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乡土未来:面向地方发展的乡土和土质建筑保护

VERNACULAR AND EARTHEN ARCHITECTURE TOWARDS LOCAL DEVELOPMENT

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乡土未来:面向地方发展的乡土和土质建筑保护

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Preface

CIAV is an international platform for the dialogue and cooperation between professionals, experts, academics and students of vernacular heritage. We work primarily through our annual meetings and scientific conferences. CIAV fosters discussions and activities on national and regional levels.

CIAV consists of members with established expertise in the field of Vernacular Architecture.

Our annual conferences are held to exchange experiences and new knowledge. This is of utmost importance for us professionals in order to further develop our competence in our fields of work. The term Vernacular Architecture includes a great variety of building types and sites, making it necessary for us to have knowledge in nearly all kinds of building constructions and the use of land.

We aim to ensure a multidisciplinary approach to the vernacular heritage by encouraging interaction between different disciplines within the framework of the annual CIAV scientific meetings and through CIAV membership. Establishing strategic alliances with other ISCs whose field of work are represented in vernacular architecture is an important aspect. This year's conference organised together with ISCEAH, International committee on Earthen Architectural Heritage, is an illustration on this work.

CIAV offers support for the cause of conservation for vernacular architecture around the world on different levels: international, regional, national and local. This may be moral support or exercising pressure to save endangered buildings and built heritage. It may also be technical support on international level to UNESCO and NGO's such as WMF and national and local levels to relevant authorities and organisations upon request.

CIAV was founded in 1976 following a resolution from the international conference for the conservation of vernacular architecture held in Plovdiv, Bulgaria, in 1975. There were 12 founding members from the 12 national committees (countries) and an additional 10 associate members. To-day we are 120 members (including 8 honorary members) within CIAV, from 52 countries.

At the moment CIAV is headed by architect Gisle Jakhelln (Norway) as President, architect Valeria Prieto (Mexico) as Vice President, architect Maria In s Subercaseaux (Canada) as Vice President and architect Ivan Enev (Bulgaria) as Secretary General.

CIAV's field of work is wide. Over the years the committee has learned to enlarge its understanding of what 'vernacular' is – from single farmsteads and traditional village units to urban vernacular areas and settlements, to cultural landscape areas, and the links between the vernacular heritage and the geomorphologic conditions of the landscape.

This conference underlines the wide field of CIAV's work. I am thankful for the keen interest in organising this conference by ICOMOS China and in particular Professor Shao YONG.

Gisle Jakhelln
President of ICOMOS—CIAV
June 26th ,2019

序

国际古迹遗址理事会乡土建筑科学委员会(下简称 CIAV)是一个供专业人士、专家、学者和学生之间就乡土遗产进行对话与合作的国际平台。我们主要通过年度会议和学术研讨会开展工作,在国家与地区层面促成讨论与活动。

CIAV 由在乡土建筑领域拥有丰富专业知识的成员组成。我们每年会举办年度会议,旨在交流经验和最新技术。这对于专业人员进一步提升在工作领域的竞争力至关重要。“乡土建筑”一词涵盖了广泛的建筑类型和场地,这就要求我们有必要了解几乎所有类型的建筑建造和土地使用方式。

我们的目标是在 CIAV 成员之间、年度学术研讨会的框架之下,通过鼓励跨学科的交流互动,建立一个研究乡土遗产的多学科方法。与诸多研究特定类型乡土建筑的 ICOMOS 科学委员会建立战略联盟,也是 CIAV 的重要工作之一。今年的会议与土质建筑科学委员会(ISCEAH)一起举办,即是一次较好的合作范例。

CIAV 为全世界范围的乡土建筑保护事业提供支持,涵盖国际、区域、国家和地方各个层面。这些支持或是道义上的支持,或是为了拯救濒危建筑与建成遗产施加压力,或是根据有关机构与组织的要求提供技术支援。服务对象既包括国际层面的联合国教科文组织、非政府组织(如 WMF),也有国家和地方层面的有关当局和机构。

CIAV 根据 1975 年保加利亚普罗夫迪夫举办的乡土建筑保护国际会议的相关决议,于 1976 年正式成立。初成立时,只有来自 12 个国家委员会的 12 名创始成员和另外 10 名准成员。今天,我们已有来自全球 52 个国家的 120 名成员(包括 8 名荣誉委员)。

目前,CIAV 由挪威建筑师 Gisle Jakhelln 担任主席,墨西哥建筑师 Valeria Prieto 和加拿大建筑师 Maria Inés Subercaseaux 担任副主席,保加利亚建筑师 Ivan Enev 担任秘书长。

CIAV 的工作领域很广。数年来,委员会不断扩展对“乡土”一词的内涵释义,从单一的农庄、传统的村落单元到城市中自发形成的区域与居民点,再到文化景观区以及乡土遗产与地理环境之间形成的强烈联系。

本次会议正凸显了 CIAV 工作的广泛领域。在此,我要十分感谢中国古迹遗址理事会,特别是邵甬教授对这次会议组织的热情与持续投入。

吉斯勒·亚克林
国际古迹遗址理事会乡土建筑科学委员会主席
2019 年 6 月 26 日

Preface from ISCEAH

The International Scientific Committee on Earthen Architectural Heritage is a Committee from ICOMOS with 140 experts and associate members, from 41 countries. ISCEAH contributes to the development of better practice and methods for the protection and conservation of the world's earthen architectural, archaeological and cultural landscape heritage.

The objectives of the scientific program of ISCEAH are focused on: (1) Conserving and studying the standing, and in use, architectural heritage; (2) Conserving and studying the earthen archaeological environment; (3) Understanding the historic/ traditional techniques of earthen structures, including its impact on new earthen construction; (4) Researching the contribution of earthen architectural heritage to cultural landscapes and its relation to the intangible heritage and living traditions; and (5) Researching ancient/ historic a-seismic techniques, in addition to current research, to inform retrofitting of existing structures and appropriate new construction.

At present, ISCEAH is headed by Mariana Correia (Portugal) as President; Maddalena Achenza (Italy) as Vice-President; Pamela Jerome (USA) as Secretary-General; Shao Yong (China) as Treasurer; Ione Stiegler (USA), as In Use Chair; Jorge Aching (Peru), as Archaeology Chair; Bakonirina Rakotomamonjy (Madagascar), as Technology Chair; Ishanlosen Odiaua (Nigeria), as Landscape Chair; and Claudia Cancino (Peru/USA), as Seismic Chair. The International Committee has been a platform of dialogue and knowledge exchange between professionals and academics from the 5 continents.

For almost 50 years, earthen architecture experts have gathered on different continents. The first symposium in 1972 in Iran, grew from a group of less than two-dozen people to an International Conference with 750 people attending TERRA 2016, in Lyon, France. In the near future, TERRA 2021 will take place in Santa Fe, USA, and TERRA 2024 in Cuenca, Ecuador, and more than a thousand experts will be expected to attend the events that became now a World Congress, under the aegis of ISCEAH. The Committee now contributes for World Heritage assessments regarding desk-reviews, technical evaluation missions and reactive monitoring missions to World Heritage earthen properties, and addresses assessments for the World Monument Fund regarding cultural nominations.

The organization of the ICOMOS CIAV-ISCEAH 2019, Joint Annual Meeting and International Conference "Vernacular & Earthen Architecture towards Local Development" reveals the commitment of ICOMOS-ISCEAH and ICOMOS-CIAV, with ICOMOS-China, to work together with WHITRAP and Tongji University, to protect cultural heritage and enhance best practices in the conservation of vernacular and earthen sites, and in particular, the World Heritage city of Pingyao. The successful collaboration of international and national institutions organizing CIAV-ISCEAH 2019 was just possible due to the commitment of professionals from ICOMOS-China and in particular of Prof. Shao Yong and her team. Thank you to all.

The International Scientific Committee of Earthen Architecture Heritage (ICOMOS-ISCEAH) joins efforts with other institutions to continue supporting capacity-building initiatives for and with communities: in Pingyao and around the world.

Mariana Correia
President of ICOMOS-ISCEAH

序

国际古迹遗址理事会土质建筑遗产科学委员会(以下简称 ISCEAH)由来自 41 个国家的 140 位专家委员与委员组成。ISCEAH 致力于为世界范围内的土质建筑、考古和文化景观遗产寻求更好的保护实践和方法。

ISCEAH 科学计划的目标着重于五大主题:(一)保护和研究既存且处于使用中的建筑遗产;(二)保护和研究土质考古环境;(三)通过研究物质特性及其对新的土质构造的影响,理解土质结构相关的历史及传统技术,并在这一过程中进行合作;(四)研究土质建筑遗产对文化景观,以及其与非物质遗产和生活传统之间关系的促进作用;(无)研究古代及历史上的抗震技术,并在当前研究中应用这些技术为既有结构的改造和适应性新建造提供借鉴。

目前,ISCEAH 由玛丽安娜·科雷亚(Mariana Correia,葡萄牙)担任主席,玛达莱娜·阿西娜(Maddalena Achenza,意大利)担任副主席,帕梅拉·杰罗姆(Pamela Jerome,美国)担任秘书长,邵甬(中国)担任司库。艾奥尼·斯蒂格勒(Ione Stiegler,美国)负责遗产利用主题,豪尔赫·阿辛(Jorge Aching,秘鲁)负责考古主题,巴科尼丽娜·拉库图马蒙吉 Bakonirina Rakotomamonjy(马达加斯加/法国)负责技术主题,伊斯汉洛森·奥迪欧(Ishanlosen Odiaua,尼日利亚)负责景观主题,克劳迪娅·坎西诺(Claudia Cancino,秘鲁/美国)负责抗震主题。ISCEAH 已成为五大洲专业实践和学术界人士进行对话和知识交流的平台。

50 多年以来,土质建筑领域的专家在世界各地齐聚一堂。1972 年在伊朗举办的首届研讨会还只是 20 人左右的团体,到 2016 年法国里昂举办的世界生土建筑大会(以下简称 TERRA 大会),已有 750 余名参与者。不久之后即将在美国圣达菲和厄瓜多尔昆卡举办的 2021 和 2024 年 TERRA 大会将会吸引一千余名参与者,成为在 ISCEAH 指导下的一个真正意义上的世界大会。如今,ISCEAH 还致力于世界遗产评估,包括针对土质世界遗产的书面材料的审查、技术评估考察和反应性监测考察,同时还为世界文物基金会的文化遗产保护申请进行评估。举办 2019 年国际古迹遗址理事会乡土建筑和土质建筑遗产科学委员会联合年会暨"面向地方发展的乡土和土质建筑保护"国际学术研讨会,体现了国际古迹遗址理事会乡土建筑和土质建筑遗产科学委员会,以及中国古迹遗址保护协会与高水准机构如亚太遗产中心和同济大学等共同合作保护文化遗产并加强乡土和土质遗产地保护最佳案例(特别是世界遗产城市平遥)的承诺。2019 年国际古迹遗址理事会乡土建筑和土质建筑遗产科学委员会联合年会能够成功举办离不开各国际机构和国家机构通力合作,离不开中国古迹遗址保护协会的专家,特别是邵甬教授及其团队的辛勤付出。在此向所有人表示感谢。

国际古迹遗址理事会土质建筑遗产科学委员会将同其他机构一起共同努力,继续支持平遥乃至全世界针对社区的能力建设倡议和举措。

玛丽安娜·科雷亚
国际古迹遗址理事会土质建筑遗产科学委员会主席

Preface

The ancient city of Pingyao is an outstanding example of Han cities in the Ming and Qing dynasties (from the 14th to 20th century). It retains all the Han city features, provides a complete picture of the cultural, social, economic and religious development in Chinese history, and it is of great value for us to study the social form, economic structure, military defense, religious belief, traditional thinking, traditional ethics and dwelling form.

Since 1980s, China has started the establishment of the conservation theory of historic cities and the practices. The effort to conserve Pingyao ancient city, in which I was engaged then as programme director, is a typical and important example of integrated conservation in China. The inscription of the ancient city of Pingyao on the World Heritage List in 1997 has brought the city into a new phase of development. Pingyao County People's Government has worked with Tongji University, Shanxi Urban Planning & Design Institute and other universities and institutions since 2000 to carry out continuous research and practice to deal with the dual objectives of human-habitat heritage conservation and urban development. In addition to important and officially protected cultural relics, a large number of vernacular heritage have been rescued and protected through the effort, which also led to a multidimensional development in social, economic, environmental and cultural terms of urban and rural areas.

I am very pleased to know that the ICOMOS-CIAV& I SCEAH 2019 Annual Meeting & International Conference on "Vernacular & Earthen Architecture to wards Local Development" will be held in Pingyao. I hope that this conference will provide Pingyao with new development opportunities in the future, as well as the advanced theories, methods and techniques from international experience to conserve its abundant vernacular and earthen heritage resources. And importantly, this is an occasion where Pingyao would make its own contribution to the international community of heritage conservation, by building an important platform for ICOMOS and international experts, scholars, managers and technicians to exchange experiences and discuss challenges on the conservation of vernacular & earthen heritage.

Ms. SHAO Yong, a professor at Tongji University and my student, is in charge of the organization of conference and the publication of the conference proceedings, etc., which makes me feel so proud. I am glad to write a preface for this proceeding to express my sincere wishes for the inheritance of the spirit of heritage conservation and the undertaking from generation to generation, and I also expec more and more successful practices in heritage conservation that will emerge in the future.

RUAN Yisan
Professor of College of Architecture and Urban Planning, Tongji University
Director of National Historic Cities Research Center
Advisory Board Member of the Academic Committee of Historical and Cultural City Planning, the Urban Planning Society of China (ACHCCP-UPSC)
June 24th ,2019 in Tongji University

序

平遥古城是汉族城市在明清时期的杰出范例(14—20 世纪),它保存了汉民族城市的所有特征,为人们展示了一幅中国历史非同寻常的文化、社会、经济及宗教发展的完整画卷,并且对研究这一时期的社会形态、经济结构、军事防御、宗教信仰、传统思想、伦理道德和人类居住形式等都具有重要价值。

1980 年代以来,中国开始了保护历史城市的理论探讨和实践,我当年主持的平遥古城保护即为典型的完整保护的重要案例。平遥古城在 1997 年成为世界遗产,从而进入新的历史发展阶段。从 2000 年以后,针对人居遗产保护与城市发展的双重目标,平遥县政府和同济大学、山西省城市规划设计院等高校、研究机构进行了持续不断的保护研究和实践的工作,除了重要的文物保护单位,也抢救和保护了大量的乡土遗产,并且也获得城乡社会、经济、环境和文化等方面的发展。

我非常高兴地看到 2019 年 ICOMOS 乡土建筑科学委员会与土质建筑遗产科学委员会的联合年会暨面向地方发展的乡土和土质建筑保护学术研讨会在平遥召开,希望平遥古城不仅通过此次机会获得新的发展契机,从国际经验中获得针对平遥丰富的乡土遗产和土质遗产保护的理论、方法和技术参考,同时也为国际的遗产保护贡献自己的力量,成为 ICOMOS 和国际专家、学者、管理者、技术人员等就乡土遗产和土质遗产的保护经验和挑战进行交流的一个重要平台。

同济大学邵甬教授主持了本次国际研讨会的组织、论文集的编辑出版等,作为她的老师我甚为宽慰。值此学术研讨会论文集出版之际,欣然为之序,祝愿遗产保护精神和事业能够代代传承,涌现更多的遗产保护成功案例。

同济大学建筑与城市规划学院 教授
国家历史文化名城研究中心主任
中国城市规划学会历史文化名城保护规划学术委员会 顾问委员
2019 年 6 月 24 日于同济大学

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Amarbuyant Monastery: Conservation and Revitalization through Community Engagement and Digital Documentation

Ricelli Laplace Resende[1], *Christopher McCarthy*[2], *Erdenebuyan Enkhjargal*[3]

1 Kyoto University, Graduate School of Global Environmental Studies
2 Johns Hopkins University, Japan
3 Doshisha University, GSGS

Abstract The Amarbuyant Monastery is a geographically and culturally significant stop on the Great Tibetan Highway. Spanning from Lhasa to Ulaanbaatar, this route was used for the exchange of ideas and information by pilgrims and traders since the 13th century; forging cultural, economic and political ties that still exist between Mongolia and Tibet to this day. Towards Ulaanbaatar, Amarbuyant is the first temple complex on the route inside Mongolia territory, located close to the Chinese border. Many important a historical figures have used this temple as refuge after crossing the Gobi Desert, including the 13th Dalai Lama in 1904. Although the complex was almost completely destroyed during the Soviet purges of the 1930s, reconstruction and conservation activities undertaken by the local community and lamas (monk teachers) have conserved part of the temple, and locals still gather for religious and cultural ceremonies. No historical maps are known to exist about the Mongolian side of the pilgrimage route and its temples.

This is the first study to document the physical structures of the Amarbuyant temple complex for heritage conservation. In order to create a database and image collection of the temple, drone technology was used to obtain aerial views of the complex, highlighting archeological boundaries and structures. Interview surveys were conducted with nomadic households living around the complex, resident lamas and students.

Results contemplate aerial documentation, retraced architectural maps, and imagery documentation of buildings and surroundings. Perspectives from local community members and their relationship with the temple, and exploration of future possibilities for conservation is discussed. This study creates awareness for the cultural heritage of the Gobi Desert, and is a starting point for future studies to contribute to a conservation action plan for Amarbuyant Monastery, and other archeological sites along the Great Tibetan Highway into the cultural heritage registry of Mongolia.

Keywords drone and digital heritage, Mongolian heritage, intangible heritage, The Dalai Lama, Mongolian-Tibetan route, imaging science, digital archeology

1 Introduction

1.1 The Mongolian-Tibetan Route

The Great Tibetan Highway stretches across more than 2700 kilometers of harsh landscape between Ulaanbaatar and Lhasa (McCarthy, 2019). It is a mysterious and fabled land, a mix of steppe and deserts, nearly half the size of Europe. In the 13th century, this route facilitated the exchange of ideas and information between pilgrims and traders fostering cultural, economic and political ties that still exist between Mongolia and Tibet (Atwood, 2014). Caravans and important historical figures (including the 13th Dalai Lama in 1904 who was fleeing the Younghusband expedition) used this route for travelling and its temples as shelter (Atwood, 2014). It is said that Lamaism (Tibetan Buddhism) has been the key aspect linking the Mongolian people, contributing to the country's cultural cohesion (Sharad, 2010).

This paper is a part of a study that retraced and documented in detail the Mongolian side of the ancient caravan route between 2016—2019 (McCarthy, 2019). The route was traced back and documented using modern technological tools such as GPS, drones (UAV) and architectural survey for

heritage conservation.

Guided by historical sources from 19th and 20th century explorers (Prezwalski, 1876; Roerich, 1931 & Lattimore, 1962) and field survey, the route and its elements were studied: waypoints and coordinates, temple complexes, padme hum stones, deer stones and way markers, wells, oases, and other cultural heritage artifacts.

1.2 The Amarbuyant monastery

In this paper, we will discuss a historically and geographically significant temple complex of the route: The Amarbuyant Monastery. This monastery is especially famous for the visit of the 13th Dalai Lama in 1904. It was the first Mongolian temple to shelter his caravan, which was secretly fleeing the British invasion of Tibet in the early 20th century (Kozlov, 2004).

The monastery is located in Bayankhongor province, close to the border of Gobi Altai province and the Gobi Protected Area A and Chinese border in the south. The closest sum (district) is Bayan-Odor (Fig. 1).

Amarbuyant Monastery was a thriving community, until it was invaded and destroyed during the Soviet purges in 1937. Buddhism used to be central in the life of Mongolians. In 1918 it is estimated that 115,000 monks were living in the country. A census in 1937 counted a total of 700 monasteries, which were home to more than 110,000 practicing monks (Lokesh, 2001).

In the late 1930s, almost all the Buddhist monasteries were destroyed and monks killed during the purges under command of Kh. Choibalsan (Dashpurev & Soni, 1992).

What remains of Amarbuyant Monastery measures roughly 88 280.368 $3m^2$ (8.8 hectares) in area and contains a few buildings and structures. An additional 36 hectares surrounding the monastery also contains some structures like religious paths and sculptures.

In this study, we tried to document existing structures and also the reconstruction that has taken place since the early 1990s. Imagery documentation, aerial photographs, mapping and measurement surveys have helped us to produce detailed documentation of the actual condition of the complex and remaining structures. Interview surveys with lamas, students and local families helped us to gather a greater understanding of the history of the temple complex and connection with the local community. We believe this study opens up a new field of heritage documentation and conservation in Mongolia.

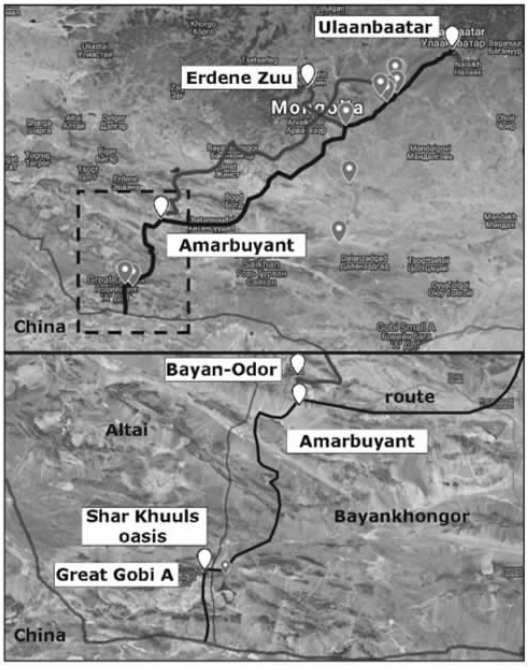


Fig. 1 The above map shows the two branches of the Tibetan highway from Ulaanbaatar to the border of China, including the route traveled during our expedition (black). The bottom map shows the location of Amarbuyant Monastery and its surroundings

2 Relevance and Objectives

No historical maps are known to exist about the Mongolian side of the Great Tibetan Highway and its temples. Official caravan archives, once kept in Ulaanbaatar, documenting travel between the two states were destroyed during the Stalinist repression of the 1930s (McCarthy, 2019). Currently, few studies exist on the caravan route and documentation of temple complexes and cultural heritage is also limited.

By documenting and retracing the his-

tory and architecture of Amarbuyant Monastery, this study can help to promote its conservation and revitalization, as well serve as a starting point for further documentation and revitalization of temples and historical points along the Mongolian side of the route. The local community, temple students and monks can also benefit by bringing awareness to the necessities and difficulties they face regarding temple conservation and local development. This can create big impacts for the future of Mongolian heritage conservation and the communities that live alongside the route and in temple surroundings.

This study also shows the importance of drone and architectural documentation for heritage conservation. Aerial photography can create an emotional impact in people and bring awareness toward historical background and heritage (Baxter, 2014), and allied to maps, drawing and photos, they are essential for the visualization of the built heritage and consequently its conservation (Pauwels et al., 2008). Also, the documentation of built heritage through digital data can help future data access of heritage sites, even if they are inaccessible or deteriorated (Richards & Jeffrey, 2013).

By telling the story of this inspiring human journey and this forgotten temple, this study aims to raise awareness about the historical and cultural heritage of the Gobi Desert as well as promote conservation and open up a new field of academic research for those studying Mongolia-Tibet relations. The goal of this study is the documentation for conservation of Amarbuyant monastery in order to shine a light on the long forgotten, yet, inspiring human story of the caravan pilgrimage and its architectural heritage.

3 Methodology

3.1 Temple Mapping

Three expeditions (2016 — 2018) to document cultural heritage along the route were undertaken (McCarthy, 2019). As shown in Fig. 1, the route was traced from Ulaanbaatar to the Chinese border. Erdene Zuu, the ancient capital city, is one of the main tourist sites of the country, and was once an important stop along route linking Mongolia with Tibet. Amarbuyant Monastery is located along the southernmost part of the Mongolian side of the route. It is the first temple complex within the Mongolian border, and it was studied in detail in the 2018 expedition. Drone technology was used to obtain aerial views of temples and structures. DJI Mavic equipped with an RGB camera was used (see Tab. 1).

Images could highlight archeological boundaries, structures as well as vegetation and geographical aspects. Processing of images was conducted in Drone Deploy, MultiSpec and ArcGIS. Aerial images of temple complexes were outlined to count building and structures and retrace old setting by AutoCAD Drawing software.

Tab. 1 Drone flight specifications

Parameters	specification
Camera parameter	
Lens	8.8mm/24mm (35mm format equivalent) f/2.8
Sensor	1″CMOS
Maximum angle of aperture	FOV 84
Pixel number	20M
Flight parameter	
Altitude above ground	120m
Overlap	85%
Geometric resolution	2.5 cm
Size of recorded area	10 hectares
Speed	12m/s
Flight duration	23min
GPS location	available

3.2 Interview Survey

Semi-structured interview surveys were conducted with lamas and students at the temple, nomadic households living in the surrounding areas, and residents of the nearby village center, Bayan-Ondor. Interviews were recorded for discourse analyses. Questions were designed to understand historical knowledge, relationship

with the temple and its conservation, and ideas and hopes for the future of its revitalization. This provided a qualitative approach to understand the social-economic change that the revitalization and conservation of the monastery and temple could provide. This also helped to construct a picture of the historical background and to measure the attachment that locals had towards the monastery.

4 Results

4.1 Imagery and Digital Documentation

The main outputs of this study can be divided into three parts:

① An online map and database of the Temple within the caravan route including locations for important archeological artifacts of the surroundings (under construction, refer to https://thegreattibetanhighway.wordpress.com)

② A retraced map outlining temple structures, ruins, reconstructed buildings with historical information

③ Qualitative data from interview surveys with locals and ideas for future conservation

For the database, exact geographical location of the temple in relation to the caravan route was made. This included locations of other important key points in the surroundings of the temple, like deer and padme hum stones (monument with inscriptions that indicate the route), ovoos, oases, etc. (Fig. 2).

4.1.1 Detailed Map Past-present

For the retraced map, drone images were used as a base, and detailed in-loco measurement of structures were made and combined with the images to produce accurate floor plan of structures and architecture. The drone images were captured within a day and used as a base to assist in loco measurement that was made to complement and confirm remaining ruin structures that are difficult to see in the images. This was finished within two days, making a total of three days needed to collect the raw data necessary to create the maps. This is an example of how drone survey can assist heritage mapping and improve greatly the speed and quality of the documentation process (Tab. 2).

Fig. 2 The top image shows a padme hum stone. A sacred ovoo (cairn, below), both indicating the route path to the temple

Information from the interview surveys with lamas helped to understand structures and ruins, old and new buildings, it's functions and shapes. A map was created showing not only existing structures, but remnants of past structures and new structures that were reconstructed by the community and previous lamas (Fig. 3).

It was found that between 1600—1900 the temple was thriving, it was the center unit that unified 3 villages (Bayan Ondor, Bayan Tasagaan and Shine Jinst), forming one town. However, during Soviet times, the temple was attacked in 1937, and almost completely destroyed.

Until 1937, the complex contained 6 main temples, and according to locals, around 1500 to 2000 lamas and students used to live there. It seems like the complex was not only the religious center, but also the political center, since politicians like local governors used to live there too (left upper part is shown in map).

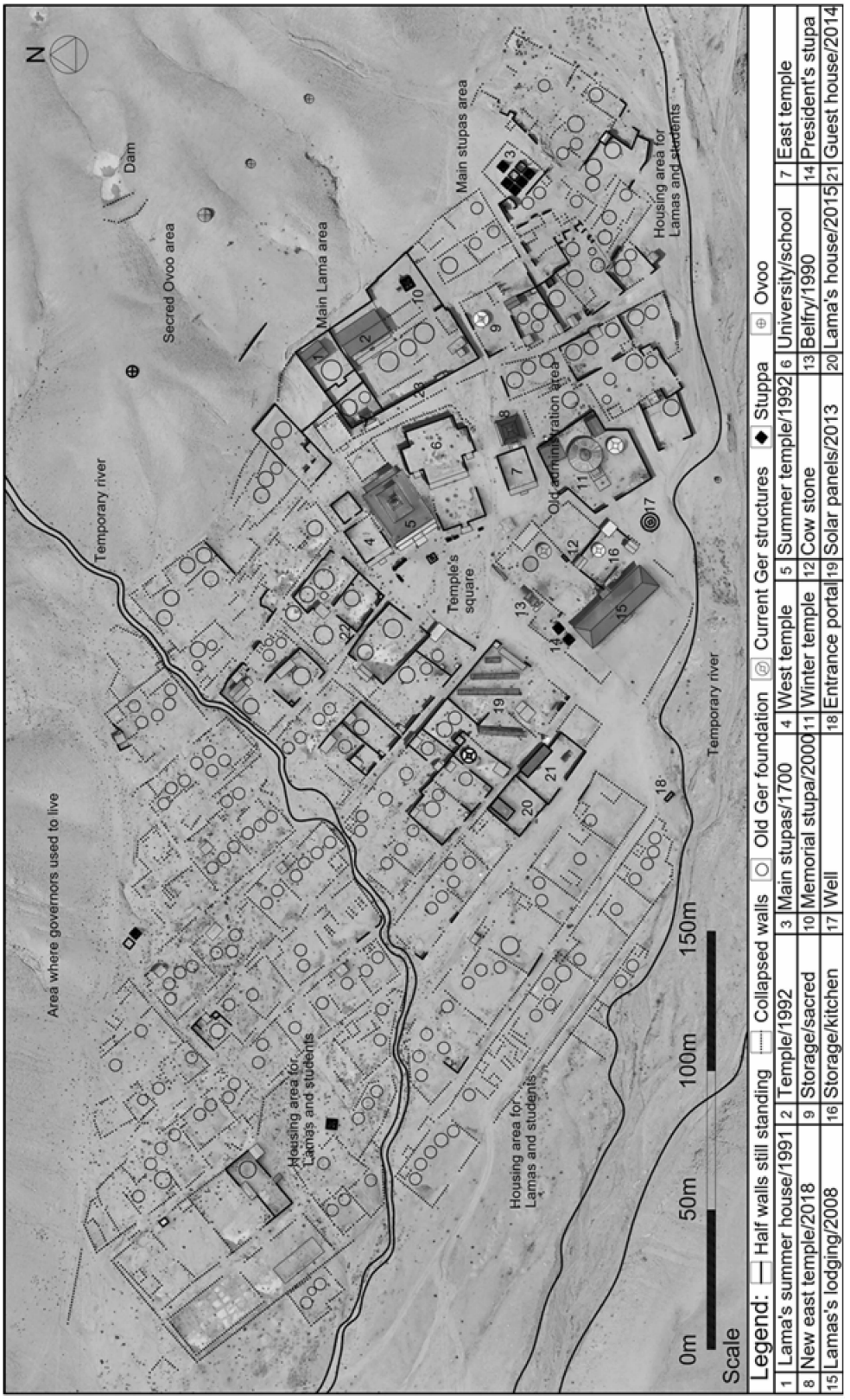
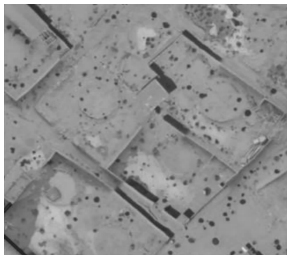
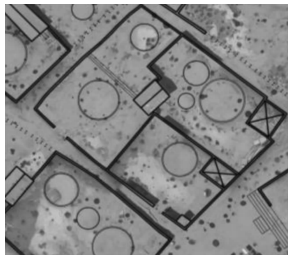
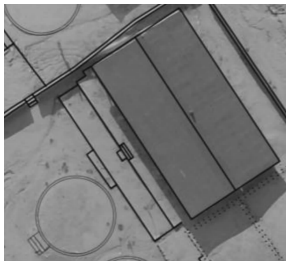


Fig. 3 Retraced map of Amarbuyant complex

Tab. 2 Examples of detailed map retracing

n°	Type	Description	Aerial photo	Retraced structures
22	Residential cluster	Residential cluster for lamas and students with four subdivision. Measuring a total of 750m^2 (30m × 25m). Contains 6 ger foundations, walls and 3 storages. Materials: stones, clay bricks, wooden roof.		
2	Temple	Reconstructed in 1992, measuring 17m × 10m, with 170m^2. Foundation and staircase were renovated. Materials: stones, clay bricks, wooden roof.		

The complex was supported by local families that provided food and supplies to the lamas.

There used to be a school (n° 6 in Fig. 3), where students could learn how to read, write, recite mantras, study philosophy and practice Buddhism. By every indication, Amarbuyant was a rich temple complex containing big and small temples, roads, houses, administrative buildings, schools, etc.

Today, only 200 foundations of the previous *gers* (traditional round-shaped Mongolian dwelling) were found, but since there are at least 130 identified clusters and each cluster contains 3 *gers*, we estimate that at least 400 *gers* existed inside the complex before. Now, lamas and students live mainly inside lodging structures built from donations or by themselves, and only 5 *gers* are being used for storage or temporary housing for lamas and visitors.

Today, 3 main families help feed around 20 to 30 temple residents, which varies according to the season. But we roughly estimated that around 150～300 families used to live in the neighboring surroundings before.

During the attack of the temple in 1937, the head lama escaped with various items in order to try to save them, including; images, portraits, sculptures, etc. After the democratic revolution in the early 1990s, he returned the artifacts to Mongolia. and started reconstruction on a small temple and a residence for the lamas (n° 1 and 2 in Fig. 3).

the reconstruction was financed and built by himself. Moved by his efforts, locals and the government started some small reconstruction projects. In 1992, the main temple reconstruction was financed by the 3 village centers to which the temple belongs to, and local families made many donations (especially animals like sheep) and contributed with the construction (n° 5 in Fig. 3). The reconstruction took over one year to complete, and it was built on top of the old foundation of the previously destroyed temple.

We found many of the modern structures don't follow the traditional architectural style of the other reconstructed buildings, but serve as lodging for students and visitors and supporting infrastructures (n° 15, 21 and 20 in Fig. 3).

Number 10 in the map shows a memorial stupa made for the killed lamas during the 1937 event. A stupa' is a religious Buddhist structure that contains sacred images and inscriptions inside its main body. Number 3 shows the area where old stupas, some dating from 1700, still stand and were reconstructed.

The last construction made in the temple complex was finished in the summer of 2018, a new temple made of wood financed by a collective between local people, the government, external donors and built by local families, lamas and students. Photographic documentation of all structures was made, some examples can be seen in Fig. 4.

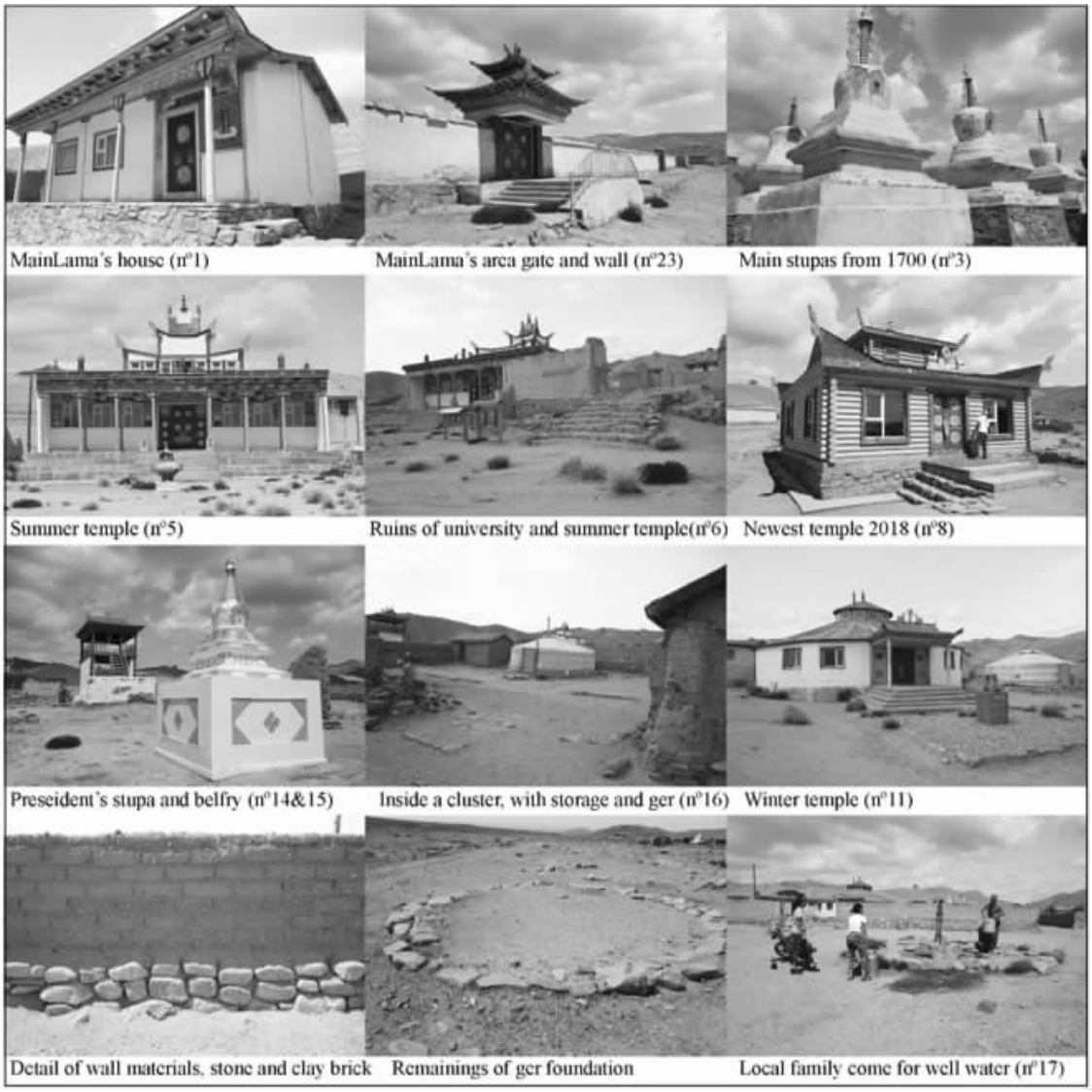


Fig. 4 Photo documentation of structures

4.2 Local Engagement and Perspectives

Our study shows that Amarbuyant Monastery and its memory only survived because of the great effort of some lamas and the local community. Not only that but efforts are continuously being made to revitalize the temple.

From interviews and surveys, we could understand that locals have a strong attachment to the temple, its history and what it represents for the life of residents in that area. Families are supported by the temple and the temple is supported by the families in a mutual gain relationship. Rural herder

families visit the temple daily for water (the temple has a well with clean water which only males are allowed to access, and its mainly the lama's job, n° 17 in Fig. 3). Everyday families come and go for water. They also seek spiritual guidance and use the temple areas for local festivals and religious celebrations. In ancient times, the temples served as an important education center for local family's male children. In return, families provide food for the students and lamas, as well as maintenance and construction of the temple. They also provide transportation and bring goods from the village centers.

Important figures also visit the temple for religious purposes, the stupa n 14 on the map was constructed by the Mongolian president in memory of his father. We also found that the temple is used as a pit-stop for tourists crossing the Gobi. They usually stay one night to rest and continue their journey the next day. Most of them don't know what Amarbuyant monastery is and what it represents.

4.2.1 Challenges and Hope for the Future

When we asked lamas, students and locals about their perspective for the future of Amarbuyant, we had a unanimous answer: they all dream of the revitalization of the monastery as a school/university for lamas. Since they don't have the school anymore, they need to send their lama students to Tibet or India, creating a great economic cost for the temple, making it possible to send only one or two students per year. Since the area is also geographically isolated, families also wish for a school nearby, but not only for teaching Buddhism, but secular for all the children in the area.

Interviews with local children revealed that many of them don't adapt well to studying in the village center, having to move and stay away from their parents for many months, they expressed the wish that they could study nearby and come back home more easily.

Locals dream to see the temple complex revitalized and inhabited by many people again, but geographical isolation and low-density population around the temple make these efforts seem small to achieve bigger goals.

The main support for the temple has been made by nomadic herder families, but today 25～40% of Mongolians live in the countryside, while the majority live in cities (Campi, 2006), especially Ulaanbaatar (where half of the population lives). Now, only three main herder families are living in the surroundings of the temple, which makes it difficult to support bigger and continuous revitalization projects. This can be seen in the difference between the first reconstructed temple that measures 170m^2, compared to the most recent one that measures 80m^2, less than half of the size. There are indications that economic and material availability restrictions and low density of dwellers in the area are challenges for the development of new projects.

There is great potential for earth construction, like the traditional technique. Three times a year a heavy rain creates two to four temporary rivers (which the main river is shown in the bottom part of the map), creating good conditions for making earth materials. But these techniques require knowledge, time and effort, an especially group effort to carry the mortar from the river to the construction site.

Most of the knowledge holders of this technique have died, this, together with the low density of people around the temple, makes it difficult to use the traditional techniques for building. Therefore, locals relied on imported wood and construction workers for the last reconstruction, making it more expensive and not keeping with the traditional architectural style.

Also, to adapt to Mongolian economic development and changes in cultural aspects of the modern times, many families wish to include new functions to the temple to support a more modernized lifestyle. This includes an open school (for all genders, religious education and non-religious education) and tourism attractions to generate

extra income.

Therefore, locals also shared with us the ideas of bringing tourism to the area, especially religious tourism. For this, better lodging structures and cultural experiences should be provided.

5 Conclusion

Through digital documentation, this study establishes a formal research record on Amarbuyant Monastery, an important temple along the ancient Mongolia-Tibet caravan route. In doing so, it contributes to efforts to raise awareness about the cultural heritage of the Gobi Desert.

Evidence of a caravan route linking Ulaanbaatar and Lhasa is documented in the expedition journals of Kozlov, Roerich, Przhevalsky and others. These journals and reports also indicate the presence of thriving temple communities. One can only imagine how dynamic this route and its communities used to be before Soviet occupation during the 1930s.

Our study shows that the conservation of the temples was possible due to local community engagement, and collaboration between local families and residents of the temple.

We also discussed some future hopes from locals towards the sustainability and revitalization of the temple, including the reconstruction of a local school and tourism activities. These would probably create changes in historical architectural functions of the temple, adapting it to new uses and necessities. This points to the necessity of a creative revitalization project that balances tourism attraction and local activities. If done properly, this can help to promote local sustainable development and revitalization of the complex area and surroundings.

This study is the first of its kind and will surely open new possibilities for understanding the communities that once thrived along the caravan route once linking Ulaanbaatar to Lhasa.

We hope that more studies will be made at other temple complexes along the route, as well as the documentation and present conditions surrounding communities. This can help to create a future plan for the conservation and revitalization of the route as a cultural heritage monument, incentivize religious and eco-tourism, contributing for the striving of these communities and its sustainable development.

Local NGOs and government agencies (Ministry of Culture, UNESCO) can benefit from the results of this type of study, using this documentation as a starting point to develop a formal conservation action plan for the designation of the route, its temples and archeological sites into the cultural heritage registry of Mongolia.

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