Introduction
Understanding Humans and Plants in Early Southwest China

Yunnan Province is located on the southwestern end of modern continental China. To the northeast, it borders with the Chinese provinces of Tibet (*Xizang* 西藏 in Chinese), Sichuan 四川, Guizhou 贵州[1] and Guangxi 广西, and to the southwest with the countries of Myanmar, Laos, and Vietnam **[fig. 1]**. Ecologically, Yunnan sits between temperate East Asia and tropical Southeast Asia, acting *de facto* as a transitional belt between the two regions (Tang 2015). The Yunnan landscape descends from high mountains and an alpine climate in the northwest to tropical rainforest in the southeast, creating vertical zonation in vegetation and environment. This provides the province with the highest biodiversity within mainland China, counting 14,822 of native seed plants, which corresponds to ca. 49% of the total recorded seed plants in the whole country, giving Yunnan the title of 'Treasure Garden of China'.[2] Yunnan's biodiversity attracted many 'botanical explorers'[3] in the early nineteenth century, who travelled to the region and identified and exported the local flora, contributing to document the vegetation of the province before its economic modernisation.

Note on Chinese terms and names: this volume uses Pinyin, the official romanization system of the People's Republic of China, for the transliteration of Chinese terms. Chinese characters are presented as per the original publication, either in simplified or traditional form, depending on the version adopted by the original authors. Chinese personal names are listed according to the standard practice, with the surname preceding the given name.

1 Geographically, the region of Southwest China includes the provinces of Yunnan, Sichuan, Guizhou and Chongqing 重庆 Municipality. Tibet is sometimes also included in broader Southwest China, and other times given its own regional division.

2 Wu 1977-2006; Walker 1986; Myers 1988; Zhao 1994.

3 Botanists that went on expeditions to Yunnan include, for example, French missionary Père Jean Marie Delavay (1834-95), Scottish botanist George Forrest (1873-1932), and British botanist Ernest Henry Wilson (1876-1930; see Godfrey 2017).

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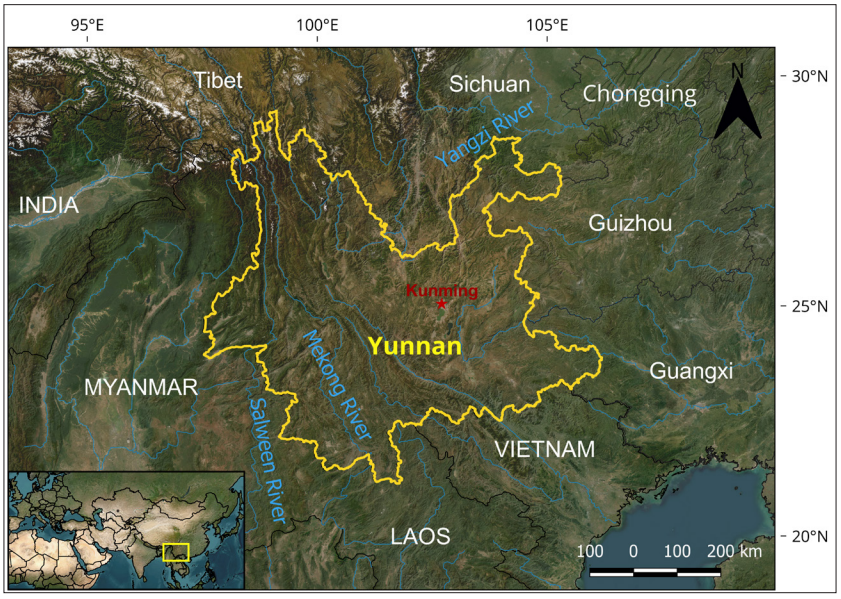

Figure 1 Location of Yunnan Province with indication of capital city of Kunming, major rivers, neighbouring Chinese provinces and Asian countries. Made by the Author with QGIS 3.28.5. Firenze, Natural Earth and ESRI Imagery basemap

Yunnan is also home to the largest number of ethnic groups in China. According to the 2020 Chinese National Census, the province had a population of 47,209 million people, accounting for 3.34% of the total Chinese population (NBS 2021). At least 25 recognised ethnic groups live in Yunnan, representing over 33% of the total provincial population. The 2020 Chinese Population Census further states that, within modern China, some of these groups are only found in Yunnan (NBS 2023). These include, for example, the Hani 哈尼, Dai 傣, Va (*Wa* 佤), Lahu 拉祜, Naxi 纳西, Jingpo 景颇, Blang (*Bulang* 布朗), Achang 阿昌, Pumi 普米, Nu 怒, Jino (*Jinuo* 基诺), De'ang 德昂, and Drung (*Dulong* 独龙) people. This contributes to an unparalleled diversity of cultural traditions and customs, and the vertical zonation of Yunnan's vegetation offers insights into the distribution of those ethnic populations, with the same group inhabiting similar landscapes sharing elevation, vegetation, climate and derived lifeways across distinct areas of the province (and across with neighbouring countries; Zhao 1994). The great diversity in landscapes and people of Yunnan has contributed to the current popularity of the province for both domestic and international travel, with an attested 5% increase in annual visitors in the last few years (SCIO 2024). The fascination with Yunnan's modern life, culture, and landscapes is counteracted by the still rather limited knowledge about its early cultural and social development. Yunnan's remote location might have hindered systematic archaeological research. Other contributing factors include the general short history of archaeological research in the country as a whole and the greater focus placed upon the investigation of the Central Plains, seen as the 'cradle of Chinese civilisation'.[4] This narrative

4 Falkenhausen 1993; Shelach-Lavi 2015; Lu 2012; Liu, Chen 2012; Yao 2016.

puts the Central Plains in contrast to more peripheral areas and as such traditionally considered of secondary importance to the development of Chinese civilisation. This is well exemplified by the scarcity of information about Yunnan contained in recent major English language reference books of Chinese archaeology, which reflects the lower number of archaeological excavations undertaken in the province.[5] The assumed secondary role of Southwest China in the formation of Chinese civilisation is being increasingly challenged.[6] On one hand, archaeological finds such as the incredible hundreds of bronzes, jades, gold, and ivory artefacts from two sacrificial pits in Sanxingdui 三星堆, Sichuan, in 1986 fuelled interest in the region. On the other hand, the modernisation of Yunnan's infrastructure, especially the construction of railways and motorways to connect the province to the rest of the country, although not the only factor at play, undoubtedly had a role in the expansion of archaeological excavations in the province in the past decades. Notwithstanding the rescue nature of most of these archaeological campaigns, Yunnan has become the focus of academic interest for topics such as early migrations across Asia and interactions between the early Chinese states and local polities, just to name a few.[7] Interest in early subsistence practices has developed alongside the chronological reconstruction of the cultural developments of the area.[8] Given the rich local environmental diversity within Yunnan and broader Southwest China, questions of past plants dispersal, ecological adaptation and uses are essential for fully understanding the socio-economic development of this region from antiquity to today.

Today, most of the areas with human occupation in Yunnan are frost-free, and this is hugely beneficial for agriculture. Despite the widespread belief that the karstic nature of Yunnan makes it unsuitable for agriculture,[9] plant production in the province has seen a continuous increase in the last decades. In 2023, Yunnan was the third Chinese province for fruit exports, and the fourth for vegetable products exports.[10] According to statistics provided by the Chinese National Bureau of Statistics (*Guojia Tongjiju* 国家统计局),

5 Yunnan is barely included in the seminal work by K.C. Chang (Zhang Guangzhi 張光直; 1931-2001) *The Archaeology of Ancient China* (1986), where the province is mentioned only in relation to early hominid sites (e.g., the Yuanmou Man). The province is not included at all in the edited volume *A Companion to Chinese archaeology* (Underhill 2013). Yunnan is mentioned in relations to bronze production and its long-distance trade in *The Archaeology of China* by L. Liu and X.C. Chen (2012, 249-50, Ch. 10) and *The Archaeology of Early China* by G. Shelach-Lavi (2015, 246-57, 331-6). At time of writing of this book, only two English language monographs have been published about prehistorical and early historical Yunnan to date: *The Ancient Highlands of Southwest China* (Yao 2016); *Ancient China and the Yue* (Brindley 2015).

6 Through his work in the prehistory and early history of frontier regions in Southwest China, Tong Enzhen 童恩正 (1935-1997) played an important role in highlighting the existence of local cultures in Southwest China before the Han's influence on the region, which in turn resulted in an increased recognition of local contributions and multi-regionalism in the formation of early Chinese Civilisation (Chang 1986; Falkenhausen 1995). His work is often cited as laying the basis for the current flourishing of archaeological work in these areas in the last two decades (see Hein 2014).

7 See, for example, Yang et al. 2023; Wu et al. 2019; Wang J. 2018; Yao 2016; Allard 1998.

8 See d'Alpoim Guedes 2011; 2013; d'Alpoim Guedes et al. 2015; Li et al. 2016; Dal Martello 2022.

9 According to Walker (1986), only 6% of Yunnan (the area comprised of small basins and valleys) would have been originally suitable for agriculture.

10 Statements from the Belt and Road Portal, Xinhua News Agency. `https://eng.yidaiyilu.gov.cn/p/0ROJV61F.html`.

the "total sown area of farm crops" in Yunnan was 5,890,000 ha in 2004; by 2022 it had increased to 7,130,000 ha, of which 746,930 ha of land were occupied by tree orchards (NBS 2024). This indicates that today about 20% of Yunnan territory is occupied by some level of agricultural practices.[11] Until the early 2000s, rice was one of the most cultivated cereal grains across the province, but since 2010 maize production has surpassed that of rice.[12] Before this shift, state records attest that below 1,000 m asl, abundant water availability derived from rivers, lakes, and precipitations allowed up to three crop harvests per year, often of irrigated rice (Zhao 1986; 1994, 38).[13] These regions have been historically occupied by the Dai ethnic group (Bray 1984, 21). Above 1,000 m asl, rice was cultivated in the summer, followed by wheat in the winter. Finally, above 2,400 m asl, in the western and southern border areas of the province, one crop was produced per year (Zhao 1994, 38). Here, there is a long history of slash and burn agriculture, which historically has been practiced by Drung, Jingpo, Dai, Bouyei (*Buyi* 布依), Va, Nu, Miao 苗, De'ang, Yao 瑶, Yi 彝, Hani, Lahu, and Jino groups (Bray 1984, 21; Shirasaka 1995; Yin 2001). This type of agricultural regime (also known as swidden or shifting agriculture)[14] is practiced in hilly areas and uses fire to remove the vegetation cover and to naturally fertilise the soil. After the vegetation is cleared, dryland crops are planted; after harvest the land is left to fallow for several years so to recover the lost soil nutrients, and fields are moved to another patch of land, which is cleared through fire before sowing. According to ethnographic surveys undertaken by anthropologist Yin Shaoting 尹绍亭 between 1983 and 1990, it was estimated that until the first half of the twentieth century, slash and burn practices were the dominant agricultural system in Yunnan (Yin 2001; 2015).[15] By the time of Yin's study in the 1980s, such cultivation system, although still reported as present, was nested in the mountains along the western and southernmost limits of the province borders. Its progressive decline was due to the mechanisation of agriculture and the general industrial development post 1949 (Yin 2001, 86-7). Today slash and burn agriculture is found almost exclusively in Xishuangbanna, in southern Yunnan (Yin 2015).[16]

11 This corresponds to a total agricultural production of 2,857,920 billion tons in vegetables and 1,957,960 billion tons in grain crops in 2022, compared to 1,509,500 billion tons in grain crops and 855,140 million tons in vegetables in 2004 (NBS 2024).

12 Today total maize production in tons is more than twice as much that of rice.

13 The National Bureau of Statistics divides rice production according to seasons and cropping practices in early rice, middle season rice, single cropping late rice, and double cropping late rice, further indicating how the peculiar environmental and climatic conditions of the province allow a rich, almost year-round rice production.

14 In Chinese slash and burn agriculture is indicated as *daogeng huozhong* 刀耕火种 (tilled with knife planted with fire). Historical texts until the Song Dynasty (960-1297 CE, then uncommon) used the term *shetian* 畲田 (field cultivated by first setting fire to it; Yin 2001).

15 Beyond Yunnan, slash and burn agriculture was also still practiced in Hainan and in southern Guizhou (Yin 2015).

16 It is worth pointing out that local ethnic groups still practicing slash and burn agriculture in the 1970s and 1980s were largely blamed for forest degradation and pushed to adopt other types of 'improved' (less 'primitive') agriculture (Yin 2015, 123). This, together with population growth, the adoption of mono-culture plantations, and the implementation of state agricultural policies (for example the 2003 Sloping Land Conversion Program in northwest Yunnan) have altogether caused a progressive decline or completely ended slash and burn practices (see Guo et al. 2002; Gros 2014).

Although scholars hypothesise that the earliest agricultural systems were similar to slash and burn practices, information on the establishment of early agricultural systems in the region is scarce. In the last two decades, the direct recovery of ancient plant remains from archaeological sites through the increased application of flotation (see Ch. 2) has resulted in a wealth of data that puts us in a unique position to reconstruct the origin and development of agricultural systems in China, based on direct evidence from archaeological sites. This book reviews the available archaeological and archaeobotanical evidence related to the transition to an agricultural life in Yunnan and explores questions of how agriculture emerged and developed in the region. Covering the period from the first sedentary villages to the Han conquest of the Dian Kingdom (third millennium BCE to early first millennium CE), this book also explores the local evolution of farming in the broader context of external connections and local adaptations. What role did migrations play in the establishment of farming systems in Yunnan? And was Yunnan itself the origin for further spreads of agriculture to the surrounding regions, such as mainland Southeast Asia, as it has been inferred by some linguistics reconstructions? By analysing crops cultivation and uses, and comparing findings from Yunnan with those from broader Southwest China and mainland Southeast Asia, this monograph addresses the question of early human migrations in and out of Yunnan, and how these impacted the evolution of the region's first agricultural societies, ultimately laying the basis for the flourishing agricultural production we see in the province today.

In chapter 1, I present methodological approaches to the study of early agriculture, this includes a review of the history of archaeobotanical research in China in the context of the larger archaeological research trends in the country. Chapter 2 provides a synthesis of both early and more recent theories on the origin of agriculture in China, with special emphasis on early domestication hypotheses and recent archaeological developments that either corroborated or confuted those hypotheses; this includes theories linked with the farming/language dispersal in relation to Yunnan. This chapter ends with a synthesis of current knowledge on the spread of cereal crops domesticated elsewhere to China, as these crops contributed to the diversification of local agricultural production, including in Yunnan. In chapter 3, the ancient climate of Yunnan is reconstructed through examination of paleo-proxies from the region. This provides an environmental context through which situate the emergence of a settled, agricultural lifestyle in prehistoric Yunnan. Chapter 4 provides information on currently known sites in Yunnan with available archaeobotanical evidence to date. Data from stable isotopes is also included as this is a methodology that is increasingly being undertaken in China to explore dietary composition of ancient people and animals. Isotopes studies provide an additional line of evidence through which compare and reconstruct ancient people's diet. I use the available evidence to trace the history of agricultural practices from emergence to intensification in Yunnan. Special focus is placed on the area known as *Sanjiang* 三江 in Chinese (often referred to as the Three Rivers area), where the Yangzi, Mekong, and Salween rivers converge, creating a hub for connections between East, South and Southeast Asia. In chapter 5, reconstructed trajectories to agriculture in Yunnan are compared with those of its neighbouring regions, including broader Southwest China and mainland Southeast Asia, where agriculture is often hypothesised to derive

from Yunnan. Through this, I trace possible routes of cultural connections and migrations across broader East and Southeast Asia as evidenced by the reconstructed archaeological and archaeobotanical framework.

The aim of this book is to understand how the development of a productive subsistence based on the cultivation of domesticated plants impacted the evolution of prehistorical and early historical societies in Asia at both the local and regional levels. This work will be relevant for scholars working in this region and more broadly to researchers interested in the topic of ancient agricultural production, as well as those interested in cultural and economic exchange and connections in prehistoric times. More broadly, this book provides a glimpse into how prehistoric people in Yunnan lived, and how they interacted with a landscape that today has been heavily changed by millennia of agricultural practices.