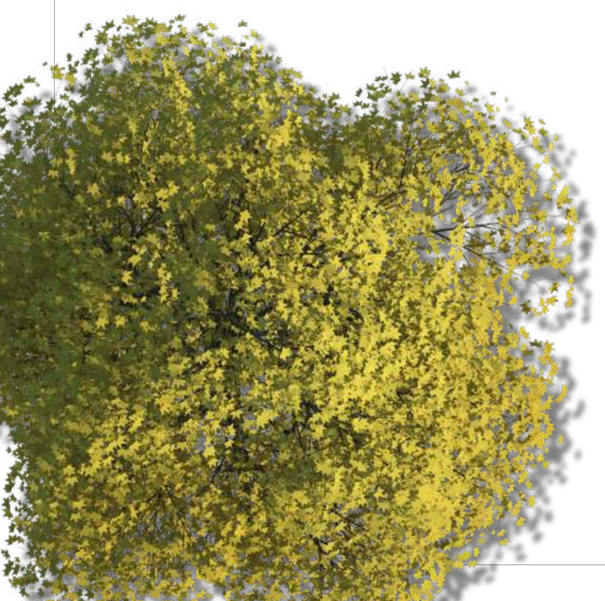
Ecosystem restoration of degraded lands

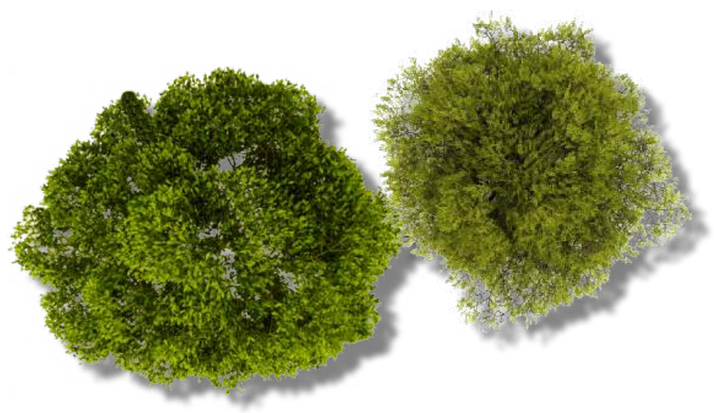
A case study



ecosys

The context:

Global climate change and deforestation cause a wide range of negative environmental and socio-economic impacts, fuelling a recent interest in tree planting as a panacea to a variety of problems. High-profile modelling studies have argued that reforestation is among the most effective strategies for climate change mitigation and have generated enthusiasm for tree planting, but have also garnered backlash from ecologists who argue that planting trees is not as simple as it may seem. For example, widespread tree planting may have complex impacts on hydrological cycles, carbon, temperature and albedo, biodiversity, social and economic issues, and can even result in ecosystem ‘disservices’.



Hundreds of millions of trees are being planted every year. To make a sizeable impact on climate change and the challenges it brings across many fronts, this is neither enough nor the right approach. If nature based solutions have to work to mitigate climate change and its effects, we need to go beyond mere tree planting and relook at these as holistic, ecosystem restoration projects that create long-lasting impact: Ecologically, economically and socially.

It is estimated that out of 329 M ha total geographical area, 120.4 M ha land in India is degraded due to deforestation, overgrazing, agriculture-related activities, and over exploitation. 41% of the total forest cover is degraded and more is being lost each year. Given the limited resources government is able to allocate to restoration of India's forests, it is critical that high quality privately funded projects are activated to reclaim the country's forests.

Who we are

Ecosys.Earth is creating the technology wireframe to move carbon markets to rewarding ecological co-benefits of climate action projects, while creating the infrastructure needed to achieve the objective.

A truly sustainable approach

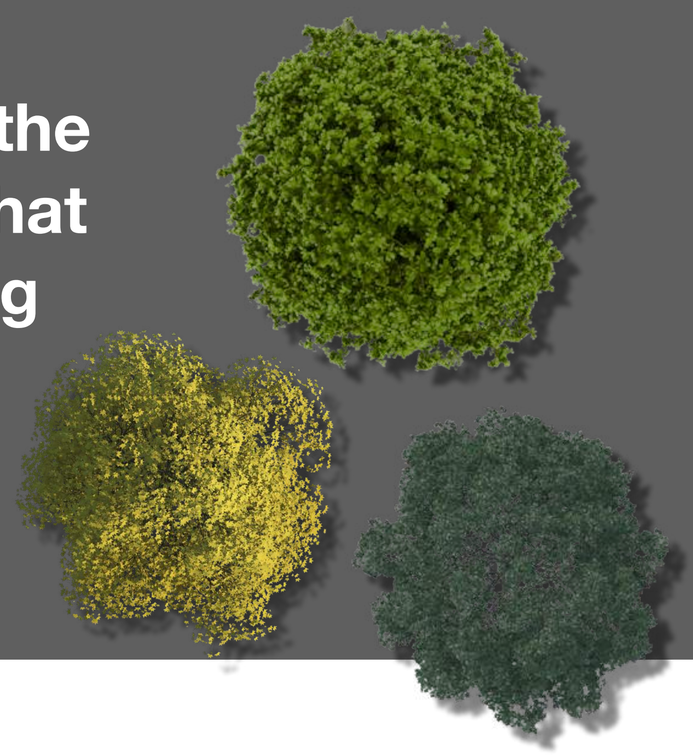
Earth's climate is in crisis because human activity has exceeded nature's capacity to heal. We need to regenerate natural ecosystems and leverage the scale only nature based solutions can provide.

In the end, every venture that succeeds depends on dollars and cents. We believe that our innovations to tackle climate change must add value - for every stakeholder. Because if it works financially, it can be scaled.

Sustainable development of communities demands going beyond livelihoods to creating a deeper social impact, so future generations learn how to live in harmony with nature and achieve true prosperity.

“We are the first generation to feel the sting of climate change...we are the last generation that can do something about it.”

– Jay Inslee



The clock is ticking.

Global economy - and especially intensive carbon emission sectors - must make a decisive U turn towards a zero carbon business model by 2030. Or the world faces grave ecological disasters of extreme climate, desertification and large human migrations and suffering.

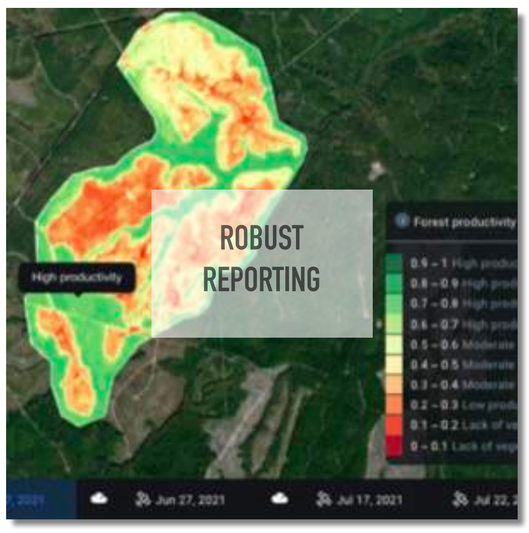
The time for action is now. Or our future generations will never forgive us.

What we do

Ecosys.Earth restores degraded lands into thriving ecosystems that not just capture carbon but also start a virtuous cycle that benefits nature, the environment and human communities.

How we do it

Our key differentiator is integrating environmental, financial and social benefits in every ecosystem restoration project.



Transparency and accountability

Data-backed metrics that ensure transparency and credibility

The project:

When Naved, founder of **Ecosys.Earth**, decided to return back to India after 15 years in Dubai, he settled on a 6 acre patch of degraded scrub grassland with one tree on it.

Today, **Grassroots** is a thriving ecosystem with 3400 trees of 70 different species and a host of shrubs and grasses, creating a thriving habitat for birds, mammals and reptiles that call it home.

This case study details the restoration of a degraded piece of land with extensive damage to soil and vegetation into a rich ecosystem providing a host of services to humans and wildlife while capturing and sequestering carbon. While it is a comparatively small project, it is a model that can be replicated at scale to reclaim India's degrading farmlands into rich carbon sinks.

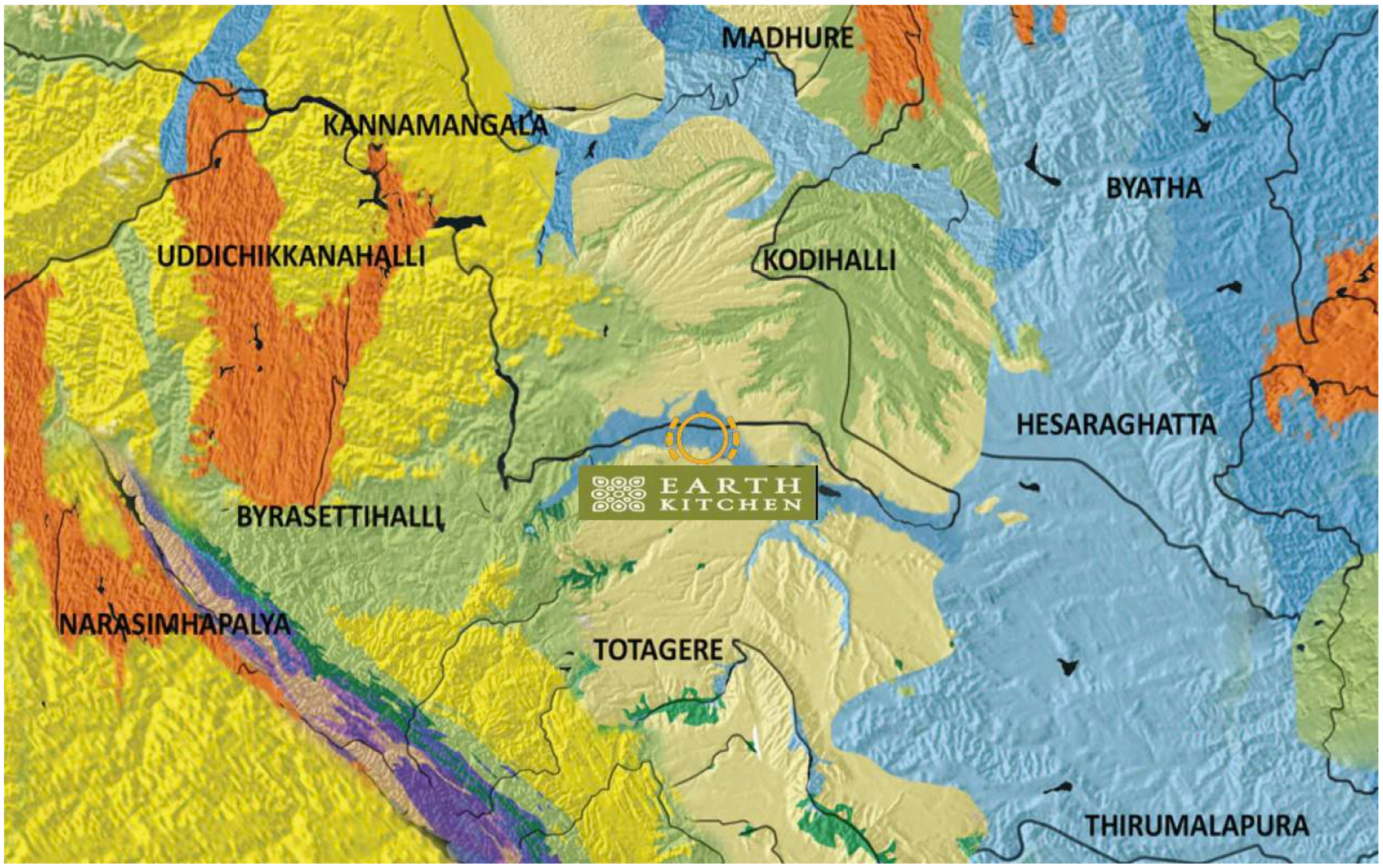
Water security: Planning

The logistics of executing a project that encompasses all the various elements requires not just meticulous planning but also careful execution. Unlike tree planting, which is a one time activity, ecosystem restoration projects are long term commitments for all the stakeholders: Project owners, sponsors and the communities where they are located.

Understanding the natural systems that existed before degradation commenced is key to restoring ecosystems. Using a range of technologies and analyses, including that of existing conditions, soil, hydrological (both surface and sub-surface) and ecology surveys are done that guide the masterplanning of the watershed.

Availability of fresh water is the first pre-requisite for any ecosystem restoration project. India relies on seasonal monsoon rains for the health of its rivers and recharging groundwater aquifers that supply water to the country's growing population during dry seasons. Unscientific exploitation of water resources has led to an acute shortage of water across the country, even in areas where plentiful rain falls.

Ground water / soil prospects



Dark Blue / **Blue** / **Green**: Indicate zones with most availability of water, supported by natural systems.

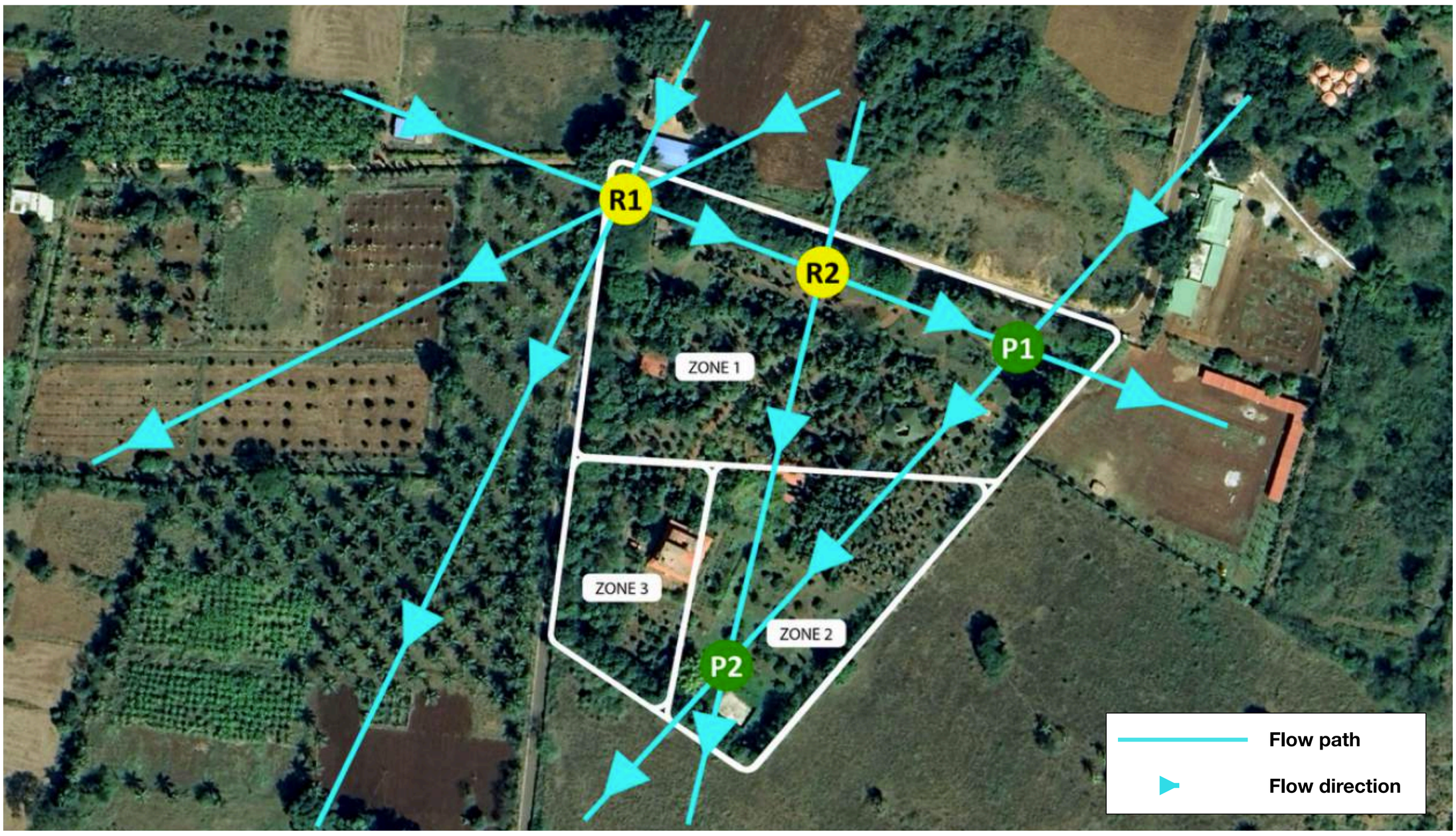
Yellow: Indicate moderate to low availability of water. Needs human support via artificial re-charging.

Red / **Orange**: High Risk Zones with very low availability of groundwater.

Violet / / **Purple**: Presence of large aquifers underground.

The farm sits atop blue (northern portion) and yellow (southern portion) zones, indicating abundant availability of water towards the north, which is where it should be tapped.

Flow connectivity track and aquifers



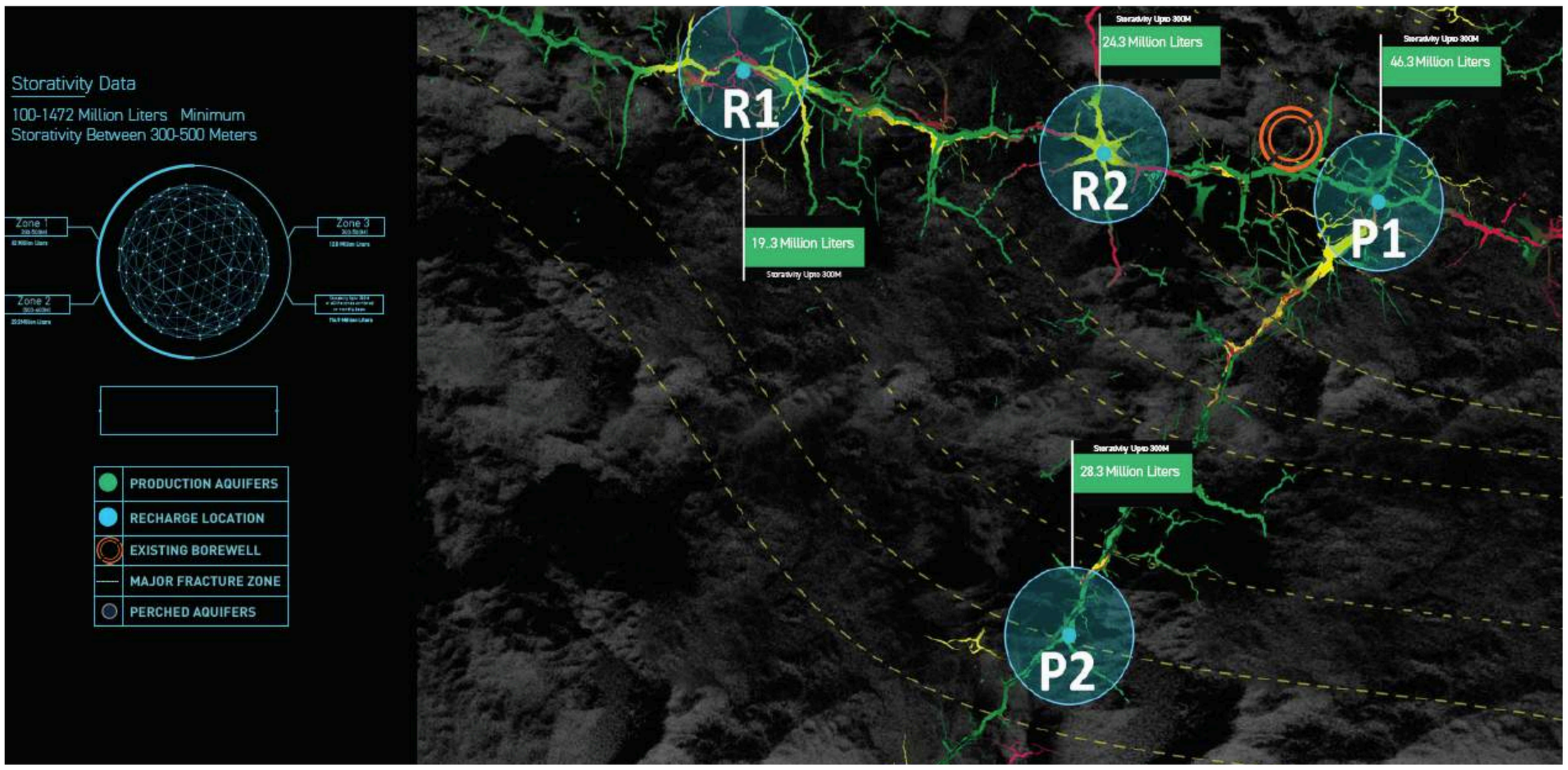
Groundwater water systems are underwater streams through geologic apertures and cracks that connect aquifers and where water flows from high to low levels through gravity.

An analysis of these channels revealed that the primary vein runs parallel to the northern boundary of the property, with secondary offshoots going southwards.

A study of rock strata under the farm revealed a network of channels that could be tapped for groundwater.

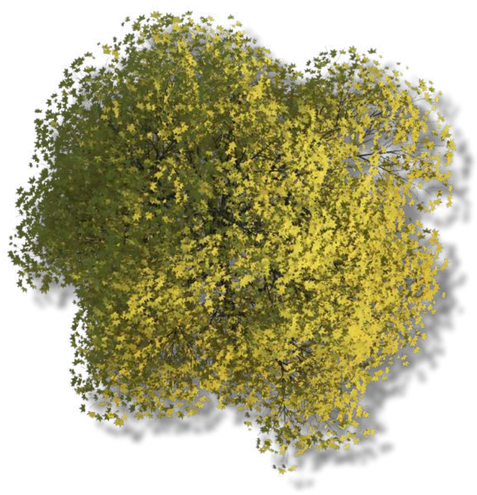
Based on this analysis, two recharge points (R1 and R2) were identified and the bore well was sited at P1 to ensure abundant and perennial availability of water for the project.

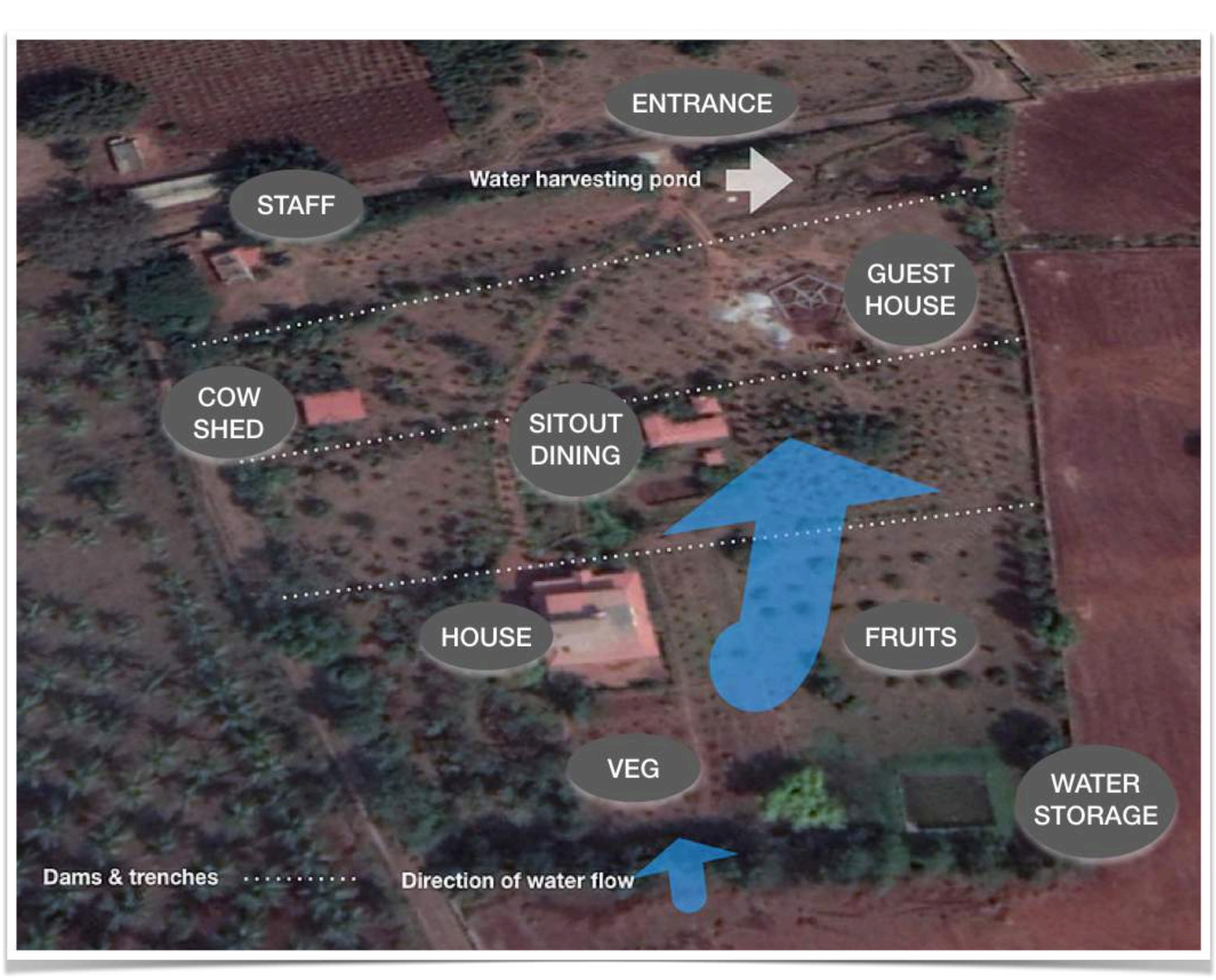
Flow connectivity tracks (regional)



Water security: Execution

Based on the inputs received from TGC, a masterplan of the project was developed. while groundwater availability was most abundant in the northern part of the property, tests revealed that the best soil was in the southern part of the land. Planning the planting mix was decided based on this.





The land slopes towards the north from the south, at a rate of metre every 40 meters. To stop the flow of water, which carries away precious top soil, the land was divided into 4 portions by bunds and trenches to check the flow of rain water.

All the rainwater runoff was directed towards the north west corner of the land where a water harvesting pond with a capacity to story 1.5 million litres of water was dug. This ensured no rain that fell on the land overflowed outside.

Biodiversity: Planning and execution

Birds, mammals, reptiles, amphibians and invertebrates that inhabit an ecosystem rely on biodiversity for their sustenance.

Trees, shrubs and grasses of different species flower, fruit and seed at different times, providing food and habitat to all organisms dependant on the ecosystem.

It is therefore important to plan the planting material, focusing on indigenous species that are not only adapted to the local terrain and weather but also support local wildlife.

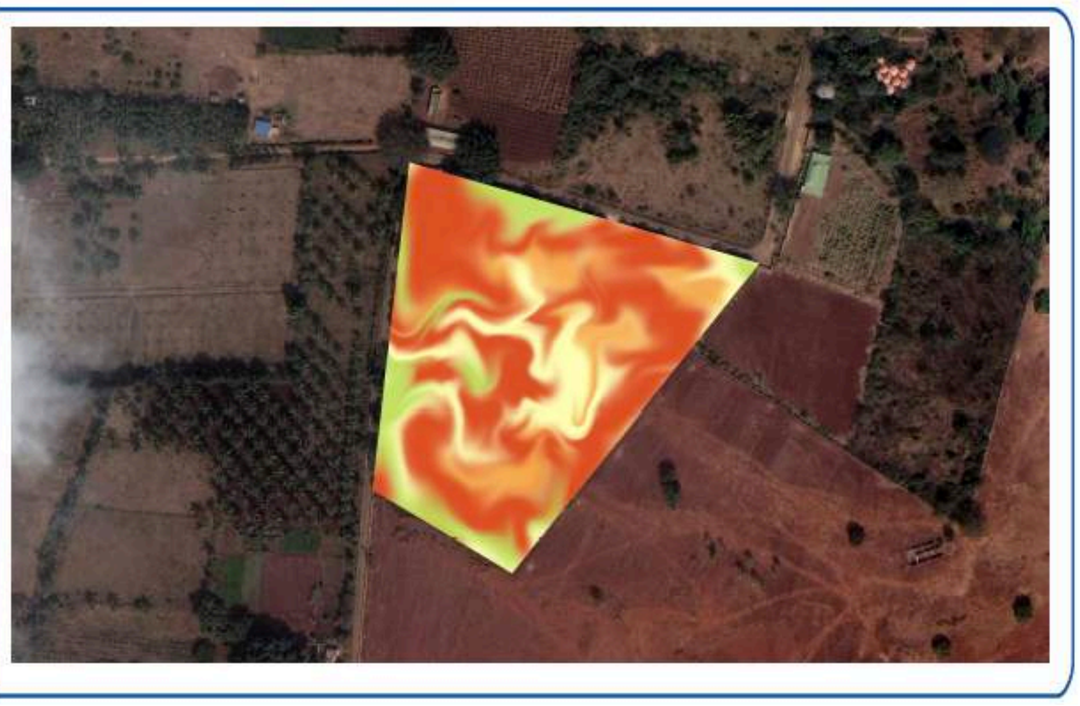
A biodiverse mix of over 70 species of trees, shrubs and grasses where planted across the land, taking care of the soil condition in each zone. While fruit trees and vegetable beds were planned in the southern portion of the land, which has a rich, nutrient rich composition, the north west zone was planted with hardy, forest trees as it is rocky and degraded.

Monitoring: Forest health

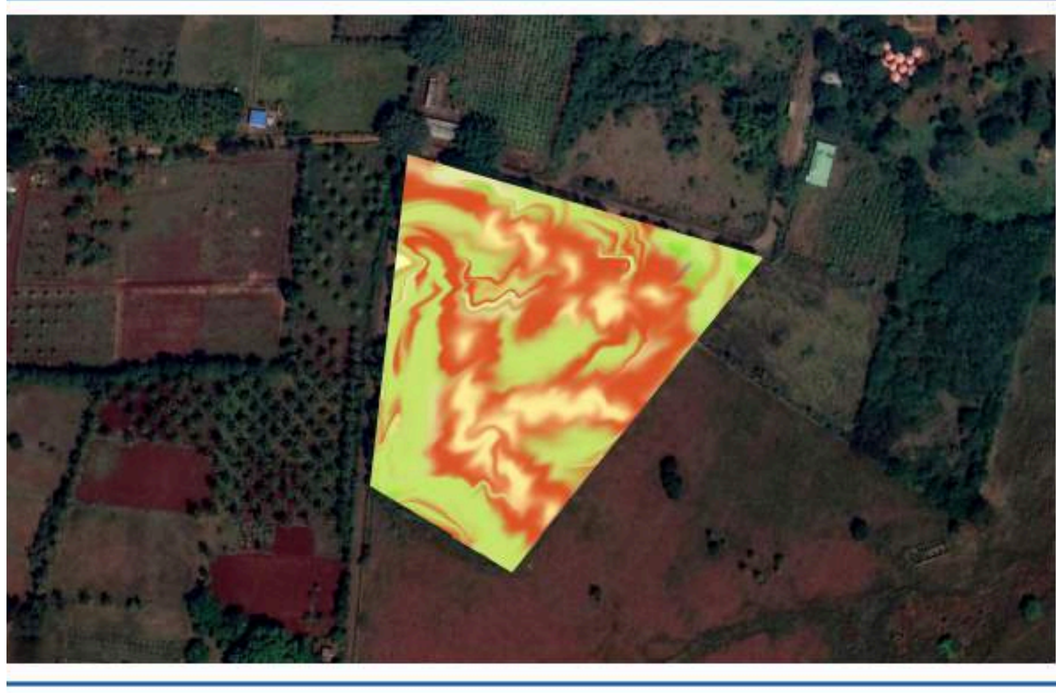
It takes continuous tracking of forest health to restore an ecosystem, maintaining water security and biodiversity to support all the inhabitants living on the land: Human communities and wildlife.

To ensure a project achieves its objectives, reports are generated on an ongoing basis to monitor progress.

The forest health diagrams placed below were generated during the last few years and depict vegetation density and soil moisture through thermal mapping. Orange zones indicate low vegetation density / tree canopy cover and soils low in organic content holding less moisture, therefore producing higher heat. Green zones indicate moderate to good vegetation and moderate organic content in soil. Blue zone (northwest corner in the 2021 heat map) indicate cooler temperatures. This is where the rainwater harvesting pond is sited.



May 2019



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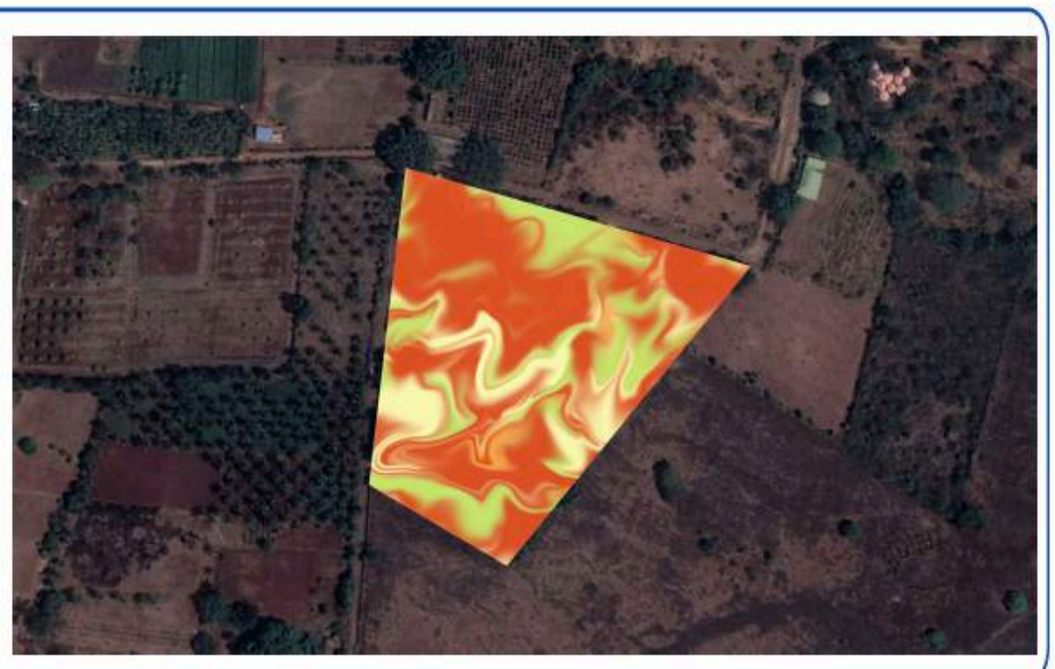

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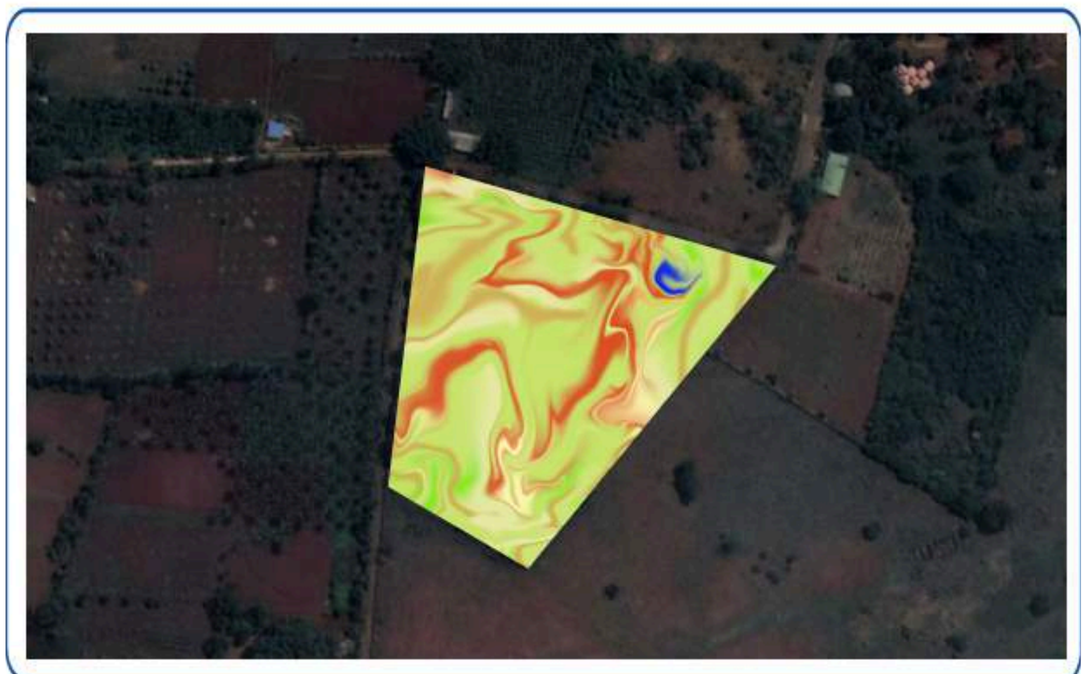

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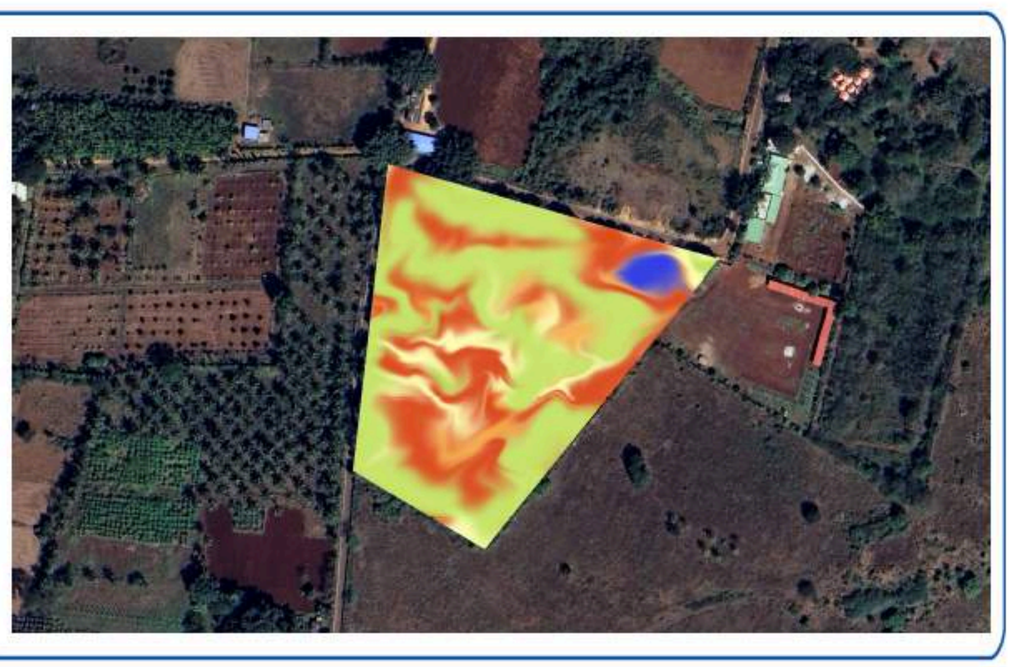


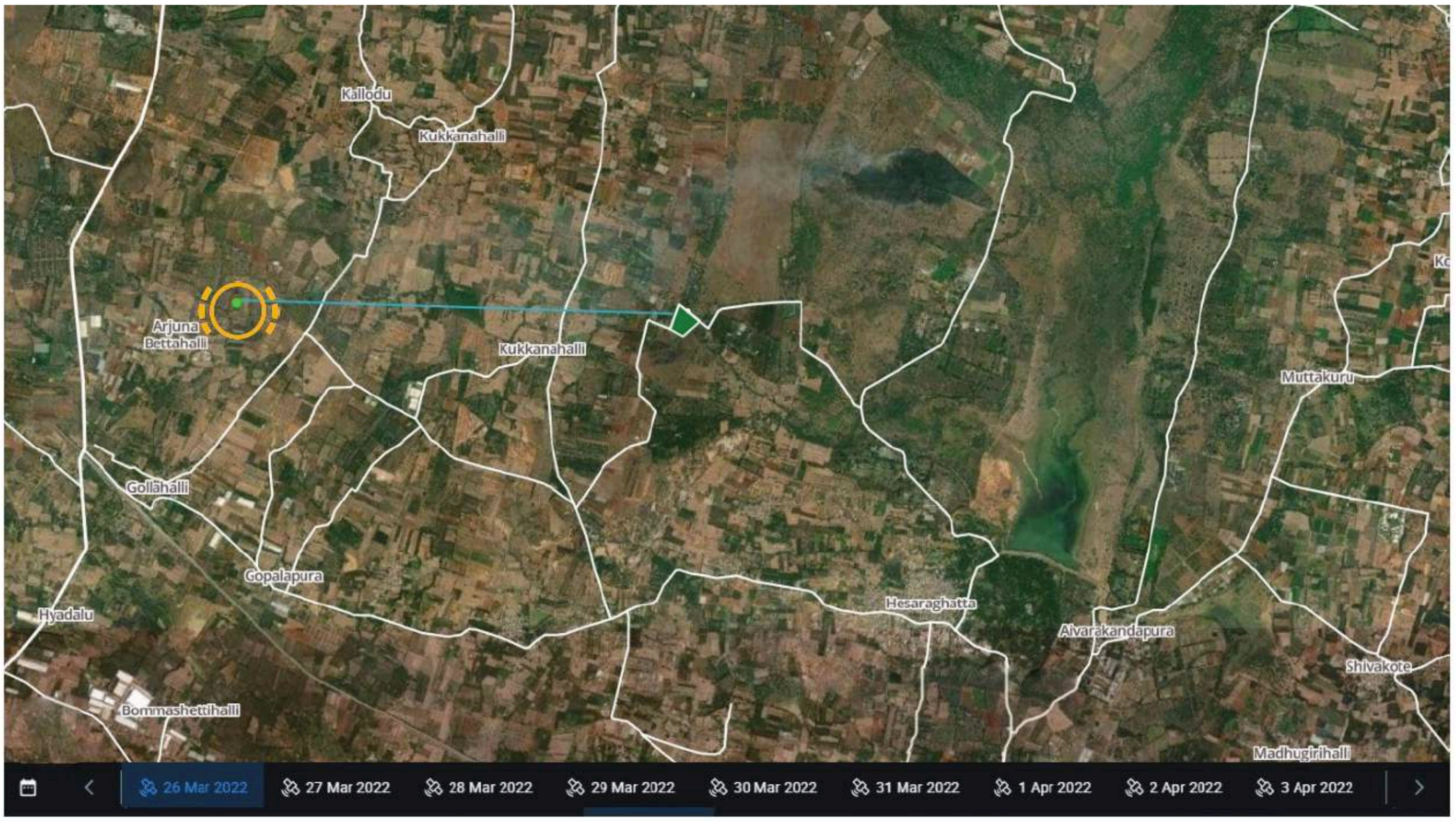
May 2021

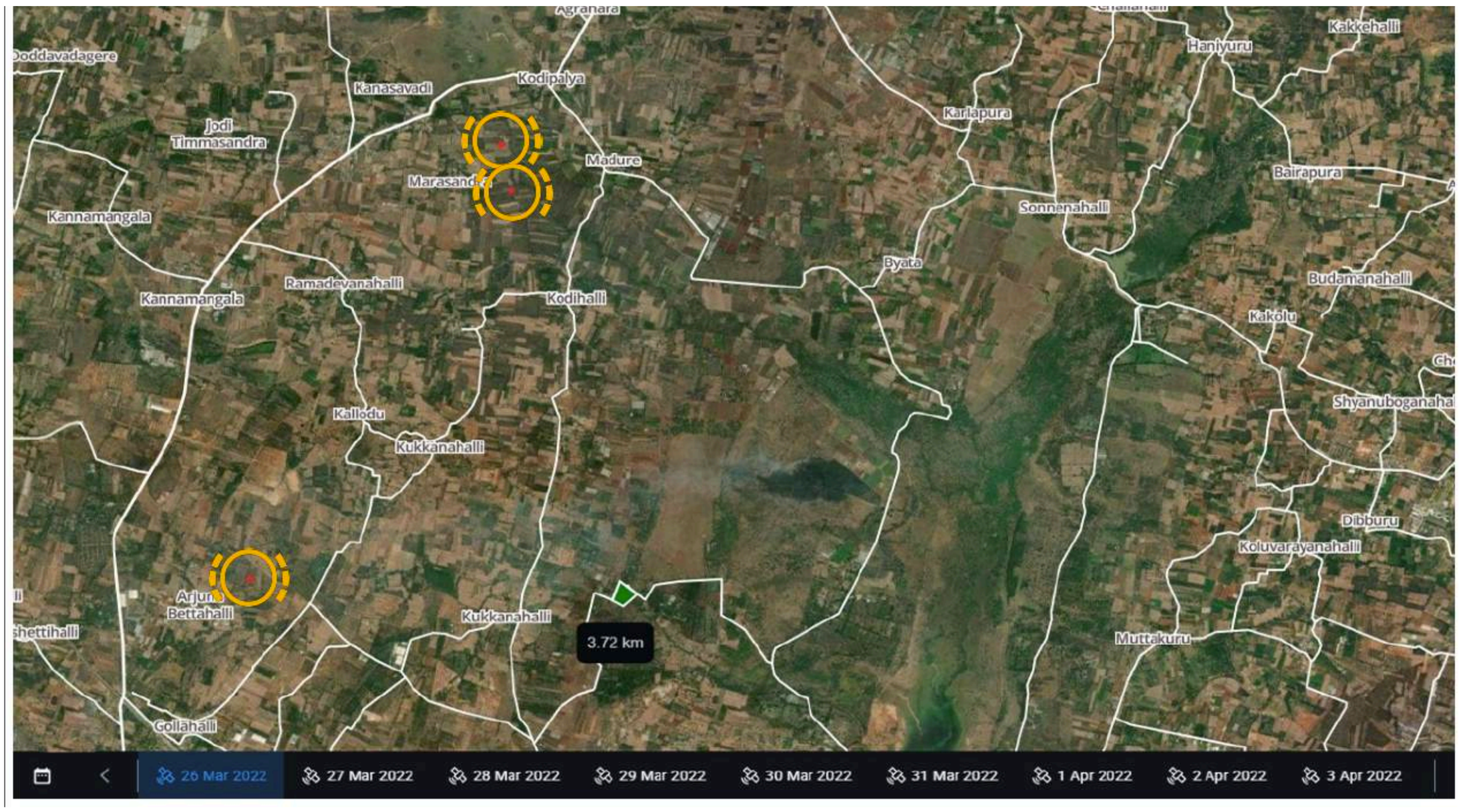
September 2021

Monitoring: Fire risk

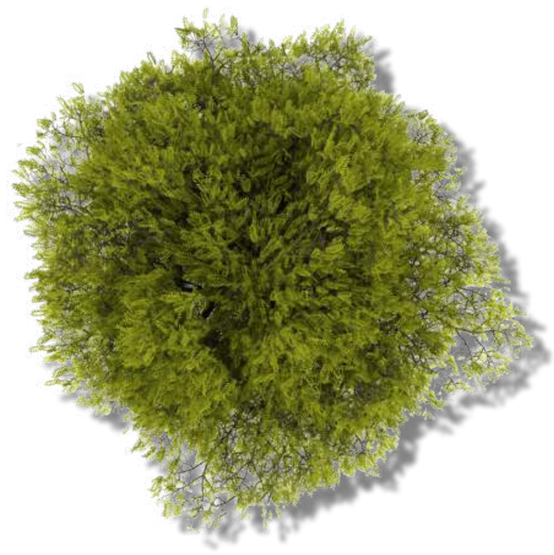
The greatest risk to ant forest ecosystem is through fires. To mitigate this risk, a continuous monitoring system is put in place that tracks possibility of a fire, using ‘Abnormally High Temperature Alert Technology’.

The maps below indicate high possibility of fires (yellow circles) in the vicinity of the project on certain dates. These alerts are generated whenever there is a high risk of fire due to higher ambient temperatures and low humidity levels. Once the alert is received, an on ground inspection is carried out if the fire risk is close to the forest.





Transforming ecosystems



When undertaken combining technology and best practices, ecosystem restoration project can deliver lasting and real benefits that can be quantified and measured.

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