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No water, no life
No blue, no green

‘Kunji Pit’ Network

Kerala’s Unique Natural Justice Intervention

KUNJI PIT NETWORK

Distributed Earth Recharging Network For Better Ground Water and Rain

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Table of Contents

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THE WATER STORY

97% of water in the planet earth is not drinkable

2.4% is locked and only

0.6% is available for drinking

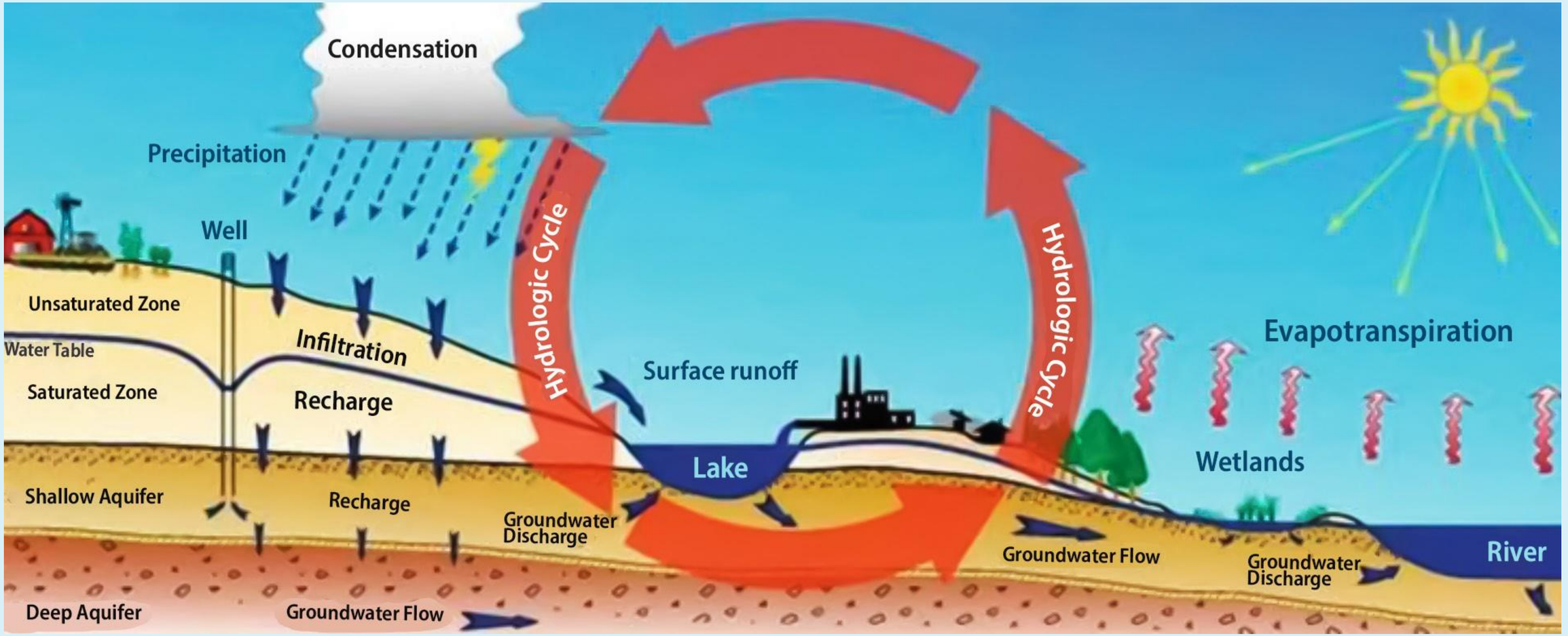
So, Let's Promote:
Rainwater Harvesting &
Earth Recharge

WAR STATEMENT

“No more chances for waging a war for water”

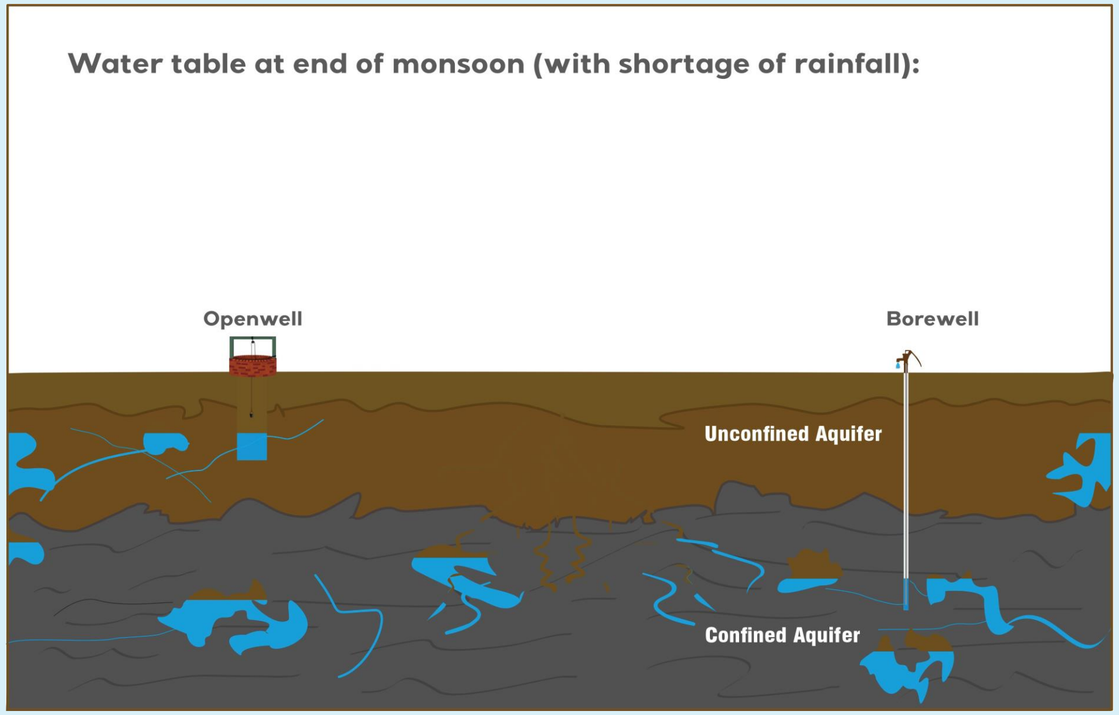
– Water Conservation Army

CYCLE OF WATERFLOW

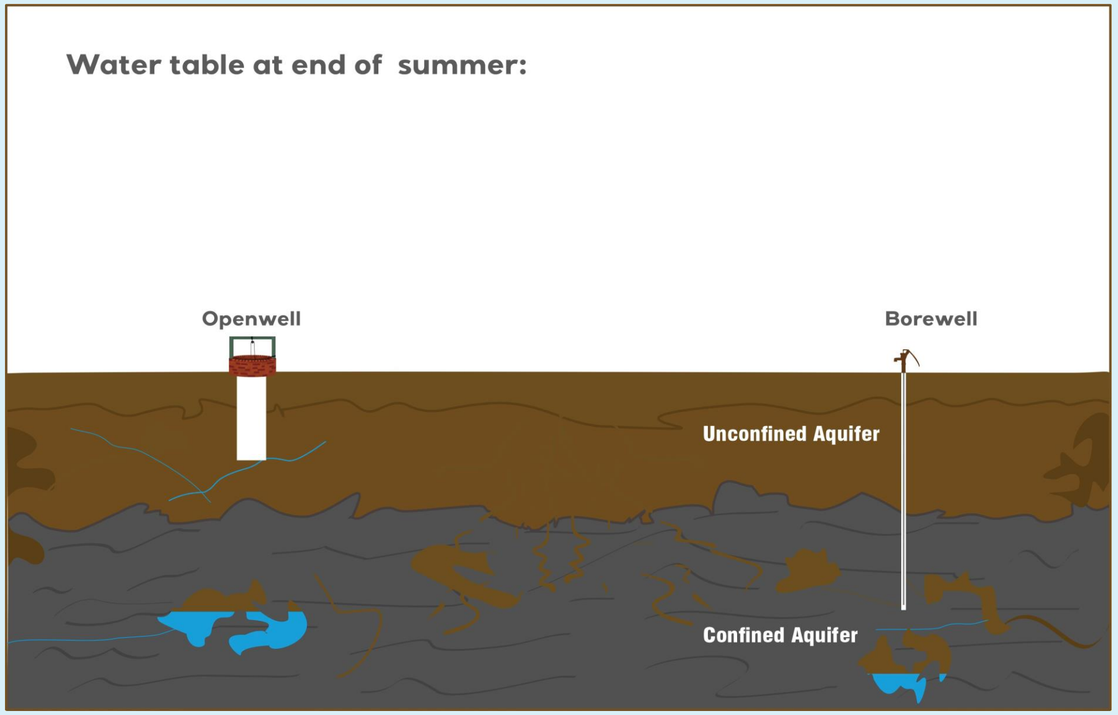


GENERAL CONDITIONS OF AQUIFERS

End of Monsoon with Low Rain Fall



End of Summer



EARTH RECHARGE METHODS

NATURAL

The natural methods involve precipitation (rain) on soil, which enters the Aquifers through the mud cracks and bring up the underground water table.

ARTIFICIAL

Several techniques can be used to augment water and increase its availability. Depending on the hydrogeological specifications, the techniques are diverse and can vary. Some include:

Direct Surface

- Flooding
- Basins or percolation tanks
- Stream augmentation
- Ditch and furrow/channel system

Direct Sub Surface Techniques

- Injection wells or recharge wells
- Recharge pits and shafts
- Dug well recharge
- Borehole flooding
- Natural openings, cavity fillings.
- Combination Surface/ Subsurface Techniques
- Basin or percolation tanks with pit shaft or wells.
- Water harnessing structures like dams

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INTRODUCING

KUNJI PIT NETWORK

A Distributed Earth Recharge Network System

What is ‘Kunji Pit’ Network ?

Kunji Pit Network is a network of Artificial Distributed Earth Recharge Miniature Pits that provides an efficient, convenient and easy implementation of Earth Water Recharge.

Improve Drinking Water Availability

Kunji Pit Network helps develop and improve water table of the unconfined underground aquifers, thus availing better drinking water in the open wells and better moisture content in the soil, etc.

Better Rainfall

Rain is caused by the cloud formation through Evapotranspiration (ET) process that is a combination of water surface evaporation (sea, river, wetlands), soil moisture evaporation and plant transpiration.

Kunji Pit Network aids in better soil moisture evaporation that helps improve the ET

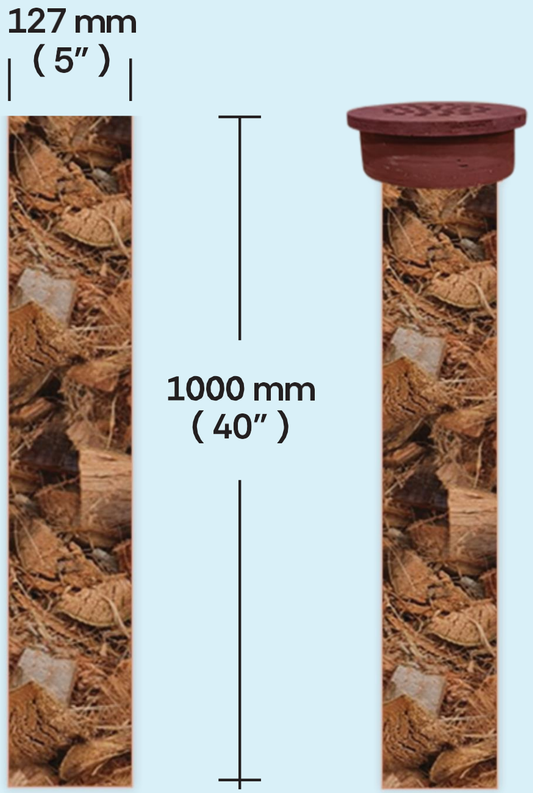
‘Kunji Pit‘ Construction Details

Kunji Pit is made by drilling a 5″ Dia x 40″ Deep (127mm Dia x 1000mm Deep) hole in the ground and filling it with Coconut Husk.

Hole Depth : 40″ (1000mm)
Hole Width: 5″ (127mm)

Coconut husk filled to maintain the hole shape, water retention and organic growth. Must be covered to avoid the husk from moving out of the hole if Kunji Pit is made near flowing water.

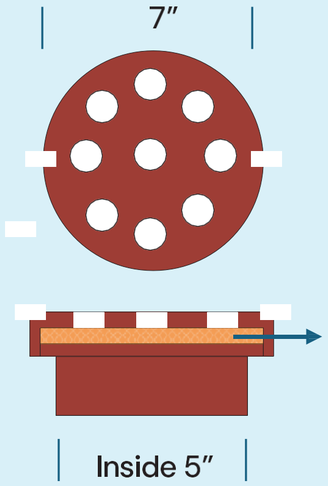
(Note : any other alterative organic slow biodegradable material that would aid water percolation and organic growth may also be tried. Bagasse in sufficiently loose briquette form could be tried.)



Option –A

Earthen Lid System

A simple Earthen Lid System for general protection and identification.



Option –B

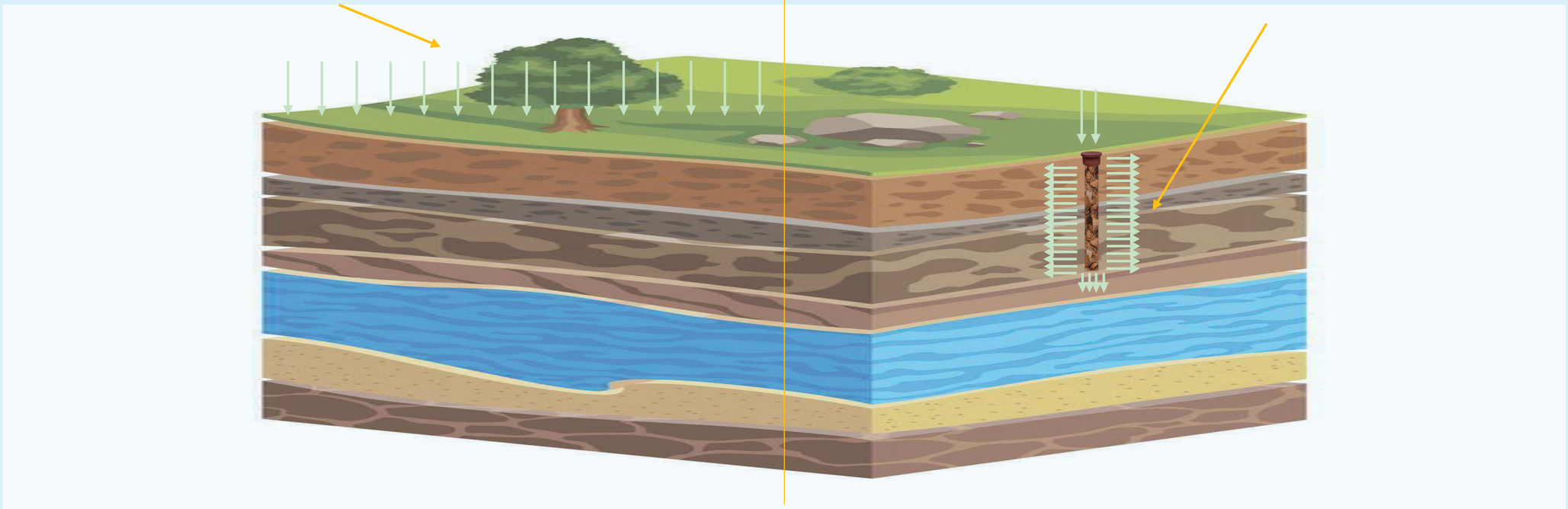
Earthen Coir Filter Lid System

A purpose-built Earthen Filter Lid to control silt penetration, protection and identification

‘Kunji Pit‘ Recharging Advantage

Natural Vertical Recharging

Kunji Pit Horizontal Recharging



Note : Indicative only. Earth layers may not be as close as shown.

‘Kunji Pit‘ Making Process

A pit size of 5” (127mm) diameter and 40” (1000mm) depth made using a Petrol Driven Earth Augur Machine.

Coconut Husk (or any suitable alternative)

Install an earther cover if protection needed.

‘Kunji Pit‘ Network Making Process

MACHINE/TOOLS REQUIRED :

Petrol Driven Earth Augur Machine with 4” Blade Size which makes almost a size of 5” Kunji Pit if soil is fairly loose. Use higher capacity Augur machine if the soil is hard.

MATERIALS REQUIRED :

1. Coconut Husk
2. Earthen Cover (Optional)

MANPOWER REQUIRED :

1. Labor if soil is not hard and 2 Labors if soil is very hard.

TIME AND EFFORT REQUIRED :

1. Locating the right spots for 12 Kunji Pits	: 5 Minutes
2. Time required for making 12 Kunji Pits	: 12 Minutes
3. Filling coconut husk (and providing earthern cover)	: 5 Minutes
4. Total time required for making 12 functional Kunji Pits	: 22 Minutes
Rounded	: 30 Minutes

OUTPUT PER DAY

One/Two person per Day 8hrs/30mts : 192 Kunji Pits

‘Kunji Pit‘ Network Application – General Purpose

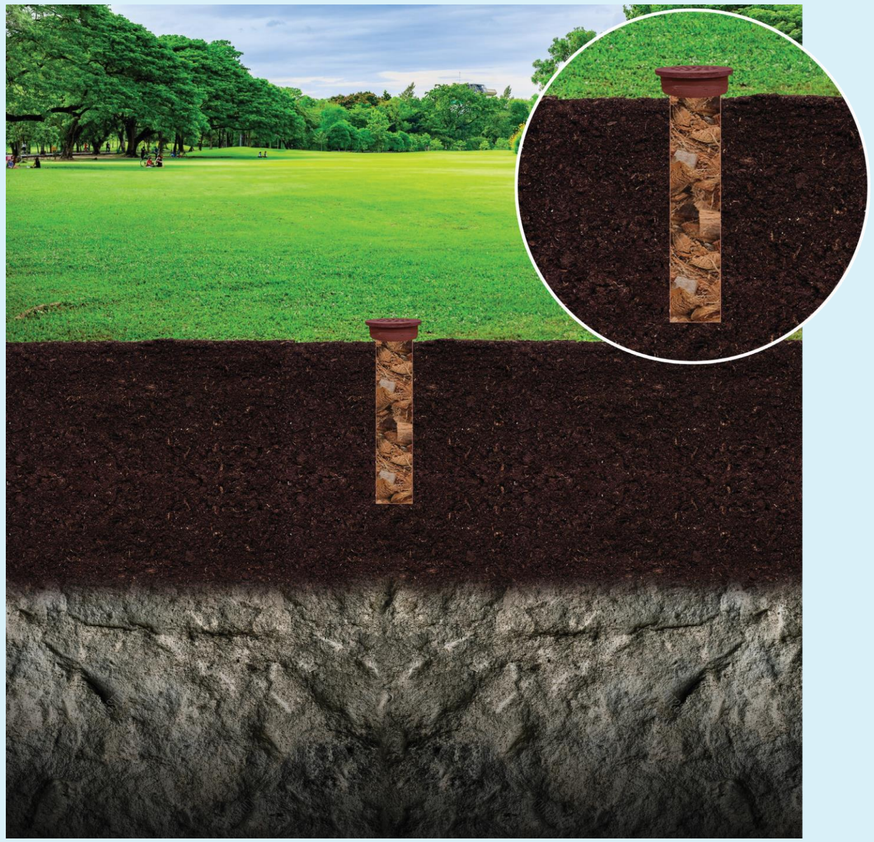
Locations/Sites/Spaces proposed for ‘Kunji Pit‘ implementation:

ALL RESIDENCES/TOWNSHIPS

1. Adjacent to terrace water drainage pipes
2. Near rainwater furrows
3. Gardens/Lawns
4. Concrete/tile Pavement areas

GENERAL

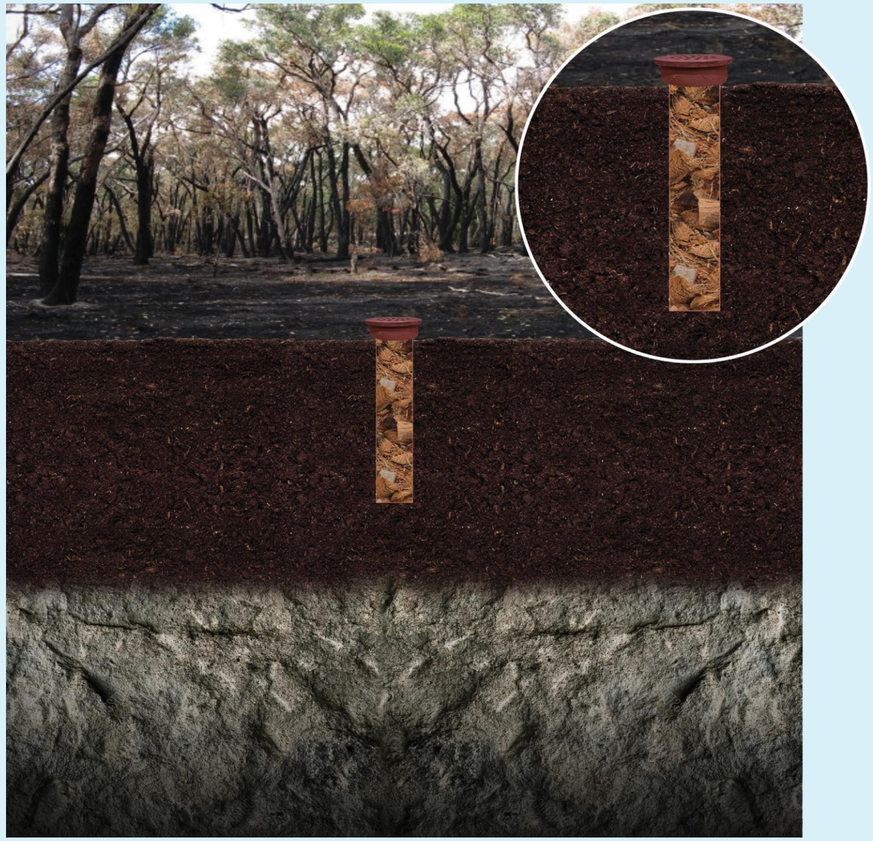
1. All lands where rainwater is available.
2. Alongside the major furrows
3. Riverside
4. Unirrigated farmlands/agricultural fields
5. All other areas where the Kunji Pit Network can be practically made without disturbance.



‘Kunji Pit‘ Network Application – Rejuvenating Forest Water Bodies

The disappearance of water bodies in the forest due to low rainfall results in animal migration to human habitats, creating a major threat to many lives. The best way to stop this problem is by rejuvenating the dried water bodies in the forest.

‘Kunji Pit‘ Network implementation in and around the dried water bodies/catchment areas and the upper landscapes is a viable and sustainable solution to rejuvenate the water bodies.



‘Kunji Pit‘ Network Application – Utilization Of Road Water

There is a huge amount of clean water that can be collected from the road network and can be used for earth recharge. There could be 2 designs:

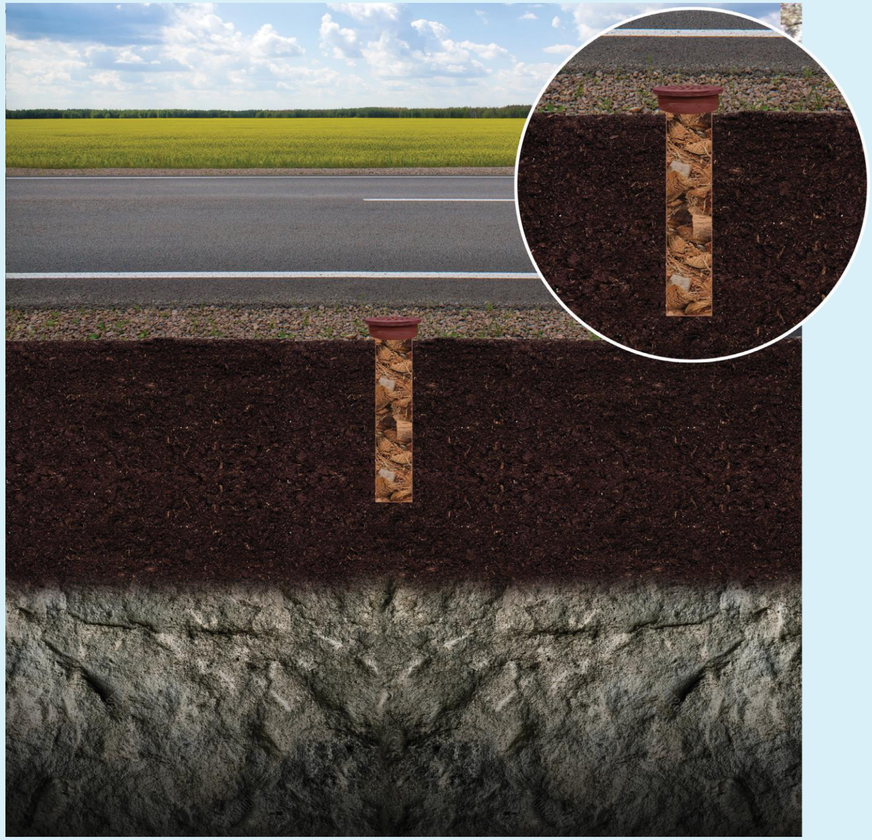
Median Strip

If drainage is suitably designed, the median strip can be used for earth water recharge and Kunji Pit Network can be added to this area. It can also hold water for the plants and the vegetation in the median strip.

Road Verge

Kunji Pit Networks can be added to the road verges for earth water recharge.

Note : If maintaining a Kunji Pit with organic matter inside could lead other issues then it may be replaced with purpose built plastic pipe strainers. Further study required.



‘Kunji Pit‘ Network Application – Address Urban Water Crisis

Example : Bangaluru Underground Water Table Depletion

Problem

70% of the soil surface of Bangaluru is under concrete flooring! and only

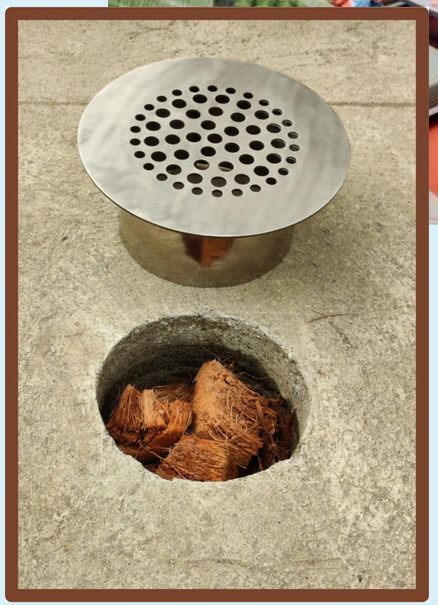
30% soil exposed to precipitation.

‘Kunji Pit‘ Network Application – Address Urban Water Crisis

Solution – Kunji Pit Network

Concrete Covered Soil Surface
Wherever possible, introduce Kunji Pit Network across Bangaluru and Ground Recharge rainwater falling on the Concrete Floors and Lawns. A Stainless Steel Lid would ensure that none of the utility is affected.

Soil Exposed Surface
Intorduce Kunji Pit Network and Ground Recharge rainwater falling on lawns and soil surfaces.



Core cut concrete and fill coconut husk.

Cover Kunji Pit using a purpose-built stainless steel cover

Kunji Pit in a lawn covered with a clay cover.

‘Kunji Pit‘ Network Application – Mini Flood Control

Kunji Pit Network implementation around the potential waterbodies that develop during heavy rains particularly in the urban area helps enhance water discharge to the underground.

‘Kunji Pit‘ Network Application –

Help Counter Global Warming

Introduction of Kunji Pit Network helps cover the soil surface with green cover which reduces the heat reflection to green house gases in the atmosphere thus reducing the atmospheric temperature.

Execution Methodology Of ‘Kunji Pit‘ Network

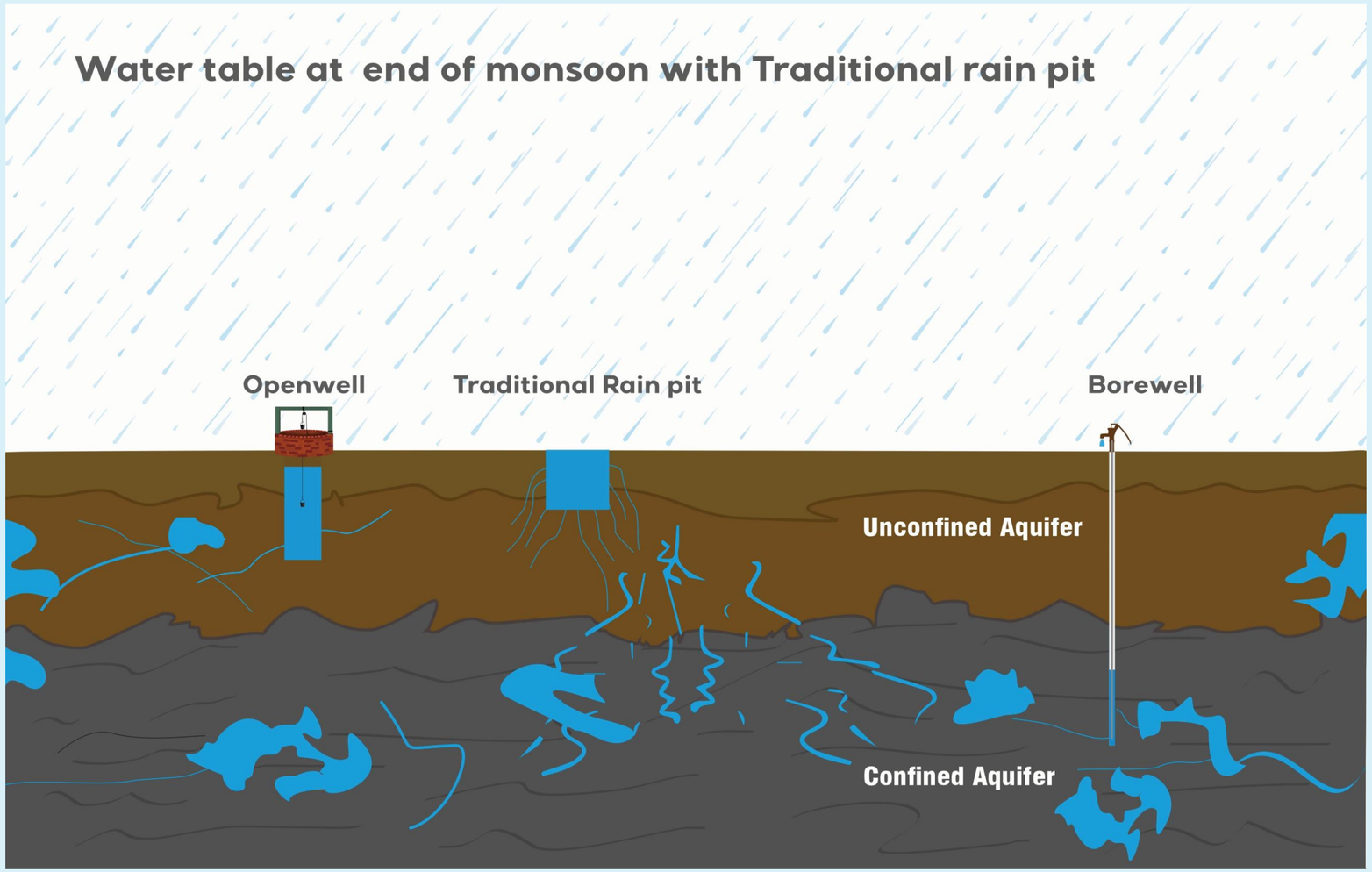
Urban/Agricultural/Forest/Road Transport Ministries, Panjayath, Municipality, Corporation, Govt. Agencies to consider:-

1. A ‘minimum’ number of Kunji Pits per Hectre to be made compulsory, including for farmland by the appropriate statutory body.
2. In residences, all sides of furrows/channels must have Kunji Pits implemented.
3. Earth recharge drive through housing colonies.
4. Collaborate with corporates to promote as CSR project.
5. Collaborate with Clubs, social organisations, NGOs, HNIs etc to promote as CSR project.
6. Sensitize public to preserve water for their next generation rather than accumulating wealth since they can’t survive without water.
7. Strategic study on optimizing the Kunji Pit Network implementation with due consideration of the existing data from the hydrogeology analysis of a particular location.

Case Study

A Kerala Traditional Recharge Pit
V/s.
Kunji Pit Network

Expected Conditions Of Aquifers At The End Of Monsoon With Traditional Kerala Rain Recharge Pit

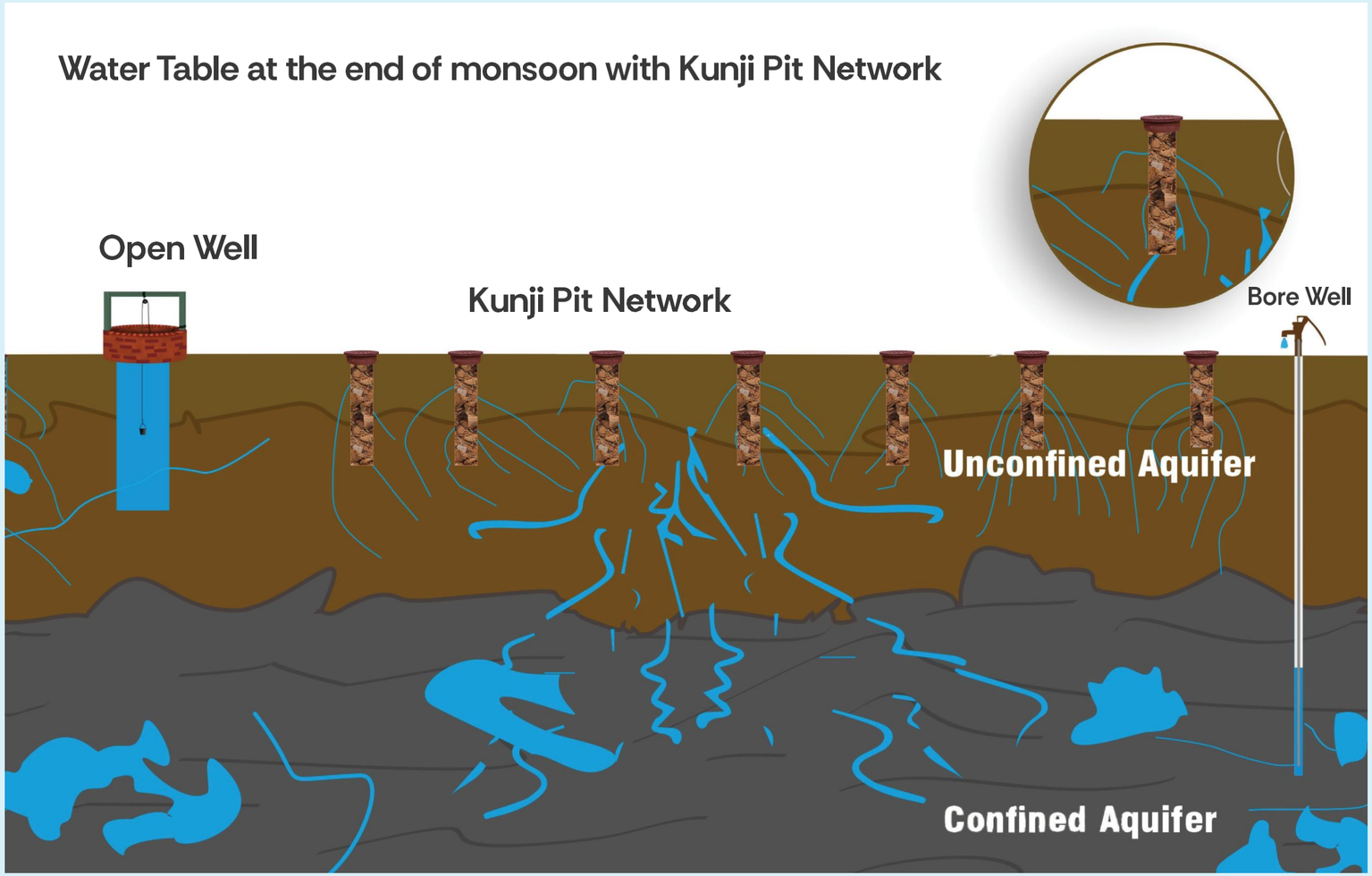


Kerala Model - Actual Situation Of A Traditional Kerala Rain Recharge Pit

Kerala ‘Mazhakuzhi’ explained!

This is the situation of most of the Rain Recharge Pits provided in a village by a MGNREGA (Mahatma Gandhi National Rural Employment Guarantee Act) programme. Pits are converted to waste pit, planting trees or get covered by silting.

Expected Conditions Of Aquifers At The End Of Monsoon Using Kunji Pit Network



Merits And Demerits
Kunji Pit Network V/s Kerala Traditional Recharge Pit

Kunji Pit of 127mm x 1Mtr depth

Merit

1. Distributed locations, hence no space constraints
2. Kunji Pit Network can be easily made and faster by machine
3. Not blocking single large land area
4. Water need not be diverted, and it can be made near water channels
5. Multiple point penetration gives better percolation
6. 12 Holes of 127mm Dia x 1000mm equal to the surface area of conventional pit size of 1Mx1Mx1M standard rain pit.

Kerala Traditional Recharge Pit of 1Mtr x 1Mtr x 1Mtr

Merit

1. Single Location
2. Pit generally made by Labour.

Demerit

1. Blocking large land area
2. Water to be diverted to the pit
3. Single point percolation
4. Total percolation surface area : 5 Sq. Mtr only
5. Pit dimension reduces due to silt. Introducing side walls increases cost and reduces percolation
6. Chances of animals falling into pit

Performance Comparison Study of

‘Kunji Pit’ Network
V/S
Kerala Traditional Earth Recharge Pit

Kerala Traditional Earth Recharge Pit Performance Test Set Up

Water Tank 1000Ltr

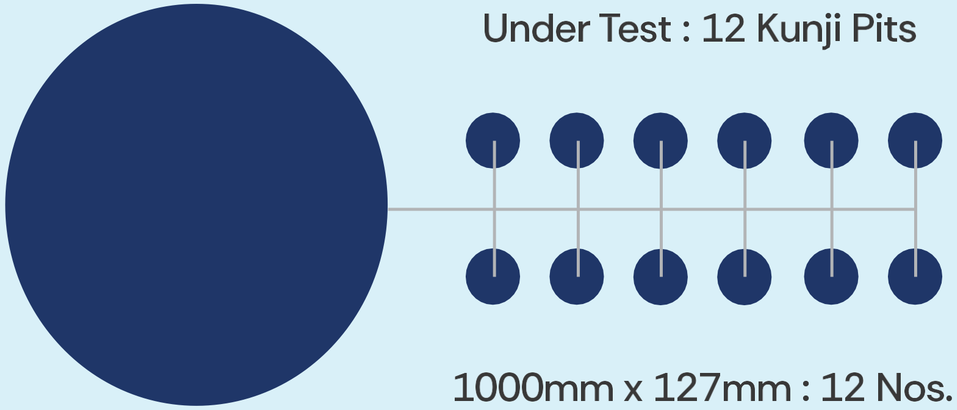
Traditional Recharge Pit 1m x 1m x 1m Total Surface Area = 5m²

Traditional Rain Pit 1M x 1M x 1M

Rain Water Percolation Surface Area = 5 M²

Pit Volume : 1000 Ltr (1M³)

‘Kunji Pit‘ Network Performance Test Set Up



Rain Water Percolation Surface Area ($2\pi rh$) + (πr^2)

Single Hole = (2 x 3.14 x 0.0635 x 1) + (3.14 x 0.0635 x 0.0635) = 0.398 + 0.0126 = 0.410M^2

Total surface area for 12 Holes

(Which is almost equal to 5M^2 Traditional Pit Surface Area) = 0.410 x 12 = 4.92 M^2

Kunji Pit Volume ($\pi r^2 h$)

Single Hole = (3.14 x 0.0635x 0.0635 x 1) = 0.0126M^3

Total for 12 Holes = 0.0126 x 12 = 0.151M^3

(Which is equal to 15% of the 1M^3 Traditional Pit Volume)

Artificial Recharge Comparison Study

Kerala Traditional Earth Recharge Pit V/s ‘Kunji Pit‘ Network

Percolation Performance Test Result

Kerala Traditional Pit (Size 1M x 1M x 1M)	
Test Date	15-04-2024
Test Time	3.45pm
Ambient Temp	37Deg C
Time	Percolation Qty
3.45pm	Started Charging 1000Ltr Water from Tank
4.20pm	Completed Charging
4.20pm	800 Ltr
5.10pm	675 Ltr
6.10pm	575 Ltr
11.20pm	0
Percolation Hrs. for 1000 Ltrs	7Hrs. 35 Minutes
Percolation Volume/Hour	131.4 Ltrs

Kunji Pit (12 Nos. x 127mm” Dia x 1000mm L)	
Test Date	24-04-2024
Test Time	5.00pm
Ambient Temp	37Deg C
Time	Percolation Qty (Tank Level)
5.00pm	Started Charging 1000Ltr Water from Tank
5.40pm	500 Ltr
6.40pm	200 Ltr
7.00pm	100 Ltr
7.20pm	0
Percolation Hrs. for 1000 Ltrs	2Hrs. 20 Minutes
Percolation Volume/Hour	428.4 Ltrs

General Note : Result may vary subject to soil type/layer/structure and soil moisture content.

Inference – Efficiency And Surface Area

Percolation Efficiency (Time) Comparison

4 Nos. Kunji Pit Network (1M x 5" dia) can replace one Kerala Traditional Recharge Pit of 1M x 1M x 1M considering the percolation time of both Kunji Pit Network and Kerala Traditional Recharge Pit.
The time taken for the same quantity of water percolated through 4 Kunji Pits and 1 Kerala Traditional Recharge Pit are same!

Percolation Surface Area Efficiency Comparaision

12 Nos. Kunji Pit Network (1M x 5" dia) can replace one Kerala Traditional Recharge Pit of 1M x 1M x 1M on the basis of the total surface area for percolation.
Based on the time taken for percolation, 12 Nos. Kunji Pit can replace 3 Nos. Kerala Traditional Recharge Pit

Note : The result may vary site to site, subject to soil type, texture and moisture conditions etc

Artificial Recharge Comparison Study

Kerala Traditional Earth Recharge System V/s 'Kunji Pit' Network

Conclusion

This Kunji Pit Network has the following advantages:

1. Very easy implementation
2. Generally, a Kunji Pit can be made in few seconds, subject to soil condition.
3. The surface area of 12 Kunji Pits is equal to the standard rain pit size of 1 x 1 x 1M.
4. Faster percolation than the Kerala Traditional Pit.
5. Distributed percolation improves effectiveness of recharge.
6. Space saving
7. Captures the water close to the rainwater drain.
8. Avoids the worry of animals falling into pit.
9. Coconut husk improves organic growth such as earth worm production etc.
10. Protects from silting

Let Us Do
'Kunji Pit' Network
Better Ground Water
And Better Rain

For Us And Also For
Our Future Generation !

Thank You :)