The Blue Book

A Beginners Guide To Residential Rainwater Resiliency

Initiation

“Do Non-Doing: The attainment of this purely natural way of behaving, as when the planets revolve around the sun. The planets effortlessly do this revolving without any sort of control, force, or attempt to revolve themselves, thus engaging in effortless and spontaneous movement” - Lao Tzu

Raincube is the simplest, easiest, and quickest way to start harvesting rainwater smarter and at scale. This design is based off lessons learned from 5 years of real-world testing around the world.

The goal of this book is to spread awareness about the benefits of rainwater harvesting while showing you how to design, build, and maintain, a Raincube in your home or community garden. This book will help you get your feet wet while building a strong foundation for continuing to expand our rainwater harvesting proficiency.

By harvesting rainwater, building compost, and growing food locally as a community, we can collectively build resiliency and regenerate the soil and our souls through sacred service to others. Let’s us learn to go with the flow with nature as our guide.

Who Am I?

My given name is Anthony Joseph, but you can call me rainman. My purpose in this life is to help humanity resync to the rhythm of rain.

My story starts in suburban Florida. The first paycheck I ever received was $20 from my father for mowing the lawn weekly. While I was grateful for the money to spend at the mall on the weekends, it was a chore. A recurring task that never led anywhere. I felt like a hamster running on a wheel made of grass clippings turning a two-stroke engine.

In college, I studied economics at the University of Florida at a precarious time. After receiving a degree in the fall of 2008 during the beginning of Great Financial Crisis, the one lesson I learned was that the our global economic system is flawed, and I wanted to find a solution.

For the next four years I lived, worked, and traveled in China, from Beijing to Shenzhen, and all the way to the Southwest in Sichuan, and Yunnan province. I was drawn to China both by the economic growth it was experiencing, and also to witness the ecological destruction that growth required. It was in a small farming village in the foothills of the Himalayan mountains while working as a tour guide where I discovered what a community truly was. The mutual interdependence for the sake of survival.

In traditional farming villages, each member of the community needs to work together to ensure the rice and wheat harvests are successfully planted, and harvested. During the time I was there, a severe drought impacted the area, and I was exposed to how all life is dependent on the flow of water. Specifically rainwater.

Returning to the US, I envisioned the potential of turning suburban lawns into gardens. To enact this change will require both a cultural shift, and a technological shift that is already well under way. This idea is a seed that just needs a little water.

The truth is there is no separation between you and me. We are all traveling the same path. Our pilgrimage is a process of purification that leads to a more abundant and beautiful world.

DI(WHY)?

Our connection with water has been severed. Each of us individually can reestablish an intimate relationship with where water comes from and where it wants to go. By personally getting involved with the water cycle at the individual and home level, we can manifest the global change that is needed to rehabilitate the planetary hydrologic cycle.

City water is dead and stangant, killed with chemicals and underground plumbing. Well-water is full of sediment, and aquifers levels are rapidly being depleted. Where will our water come from in the future? It will come where it always has come from. Above. The bio-physical composition of rainwater is optimized for plants and it is how all of life on planet earth has been biologically adapted over billions of years to thrive.

So if rainwater is so great, why aren't we already running on rain? The cost to professionally install rainwater harvesting systems can range from 3-5 dollars per installed gallon. Installing even a modestly sized system is out of the financial reach for most people. Doing it yourself and with the help of friends, the cost drops to below 2 dollars per gallon or less depending on how materials are sourced. The larger the system, the lower the marginal Raincube cost is. For example, a single Raincube garden installation will cost about $500. If you build a four Raincube system, the cost is

roughly $1000. Once you have built a Raincube garden for your home, you can offer Raincube installation services for your neighborhood earning an income as a regenerative entrepreneur.

The truth is we are not an island. The more your Raincube is connected to the community, the more abundant and successful your garden will be.

Do it with your family and your friends. Do it for your community, and for our planet.

Top 10 Benefits of The Raincube Design

The best design is one that has as fewest moving parts as possible.

- No permitting required
- No pumps/Gravity Fed
- Low Cost/High Performance
- No heavy machinery or special tools needed
- Long lifespan 10+ years
- Easily assembled and disassembled
- Multiple uses for the water
- No advanced filtration needed
- Affordable and accessible parts
- Simple maintenance

Roof Types

If you have a shingle roof, be prepared for a lot of grit to accumulate in your Raincube. According to Brad Lancaster in his book “Rainwater Harvesting for Drylands and Beyond”, the best roof for harvesting rainwater is 24 gauge metal roofing. Terracotta roofing is also appropriate. In Bermuda where there is no groundwater resources, every house has been required to have a limestone roof. The limestone is anti-bacterial, and the white color purifies the water by reflecting UV light from the sun.

Calculating Rainwater Harvesting Potential

The equation is simple. Roof size (sq ft.) x .6 x inches of rain.

E.g. 1000 sq ft roof with 1-inch of rain will collect 600 gallons.

How many Raincubes do you need? Calculate How much water will fall on your roof in a 3-inch rain and that will be on the upper end of your storage capacity.

While this guide focuses on a single Raincube installation, you can add more capacity by simply repeating the steps and placing the Raincube on level ground together. I recommend to start with one Raincube and grow from there.

How much you can grow depends on how much rain you get. A simple rule that I follow is one Raincube can provide enough water for a 24 sq ft. bed for one month between rains. Adding compost to your garden bed will drastically improve the rainwater retention rate of your soil since compost acts as a sponge and can hold up to 9 times its mass in water.

*Note: For each Raincube installed, a small ventilation opening will need to be made in the lid by drilling a small hole and covering it with mesh screen. The Raincube attached to the leaf eater does not need an extra vent since airflow is already coming through the inlet.

Uses for Rainwater

With all this water, you may be wondering what you can do with it. Since the filtration is removing sediments, and not bacteria or viruses, it's recommended to use this mainly with irrigation and washing. If you are thinking of using rainwater to water your grass, you will find that ratio of rainfall to grass watering needs isn't sustainable.

- Irrigation for edible plants
- Drinking water for chickens, and pets
- Watering compost piles
- Cleaning compost toilet buckets
- Washing your car, bike, or clothes

*Note: In a grid shutdown situation after a hurricane or mass contamination event, rainwater can be run through a Berkey water filter or Life Straw to make it clean enough for drinking.

Tools

What tools will you need for the job? Looking at the list below, you may be surprised to find that many of the tools are already in your possession. If you don't have the tools

necessary ask a neighbor first. Cheap tools can always be found at pawn shops so stop there before heading to Home Depot.

- Hacksaw or pipe cutter
- Level
- Ladder
- Tape measure
- Gloves
- Box cutter or scissors
- Starbit
- Screwdriver
- Crescent wrench
- Shovel
- Holesaw 2 ½”
- Holesaw ¾”

Materials
Source and salvage as many supplies as you can. You will find that many of the supplies including cinder blocks, hoses, and PVC piping may already be available for free in your garage or community. Simply ask friends and neighbors, while also posting on facebook groups, Letgo, or by checking the free section on Craigslist.

All other items can be bought either online at Amazon or Home Depot, or in person at your local hardware store.

*Note: Click on the item below to view the product link.

Items	Cost
Recycled IBC Tote	175
Leaf Eater	35
Soil Moisture Sensor	10
Flow Meter	19
Water Level Gauge	35
Rain Gauge	5
Flex Gutter Downspout	2.87
3" to 2" Coupling	4
2" male adapter	1.5

2" female adapter	2
2" to 3/4" reducer	2.55
Brass valve	11
Y filter	10
Two way hose bibb	10
Soaker Hose	8
Leader Hose 6 ft	8
2" male adapter elbow	5
2" elbow	2.7
2" O-ring	1.6
2" Nut	2
2" PVC Pipe 10'	9
3" PVC Pipe 2'	7
Hose clamp	1.27
Cinder Blocks (12pc)	18
Black Plastic Wrapping	30
Gorilla Tape	5
Teflon Tape	0.5
PVC Glue	8
Home Depot	**116.07**
Amazon	**104**
Total	**403.99**

How to Source a Raincube?

The best way to find an IBC tote in your area is to go to craigslist.com and find a reseller. Prices often vary depending on the quality and quantity you are buying. IBC totes are the global standard for shipping liquids across long distances so they are available worldwide. Make sure to get a food grade IBC tote. Ask the seller what was in the containers last. In the past, I've sourced Raincubes that were used to store fish emulsion, balsamic vinegar, and one even was used for a shipment of olives.

Site Assessment

Where do you put your Raincube on your property? It depends. The best place for rainwater storage is on the north side of the house. This protects the Raincube from UV degradation and keeps the water cool. The best place for growing vegetables is on the south side of the house since that is where there is the most direct sunlight. Ideally, you'll want to put the Raincube where there is an already existing downspout. This will make the installation much easier, and depending on the orientation of the house, still, provide partial or full shade for the Raincubes. Design the base so that you can still navigate around the entire cube for access, maintenance, and repair by including a gravel lining. Smashing cinderblocks to bits is an easy and cheap way to create a buffer and to suppress plant growth where you don't want it.

10 Step Assembly Instructions

Now that you've decided where to put the Raincube, sourced your tools and materials, we can get down to putting these pieces together. While this is the method I have used, your assembly may differ slightly. Use this as a guide and remember to trust your judgment if you need to improvise. Hands-on experience is the best teacher.

1. **Build Platform** Make sure to level the ground first and mark where the cinderblocks will go. The cinderblocks should align flush with the outside of the pallet cage.
2. **Wrap Raincube** Remove the plastic container from the metal cage by first unscrewing the star screws using a star screwdriver and sliding the metal bars out. Most drill bit kits will include this specific bit. Tilt the cage on its side and slide the container out. Cut a 14 ft long by 10 ft wide strip of black plastic sheeting. With the cap off, place the IBC plastic container upside down. Use the tape to secure one side of the plastic to the center of the bottom of the cube. Take the other side and tape the front side of the plastic over the center. Similar to wrapping a present for Christmas, you can tape the remaining sides. Don't do the wrapping in direct sunlight since the heat will cause the adhesive to melt. Once the Raincube is wrapped cut slits over the cap, and outlet. Place the wrapped Raincube back in the cage making sure to have the front outlet in line with the front of the cage.

   *Note: It is important to wrap or cover the Raincube to prevent UV rays from causing algae growth in the water. Many beginners will make this mistake. Algae growth will make the rainwater and the Raincube unusable.

3. Place Raincube on platform and use a level to make sure the placement is balanced. Since the Raincube weighs 2000 lbs when fully filled, there is no need to attach or secure the Raincube to the base. Just make sure the cinderblocks are level.
4. Attach Leaf Eater to Raincube inlet (optional mesh screen filter using pantyhose). The bottom of the Leaf eater will fit into the 3” to 2” reducer. Cut a 4-inch long piece of 3” pvc piping and a 4-inch long piece of 2” pvc piping to be used as couplers. The lid to the Raincube will either come in one piece, or there will be a detachable bung hole with threading. If there is no bunghole you can create one by cutting a 2 and ½ inch hole. Screw in 2 inch male adapter and connect the Leaf Eater.
5. Create overflow by drilling hole using a 2 and ½ inch hole saw and screw in 2” male adapter. Attach o-ring and nut to inside to secure. Once again cut a 4” long piece of 2” pvc piping to connect the male adapter and the elbow. Use 2” pvc piping to divert water away from home foundation. Measure the height of the Raincube from the ground, and cut the 2” pipe so that it is flush with the ground. Connect another elbow and run the rest of the 2” pipe into the garden bed. At the end of the pipe, cover with a small piece of mesh screening and secure with hose clamp. Cut a 2 and a half inch wide hole into an old nursery pot and use as a mulch basin. This will make sure any overflowing water from heavy storms will filtrate into the ground, keeping the foundation of your Raincube and house safe.
6. Attach water level gauge using ¾ inch hole saw.
7. Wrap teflon tape around each male thread and attach hose bibb connection, Y filter, flow meter, and splitter.
8. Attach hose and lay irrigation line in garden beds. Stake the irrigation line, or cover with mulch.
9. Place rain gauge in the yard to measure rainfall. Calibrate instruments and record water collection and consumption.
10. Decorate and beautify your Raincube.

Garden Bed Prep

1. Pull out weeds and level
2. Place cardboard to supress unwanted plant gowth
3. Construct a raised bed border.
4. Layer the bed with sticks for better airflow.
5. Add compost and biochar.
6. Add a mulch layer
7. Plant seeds or starts.
8. Apply compost tea.

9. Water regularly.

Maintenance & Operations

- Clean out gutters after every rain.
- Wipe off water and leaf accumulation on top of Raincube.
- Clean leaf eater and pantyhose liner after every rain.
- Check for drips and leaks at connection points. If leaky, unscrew, apply more teflon tape, and reattach.
- At the end of the dry season, empty Raincube and flush out sediment on the bottom of the tank.
- Clean sediment filter when clogged.
- Red handle is main on-off valve for the IBC tote and should be left open when in use.
- The blue handle on the brass hose bibb can be closed if the irrigation manifold needs to be disconnected.
- To access water simply turn the nozzles on the brass valve for either green garden hose, or soaker hose.
- Log water collection and use by checking water level gauge, and flow meter.

Record and Catalogue

Water Level
Water Usage and where and when
Water moisture content
Water collection amount

Resources

Rainwater Harvesting Regulations Map
https://www.energy.gov/eere/femp/rainwater-harvesting-regulations-map