

突破三

喀斯特地区生物多样性保护

**Biodiversity Conservation  
in Karst Areas**



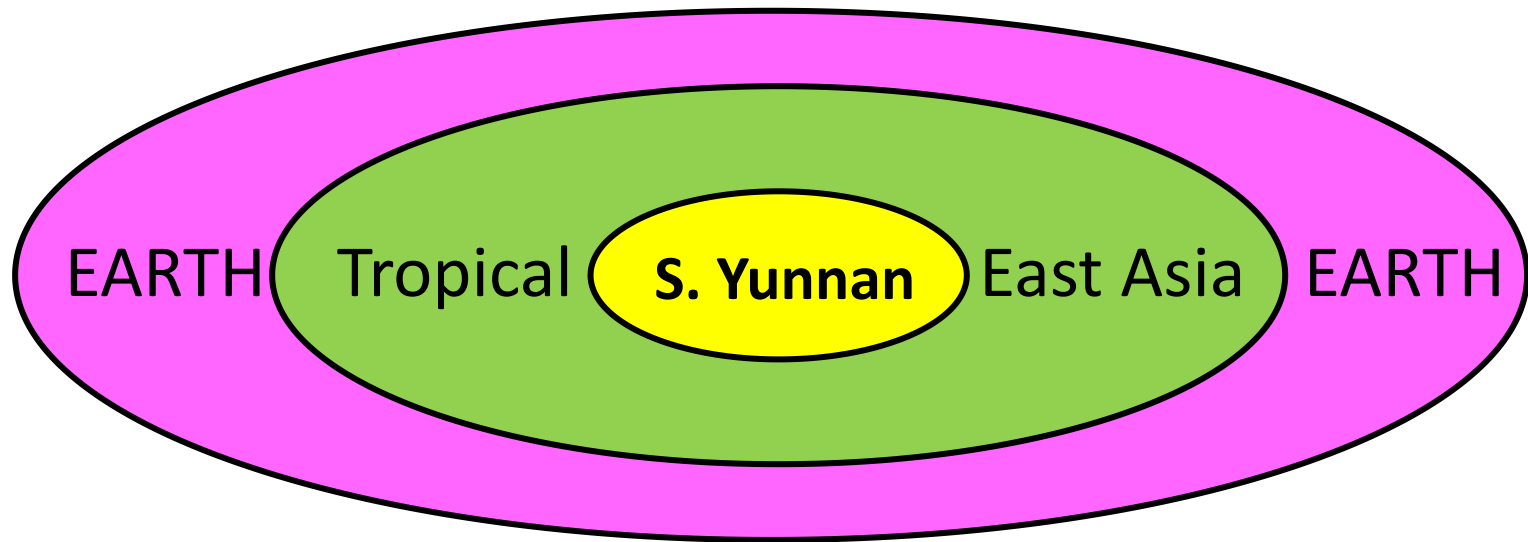
A very  
successful  
6 months!





## Overall goal:

To make a major contribution to the **understanding and conservation of karst biodiversity** in southern Yunnan, in tropical and subtropical East Asia, and in similar environments globally.



## Three **subprojects**:

1. Preserving the **evolutionary potential** of SE Asian karst diversity by reconstructing its origins.

(Harald, Li Jie, Su Tao, Xing Yaowu, Yu Wen Bin, Song Yu).

2. Assessing the **distribution and diversity** of the karst biota in the region.

(Alice Hughes and all members of the project team).

3. Developing practical **strategies for the conservation** of karst diversity in southern Yunnan.

(Richard, Wen Bin, Alice, and all fieldworkers).

## Three **subprojects**:

1. Preserving the **evolutionary potential** of SE Asian karst diversity by reconstructing its origins.

(Harald, Li Jie, Su Tao, Xing Yaowu, Yu Wen Bin, Song Yu).

Aims to establish a historical framework for the diversification of karst plants in Yunnan since the Miocene by an integrated phylogenetic-paleontological approach.

## Three **subprojects**:

2. Assessing the **distribution and diversity** of the karst biota in the region.

(Alice Hughes and all members of the project team).

Focusses on present-day biodiversity and will be used—with Subproject 1—to identify the ‘irreplaceable sites’ for conserving present karst diversity, its past history, and its future evolutionary potential. We expect this subproject will also include many new species discoveries and descriptions.

## Three **subprojects**:

3. Developing practical **strategies for the conservation** of karst diversity in southern Yunnan.

(Richard, Wen Bin, Alice, and all fieldworkers).

The most significant output from Subproject 3 should be the establishment of protected status for as many as possible of the priority sites identified in Subprojects 1 and 2. We will also back-up threatened plants in the XTBG seed bank and/or living collections.



**Director:** Richard Corlett

**Deputy Director:** Alice Hughes

**Coordination:** Pan Libing (CIC secretary)

**Management committee:** PIs of all groups involved.

Monthly PI meetings at the project or subproject level; annual all-participants meetings.

## 2.项目年度目标及考核指标 Annual targets and indicators

2017 (10-12): Collect existing data on regional karsts, including geology, flora, and fauna. Contact regional collaborators. Start writing review(s) of recent karst literature. Assessment indicators: all major components of the project initiated.

All completed.

2018: Field surveys and collections, threat assessments, studies of karst seed biology, microclimate assessment, phylogenetic studies. Assessment indicators: Publication of 2 review papers and 1 assessment of the climate change vulnerability of karst areas in the region and globally. Additional publications .... An international expert symposium...

All in progress, including review papers.

## Major progress so far:

1. Compiling **existing information**.
  - a. Alice's team has compiled **species occurrence records** for karst animals from all available sources.
  - b. Zhu Hua has compiled a **plant species list** for karst in Xishuangbanna.
  - c. Pan Bo has downloaded **karst plant records** for Yunnan from the Chinese Virtual Herbarium.
  - d. Yao Xin and others have checked the Barcode of Life Database and other sources for useable karst plant **sequence data**.
  - e. We have compiled **literature** in English and Chinese on regional karsts and global karst processes.

## Major progress so far:

**2. Reconstructing phylogenetic histories** with high species coverage per lineage; focal groups, in various stages of progress include:

- a. All ferns and lycophytes, selected gymnosperms (Harald's group)
- b. Lauraceae – selected lineages (Li Jie's group)
- c. Other selected angiosperm groups: Orchidaceae, Begoniaceae, Gesneriaceae, *Ficus*, *Ilex*, etc. (Xing Yaowu's group).
- d. Others to be added...

+ Su Tao's group will focus on dating and looking at changes in diversity over time.

## Major progress so far:

### 3. Surveys and collection.

- a. Alice's team lead a **multi-species survey** of southern Yunnan, January 7<sup>th</sup> to February 10<sup>th</sup>. This focused on bats, microsnails, and cave beetles, but also included Wen Bin from the Seed Bank, Zhou Shishun from the Herbarium, and Lu Yun from Kyle's group.
- b. Beng, from my group, collected **soil samples for eDNA** analysis from 22 matched karst and non-karst sites from 22 counties across southern Yunnan.
- c. Additional Yunnan fieldwork by several groups.
- d. Li Lang and Meng Hong Hu from Li Jie's group visited Nature Reserves in **Vietnam** in October/November 2017.



*Io io*





*Rhinolophus  
paradoxolophus*





*Rousettus  
leschenaultii*



Alice's bat group is also looking at patterns of hibernation and migration, and has also found several 'cryptic species' which are similar in morphology but can be distinguished by their calls.

Sequencing is likely to reveal new species.







## Microsnails

**Major progress so far:**

**3. Surveys and collection.**

We have several **new records** awaiting confirmation and several **possible new species**.

## Major progress so far:

### 4. Threat assessment and conservation

- a. All fieldworkers have collected site data for threat assessment.
- b. We have also started collecting information on land ownership status.
- c. We are investigating potential protection mechanisms, including various types of small protected areas (保护区) and collaboration with quarry companies.
- d. Wen Bin is collecting seeds of threatened plant species for the seed bank.

## Major progress so far:

### 4. Threat assessment and conservation

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- d. Wen Bin is collecting seeds of threatened plant species for the seed bank.

**\* Karst habitats and species are highly threatened almost everywhere in the region\***









*Coelogyne viscosa*





Two **karst-related papers** have recently been published by Krizler Tanalgo, a PhD student in Alice Hughes' group, based on work funded from her CAS grant, **not the 135 program**.

1. Tanalgo and Hughes (2018) Bats of the Philippine Islands— A review of research directions and relevance to national-level priorities and targets. *Mammalian Biology*
2. Tanalgo et al. (2018) Bat cave vulnerability index (BCVI): A holistic rapid assessment tool to identify priorities for effective cave conservation in the tropics. *Ecological Indicators*

We will be applying this index in Yunnan.

## **Training:**

We currently have 3 **graduate students** being trained under the project and this will probably increase to 6 over the next few months.

There are also at least 4 '**research assistants**' and 1 **intern** involved in the fieldwork.





At least 5 **post-docs** will have major roles.

## Conference:

Alice has separate CAS funding of 150,000 RMB for an **“International Conference and Workshop on Developing Priorities for Asian Karst Research”** at XTBG in November, 2018.

We will therefore probably move our planned “experts meeting on the evolution of karst diversity” to 2019



经费总额	600		
一、项目经费	575		
1. 设备费	32		equipment
(1) 设备购置费	(32)		
(2) 研制设备费	0		
(3) 设备改造与租赁费	0		
2.材料费	22		
3.测试化验加工及计算分析费	128		sequencing
4.燃料动力费	4		
5.差旅费	160		travel
6.会议费	20		
7.国际合作与交流费	12		
8.出版/文献/信息传播/知识产权事务费	12		
9.劳务费	150		labour
10.专家咨询费	7		
11.其他费用	30		
二、项目综合集成与调控费	25		

NO.	Category	CAS funding	XTBG funding
1	Equipment	7500	
2	Materials	1379.10	
3	sequencing and analysis cost		
4	fuel and power cost		
5	Travel	123796.5	
6	Conference		
7	international exchange		
8	Publication / literature/information dissemination /intellectual property services		
9	Labor	5714.29	
10	experts consulting		
11	Others	28357	
12	Project integration and control costs		
	Total expenditure	166746.89	0

## Next 6 months:

1. Conduct another multi-week, multi-species **field trip** in the summer. New sites + re-visiting previous ones that need further study.
2. Conduct **targeted field trips** to collect species need to fill gaps in phylogenies.
3. Complete the **soil eDNA study**.
4. Expand work on karst plant **seed banking** and **seed biology**.
5. Work on the **review papers** and the first data papers.