



Forest

Rubber



I have witnessed the continuous deforestation here. I feel very sad, but I can't help it.

Stage 1



Rubber trees replace forests and encroach on farmland. Our grain output is getting smaller .

Stage 2



I now see that drought is coming more and more frequently . We do haven't water to drink.

Stage 3

Country / City	Wuhan/China
University / School	Huazhong University of Science and Technology
Academic year	2019-2020
Title of the project	Transition from rubber plantations to tropical forests with green-blue strategies
Authors	Wang Jiafeng

## TECHNICAL DOSSIER

Title of the project ..... Transition from rubber plantations to tropical forests with green-blue strategies  
Authors ..... Wang Jiafeng  
Title of the course ..... Landscape Architecture Planning Studio  
Academic year ..... 2019-2020  
Teaching Staff ..... Han Yiwen, Dai Fei, Su Chang  
Department/Section/Program of belonging ..... School of Architecture and Urban Planning, Department of  
Landscape Architecture  
University/School ..... Huazhong University of Science and Technology



Written statement, short description of the project in English, no more than 250 words

The tropical forests have been cut down, and then planting rubber trees have caused serious climate problems: forest deterioration, drought and water shortage.

The lack of water conservation function of the forest and strong water absorption capacity of rubber trees have led to the problem of drinking water in the transition zone between China and Myanmar. Geniu village, rubber cultivation accounting for 80%, is taken as a case study.

Our goal is to effectively mitigate conflicts between ecology and economy to realize the sustainable and cost-efficient development. Through papers and expert evaluation, we determine the standard value influencing rubber tree growth and water shortage factor. By with GIS analysis, we cut down rubber trees in the area unsuitable for rubber trees growth, and then forests are restored using green strategies: the pioneer restoration method and the establishment of vegetation types by elevation; water shortage is solved using blue strategies: intercropping, reservoirs and fog droplets collection. Finally, climate is reconciled because of optimized land use pattern. This design may provide some references for other regions facing similar forest restoration and drought.

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# CLIMATE CHANGE AGAIN

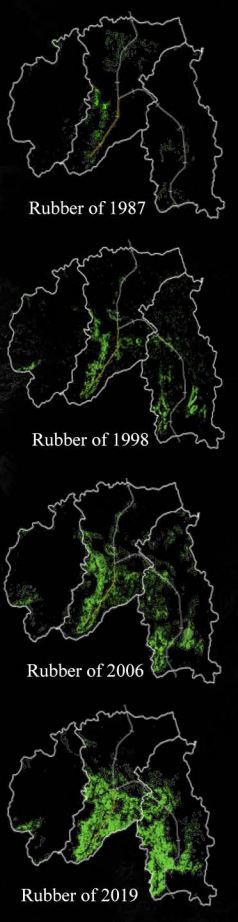
11th International Biennial Landscape Barcelona

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SCHOOL PRIZE

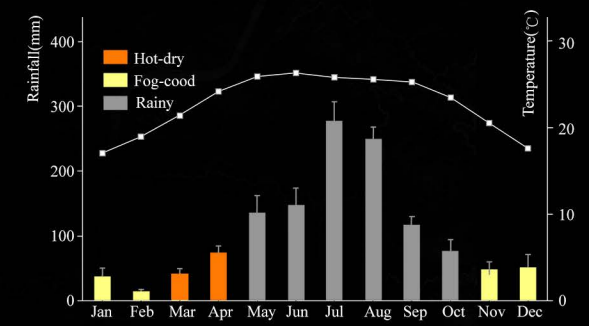
# SITE ANALYSIS & STRATEGY



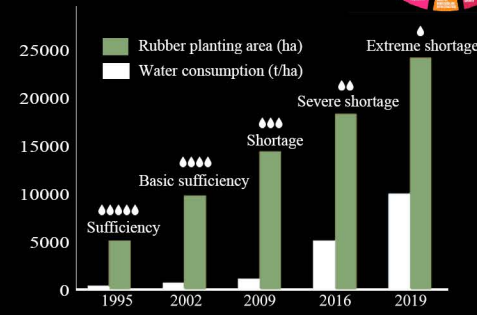
Rubber trees planting changes



## Site climate



Monthly precipitation and monthly average, maximum and minimum temperature in 2009-2018, Geniu village.



The relationship between rubber planting area and water consumption and supply

## Analysis of growth conditions of rubber trees



## Problems



RAINFOREST DESTRUCTION

### The first climate

The soaring price of rubber has brought new wealth to the site. The tropical forests are wantonly cut down and changed into rubber forest, which spreads like a prairie fire to every site. Rainforest destruction affects climate at the local scale.



DROUGHT CRISIS

### Climate change again

Rainforest destruction further brings about lack of soil water retention characteristics. Rubber forest is called "green desert": strong water absorption capacity and evaporation. Finally, these lead to the difficulty of drinking water for people and animals.

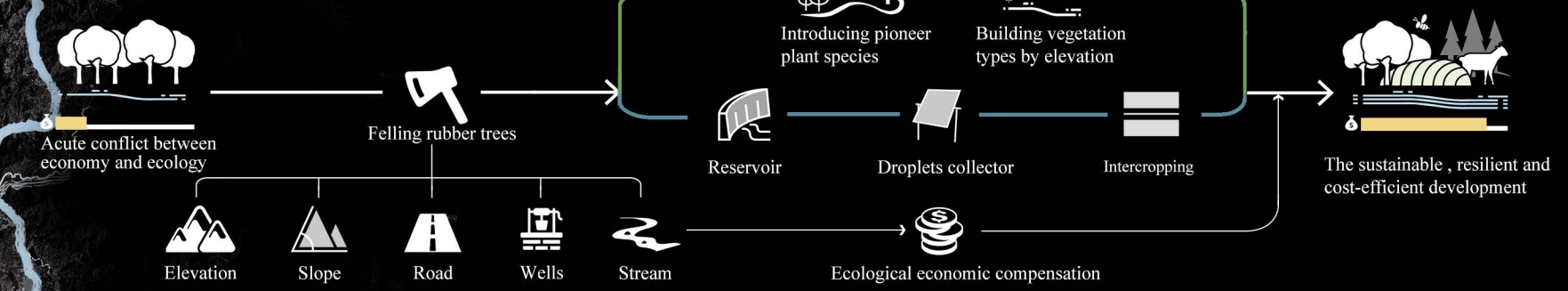


ECONOMIC DRIVE

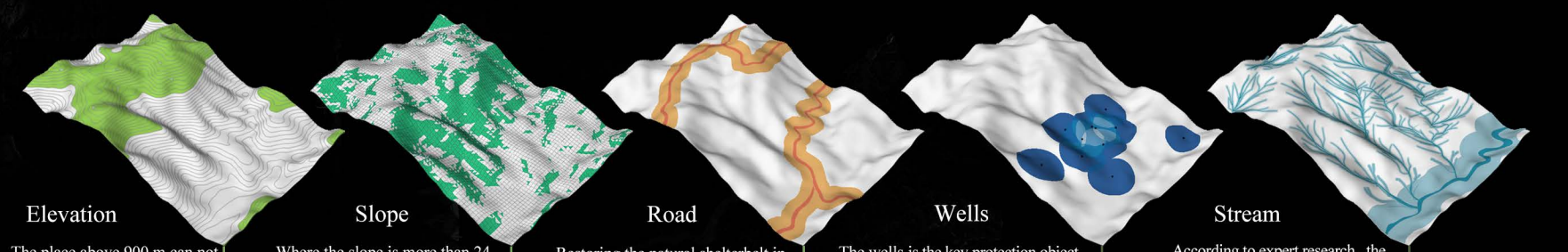
### Cause of climate

The root-cause of local climate change is driven by economic interests. The huge profits of rubber are found, and then rainforest is cut down and farmland is encroached. People plant rubber trees regardless of site conditions, which follow by a chain of climate change.

## STRATEGY



## Standard for felling rubber trees



**Elevation:** The place above 900 m can not meet temperature demand and it is easy to reduce yield and infected with diseases and insect pests.

**Slope:** Where the slope is more than 24 degrees, the site can not meet requirements of rubber trees for deep, fertile and moist soil.

**Road:** Restoring the natural shelterbelt in the 50m buffer zone along the road will bring higher opportunity cost.

**Wells:** The wells is the key protection object. The rubber forest within 400m around the well is converted into natural forest to conserve water.

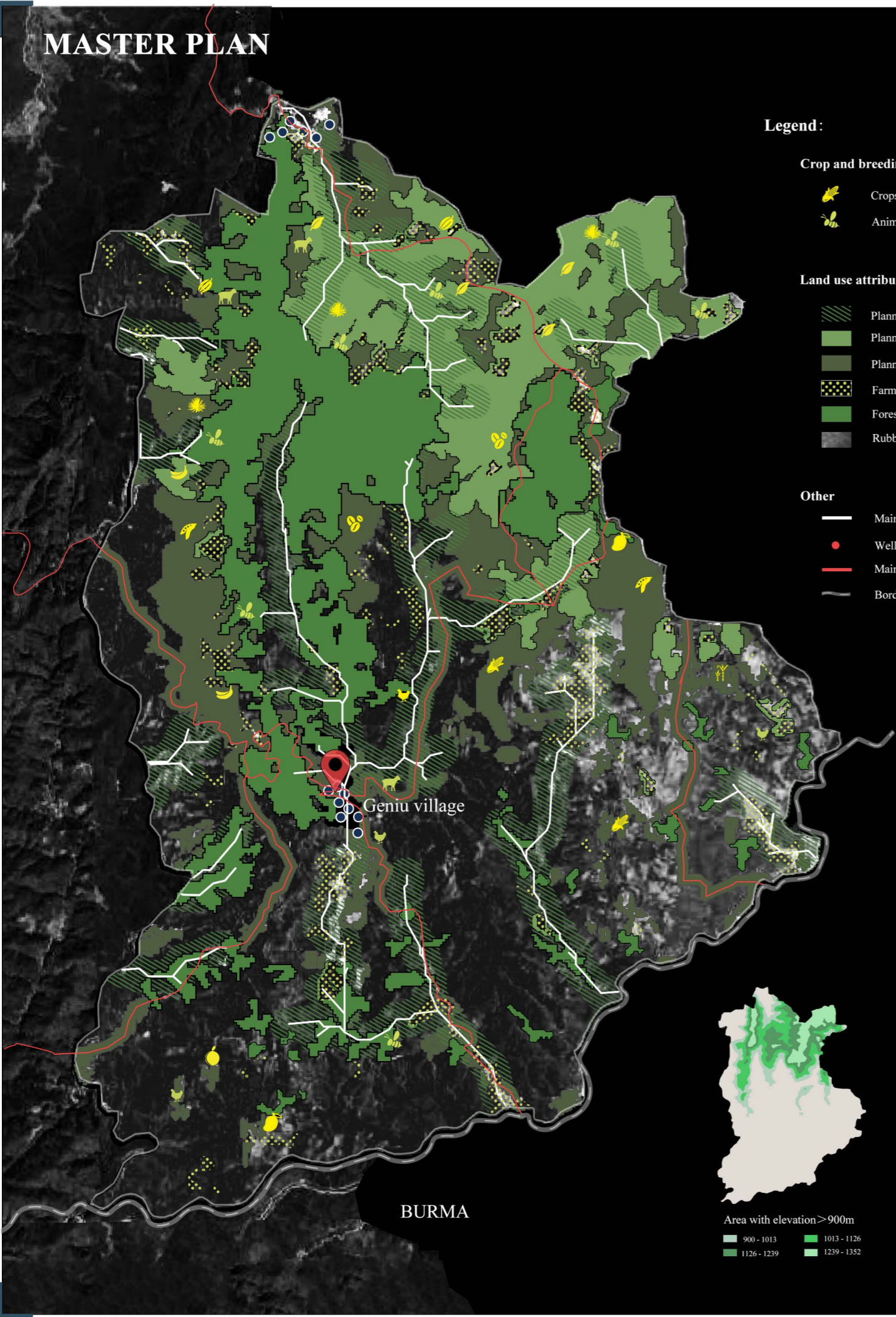
**Stream:** According to expert research, the stream range of 200m should be designated as a protection buffer zone.

Turning rubber trees into farmland or forests

Turning rubber trees into forests



# MASTER PLAN



### Legend:

#### Crop and breeding

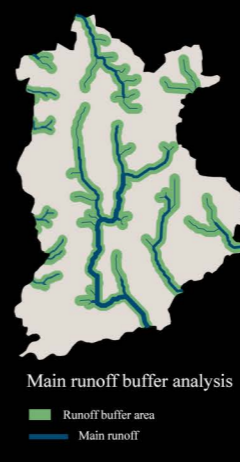
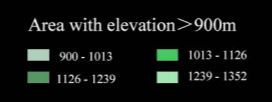
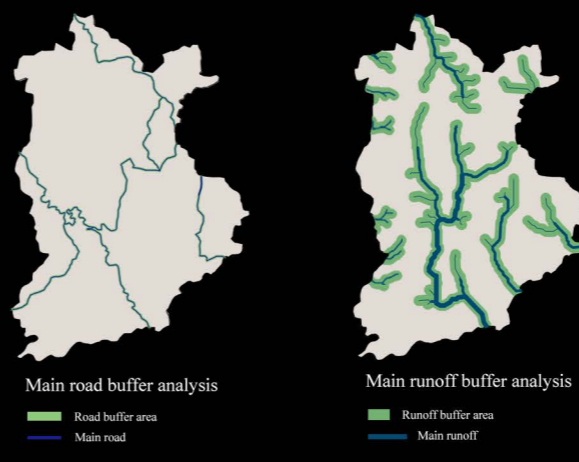
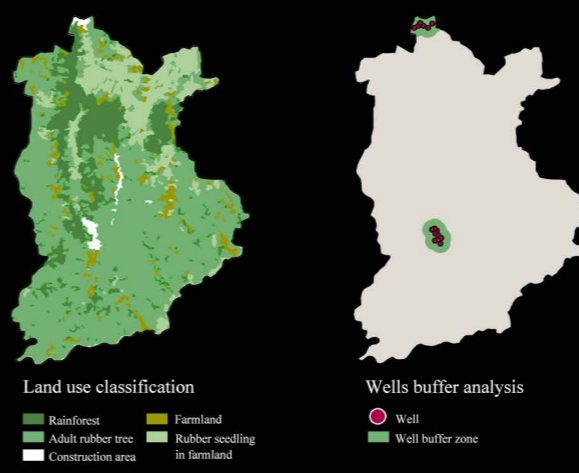
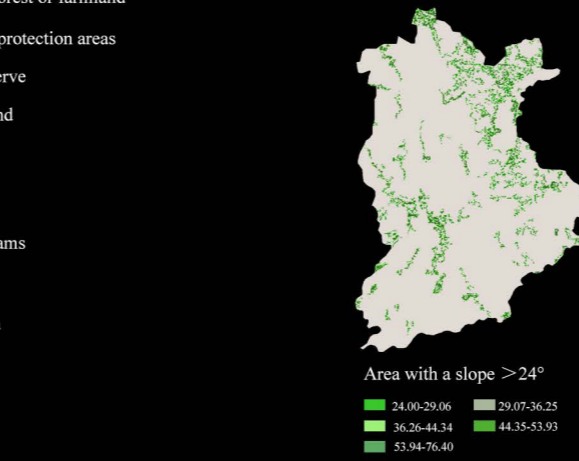
- Crops
- Animals

#### Land use attribute

- Planning forest
- Planning farmland
- Planning forest or farmland
- Farmland protection areas
- Forest reserve
- Rubber land

#### Other

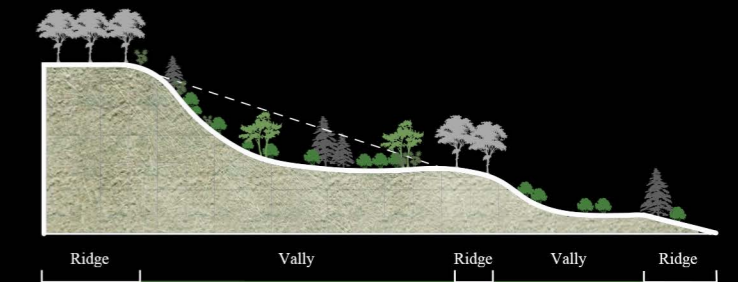
- Main streams
- Wells
- Main path
- Border



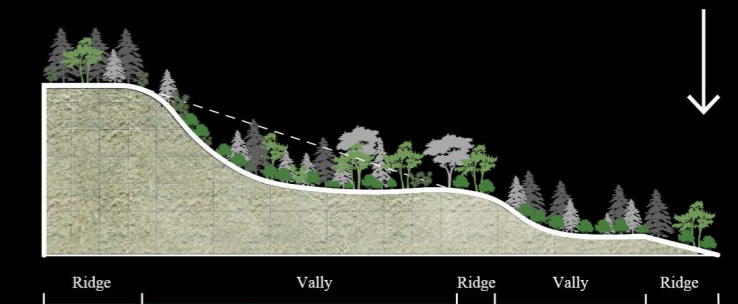
# GREEN STRATEGIES



## I Introducing pioneer plant species

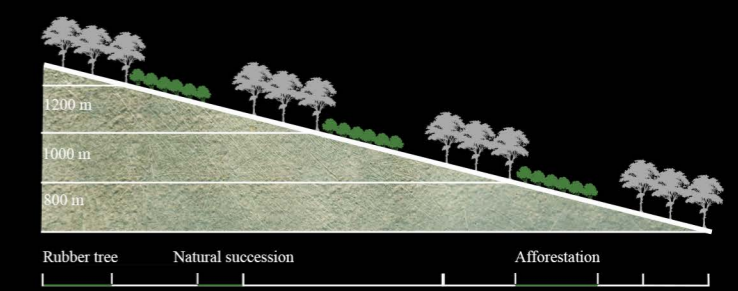


The humid microclimate in the valley would facilitate vegetation restoration. A simple-structure community will be created by removing rubber trees in the valley firstly and scientific screening and planting of pioneer saplings. After a period of growth, the pioneer vegetation will provide a better shelter condition for follow-up supplements.

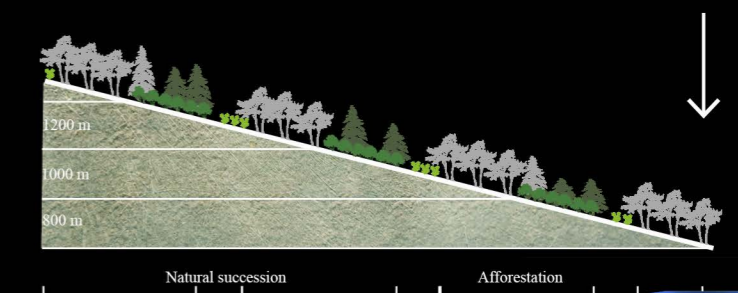


Failing to survive in a shade environment or rhizosphere competition, the pioneer species will be replaced by new tropical rainforest species which can flourish to be dominant in shade environment. Through natural succession, a variety of tropical rainforest species will replace pioneer ones, establishing a more stable and abundant structure of rainforest.

## II Building vegetation types by elevation



Rubber trees are cut in batches. Open forest windows in natural succession zone for plant restoration. Different vegetation types are chosen at different altitudes: seasonal rainforest is built below 800 meters; mountain rainforest grows at 1000-1200 meters; evergreen broad leaved rainforest is planted above 1200 meters.

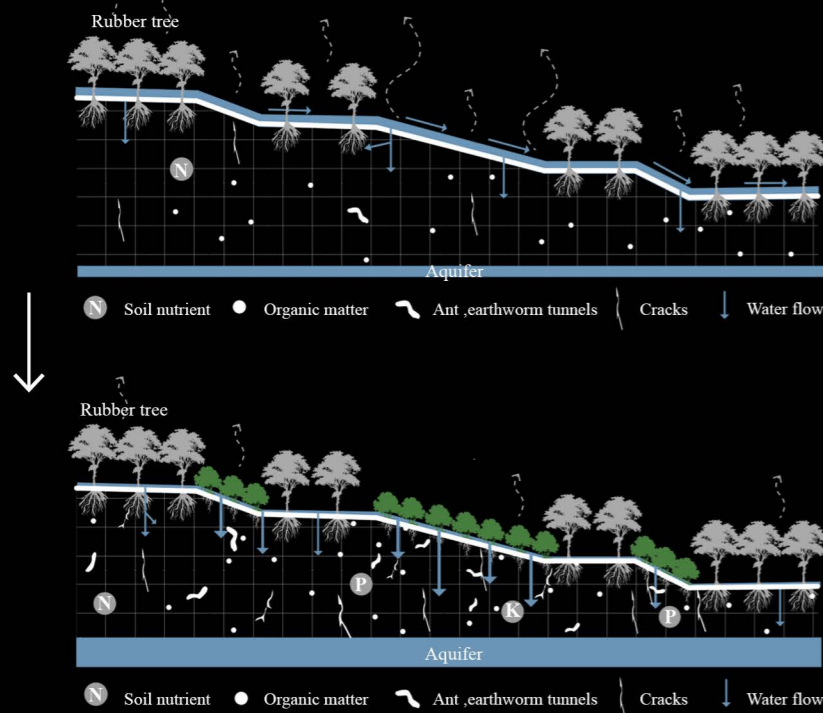


Plants grow out from preserved natural succession zone. Four kinds of shrubs and trees are mixed in the interzone and afforestation belt at different altitudes. Tending twice a year for the first three years in forest belts. Through natural succession, a stable diverse forest system will come into being at different altitudes.

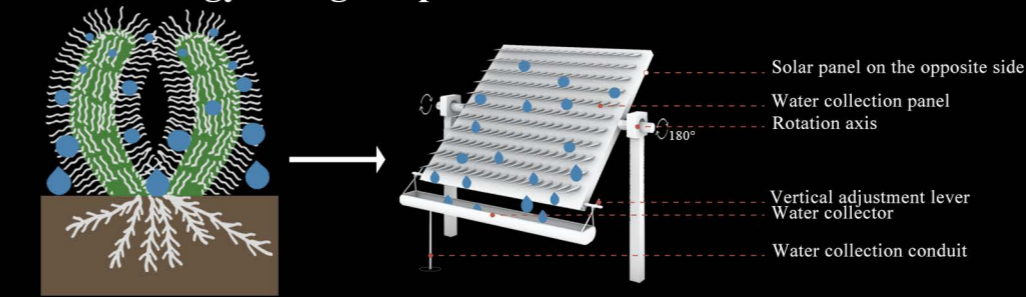


# BLUE STRATEGIES

## Blue strategy 1: intercropping

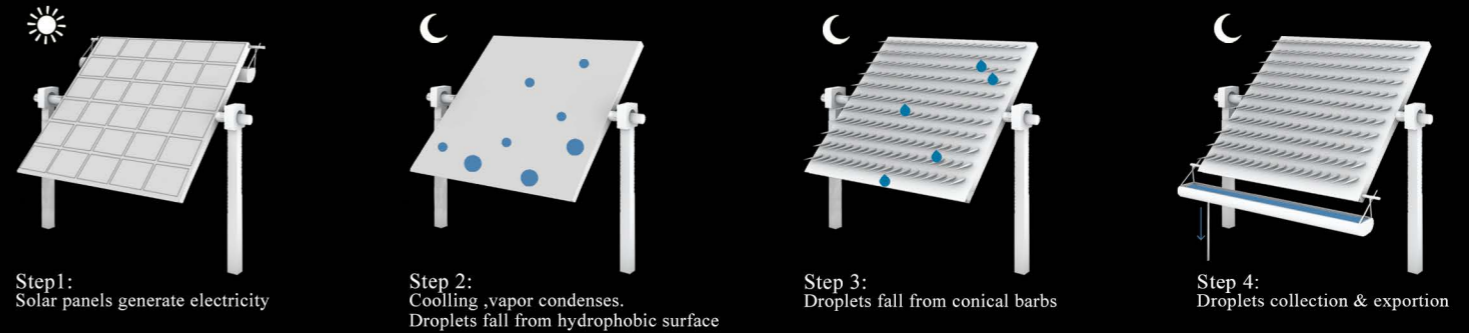


## Blue strategy 3: fog droplets collection



According to relevant research, the reason why cactus can survive in arid desert is that it uses barbs and hydrophobic surface to collect fog droplet. The biomimetic equipment is designed to collect fog using the same mechanism. During the day, solar panels absorb heat and convert it into electricity. Rotate 180°, and panel becomes droplets collection container. The hot air supersaturated with humidity reaches the dew point and condenses while contacting a substrate or conical barbs cooled by electricity, forming droplets. The sagging collector collects the droplets and then quickly leads them to the conduit to avoid evaporation.

### Collection process



### Hydrophobic plates collect water



### Conical barbs collect water



## Blue strategy 2: building the reservoir

