



# Global Montane Bioeconomy Framework 全球山地生物经济框架

Prepared for the IV Mountain Futures 2025,  
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为2025年9月24日至28日在中国昆明举办的  
第四届山地未来大会准备

## People and Nature in Harmony: Investing in the Mountain Bioeconomy

“If we invest in our mountains today, they will invest in our shared prosperity tomorrow.”

PRESENTED AT ENVIRONMENT AND NATURE LEARNING WEEK  
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# Outline for Presentation

**Background**

**Hotspots**

**Innovation**

**Pilot Projects**



# Anthropocene and its Associated Crisis

## History of Industrial Revolution

- ❑ 1610: Columbus discovered the New World
- ❑ 1784: Watt invented the steam engine
- ❑ 1945: The explosion of atomic bomb
- ❑ 1964: The green revolution

## Emerging Crisis

- ❑ Biodiversity crisis
- ❑ Climate change crisis
- ❑ Human health crisis (like COVID-19)
- ❑ Energy crisis



# Bioeconomy: Turning Crisis into Opportunities (危=机)

智能化的农业·万物互联产业链·繁荣的绿色生态经济  
Digital Agriculture, Internet of Things in Value Chain, and Green Economy



机械手臂



植物生长监测



光伏灌溉系统



无人机农药



山地生态



绿色发展



气候监测



固碳增汇



未来建筑·低碳生活



绿色能源



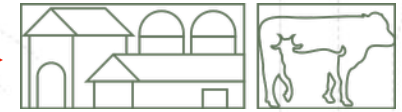
智能化



储存罐

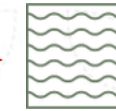


农林牧复合系统与循环农业  
Agroforestry and Circular Agriculture



牛羊养殖基地 Animal Husbandry

农耕文明与生态保护的融合



水养殖



稻田养殖



水稻



梯田



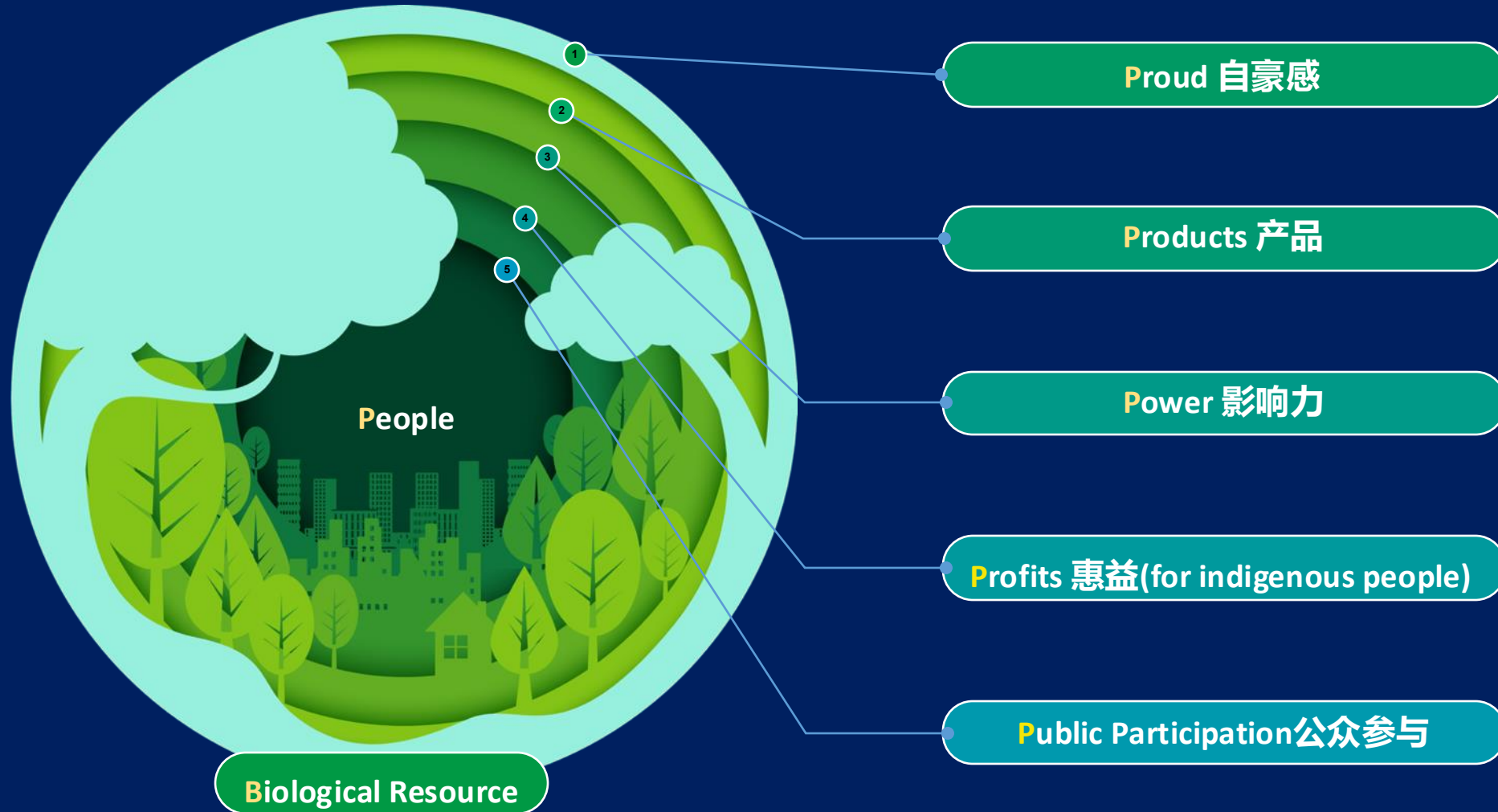
农林复合 Agroforestry



菌菇种植 Mushrooms



**Bioeconomy** is an economic framework that harnesses biological resources – plants, herbs, forests, biodiversity, and traditional knowledge – to generate sustainable growth.



Five “P” Elements of People and Plants

# Cross-cultural learning and interdisciplinary innovation to co-create global impact





"Mountain Futures" is a global initiative jointly launched in 2016 by the United Nations Environment Program (UNEP), Mountain Partnership of the Food and Agriculture Organization (FAO), the World Agroforestry Centre (ICRAF), the International Centre for Integrated Mountain Development (ICIMOD), the Chinese Academy of Sciences, and the Chinese Academy of Agricultural Sciences. Its core objective is to leverage the inextricable link of biological and cultural diversity of mountain regions to foster synergistic development of a nature-positive and climate-resilient bioeconomy, thereby promoting the sustainable transformation of global mountains.



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学习 体验 共创 分享  
LEARN EXPERIENCE CO-CREATE SHARE



## Future living lens

*Global sustainability driven*

## Socio – ecological lens

*Inclusivity driven*

## Ecosystem lens

*Stakeholders driven*

## Financial lens

*Profit driven*

Global governance

Philanthropic model

Payment for  
Ecosystem services

Traditional  
Business  
*Profit Driven*



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Target 2. Restore 30% of All Degraded Ecosystems;

Target 3. Conserve 30% of Land, Waters and Seas.

Coexist, Connecting and Circular

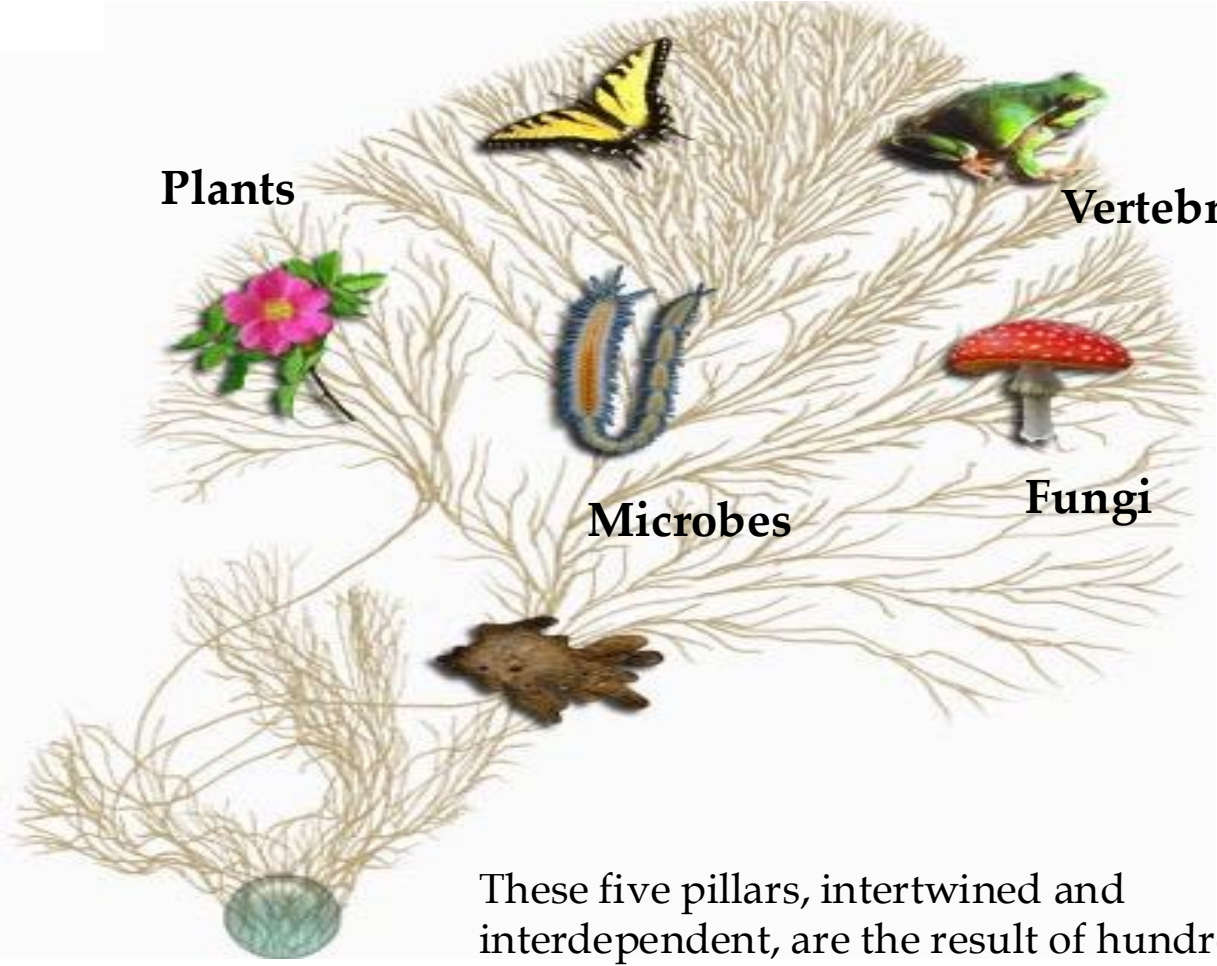


Microbes plants fungi insect animal

Biodiversity are sources of superior genes and species, which is sources for novel agri-food system and new bioeconomy.

Our wealth, our health, our beauty, and our lives are maintained by countless other living things.

Invertebrates



These five pillars, intertwined and interdependent, are the result of hundreds of millions of years of evolution.





## MOUNTAINS/RURAL FUTURES with Kunming-Montreal Global Biodiversity Framework 2030

<COP15 Montreal Side Event >

### Kunming Declaration:

Article 6: sustainable use of biodiversity

Article 10: ecological health and restoration

Article 15: participation of indigenous peoples,  
local communities and other relevant stakeholders

Article 16: public education, economic  
transformation and behavior changes

# Bioeconomy for Sustainable Mountain Development



### Scientific Exploration

Mountain is sensitive to global change, many novel species yet to be discovered, there are numerous unresolved scientific questions.



### Ecological Restoration

The unreasonable exploration has caused the large degradation, the trend of ecosystem degradation could be reversed, carbon neutrality could be achieved.



### Indigenous Wisdoms

Cross-cultural learning, shared wisdoms, nature and community-based education are essential for building local resilient and innovations.



### Future Living

Caring for life, green, low carbon and circular economy are key elements for building rural-urban social value chains and sustainable lifestyle.



On June 4<sup>th</sup>, 2018, leaders of the Chinese Academy of Sciences and the Chinese Academy of Agricultural Sciences unveiled the Honghe Mountain Future Innovation Center.





2019年7月28日



#1 Water Pool

Field Station

#3 Water Pool

#4 Water Pool

Green House &  
Nursery

Meterological Station

#2 Water Pool

Entrance



2020



2023



V S





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## 红河山地未来创新中心

### 愿景

万物共生 · 万物互联 · 万物循环的  
生命共同体！

### 定位

立足中国西南干热河谷，辐射南亚东南亚和撒哈拉南部非洲，在山地生态系统监测、生态修复与循环农业等领域取得重要突破，为我国乡村振兴与绿色“一带一路”战略做出重要贡献。

### 目标

一站一中心 · 一园一产业

山地农业生态系统科学观察研究站；  
山地未来种质资源创新中心；  
沪滇科技合作园；  
循环农业产业园。







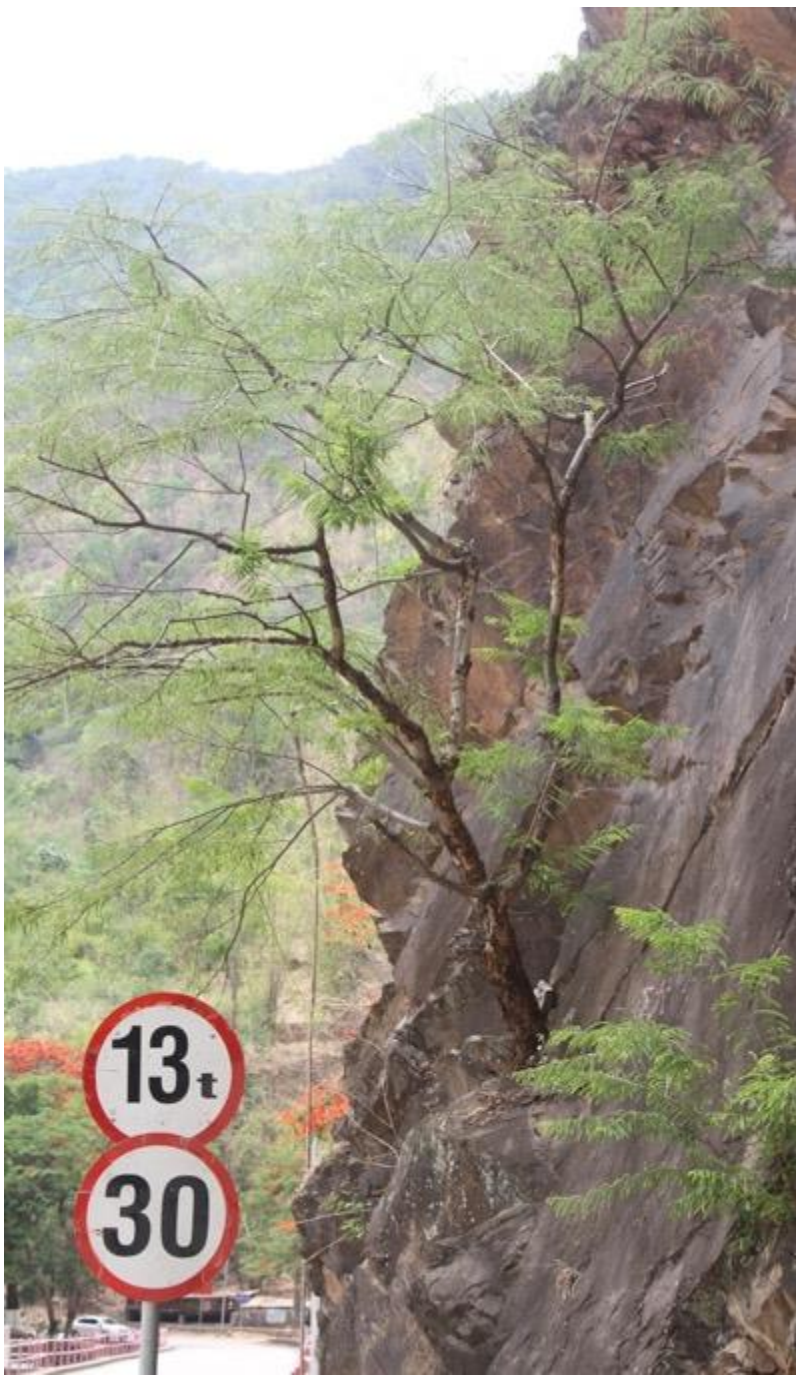




Savanna Valley in Southwest China







India Gooseberry:  
*Phyllanthus emblica*







一颗醒来的柠檬  
a waking lemon



# Fragrant Limon Project

山地未来柠檬谷计划

十万亩标准化种植基地，百亿级香水柠檬产业链



01 良种化苗木基地



02 生态化种植基地



03 城市化生活方式



04 现代化加工产业



# Agroforestry and Circular Agriculture for Restoration and Conservation: Livestock Integration, Microbe Regulation, and Smart Management

S光能



光伏



水资源



边际土地



机械化收割



植物蛋白饲料



青贮饲料生产体系



优质微生物菌株筛选



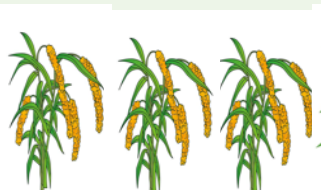
优质饲用玉米



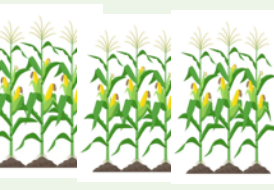
高效酵母粉



边际土壤改良(田管)



高产高蛋白甜高粱



高产优质杂交玉米



香水柠檬生态果园



光伏驱动水肥一体化系统



柠檬酸酶解生产体系



高碳+多肽土壤调理剂

澳白

湖羊



高产优质澳湖羊良种



光伏智能化澳湖羊养殖



智能化畜禽废弃物处理



优质畜禽产品



优质的



营养的五谷



食品添加剂



## Animal Dung-Insect Farming

废弃物处理已经成为工厂化养殖的重大挑战。鸡虫肽生态循环项目依托10万只蛋鸡场的废弃物，利用流水线养殖腐食性黑水虻昆虫消化鸡粪便，年产高价值的新鲜昆虫蛋白800吨，其虫粪是高级生物有机肥1000吨。黑水虻成虫可以提炼脂肪油与虫蛋白。虫蛋白也可以发酵成多肽氨基酸生物肥。







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科技  
创新





< 循环农业创新 >

山地未来 MOUNTAINFUTURES

## Mushroom Farm

山地未来科学家团队从红河阿姆山自然保护区中发现并成功栽培彩色木耳、微型香菇、白灵芝等多个新品种，开展了林菌符合林下仿生栽培，实现了“绿水青山就是金山银山”；对农林业废弃物进行循环利用，开展了冬闲农地的羊肚菌、冬茸与竹荪生态种植，提高了农田土壤有机质，增加了农民收入，构建了“美丽乡村”。







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**Symbiotic Fungi and Agroforestry**  
*(Phlebopus portentosus)*







# Small Ruminant

山地未来澳湖羊计划

千只澳湖羊良种基地，万只优质肉羊产业链



澳湖羊核心保种与育种技术



"育繁推管"一体化运作模式



饲草种质资源筛选与青贮发酵技术



"互联网+畜产品"全产业链



# I have a dream!

## GOODWILL FIBER (善意纤维)



用户价值

环境价值

人文善意

企业发展

我们希望向世界介绍新一代可持续的商业模式，基于联合国可持续发展17项目标框架下，在纺织纤维领域，携手用户，企业，具有社会影响力的专业人士组成的专家团，共同制定这个以善意为原点商业模式，对环境的改善，提高贫困地区就业，用户使用价值与企业发展达成共赢，形成更大范围的协作，并得到永续发展。









Collaborative planning with Indonesian kapok trading enterprises (May, 2023)







**Plant-based  
Cashmere from  
Giant Milkweed  
(*Calotropis procera*)**

# FASHION FROM FRAGILE ECOSYSTEMS





## 二、项目成果：肯尼亚马瓜尼(Makueni)辛巴镇牛角瓜植物羊绒栽培与收购基地







# Pharma - Agroforestry District

## ศูนย์วนเกษตร-พฤกษเภสัช



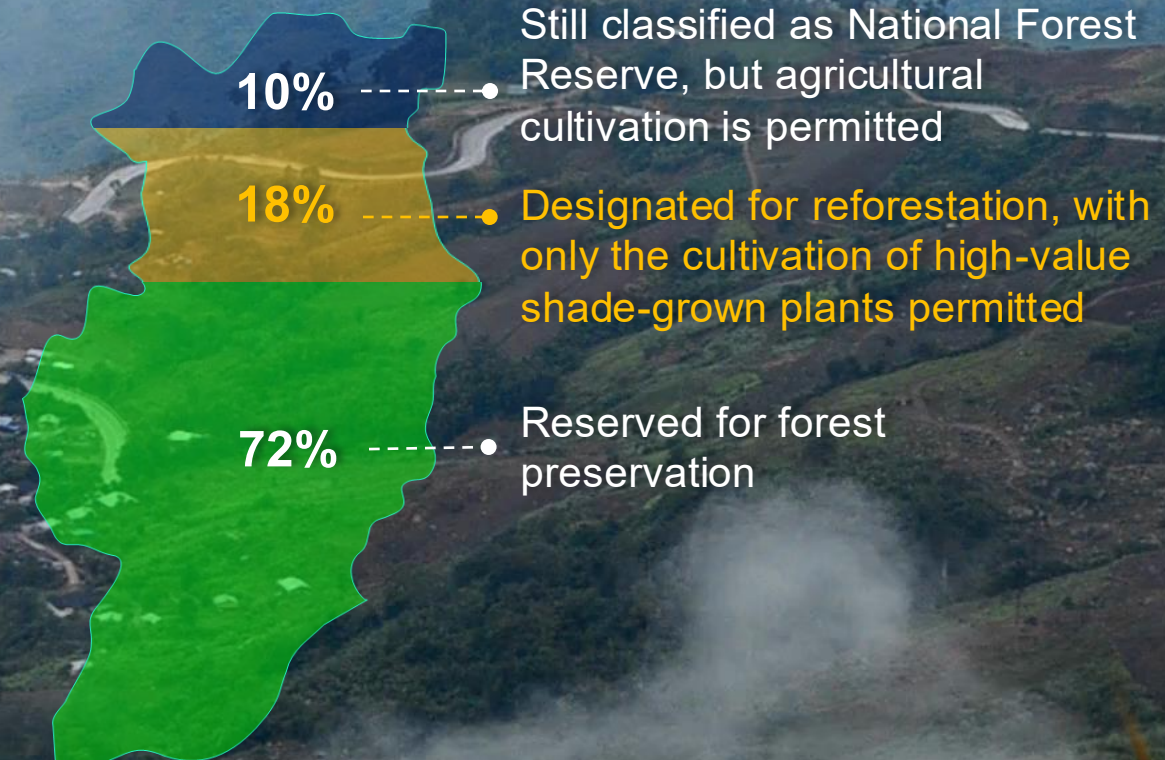


# Nan represents a systemic blind spot whereby multidimensional poverty occurs concurrently with biodiversity degradation: a living lab for change

Hence, if we need to save the environment, we must also save the people who live within it

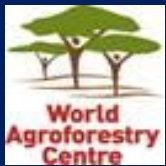
## The Regenerative Cohabitation of Human and Forest: Nan Sandbox

- **Nan** is a Northern province of Thailand
- **7,436 KM<sup>2</sup>** (Approx. 85% of Nan Province) **of Nan is a preserved headwater forest** that contributes 40% of the waters that make up the Chao Phraya River.
- **Today, Nan has lost 28% of the preserved forest due to illegal agricultural expansion**





## Mountain Future II: Lab, Office, Field Experiment, Recruitment of Students and Scientists



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**K** Agro-innovate



The project will use the Center of K Agro-innovate in Nan Province of Northeast Thailand as the core site for testing and demonstrating agroforestry systems and enterprises, while simultaneously supporting the ecological restoration and bioeconomy development in Montane Mainland Southeast Asia, forming a comprehensive bioeconomic network between forest and agroforestry and human settlements, as well as regional salient agroforestry value chain.





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**让科学看见山地，让乡村开启未来！**

**Let science see the mountains,  
let the countryside open up the future!**