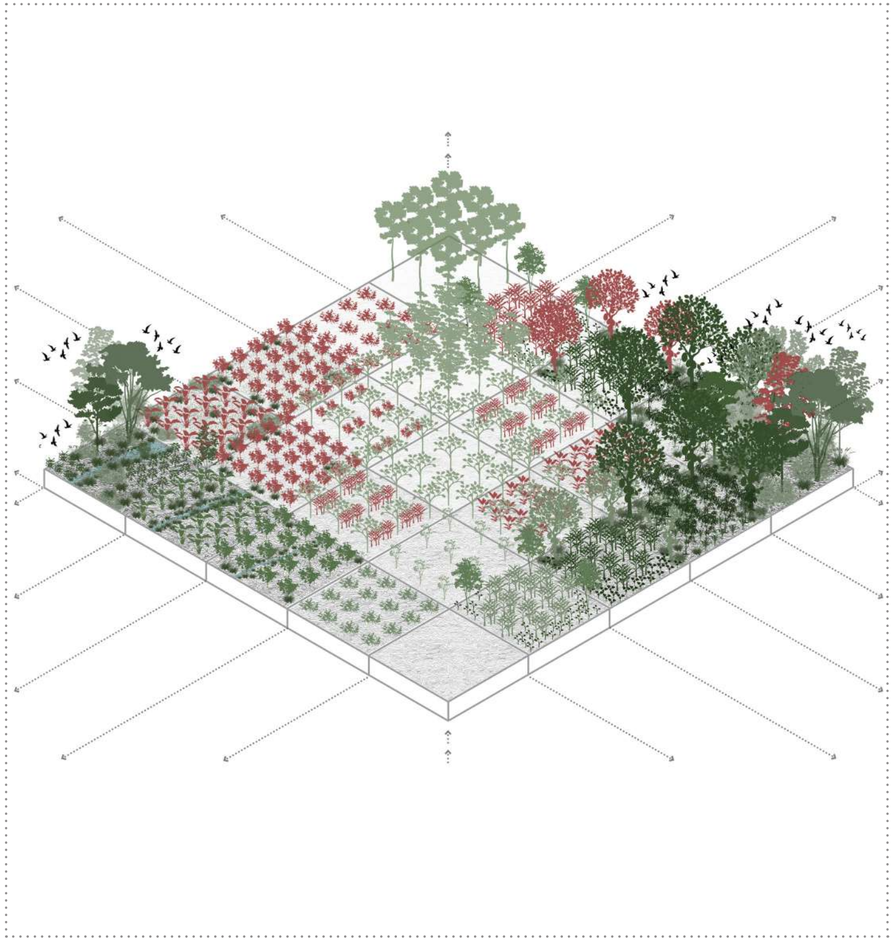
# Reclaiming the Rubber Lands: An approach to rewind the agricultural system of the Kani Community of the Western Ghats

## 1 PROJECT STATEMENT

The **Kani community**, a formerly semi-nomadic group living in the southern region of Western Ghats, who practiced conventional farming techniques for food crops, were **compelled** to settle down and **grow** cash crops like eucalyptus and **rubber**, following some conventional forest conservation and management policies by the government. This transformation has badly affected their traditional way of life as well as natural **forest degradation** around the settlements. Kani community was forced to replace their homestead gardens and forests to make way for rubber, which has spread over Kerala's lowlands. The project aims at **reclaiming** and **replacing the rubber lands**, which have replaced the natural and cultivational units of landscape systems of the Western Ghats.



## PROJECT NARRATIVE

The **intensive monoculture** of commercial crops such as tea, coffee, cardamom, rubber, pineapple, and timber plantations has slowly destroyed the region's once-heavily forested natural splendor. The **Western Ghats'** diverse and extremely delicate biodiversity faces several threats from human activities leading to the **degradation of natural habitat.** The increasing number of threatened and endangered species is unmistakable proof that the situation is worsening.

### ISSUES OF CONCERN

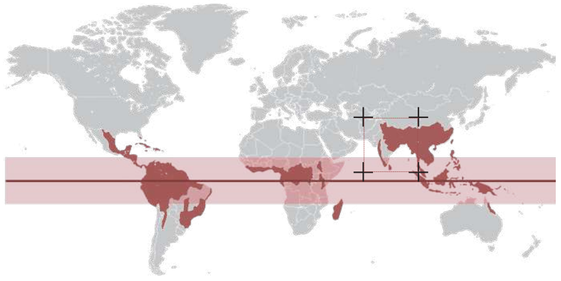
According to the Report of the Western Ghats Ecologically Expert Panel (MoEF 2011), "The area under cash crops increased during the last 20 years (16% under rubber alone) and the **expansion of commercial plantations like rubber** in the Western Ghats has led to **fragmentation of forest, soil erosion, degradation of river ecosystems and toxic contamination of the environment.** Degradation and contamination of soil and water in the upper reaches of the Ghats get carried downstream, leading to the degradation of midlands and coastal regions. Therefore, a policy shift is urgently warranted, curtailing the environmentally disastrous practices and switching over to a more sustainable farming approach in the Western Ghats."

The tidal ingression of cash crops, mainly rubber, has disturbed the Kani communities' traditional lifestyle and agricultural practices. The governmental policies that pushed this formerly semi-nomadic group, which depended on foraging for food in the forest and subsistence farming, on settling down also brought the plantation system into their way of life, mimicking the then-dominant forestry methods. This significantly impacted their way of life, changing their independent means of subsistence and increasing their dependence on market products.

### OBJECTIVE AND METHODOLOGY OF THE PROJECT

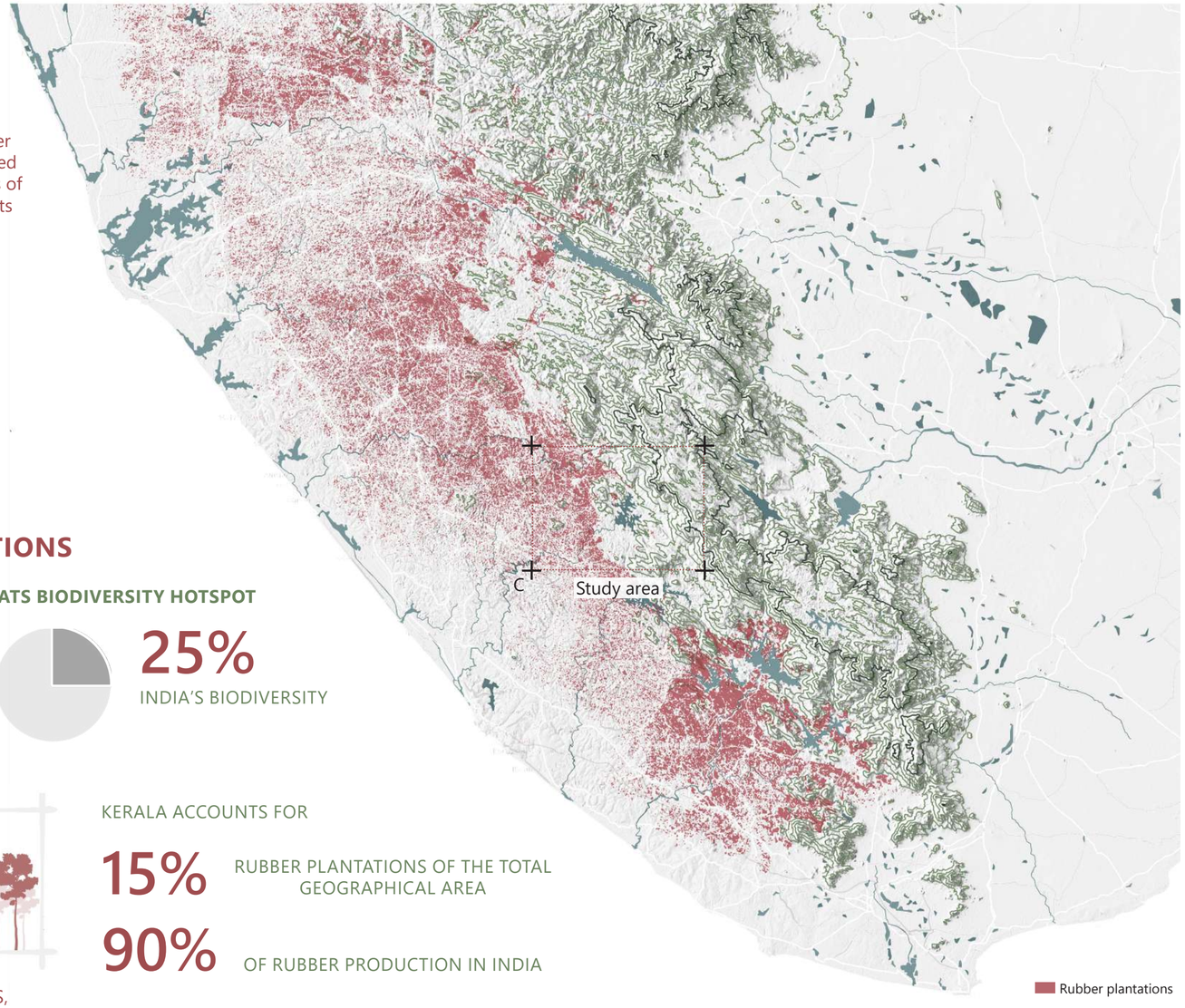
In this project, distinct typologies with which rubber shares borders were discovered by a careful assessment of the landscape systems, and t**echniques of intercropping** are implemented at various stages of rubber growth. The interventions progress till rubber tree is saturated and further Kanis are given an option of either continuing the cultivation of rubber with intercrops or transitioning into their traditional crop varieties along with allowing the forest to regenerate. This will eventually result in a **steady transition into naturally regenerating forests and landscape systems** supporting the Kani community's cultivation of food crops and sustenance practices.

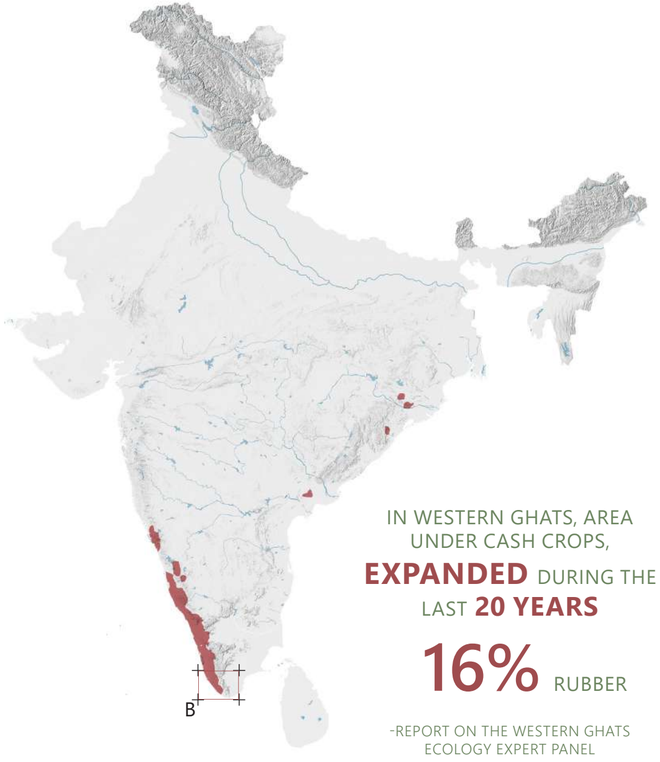
## Rubber **encroaching** into one of the world's biodiversity hotposts- Western Ghats



Rubber plantations around the world

Tracing the border rubber has encroached in the foothills of Western Ghats




IN WESTERN GHATS, AREA UNDER CASH CROPS,

**EXPANDED** DURING THE LAST **20 YEARS**

**16%** RUBBER

-REPORT ON THE WESTERN GHATS ECOLOGY EXPERT PANEL

SHIFT TO **MONOCULTURE PLANTATIONS**

**WHAT'S AT STAKE?** **WESTERN GHATS BIODIVERSITY HOTSPOT**

**140** Mammals

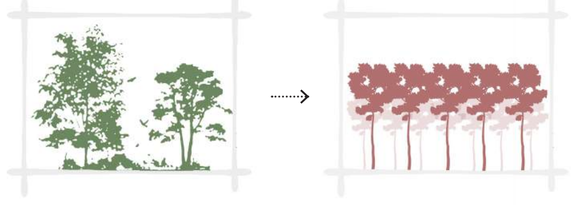
**510** Birds

**260** Reptiles

**180** Amphibians



**25%** INDIA'S BIODIVERSITY



RUBBER PLANTATIONS INDUCED BY POLICIES, **ENCROACHING** INTO THE WESTERN GHATS FROM PLAINS AND REPLACING THE NATIVE FORESTS

KERALA ACCOUNTS FOR

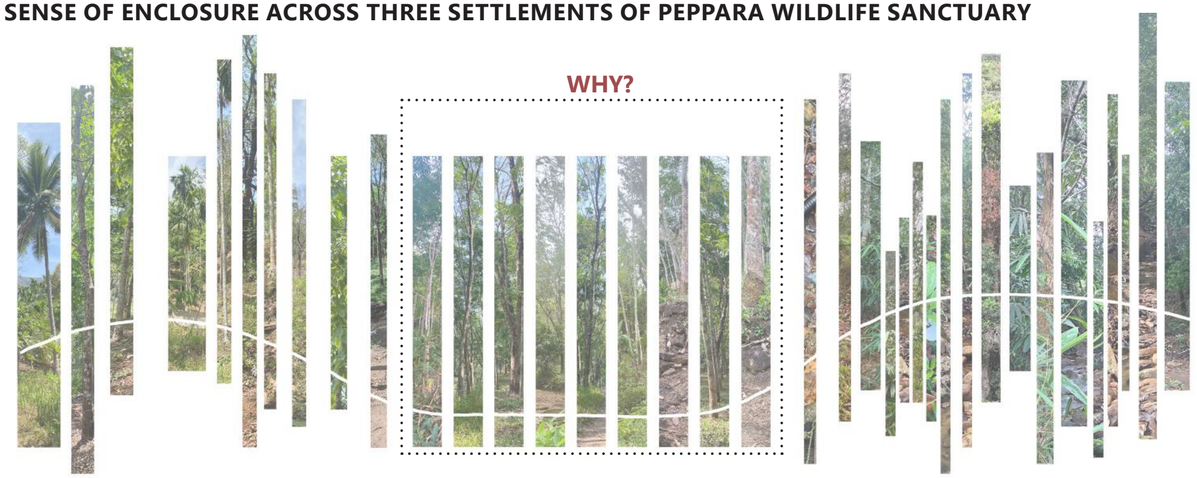
**15%** RUBBER PLANTATIONS OF THE TOTAL GEOGRAPHICAL AREA

**90%** OF RUBBER PRODUCTION IN INDIA

A| Mapping rubber plantations in India and Western Ghats

B| Mapping rubber plantations of Agasthyamalai Biosphere Reserve *Source: http://rubberboard.org.in/menuview, GIS*

## SENSE OF ENCLOSURE ACROSS THREE SETTLEMENTS OF PEPPARA WILDLIFE SANCTUARY




A | Kunnathery settlement

B| Podiyam settlement

C| Pattampara settlement

MIXED — OPEN / SPARSE — DIVERSE — SPREAD

MANICURED — REPETITION — ARRANGEMENT — ORDER — STRUCTURED — VOIDS — DENSE — PALETTE — RICH — ENCLOSURE — GREEN — PURE — UNTOUCHED

"Rubber subsidies are spoiling the people"

"Forced to cut down fruit trees and homesetadsand plant rubber"

"We used to have a rich lifestyle practising shifting agriculture"

"Now our lands have become dry!"

### Tracing the timeline of events

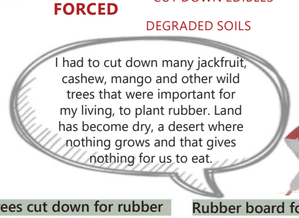
DRY

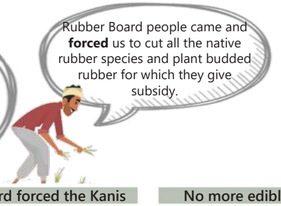

PROFIT TREE

FORCED

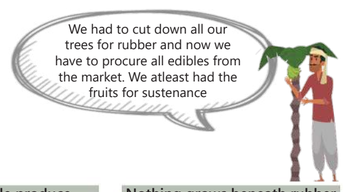
CUT DOWN EDIBLES

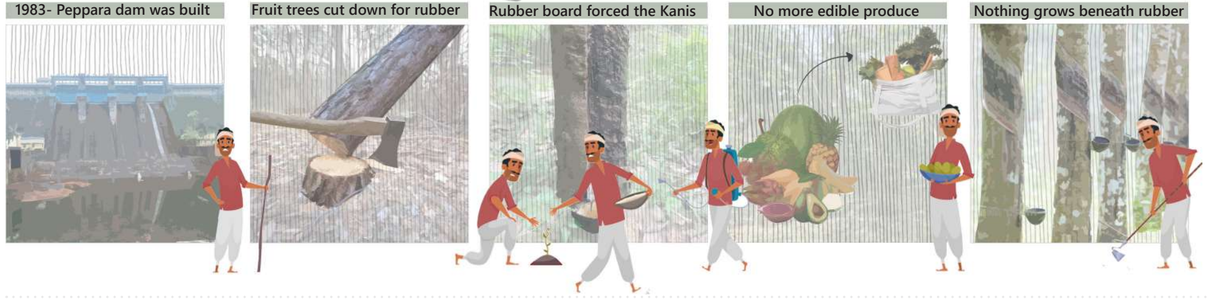
DEGRADED SOILS

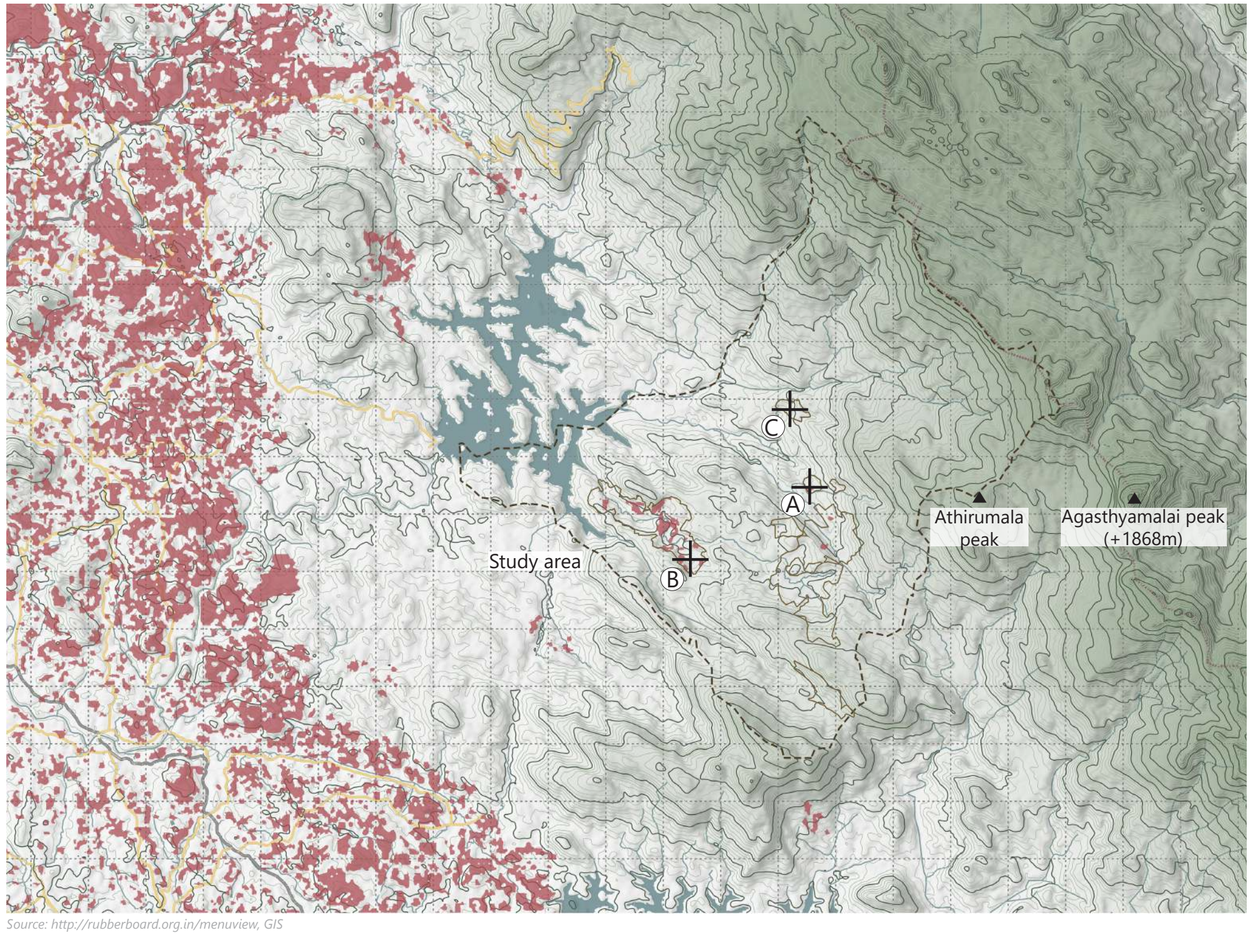



DESTROYING TRADITIONAL AGRICULTURE




Source: http://rubberboard.org.in/menuview, GIS

C| Mapping rubber plantations of Athirumala section in Peppara Wildlife Sanctuary, Agasthyamalai Biosphere Reserve

WE ARE **FORCED** TO GROW **RUBBER** INSTEAD OF ALL THE EDIBLES WE USED TO CULTIVATE

RUBBER HAS **REPLACED** OUR TRADITIONAL METHODS OF CULTIVATION AND SUSTENANCE

LEGEND

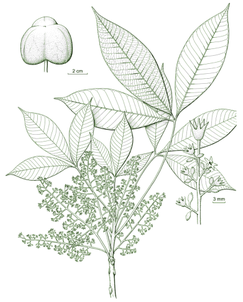
- Political Boundary
- Rubber plantations
- National Highway
- Settlements
- Streams

0 400 2000m

# The Site

Understanding the **SITE** and **CONTEXT** of Peppara wildlife sanctuary and its inhabitants- The Kanis

## TIME PERIOD OF GROWTH OF RUBBER



Botanical drawing of *Hevea brasiliensis*

1-3 years

3-7 years

7-15 years

15-30 years

Source: https://iopscience.iop.org/article/10.1088/1757-899X/917/1/012016/pdf

## CHARACTERISTICS OF RUBBER PLANT

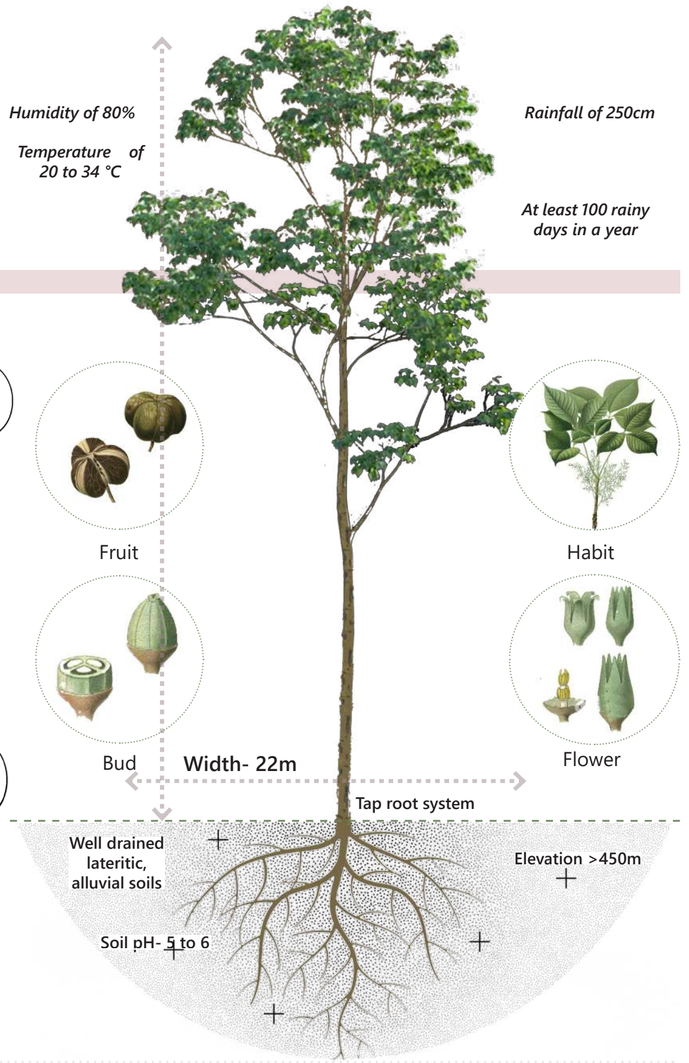
Upto 24m in plantations

*Humidity of 80%*

*Temperature of 20 to 34 °C*

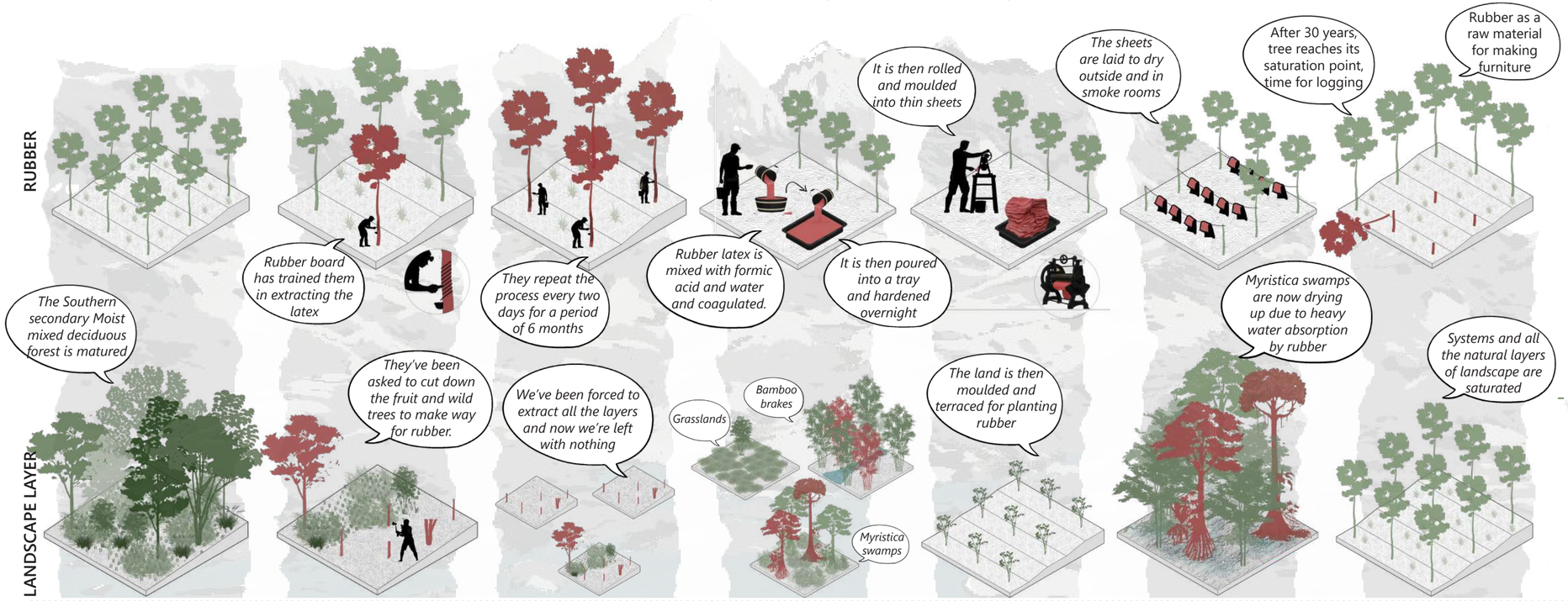
*Rainfall of 250cm*

*At least 100 rainy days in a year*




## LIFE STAGES OF RUBBER- VISUALIZING THE CHANGES TO LANDSCAPE THROUGH THE LENS OF REPLACEMENT BY RUBBER THROUGH ITS LIFECYCLE

MATURITY | EXTRACTED/REMOVED | REPETITION | MIXED, COAGULATED, HARDENED | ROLLED, MOLDED | DRYING | SATURATION




Decoding stages of growth of rubber and visualizing changes in landscape through lens of **DEGRADATION OF LANDSCAPE** with the introduction of rubber

**KEY IMPACT- EXAMPLE OF AN ECOLOGICAL IMPACT OF RUBBER- HABITAT LOSS**

SHIFT IN FUNDAMENTAL NICHES OF MYRISTICA SWAMPS

**PRE 1983**

**POST 1983**

**30 YEARS FROM NOW**

1950

1989

2023

*Source: A O, Varghese & Yelisetty, Krishna Murthy. (2007). Mapping of the realized & fundamental niches of threatened tree species and their hotspots using geoinformatics*

Tertiary

Secondary

Primary

Upperstorey

Middlestorey

Understorey

Imagining Southern Secondary Moist Deciduous forest- Before 30 years

Present condition of rubber plantations

Systems of the forest

*Bridelia retusa* *Artocarpus hirsutus* *Pterocarpus marsupium* *Hopea parviflora* *Dimocarpus longan* *Myristica malabarica* *Myristica fatua* *Vateria indica* *Mesua nagasarium* *Grewia tiliifolia* *Adenia hondala* *Dioscorea bulbifera*

*Dillenia pentagyna* *Careya arborea* *Lannea coromandelica* *Persea macrantha* *Syzygium mundagam* *Carallia brachiata* *Wrightia tinctoria* *Careya arborea*

*Curcuma aromatica* *Desmodium laxiflorum* *Rhynchosia adenodes* *Tamilnadia uliginosa* *Jerdonia indica* *Neurocalyx calycinus* *Schumanniatus virgatus* *Lagenandra ovata* *Asystasia gangetica* *Tamilnadia uliginosa* *Zingiber zerumbet*

Section of Southern Secondary Moist Deciduous forest

Myristica swamps

Section of Southern Secondary Moist Deciduous forest

Exploring **TRACES OF RUBBER** in the landscape layer through an imagination of the past, present and future scenarios

## TRADITIONAL METHOD OF AGRICULTURE

108 varieties of crops

Food crops

Cultivate for 3 years and move to let forests regenerate

Surplus produce

Reciprocal relationship with land

## BELIEF SYSTEMS AND RITUALS

Guardian gods residing in the forest

'Kalam' place of worship- within the natural setting

Beliefs were connected to landscape

Nature- Abode of gods

## DEPENDENCY ON FOREST RESOURCES

Honey, wild fruits, wild tubers

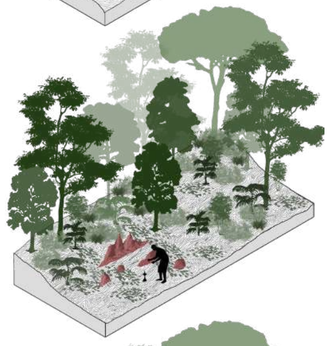
Reeds for making huts and baskets

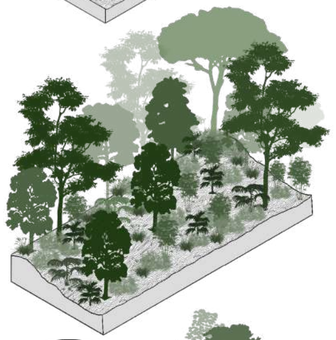
Dynamic relation with nature

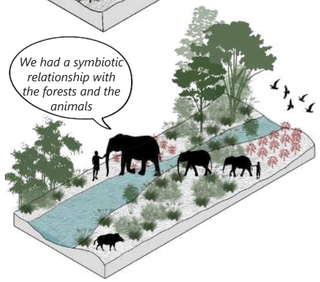
## WILDLIFE-HUMAN RELATION

They were inderdependent and lived in harmony

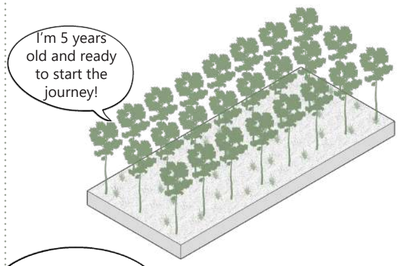
## EXTRACTED/REMOVED

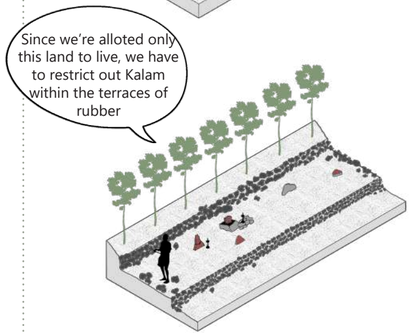



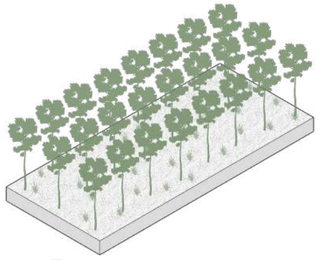


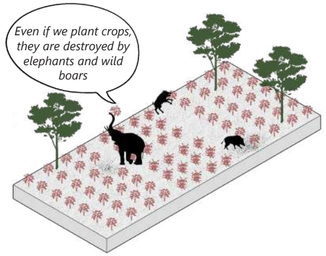



## ROLLED, MOULDED



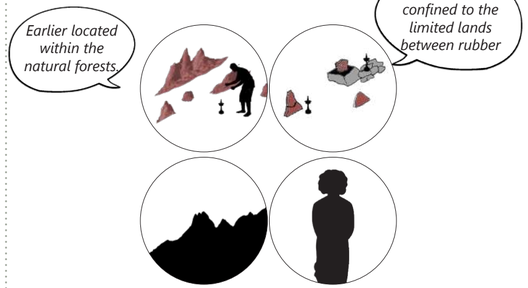






## SATURATED

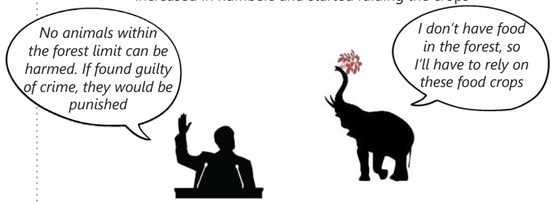
"Forest Department measured the land, put boundary cairns ('janda') and forced us to settle down in plots of land allotted to us. 'Jandas' came up everywhere in the forest even in the middle of our agricultural land."

**1980-84**


"Earlier we used to depend on the forest for honey, wild fruits, wild tubers, medicinal plants and reed and bamboo. Now due to the forest laws, we are not supposed to depend on the forest for our livelihood."


As forests degraded around the tribal settlements, and as forest plantations could not provide necessary food materials to wildlife, the now protected wild animals increased in numbers and started raiding the crops




## LAYERS SATURATED

LOST

SUSTENANCE

SELF-SUFFICIENCY

FOOD SECURITY

HARMONY

DEEP ROUTED TRADITIONS

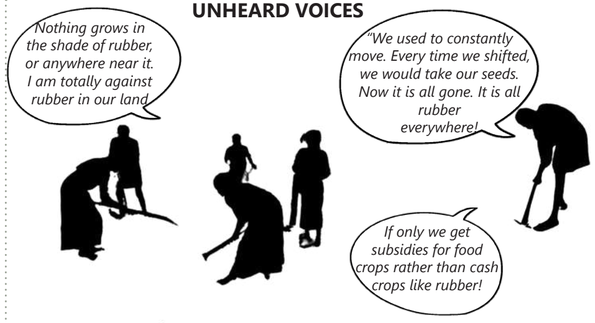
KNOWLEDGE OF MEDICINAL PLANTS

HEALTH DETERIORATING

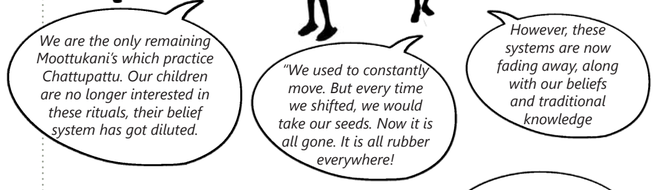
BALANCE

WAY OF LIFE

## UNHEARD VOICES



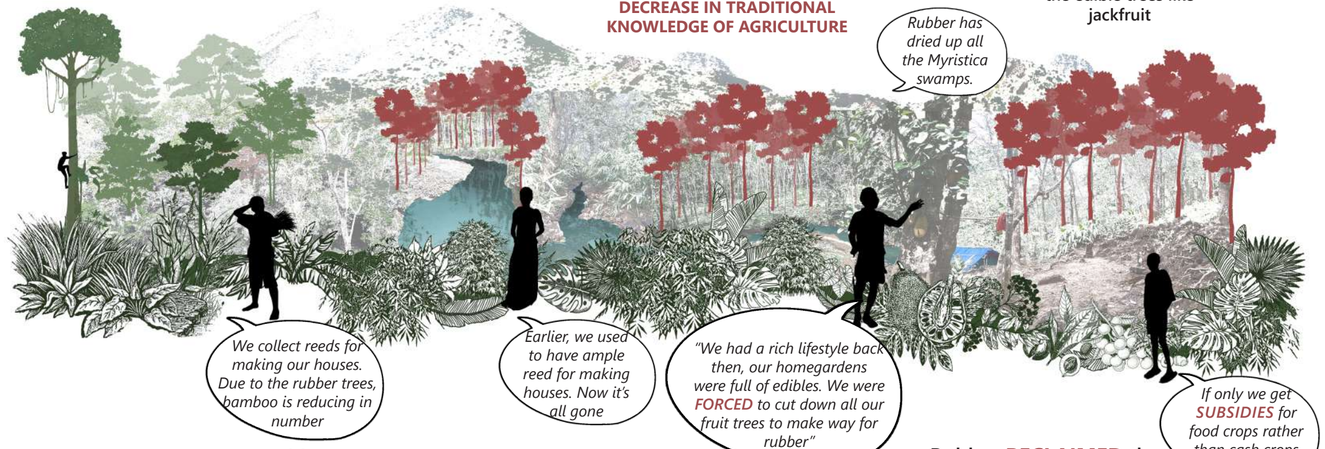







Tracing the **LAYERS OF CULTURE** that has been extracted, molded and replaced with the arrival of rubber

## ANOMALIES IN LANDSCAPE AND CULTURE DUE TO RUBBER




**DECREASING** ethnobotanical knowledge

Rubber **REPLACED** the riparian edges

Rubber **REPLACED** the bamboo reed brakes

**FORCED**

Rubber **RECLAIMED** the setting of Kalam- which was earlier placed within the forest

**LANDSCAPE**

LACK OF MATERIAL (BAMBOO REEDS) FOR HOUSE CONSTRUCTION

RUBBER DRYING UP RIPARIAN EDGES

RUBBER **REPLACED** SYSTEMS OF THE FOREST

NATURAL FORESTS ARE FORCED TO RUBBER PLANTATIONS

CARBON LOSSES

POOR **QUALITY** OF SOIL

CONTRIBUTOR TO **CLIMATE CHANGE**

REDUCTION IN GROUNDWATER

DISTURBED RELATIONSHIP OF KANI TO THE FOREST

**CULTURE**

DECREASING ETHNOBOTANICAL KNOWLEDGE

DETERIORATING **HEALTH**

DEPENDENT ON MARKET PRODUCE

HUMAN WILDLIFE CONFLICT

LOSS OF **DEEP ROOTED** TRADITIONAL KNOWLEDGE

REDUCED FOOD SECURITY

LOST **SELF SUFFICIENCY**

LOST **SUSTENANCE**

Word diagram depicting the layers and systems that rubber has replaced in landscape and culture

## EXTRACTING ACCRETIONS THROUGH DIFFERENT CASES TO DERIVE OUT THE METHODOLOGY

### CASE 1

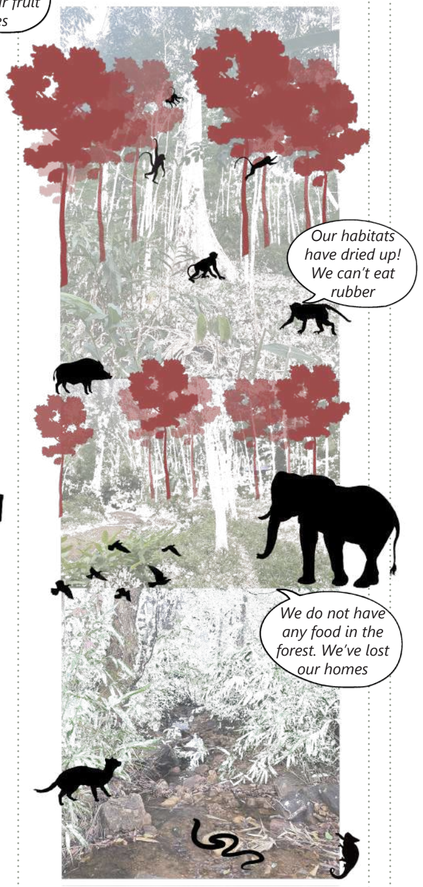
**Kanis and their aspirations-** What do they want?

**REPLACEMENT** of rubber or methods of **RECLAIMING** the lost agriculture along with rubber


### CASE 2

**From perspective of layer of landscape-** ecologically sensitive approach

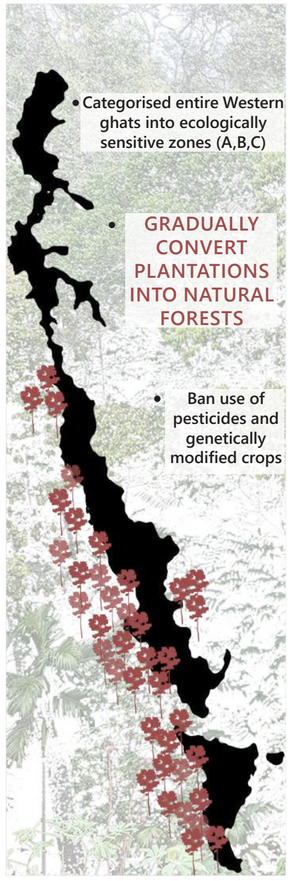
**REPLACEMENT** of rubber to increase species richness and improve biodiversity




### CASE 3

**From expert point of view** Report of the Western Ghats Ecology Expert Panel- **MADHAV GADGIL REPORT**

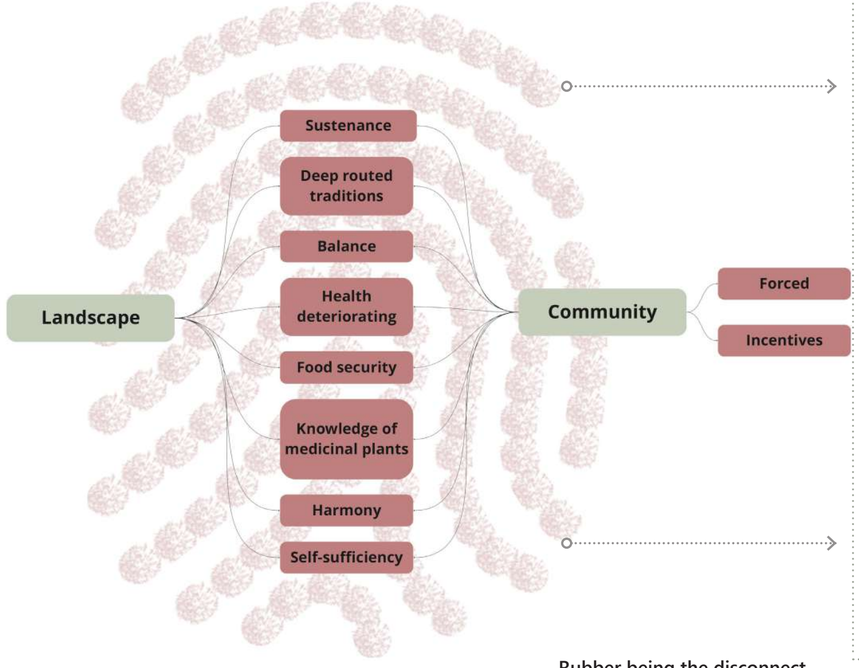
**RECLAIMING RUBBER** through **MIXED and INTERCROPPING SYSTEM** as per experts




Listing **ANOMALIES in LANDSCAPE** and **CULTURAL** layer to frame the PROJECT QUESTION and deriving out the METHODOLOGY of study

## RUBBER BEING DISCONNECT BETWEEN THE LANDSCAPE AND COMMUNITY- DERIVING THE METHODOLOGY AND VISION

What are the Kanis traditional knowledge agriculture systems and what do they prefer?




Rubber being the disconnect

**CASE 2**

**From perspective of layer of landscape-** ecologically sensitive approach

**REPLACING RUBBER**

Ideal scenario

**CASE 1**

**Kanis and their aspirations-** What do they want?

**CASE 3**

**From expert point of view** Report of the Western Ghats Ecology Expert Panel

**RECLAIMING RUBBER**

Practical scenar-

**Replace the rubber plantations with sustenance farming and rewilding practices that foreground the local cultural practices and knowledge of the Kani's.**

**REPLACING rubber trees with the ecologically richest of native species of the forest for wildlife and restoration of the forests**

**REPLACING rubber trees with the culturally richest of native species earlier cultivated and of high market value**

Cultivation of indigenous varieties of food crops like hill paddy, tapioca and other tuber crops, dry cereals such as maize, pulses and vegetables can be encouraged and the produce brought to the organic markets expanding in the cities.

Knowledge about the agricultural practices to bring back soil fertility

Wild indigenous trees of economic value apart from timber, like dammer, Cinnamomum, Myristica, Garcinia, mangoes etc. can be planted in and around the settlement

**Methods of INTERCROPPING with consideration to economy and livelihood**

**To bring in place a checking/controlling mechanism of a systematic level that prevents further expansion of rubber monoculture within Agasthyamalai Biosphere Reserve Area.**

**To derive a model of restoring traditional homestead cultivation practices and afforestation practices.**

**Carbon sequestration**

**More nutrients and minerals in the soil**

**Increase in biodiversity and species richness**

### VISION STATEMENT

The project aims at **RECLAIMING** and **REPLACING** the rubber lands, thereby **RESTORING** their traditional homestead and parts of the forests that once coexisted. The project envisions to **BRIDGE** the gap between ecology and economy through **RESTORATION** of Kanis traditional agricultural and forestry practices.

**REPLACING AND RECLAIMING THE RUBBER LANDS**

LANDSCAPE

REGENERATION OF BAMBOO REEDS

RESTORATION OF RIPARIAN EDGES

RESTORING SYSTEMS OF THE FOREST

CARBON GAINS

NATURAL FORESTS START TO REGROW

GOOD QUALITY OF SOIL

INCREASE IN GROUNDWATER

REDUCTION IN CLIMATE CHANGE

CULTURE

INCREASE IN ETHNOBOTANICAL KNOWLEDGE

DEPENDENT ON FARM PRODUCE

REGAIN SUSTENANCE

REDUCTION IN HUMAN WILDLIFE CONFLICT

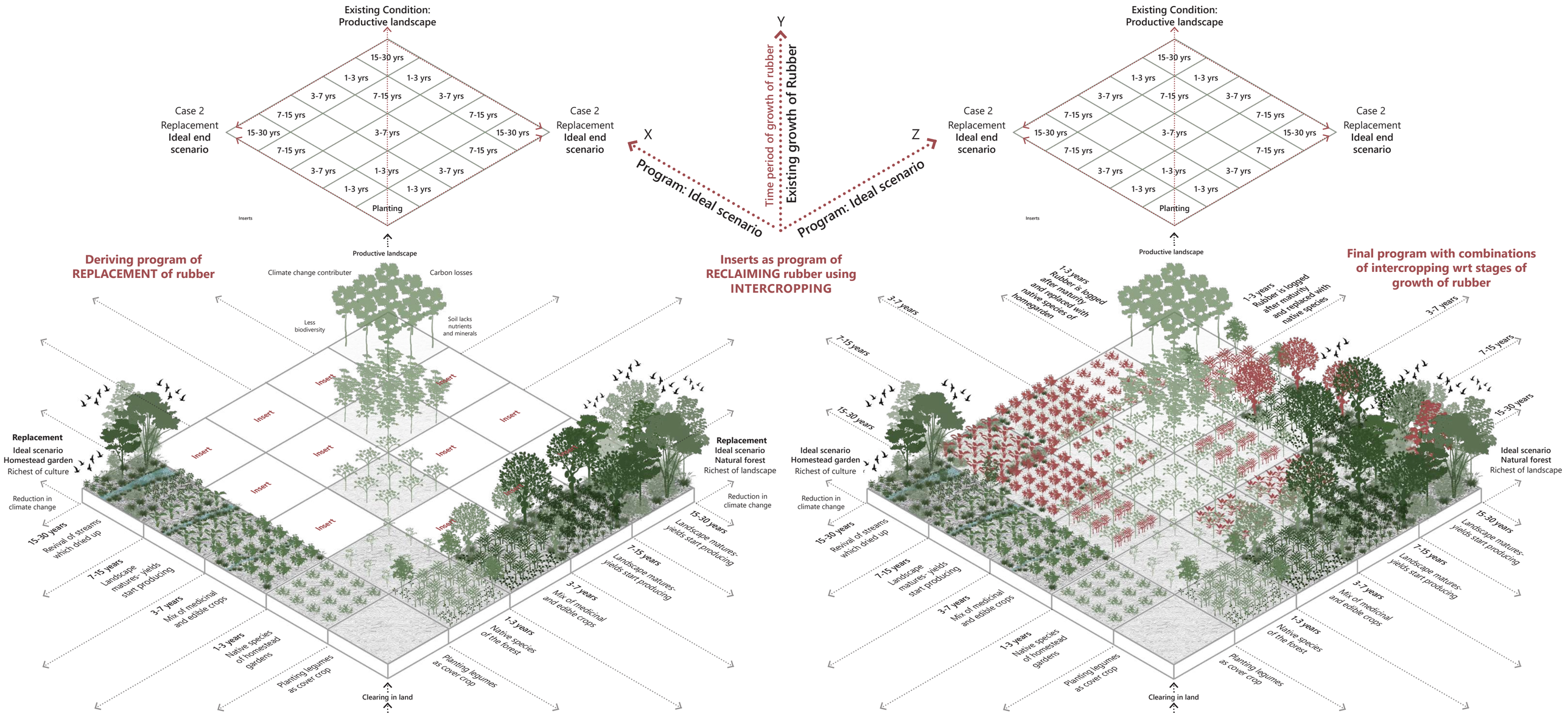
REGAIN DEEP ROOTED TRADITIONAL KNOWLEDGE

INCREASING HEALTH

INCREASED FOOD SECURITY

SELF SUFFICIENT

Formulating the **VISION**

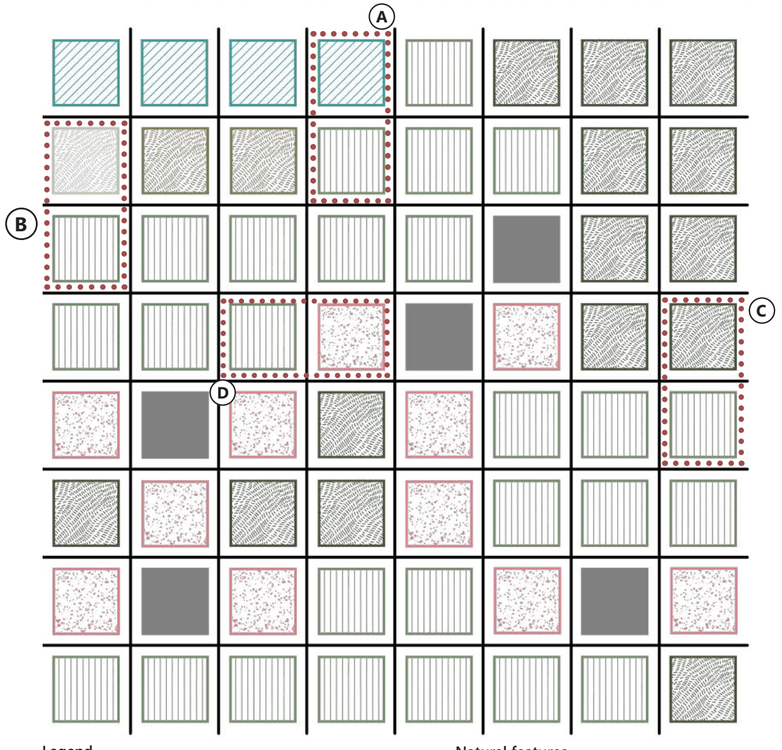



**ACCUMULATIVE PALIMPSEST AS A TOOL TO DERIVE THE PROGRAM FROM A SPATIAL-SYSTEMIC PERSPECTIVE**

Deriving the **PROGRAM** from a Spatial-Systemic perspective

*Image reference: Inspired from ASLA 2021 Award of Excellence- Analysis and Planning Category - Paddock Rewilding: An Agri-wilding Scenario for a Regenerative Rural Heritage Landscape in Post-productivist Cambrian Mountains, Wales*

## IMAGINING AND DRAWING SPATIAL-CULTURAL SYSTEMS- IDENTIFYING POTENTIAL SITES AND LANDSCAPE SYSTEMS/TYPOLOGIES



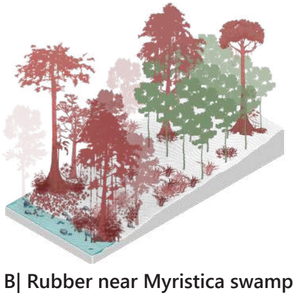

Legend

Stream
Homestead gardens
Rubber monocultures
Settlement

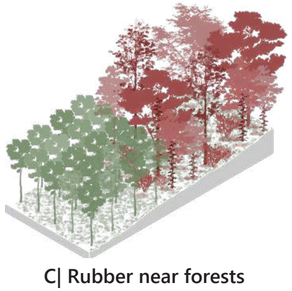
Natural features

Myristica swamp patch
Riparian edge
Forest

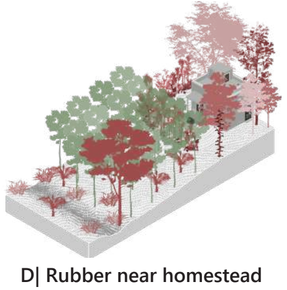
A| Rubber along riparian edge



B| Rubber near Myristica swamp



C| Rubber near forests



D| Rubber near homestead

Land ownership

Lands allotted to the community for growing rubber by Rubber board

7 year old rubber plantation

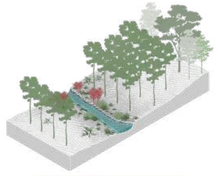
Approach

Ideal

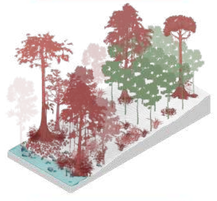
Replace

Practical

Reclaim

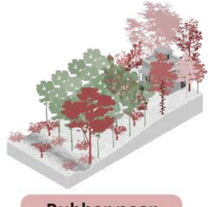


Rubber near riparian edges



Rubber near Myristica swamps

Rubber near forests



Rubber near homestead

## PROGRAM FLOW

Kani Community

Allocated land individually for cultivation by forest department

Mapping existing areas of rubber plantations for intervention

Participatory approach

Community trained into techniques of INTERCROPPING

NGO's also provide training and beneficiaries for the same

Provide seeds of native species

Provide saplings of native trees which are economically and

Saplings of endangered species grown in nursery and planted into their systems

Awareness into their deep routed traditional methods of regaining soil fertility and techniques of agriculture

Subsidies for the intercrops planted during different

Measures for reducing wildlife conflict in areas of intercropping

Measures for easy transport of materials to Kottur market

Time periods

Planting | 1-3 years | 3-7 years | 7-15 years | 15-30 years | After 30 years

Option 2

Allow forest to regenerate

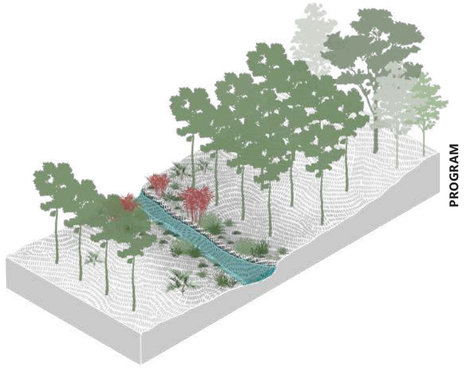
Option 1

Continue cultivation

## LANDSCAPE TYPOLOGIES AND SYSTEMS

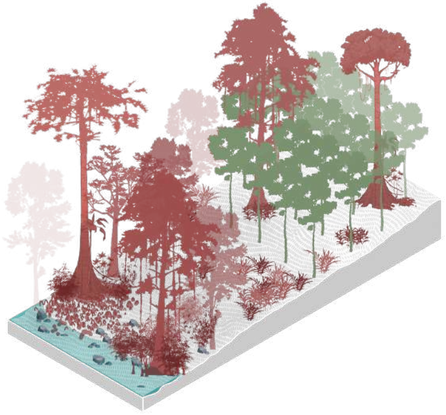
### A | RUBBER REPLACING RIPARIAN EDGES AND BAMBOO REED BRAKES

7 year old mature rubber trees



### B | RUBBER NEAR MYRISTICA SWAMPS

7 year old mature rubber trees
Mature trees of ***Cullenia exarillata*** and ***Myristica malabarica***
Bamboo brakes as undergrowth

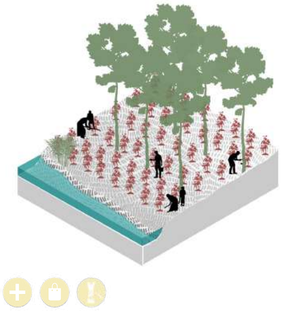


Existing varities of ginger grown between rubber trees

PROGRAM

### PLANTING

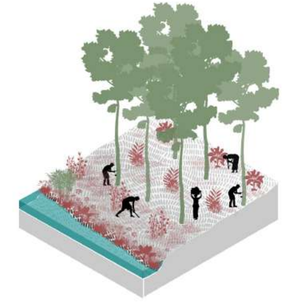
Nourishing the soil with with intercrops as **legumes/cover crops** for 1 year



Nourishing the soil with ***Zingiberaceae***, which are found in Myristica swamp habitats.

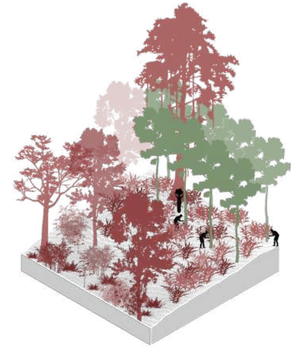
### 1-3 YEARS

Rubber trees are 10 years old, and riparian edges start to grow. ***Ochlandra travancorica*** seeds are introduced, which then renegerates on its own. Riparian grasses start to develop.



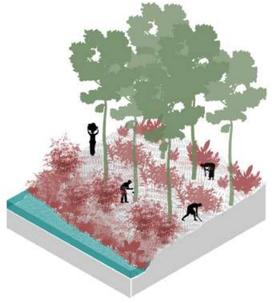
Rubber trees are 10 years old, and species *of Zingiberaceae* start to grow and yield.

Native trees such as ***Syzygium travancoricum, Myristica malabarica*** and ***Vateria indica*** saplings are grown in nursery and planted.



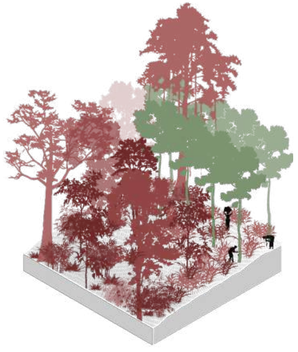
### 3-7 YEARS

Rubber trees are 15 years old, riparian edge and bamboo brakes mature. Riparian shrubs mature and creates a habitat.



Rubber trees are 15 years old, species *of Zingiberaceae* are continued to be grown.

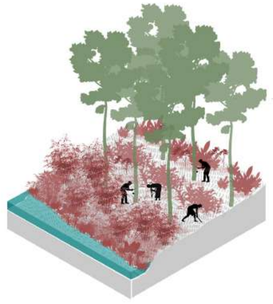
Native trees such as *Syzygium travancoricum* and *Vateria indica* start to mature.



### 7-15 YEARS

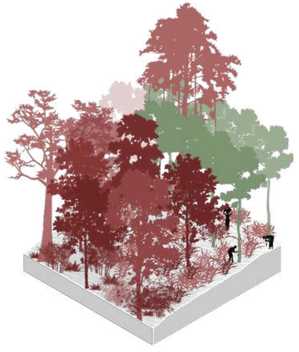
Rubber trees are 30 years old and ready to be logged, riparian edge and bamboo brakes reaches maturity

Species of **turmeric, alocassia** and **ginger** are continued to be grown.



Rubber trees are 30 years old and ready to be logged, native undergrowth reaches maturity.

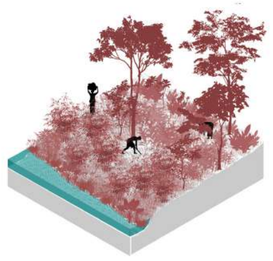
Native trees such as *Syzygium travancoricum* and *Vateria indica* matures and start yielding fruits



### 15-30 YEARS

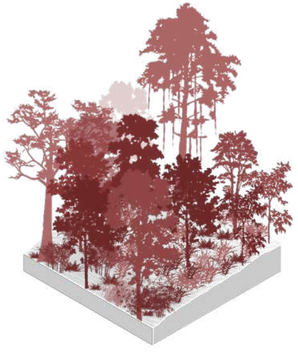
Riparian vegetation and bamboo brakes replace the area with rubber plantation

Riparian species like ***Vateria indica*** and ***Hopea parviflora*** starts to mature



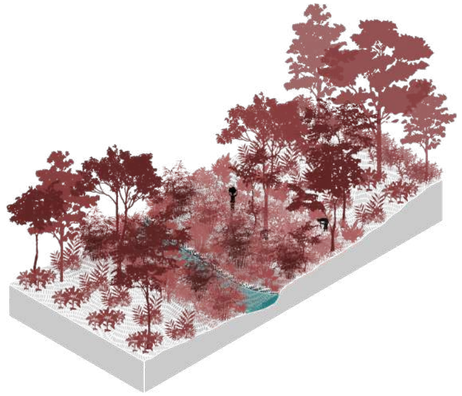
Native vegetation of undergrowth and overstory trees of *Syzygium travancoricum* and *Vateria indica* replaces the area with rubber plantation.

Species *of Zingiberaceae* are continued to be grown

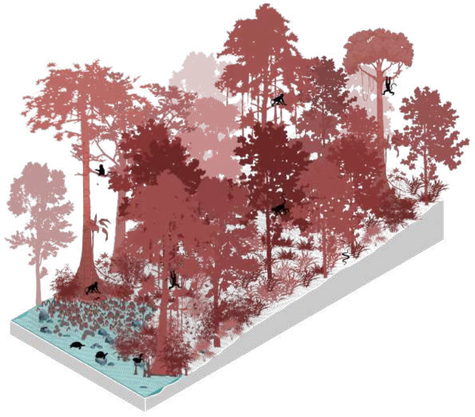


### FOREST REGENERATES

Forests start to develop on its own if cultivation is stopped. Else, even after the trees mature, ginger and turmeric can still occupy the understory.



The forest regenerates thereby creating a habitat which was earlier dying up. Lion tailed macaque, which falls under the endangered category regains its habitat and food for survival. These swamps are also home to wide range of amphibians, reptiles and frogs. Cultivation can still be practiced within the understoreys of these systems.

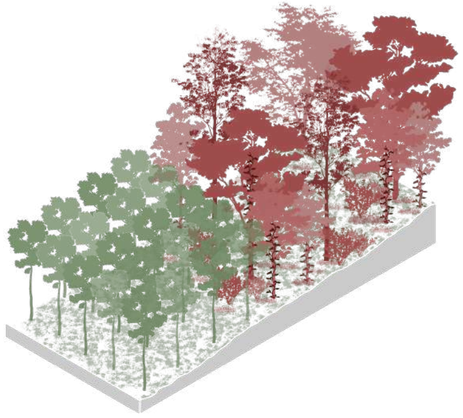


Typological interventions at different time periods of growth of rubber

## LANDSCAPE TYPOLOGIES AND SYSTEMS

### C | RUBBER NEAR FORESTS

7 year old mature rubber trees



Mature trees of *Terminalia paniculata, Pterocarpus marsupium,* and *Lagerstroemia microcarpa*

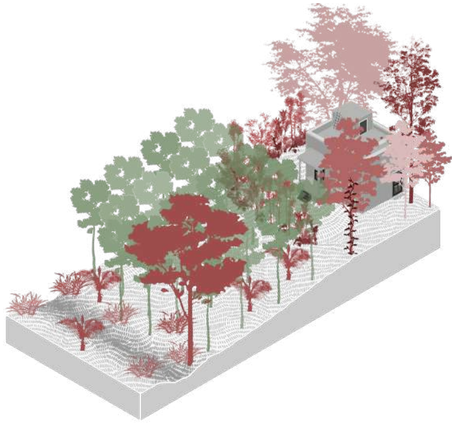
Pepper is grown on these trees by the tribes

### D | RUBBER NEAR HOMESTEAD GARDENS

7 year old mature rubber trees

Mature trees of *Artocarpus hirsutus and Cocos nucifera*

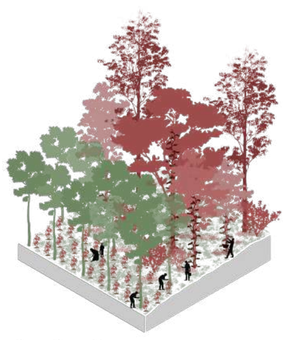
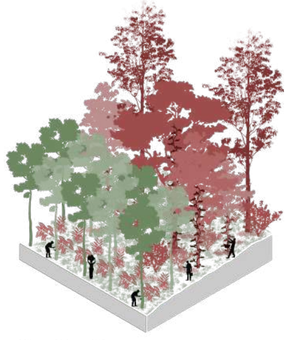
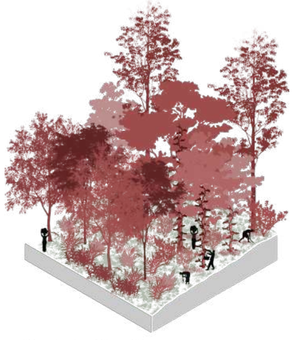
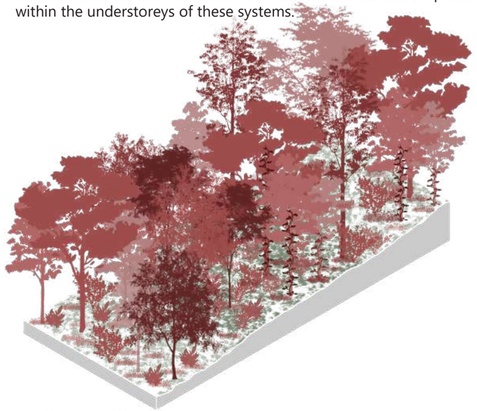
Coconut trees are grown as intercrops between rubber



Existing varities of ginger grown between rubber trees

PROGRAM

PROGRAM

| PLANTING | 1-3 YEARS | 3-7 YEARS | 7-15 YEARS | 15-30 YEARS | FOREST REGENERATES |
|---|---|---|---|---|---|
| Nourishing the soil with with intercrops as legumes/cover crops for 1 year | Rubber trees are 10 years old, and fruit trees yielding edibles and trees/shrubs with medicinal values are introduced. | Rubber trees are 15 years old, species medicinal plants are continued to be grown as intercrop within the shade conditions. | Rubber trees are 30 years old and ready to be logged, native undergrowth reaches maturity.<br>Native trees such as *Artocarpus hirustus, Mangifera indica and Tamarindus indica* matures and start yielding fruits | Undergrowth of medicinal and native shrubs and overstory trees of *Artocarpus hirustus, Tamarindus indica and other fruit and medicinal trees* replaces the area with rubber plantation. | Forest regenerates thereby creating a habitat of Moist Mixed deciduous forest.This results in an increase in biodiversity population dependent on these habitats like civets and birds. Cultivation can still be practiced within the understoreys of these systems. |
|  |  |  |  |  |  |
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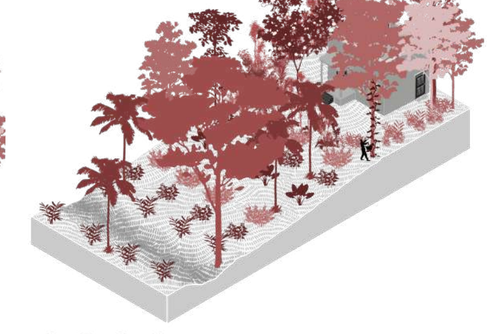
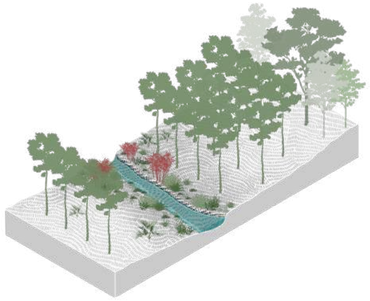
|  |  |  |  |  |  |
| Nourishing the soil with with intercrops as legumes/cover crops for 1 year<br><br>Clear boundary between the homestead gardens and the rubber plantations can be seen. | Rubber trees are 10 years old, and species of tubers, ginger and others of medicinal and edible values are grown.<br><br>Pepper is grown on the existing trees around | Rubber trees are 15 years old, species of tubers and medicinal plants are continued to be grown. | Rubber trees are 30 years old and ready to be logged, species of tubers and medicinal plants are continued to be grown.<br>Saplings of coconut trees start to mature | Native fruit trees start to mature and yield edibles along with the varieties of tubers grown. | The homestead gardens mature and start yeilding produce at an economically beneficial rate |

Typological interventions at different time periods of growth of rubber

## CRAFTING THE PROGRAM
## 1| RUBBER REPLACING RIPARIAN EDGES



View of the typology

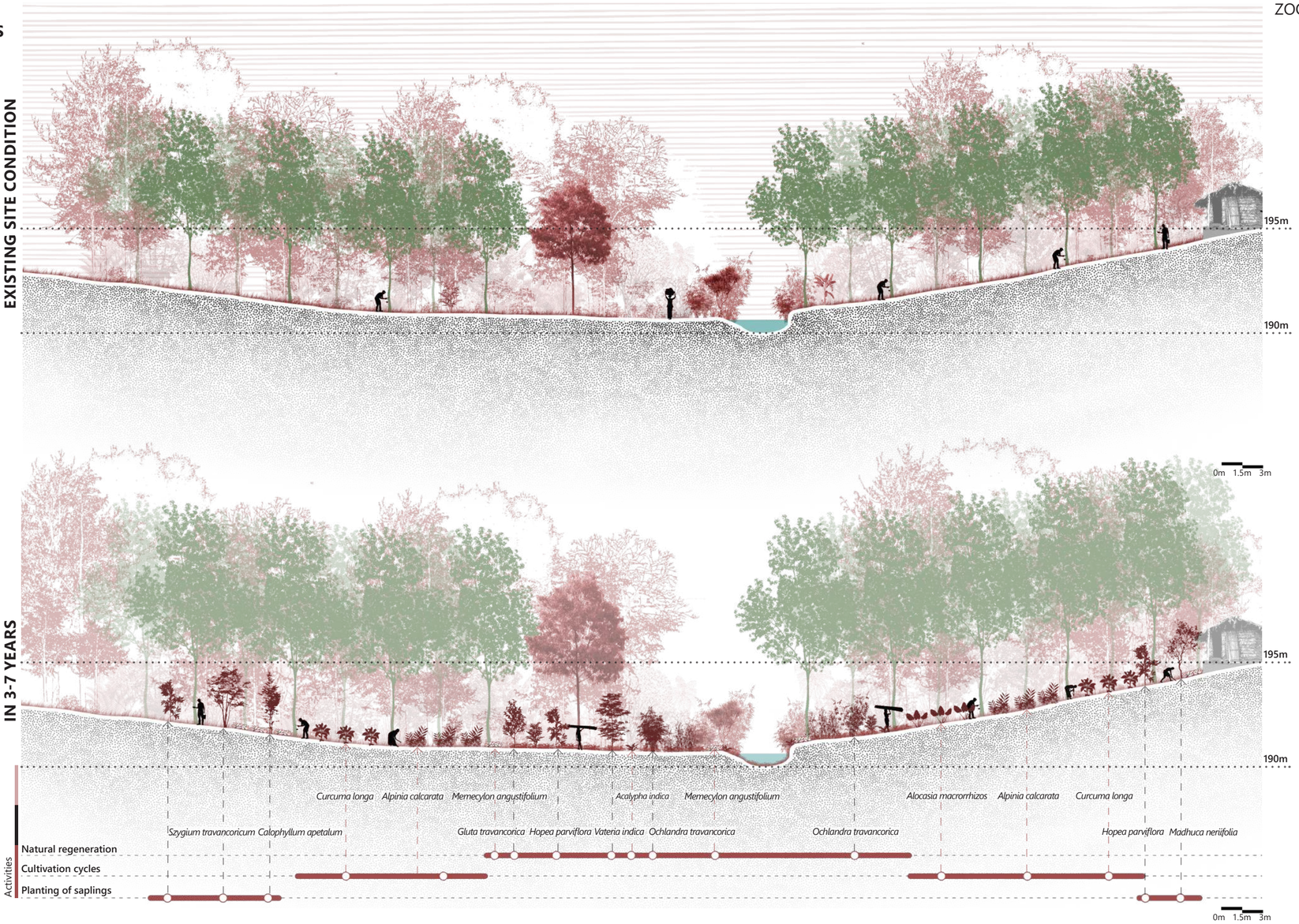
**Legend**

Trees  Shrubs

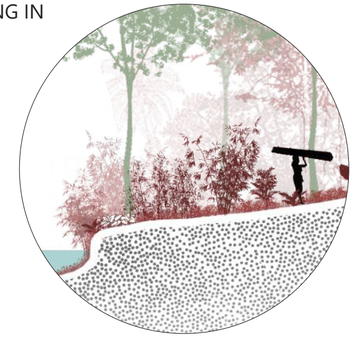
The proposed section has three layers of planting:

- **Natural regeneration**, the ones cultivated through different cycles
- **Trees**, whose saplings are planted- some native, in some typologies they are fruit trees- depending upon the intent and system they vary.
- **Shrubs** which follow cultivation cycles

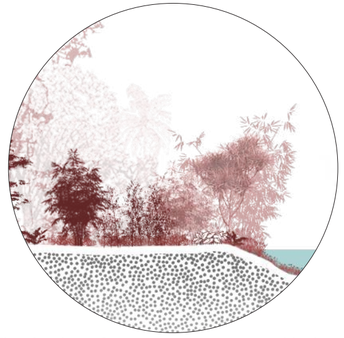
The immediate riparian edges are planted with bamboo reed (*Ochlandra travancorica*) and some like Indian Acalypha (*Acalypha indica*), little tree plant (*Biophytum sensitivum*), and other riparian grass species regenerate on its own. As intercrops, we have giant taro (*Alocasia sp.*), Indian ginger (*Alpinia calcarata*), and turmeric (*Curcuma longa*), which are the common species that Kanis' use and the ones which grow in these conditions. *Zingiber officinale,* is currently one of the main crops which they grow, which is also good in replenishing the soil. Towards the higher slopes we have saplings of Malabar Ironwood (*Hopea parviflora*) and Illipe Butter Tree (*Madhuca nerrifolia*) which are native to the riparian zones and Kanis utilise them as non-timber forest products and medicinal purposes.



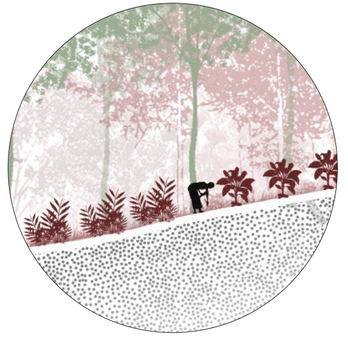

ZOOMING IN



**A|** The **riparian edge** starts to regenerate with clumps of ***Ochlandra travancorica, Acalypha indica, Biophytum sensitivum*** and other riparian species of grasses.



**B|** The **riparian edge** starts to regenerate with clumps of ***Ochlandra travancorica, Acalypha indica, Biophytum sensitivum*** and other riparian species of grasses.



**C|** ***Curcuma longa*** and ***Alpinia calcarara*** is grown in 3 rows as intercrops between the rubber plantations. Both species are found to increase the fertility and nutrients of the soil.

## CRAFTING THE PROGRAM
## 2| RUBBER NEAR MYRISTICA SWAMPS

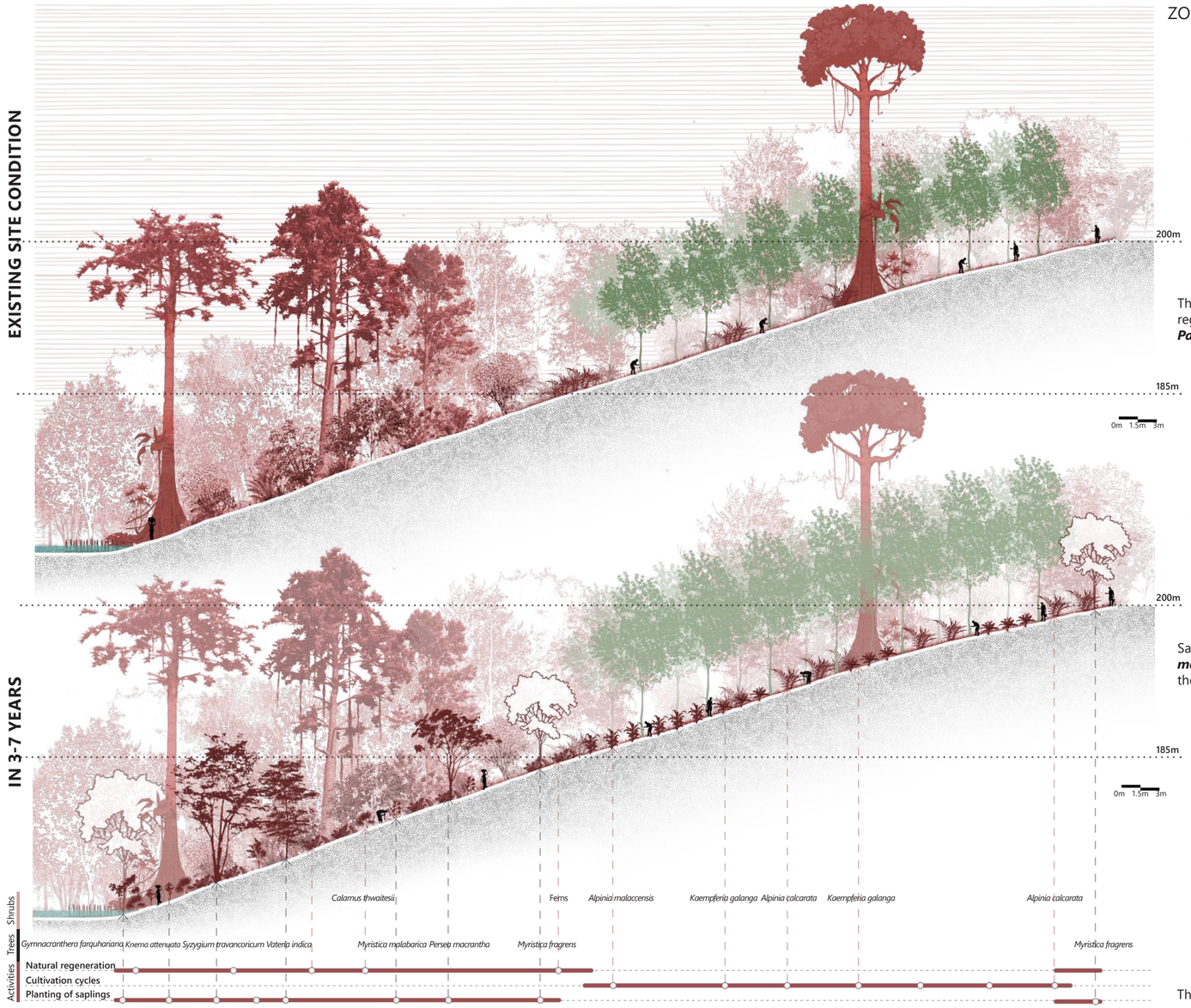
View of the typology

**Legend**

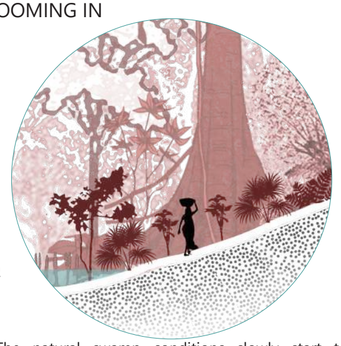
Trees  Shrubs

The existing section of Myristica swamp is on the verge of dying due to planting of rubber trees near them. Rubber trees are known sensitive to soil water availability, and they can absorb large quantities of soil water due to their strong transpiration capacity and well-developed roots.

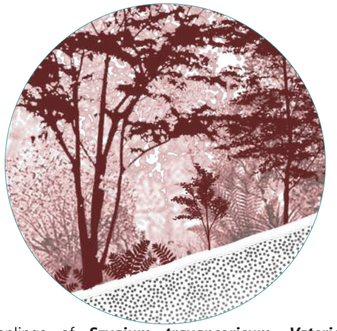
A study conducted by Jose and Pillai (2016) enabled the identification and mapping of major populations of Myristica species, developed protocols for vegetative propagation leading to a strategy for the conservation of the Myristica swamp species. It was found that the species of *Myristica malabarica,* Bay tree (*Persea macrantha*), wild nutmeg (*Knema attenuate*) have 75-85% chances of survival when planted in the existing Myristica habitats.
Similar techniques can be adopted by growing the saplings in nearby nurseries and planting them in these habitats. M. fatua, Piper nigrum, Piper hookeri, Garcinia spp., Cinnamomum spp., and Zingiber spp. etc., being wild varieites of Myristica swamps, can also help regenerate the natural system.




ZOOMING IN



The natural swamp conditions slowly start to regenerate with the presence of ***Calamus*** and ***Pandanus*** and with native species of the Myristica swamp forests brought in.



Saplings of ***Szygium travancoricum, Vateria indica and Knema attenuata*** are grown in the nearby nurseries and planted in the system.

Saplings of ***Persea macrantha, Myristica malabarica, Myristica fragrens*** are grown in the nearby nursery and are planted here as a conservation measure.

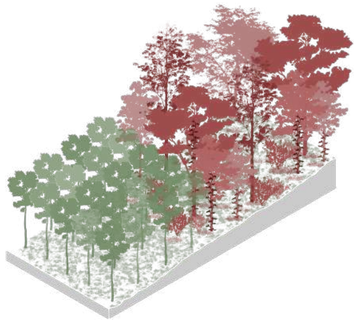
The swamps are home to some of the wild relatives of cultivated plants like of the ginger family, Zingiberaceae. Hence, we have ***Alpinia malaccensis, Alpinia calcarata and Kaempferia galanga***

The species of the ginger family, nourish the soil and inturn add nutrients to replenish the system.

With both medicinal and economic benefits, ginger species adds to the quality of life of the community.

Visualizing and spatializing the project through different typologies- Rubber near Myristica swamps

## CRAFTING THE PROGRAM
## 3| RUBBER NEAR FORESTS



View of the typology

**Legend**

Trees  Shrubs

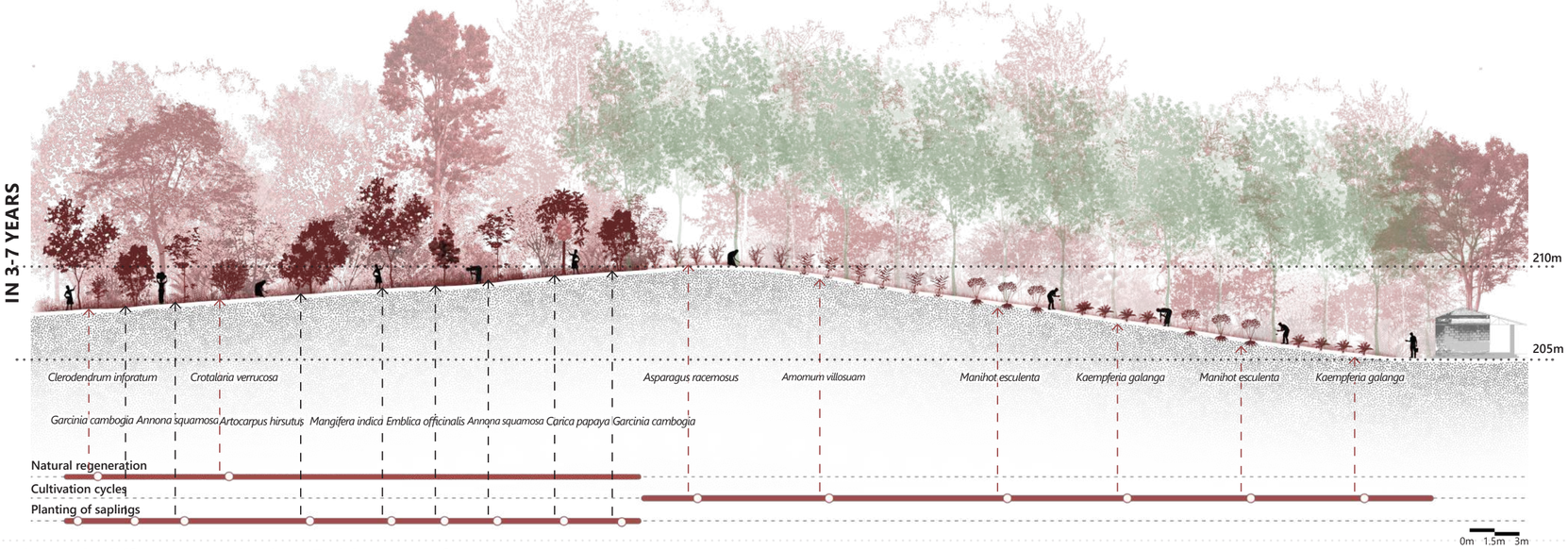
A detailed study of the crops which they had cultivated, were overlaid with their medicinal value and economic benefits to arrive at the plant list for intercropping.

Unlike the other two typologies, the species grown here are more edibles, common fruit trees, and of medicinal value due to its proximity to a community ground and to benefit the community. In this part, regeneration would be restricted to the natural area, which would be planted and left to grow on its own.

The rubber monocultures near the community centre are intercropped with tapioca (*Manihot esculenta*) and aromatic ginger (*Kaempferia galanga*), which are economically and medicinally beneficial. Towards the natural edge, fruit trees like mango (*Mangifera indica*), Indian gooseberry (*Emblica officinalis*), and custard apple (*Annona squamosa*) are planted, which provide edibles as well as marketable products.

**EXISTING SITE CONDITION**

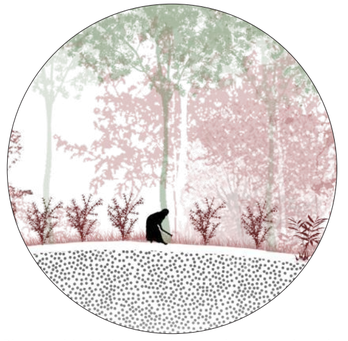

**IN 3-7 YEARS**




ZOOMING IN

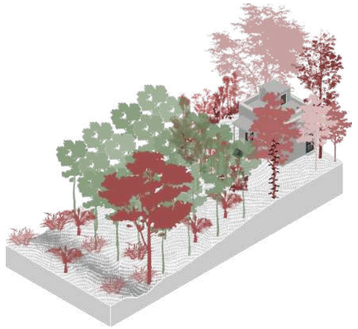
**A|**Towards the natural edge, fruit trees like ***Mangifera indica, Emblica officinalis*** and ***Annona squamosa*** are planted, which provide edibles as well as produce for the market.

**B|** With the native species grown, the undergrowth starts regenerating with shrubs like ***Clerodendrum inforatum*** and ***Crotalaria verrucosa.***



**C|** Plants with high medicinal and economic value like ***Asparagus racemosus*** are also planted.

## CRAFTING THE PROGRAM
## 4| RUBBER NEAR HOMESTEAD



View of the typology

**Legend**

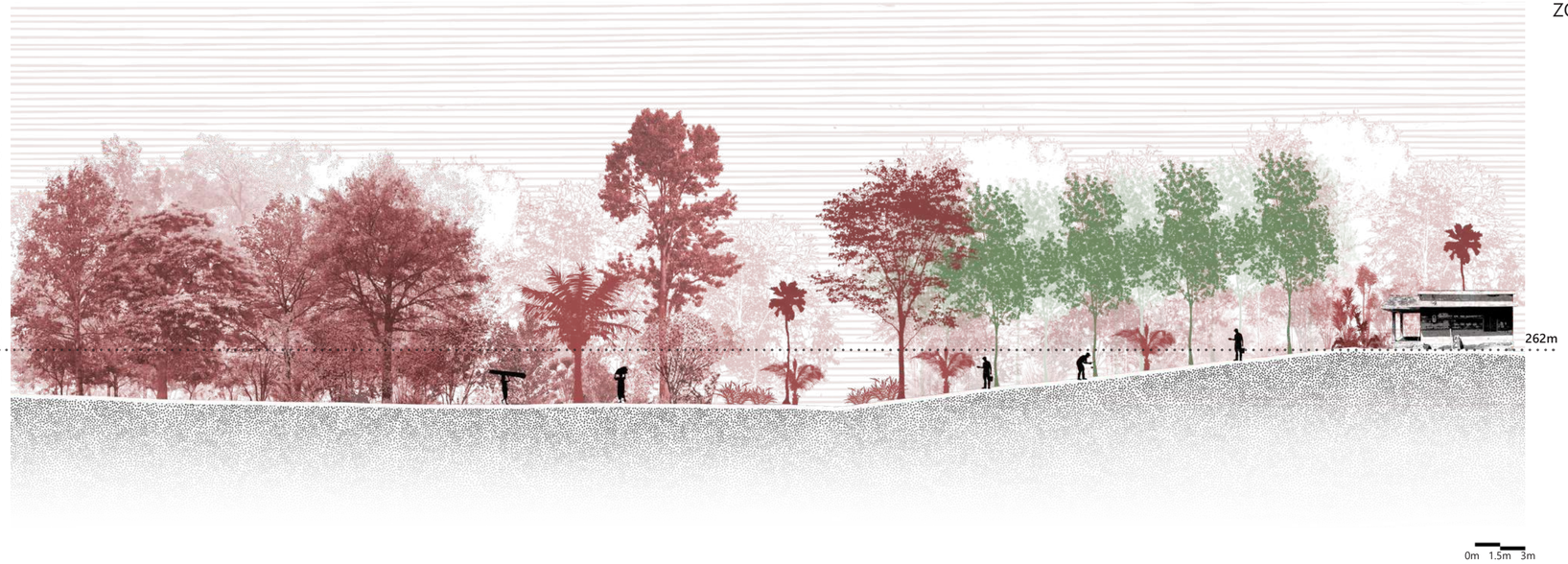
Trees  Shrubs

Rubber plantations are also seen near the homestead gardens. The homestead gardens act as the buffer between the house and the rubber plantations. Existing intercrops of coconut saplings are seen between the rubber trees.

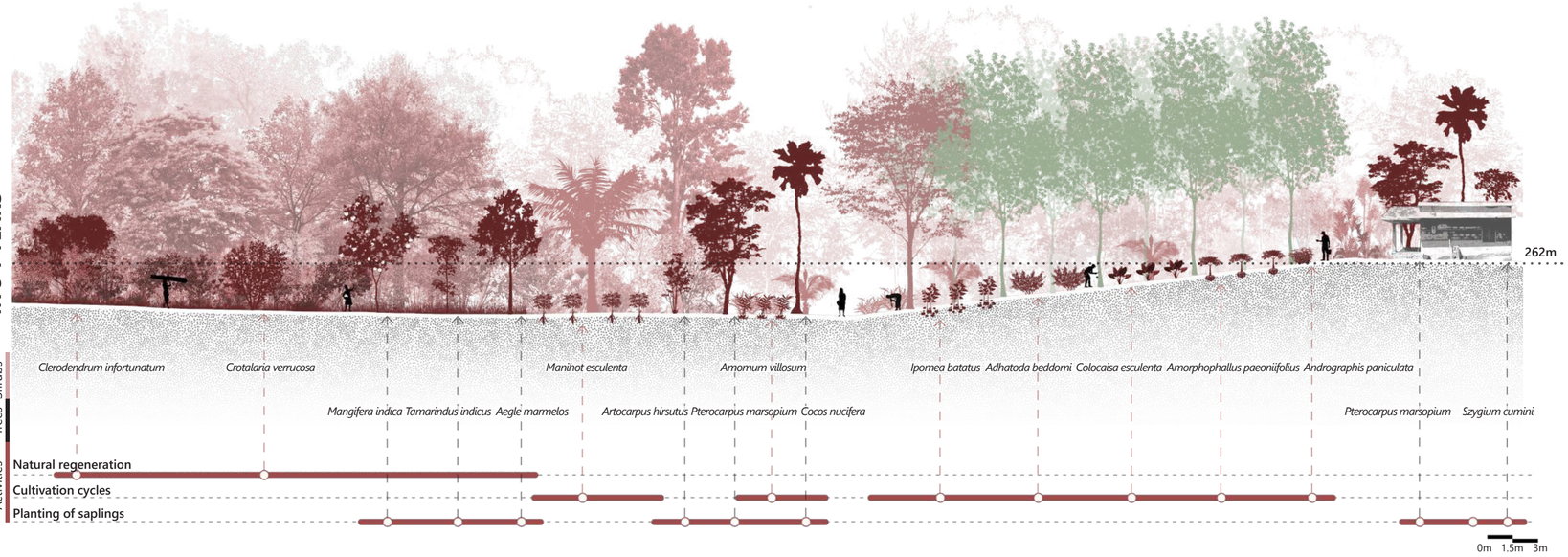
The intercrops chosen here are the varieties of edibles, mainly tubers, which Kanis used to cultivate earlier. "The forest used to give us lots and lots of tubers– Neduvan, Nooran, Nooli, Mukkizhangu, Nedunooli, Neduvanmattu, Kavala, Chengu, Pinnen (In their native language)", said Devaki Kani.

Varieties of fruit trees are also proposed closer to the natural edge. Varieties of tapioca (*Manihot esculenta*) are planted along with tamarind (*Tamarindus indica*) and stone apple (*Aegle marmelos*), which has medicinal values.

**EXISTING SITE CONDITION**

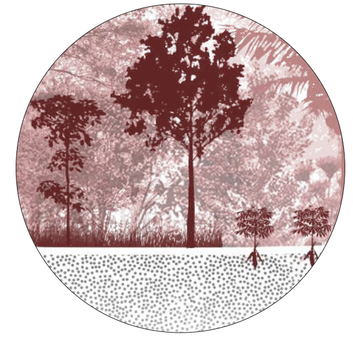



**IN 3-7 YEARS**

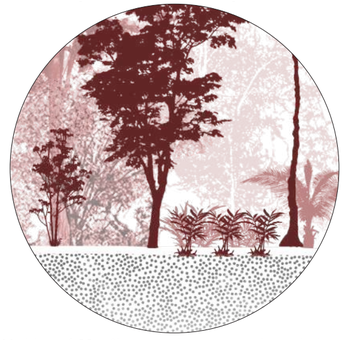



ZOOMING IN

**A|** Fruit trees and trees with medicinal value are planted

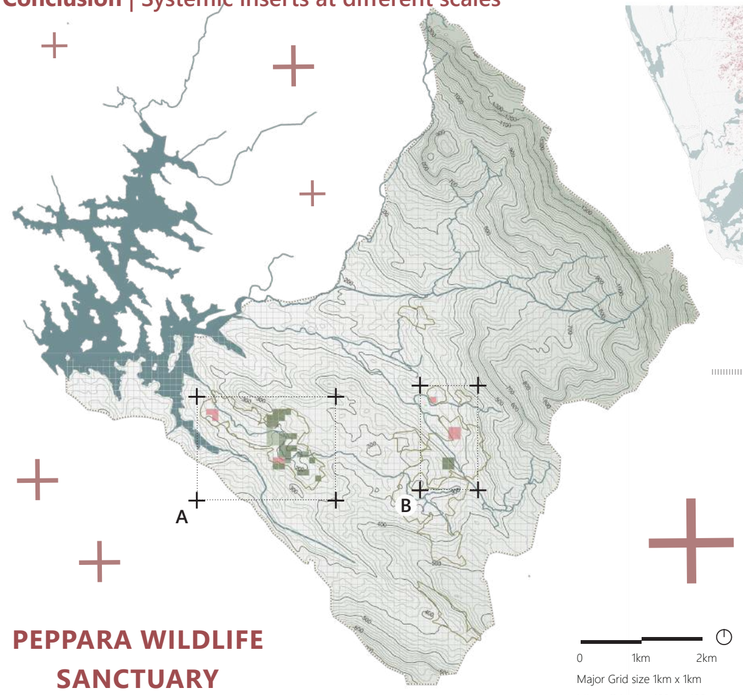


**B|** Towards the natural edge, ***Ammomum villosum***, species of ginger are planted along with trees like ***Pterocarpus marsopium*** and ***Artocarpus hirustus .***



**C|** Varities of ***Manihot esculenta*** are planted along with ***Tamarindus indica*** and ***Aegle marmelos*** which has medicinal values.

Visualizing and spatializing the project through different typologies- Rubber near homestead gardens




**PEPPARA WILDLIFE SANCTUARY**

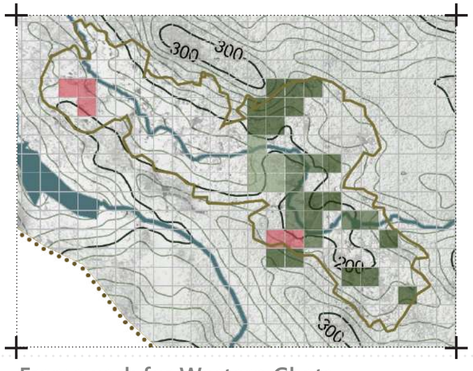
0 1km 2km

Major Grid size 1km x 1km

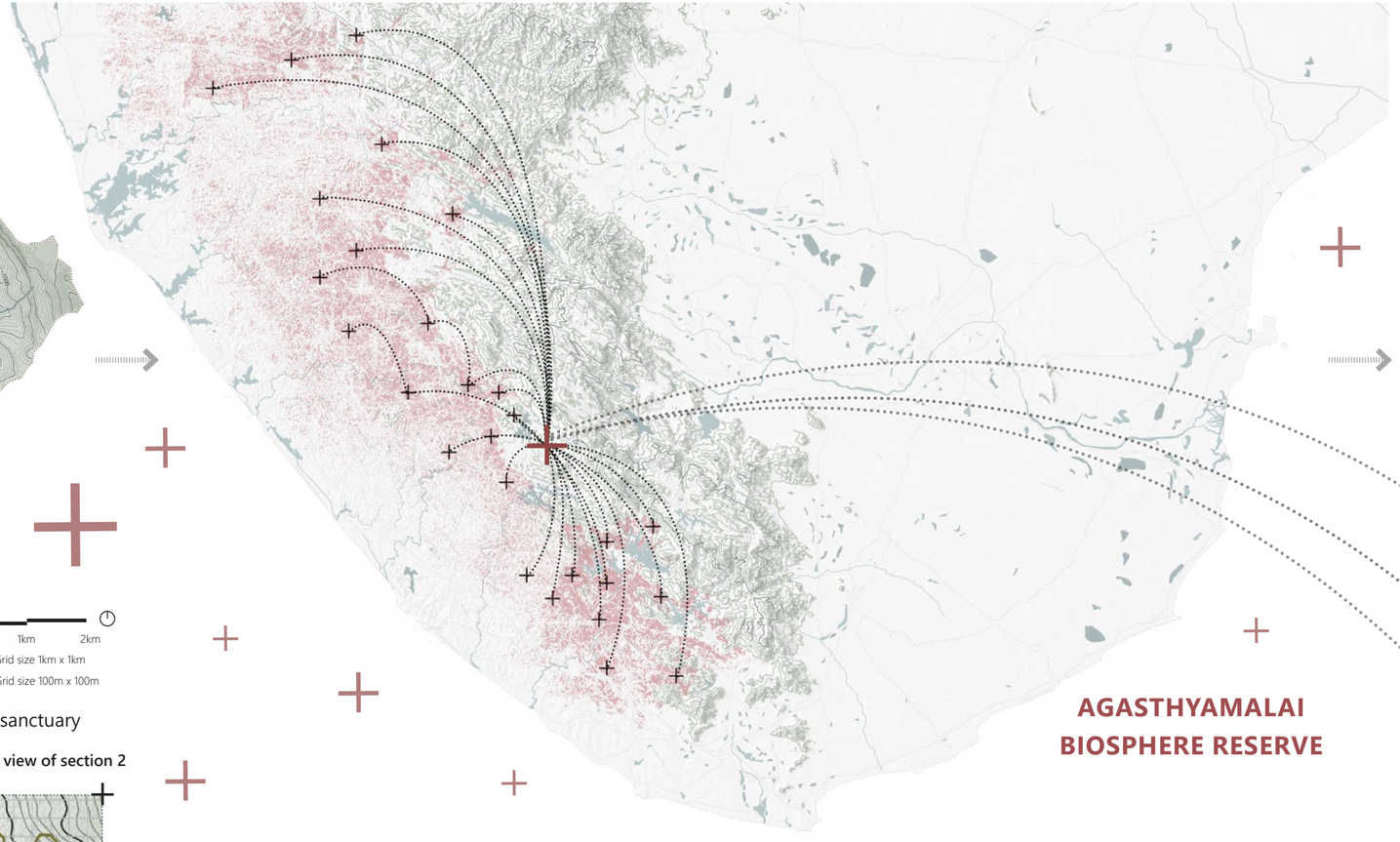
Minor Grid size 100m x 100m

Mapping the programs on the Athirumala section of Peppara wildlife sanctuary

A | Zoomed in view of section 1



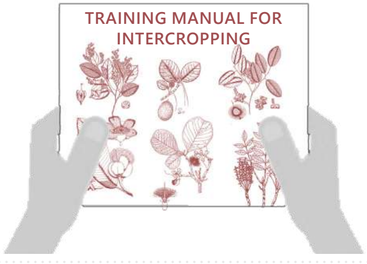

B | Zoomed in view of section 2



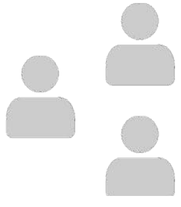
**WESTERN GHATS**

**AGASTHYAMALAI BIOSPHERE RESERVE**

**PARTICIPATORY APPROACH**




**REVISION OF POLICY TO PREVENT FURTHER EXPANSION OF RUBBER**



**SUBSIDIES FOR INTERCROPS AND PROVIDING NATIVE PLANT SAPLINGS**

**FRAMEWORK FOR WESTERN GHATS**