

# BUILDING A NATURE-BASED SYSTEM TO PREVENT SEVERE FOREST FIRE INDUCED BY CLIMATE CHANGE



Apr 14, 2008	Mar 04, 2010	Jan 27, 2012	Mar 19, 2014	Feb 13, 2019	Mar 30, 2019	Mar 30, 2020
Burned area: 100+ha Duration: 18h	Death toll: 0 Burned area: More than 40 mu The core area of the fire: Pinus yunnanensis aerial	Number of participants: 800+ wind speed: 5m/s	Distance from the core scenic area: 5km Number of participants: 1928 Burned area: 21ha	Burned area: 17ha	Burned area: 20ha Death toll: 31	Burned area: 1000+ha Damaged area: 80+ha Death toll: 19

Country / City Wuhan, China  
 University / School Huazhong University of Science and Technology  
 Academic year 2019-2020  
 Title of the project Building a nature-based system to prevent severe forest fire induced by climate change  
 Authors Pan Yingzi, Li Lingjie, Lu Meng

## TECHNICAL DOSSIER

Title of the project Building a Nature-based System to Prevent Severe Forest Fire Induced by Climate Change.  
Authors Pan Yingzi, Li Lingjie, Lu Meng  
Title of the course Landscape Architecture Planning Studio  
Academic year 2019-2020  
Teaching Staff Han Yiwen, Xiong Heping, Wan Min  
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

Due to climate change, forest fires occur more and more frequently all over the world, which lead to more carbon emission so that exacerbate the climate problem. Xichang, a southwest city in China, is one of the victims of this vicious circle. There were 6 large-area forest fire in Xichang in the past 10 years, among which the worst case caused more than 1000ha area burnt. It is believed that these wildfires are closely related to the climate change of Xichang in the past 30 years, including rising temperature and reduced humidity. What's worse, the hot-dry wind brought by valley effect makes the fire more intense and frequent. Therefore, here we take Xichang as an example to show how to alleviate the fire problem by building a nature-based system.

We will use the following strategies to prevent and mitigate climate-induced forest fire. The existing hot foehn wind and air condition can be converted to the usable energy for the rainwater collection systems, sprayers and monitor at fire-prone sites. In high fire season, the monitoring system will play an important role. Besides, herbs are planted under the original monocultural tree plantation, so as to increase the air humidity and then reduce the risk of fire. This project can serve as a model to deal with wildfires for cities located in hot and dry valley.

For further information  
Máster d'Arquitectura del Paisatge -DUOT - UPC

T: + 34 93 401 64 11 / +34 93 552 0842  
Contact via email at: [biennal.paisatge@upc.edu](mailto:biennal.paisatge@upc.edu)

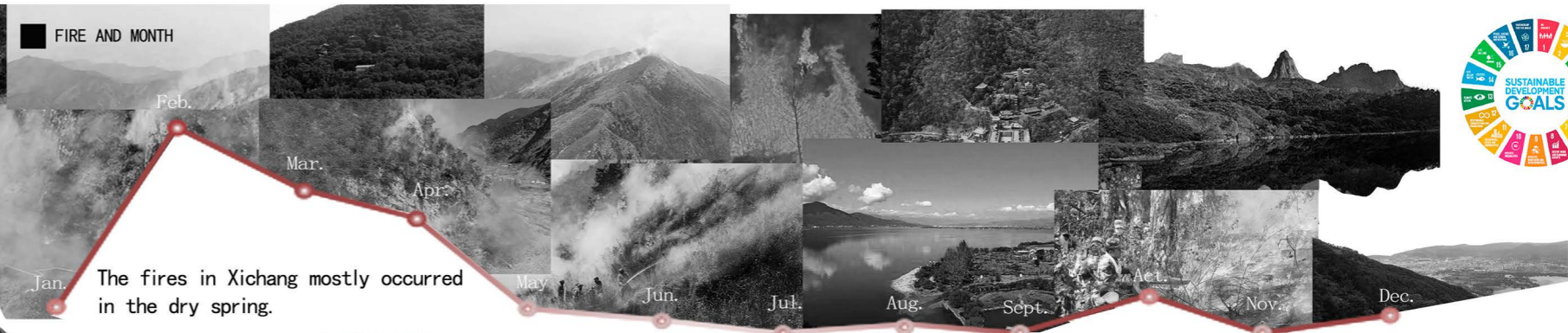
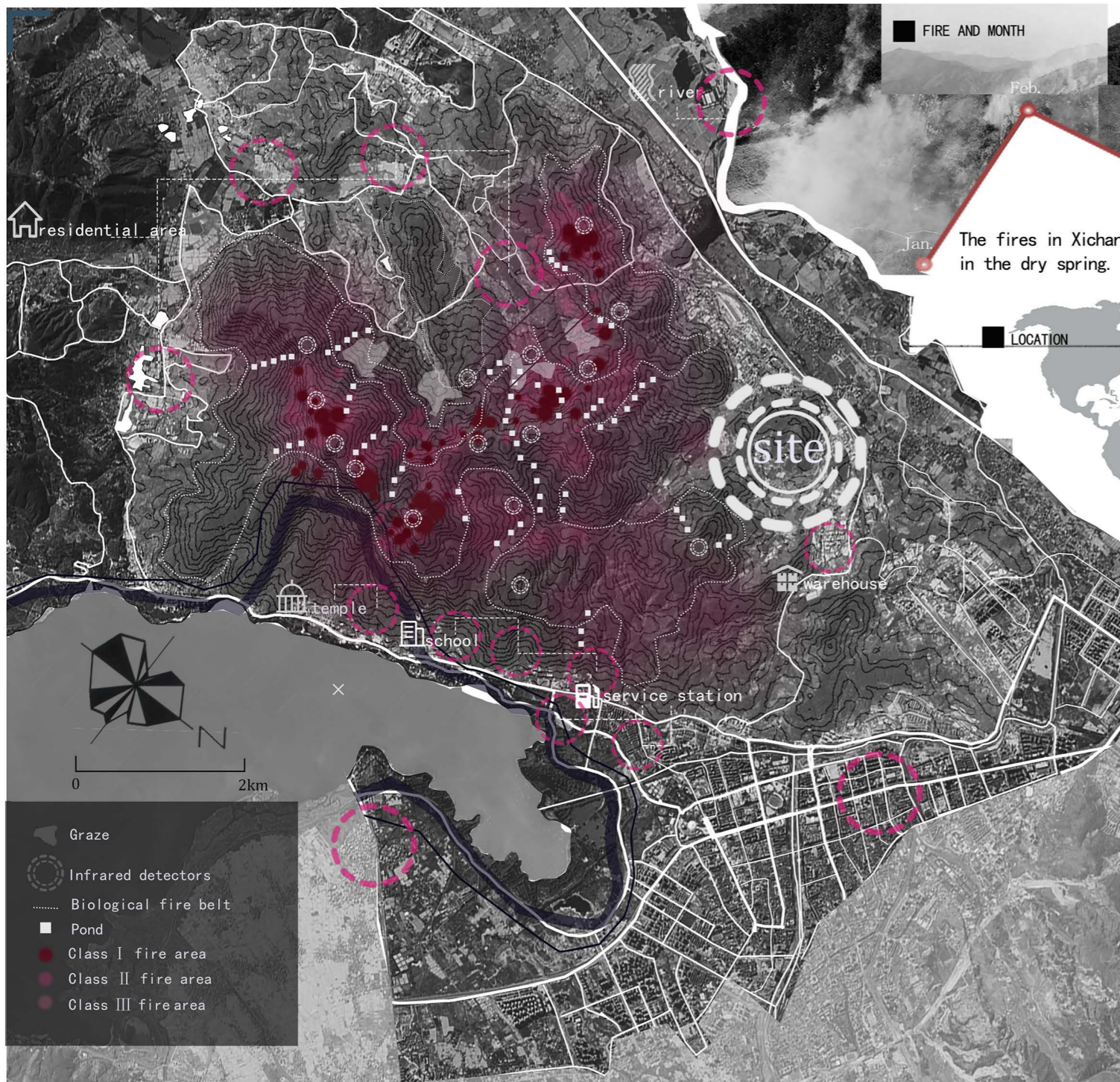
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d'Arquitectura de Barcelona  
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08028 Barcelona-Spain



# CLIMATE CHANGE AGAIN

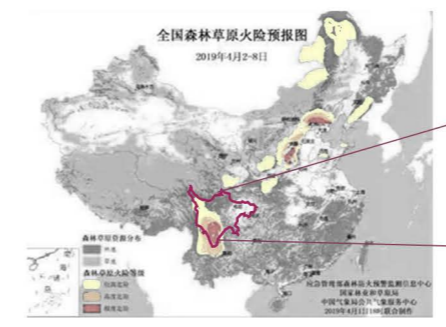
11th International Biennial Landscape Barcelona

Barcelona September 2020  
SCHOOL PRIZE

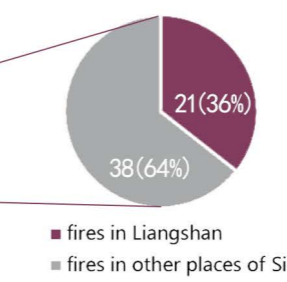


**PROBLEMS**

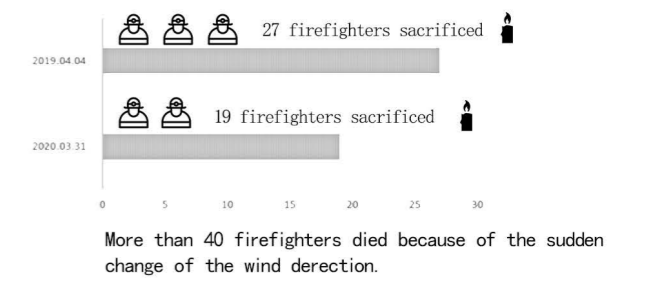
Fire Analysis  
Fire Warning



Fire Data in 2019

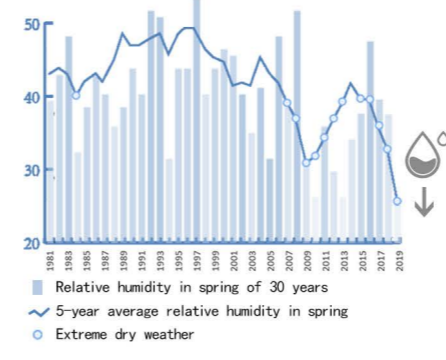


Firefighters Sacrifice due to Wind Direction Change

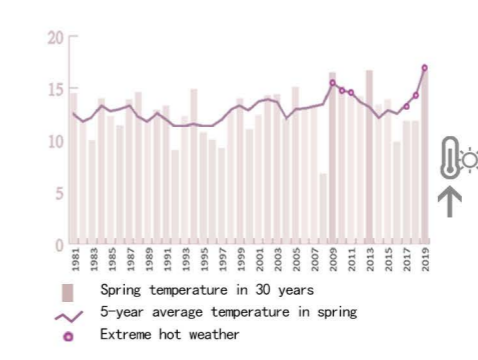


**Climate Analysis**

Relative Humidity Change in Xichang

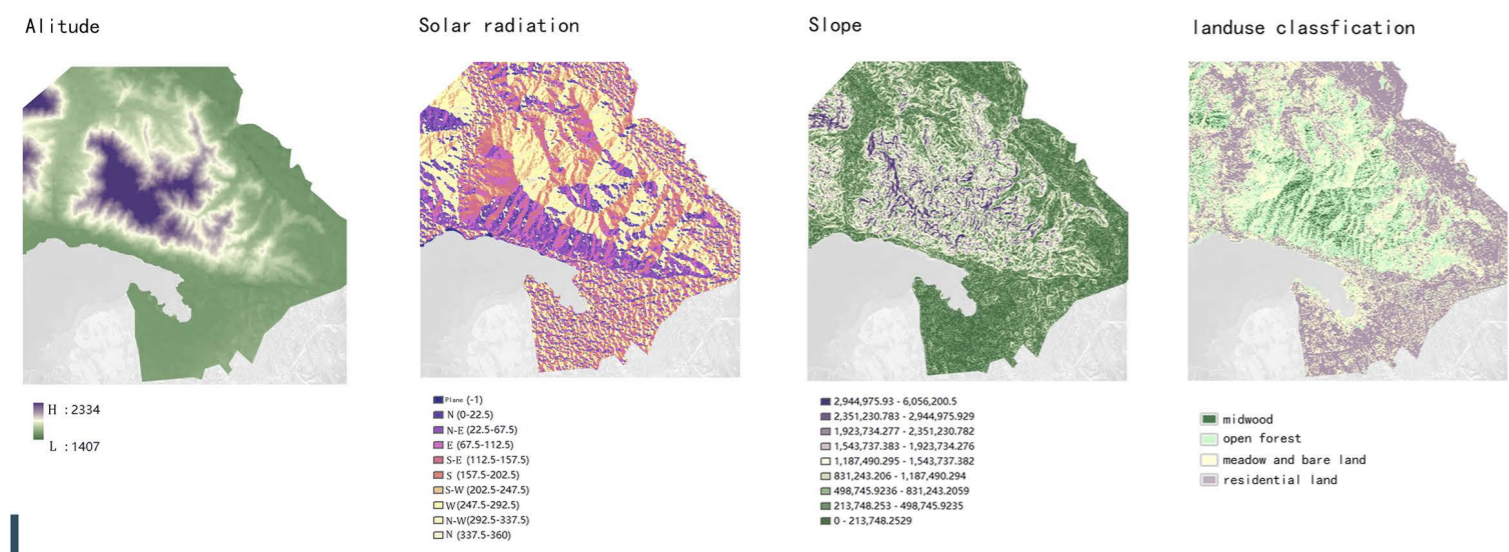


Temperature Change of Xichang



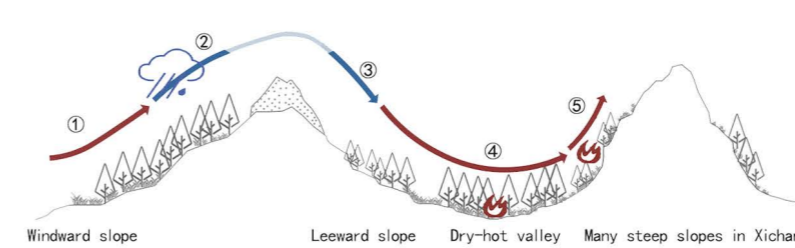
- ▶ The relative humidity in five years shows a downward trend.
- ▶ In the past ten years, the extreme dry weather is much higher than that in the previous twenty years.
- ▶ The five-year average temperature is on the rise.
- ▶ Extremely hot weather in the past decade is much higher than that in the previous two decades.

**GIS ANALYSIS**



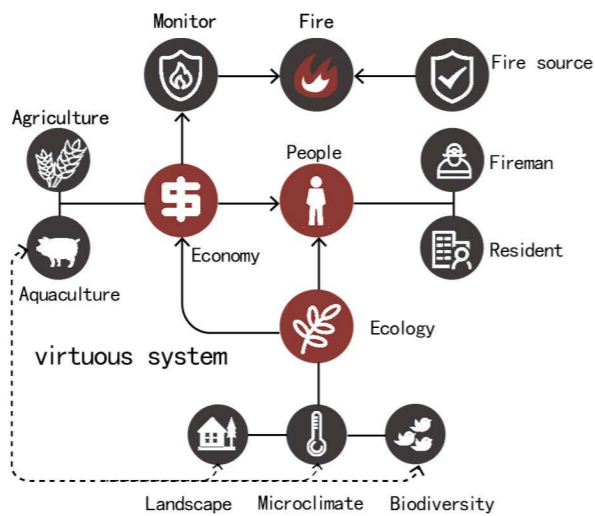
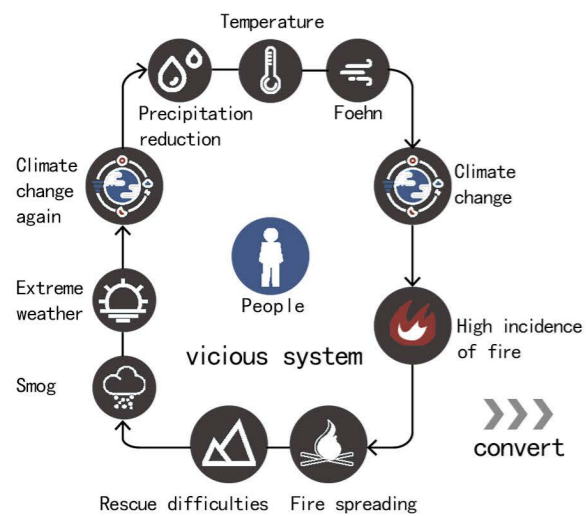
**Geography Analysis**

Hot-dry Foehn Wind & Steep Slope in Valley Effect

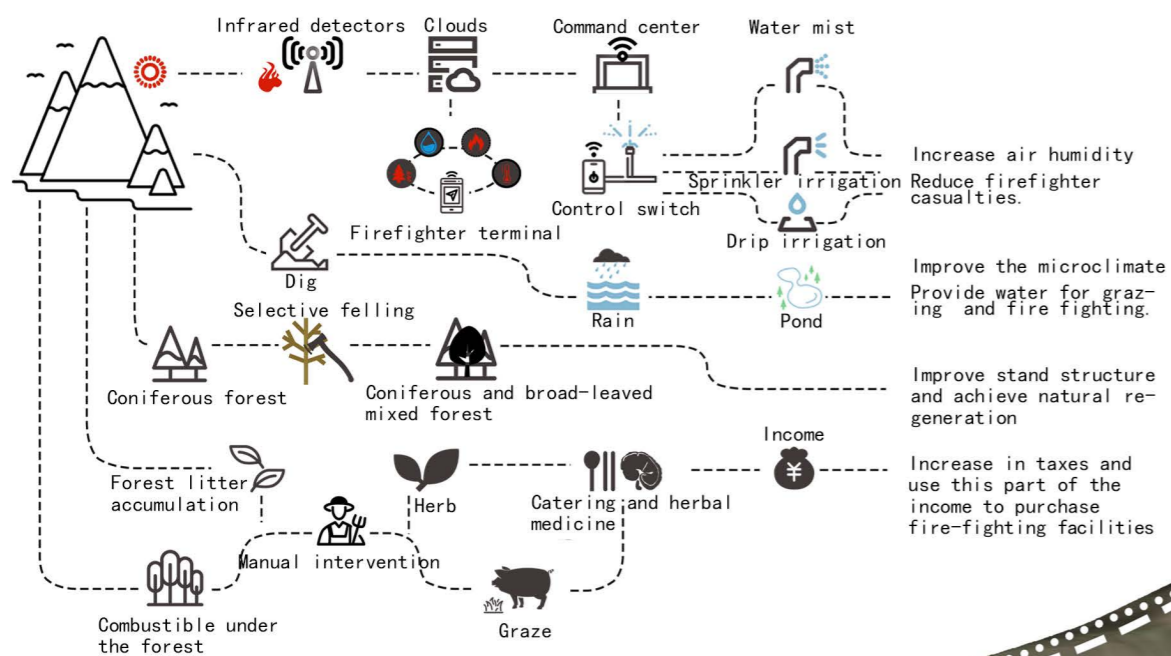


- ① Water vapor precipitated since temperature drops when altitude rises
- ② Cold & humid air rased by the mountain
- ③ Cold & dry air
- ④ Hot air-Foehn
- ⑤ Fire spreads horizontally and fast when the slope increases sharply

# STRATEGY

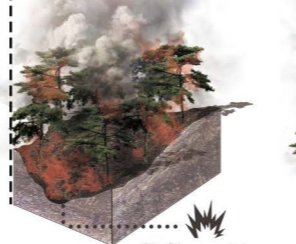
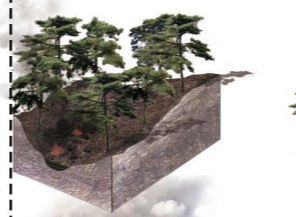
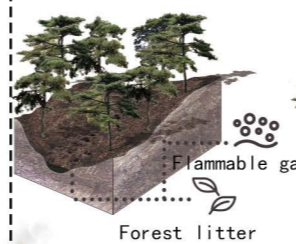


more details



# FIRE PROCESS

**FOREST DECIDUOUS**  
The accumulation of fallen leaves in the valley will produce combustible gases such as biogas, which is prone to deflagration when wildfires occur.



**COMBUSTIBLE**  
Long-term closure of mountains and afforestation will increase the amount of combustible materials under the forest, which is prone to fire.

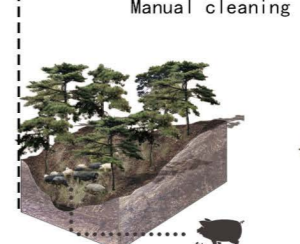
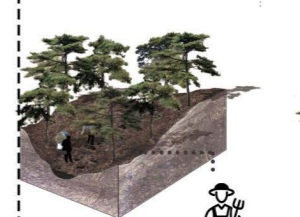


**CONIFEROUS FOREST**  
Yunnan pine is rich in oil and there is a great possibility of wildfires. Mountain fires often spread quickly after burning.



# FIRE CONTROL

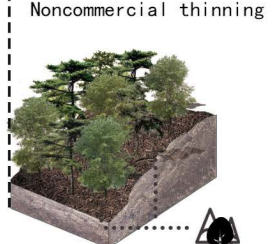
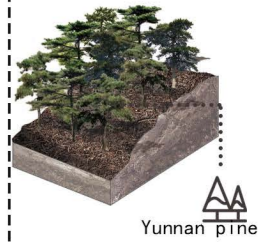
**GRAZE REGULARLY**  
Pigs are grazed during high-fire seasons to reduce forest litter accumulation. This can also reduce the cost of manual cleaning and increase farmers' income.



**FOREST ECONOMY**  
Growing cash crops such as herbs in the shelter forest around the village can increase farmers' income and improve the microclimate.



**FOREST STRUCTURE**  
Yunnan pine is rich in oil and can easily cause fire. People appropriately introduce concentrated broad-leaved tree species to improve forest structure.



# LOCAL PLAN



**RENDERINGS**

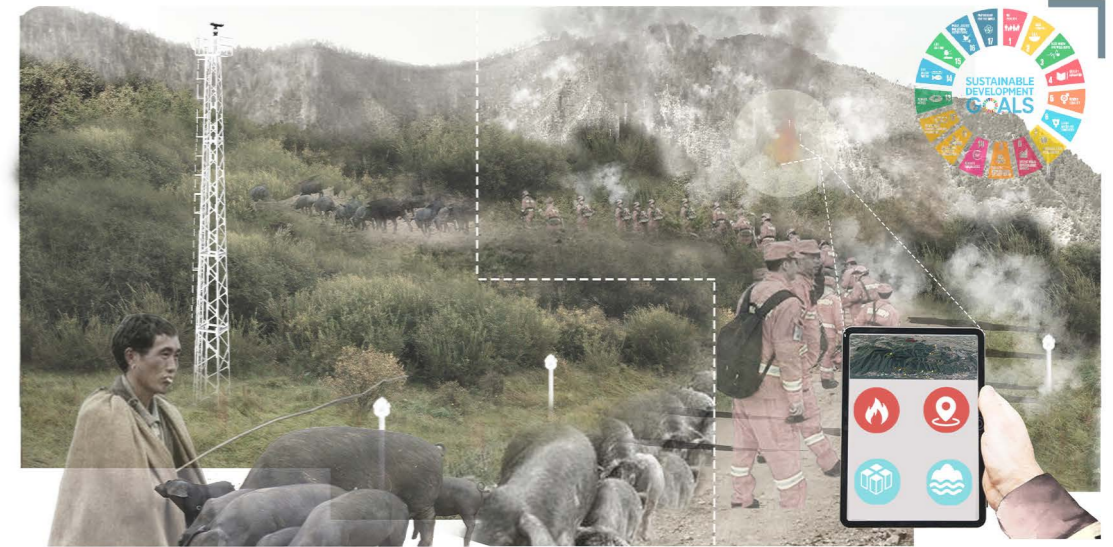
This is wildfire-prone site. Due to the complex terrain and plants with high oil content, it is difficult for firefighters to put out the fire in time.



After the design, the site has added many settings to monitor fire and water storage.



When the fire comes, various facilities are activated to control the fire.



In dry season, pigs eat fire-prone leaves and step out usable firefighting passage.



**BROADLEAF SPECIES SELECTION & PROFILE**

