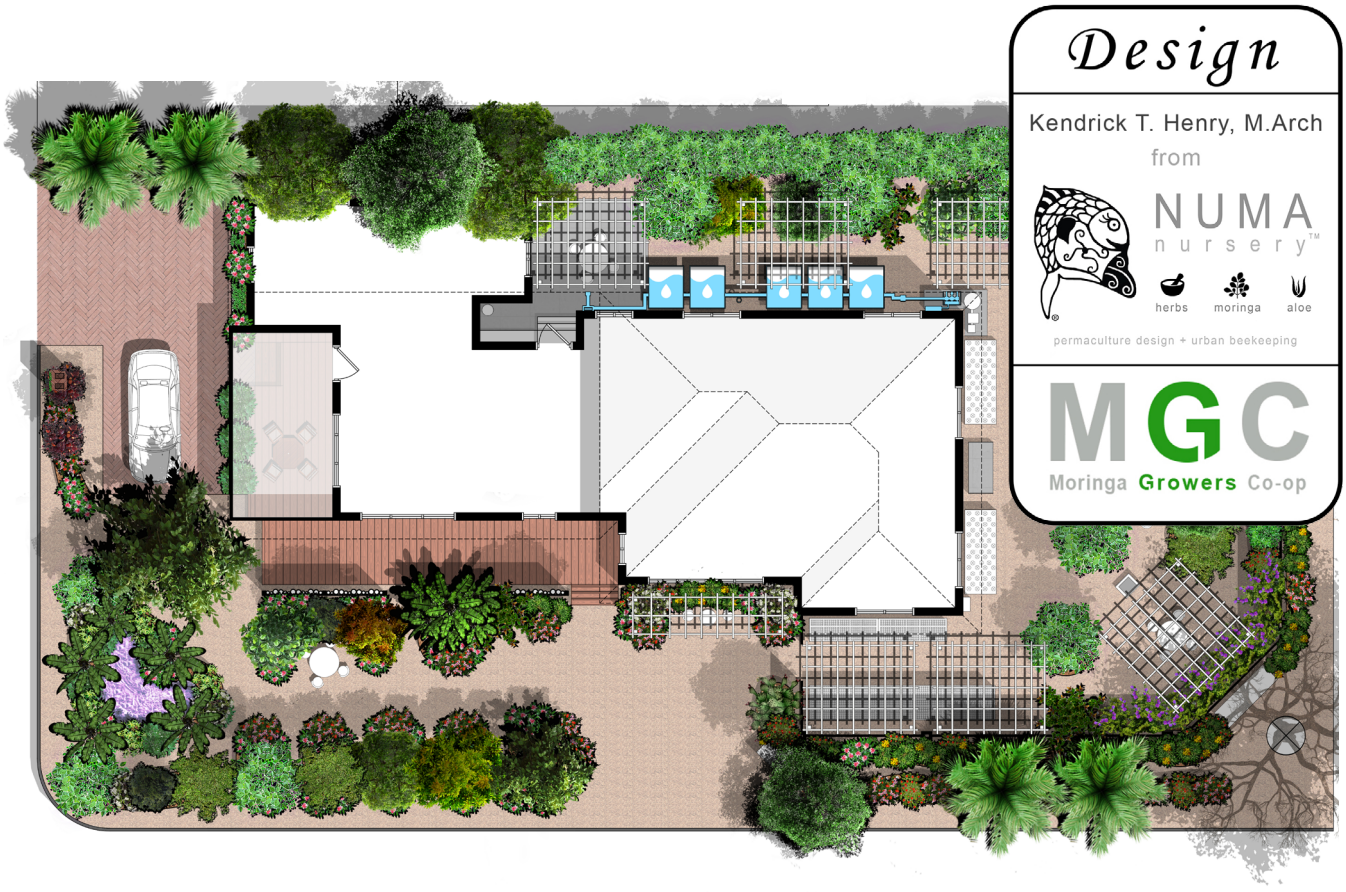

Figure 5: Residential Raincube Permaculture Design Tampa, FL

After feeding the household, the moringa surplus from each Raincube harvest is put into a community pool with moringa from other Raincube nodes. The CSA subscriber spends Raincoin using a digital wallet either online, or in person at the farmers market in exchange for moringa. As the Moringa Growers Co-op collects RNC from subscribers, the RNC can be converted back to dollars from Raincube Corp. When the RNC is recovered by Raincube Corp it is burned out of existence pushing the circulating supply back down to zero. Recovering all the coins means that the Raincubes have been installed, the moringa has been grown, and the calories consumed, completing the cycle, and allowing for ascension to the next level.

The first goal is to sell 100 Raincoins to 100 people each. 100RNC can be used to purchase 1 years supply of moringa products for one person. 50% of funds go to the Moringa Growers Co-Op to cover the cost of labor, seed, and soil, and 40% goes to the Raincube Co-op for labor and parts for installing 10 Raincubes while 10% goes to Raincube Corp in the form of a transaction fee for minting and burning Raincoins.

Only residents in the South West Florida watershed are eligible to purchase the first RNC offering using the Ethereum token. At the time of sale, the ETH-RNC exchange rate will be fixed to represent 1RNC=1USD.

This model can also be expanded beyond Moringa to encompass fruits, vegetables and other products like sauces, spices, jams, ferments, and brews. Eventually, distilling and delivering purified drinking water among neighbors will be the most cost effective application for utilizing rainwater.

Healing the Watershed

Tax Rebates for Rainwater Harvesting

Citizen-Owned and Operated Rainwater Utilities

Peer-to-Peer Water and Food Economy

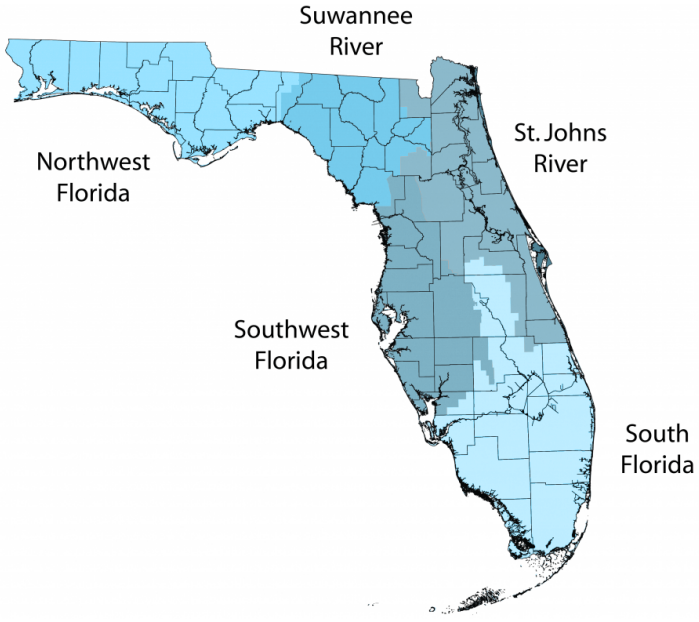

Figure 6: Florida Watershed Management Districts

Development Roadmap

After this initial beta test we will have more data to scale the network to 100 homes across Florida in 2019 that will include more applications like hydroponics, wicking beds, and potable drinking water for homes, apartments, and businesses.

This chart shows the global supply of Raincoin and the corresponding exchange rate, and transaction fee. As dollars are converted into Raincoin, the capacity of the network grows, creating a network effect attracting more people into the network and creating local economies of scale. The purchasing power of Raincoins becomes greater as the supply of Raincubes increases. This allows making goods produced on the Internet of Rain cheaper in comparison to centralized farmed goods, grocery stores and pumped groundwater. With Raincoin, all costs are internalized and accounted for. This is not true for dollars that externalize the social and environmental costs of using unsustainable methods. One Raincoin is one liter of water.

Raincoin Carrying Capacity					
Level	Raincubes (1=1000RNC)	RNC/USD	Market Capitalization	TX Fee (%)	Total Revenue
1	10	1	$10,000	10%	$1,000
2	100	0.9	$90,000	9%	$8,100
3	1,000	0.8	$800,000	8%	$64,000
4	10,000	0.7	$7,000,000	7%	$490,000
5	100,000	0.6	$60,000,000	6%	$3,600,000
6	1,000,000	0.5	$500,000,000	5%	$25,000,000
7	10,000,000	0.4	$4,000,000,000	4%	$160,000,000
8	100,000,000	0.3	$30,000,000,000	3%	$900,000,000
9	1,000,000,000	0.2	$200,000,000,000	2%	$4,000,000,000
10	10,000,000,000	0.1	$1,000,000,000,000	1%	$10,000,000,000

Once level 1 is reached and 10,000 RNC are sold, a second coin offering will be made available to the public at a reduced rate of .9 dollars for 1 RNC. Level 2 will be in effect until 100,000 RNC are raised to reach level 3 in which .8 cents will buy 1RNC. This continues until the marginal price of water is near zero.

Carrying Capacity of the Water Commons

Initial estimates of 10 trillion dollars would be needed to deploy a global Internet of Rain infrastructure connecting enough roofs to water and feed 10 billion people by 2050. Considering that over 1 trillion dollars will be needed to just repair the existing infrastructure by 2040 in the US with an corresponding increase in residents water bills, this is a good deal. Just as the internet has pushed the cost of publishing content on the internet to near zero, the Internet of Rain will do the same for producing food and water.

Value Model

To incentivize development work on the Raincube platform for both hardware and software services, Raincube Corp will initially take a transaction fee of 10% of Raincoin purchases. For example, if 1 million dollars is raised to fund the local Raincube Co-Op, $100,000 will go to technical development for the codebase. As the network scales and more rounds of Raincoins are harvested, the transaction fees decrease. Over time, the transaction cost will reach near zero since most of the development work will be maintenance. This business model ensures that stability and scale is emphasized over profiteering. Other value models include aggregating and selling of weather data, upsell services for business and enterprise level clients, and social graph advertising.

Co-ops and Corps

A **Raincube node** is a home or building that is harvesting rainwater and growing food while hosting a local copy of the **Rainchain** ledger and processing transactions on the network. Each node in a watershed is grouped into a regional **citizen cooperative** that owns the tools and profits of harvesting, producing, and processing of the water, and food. **Decentralized Autonomous Organizations (DAO)** will act as governance structures for each co-op to manage their watershed supply chain.

Raincube Corp will maintain the open source code base of the Raincube technology stack, protected under creative commons Attribution-ShareAlike 4.0 International, meaning anyone can share or remix the context, but must give credit to the original author and also share your content with the same rights.

Free Flow

Over time as the fixed cost of installing the Internet of Rain is paid back, we will enjoy the fruits of our labor for generations to come.Using the data collected from the initial rainwater harvests, we can develop a model that gives each person enough Raincoin to thrive in exchange for time contributed to the network in the form of service. Eventually there will be more water than we know what to do with.

About the Authors

Anthony Paglino has an Economics Degree from University of Florida, speaks Mandarin and Spanish, and practices yoga daily. Anthony has worked for multiple startups ranging from education, tourism, agriculture, culinary, and technology. Anthony previously worked at Seeed Studios, Facebook, Youfan, and The Urban Farmer Store in San Francisco.

Alberto Jauregui graduated from the University of South Florida with two bachelor degrees: Psychology and Communication with a concentration in Public Advocacy. Alberto received his MA in Global Sustainability alongside a concentration in food systems and food security from the Patel College of Global Sustainability (PCGS) at USF in 2017. Alberto is also a contributor to BEN, Sandcastle, and RChain.

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BLOCKSPACES

MCC MORINGA GROWER'S CO-OP Tampa | Clearwater | St. Pete

NUMA nursery herbs moringa aloe

SAINT PETERSBURG ecovillage

Suggested Reading

Sacred Economics by Charles Eisenstein
The Inevitable by Kevin Kelly
Connectography by Parag Khanna
Rainwater Harvesting for Drylands and Beyond Vol.1-3 by Brad Lancaster
Urban Farmer by Curtis Stone
The Internet of Money by Andreas M. Antonopoulos
The Permaculture Student Two by Matt Powers
Zero Marginal Cost Society by Jeremy Rifkin
The Miracle of Water by Masaru Emoto
Democracy at Work: A Cure for Capitalism by Richard D. Wolff

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