Academic earth building courses and the genius loci of the Fujian Tolou world heritage and intangible heritage sites

TKK College is part of Xiamen University and is located in Fujian Province, China. Since 2016, the Faculty of Architecture at TKK College has organised earth building course as an elective subject with the intention of linking the academic course to the "Fujian Tulou" UNESCO World Heritage Site and China's "Craftsmanship for Hakka Tulou" Intangible Cultural Heritage Site. The aim is to draw on the *genius loci* as a basis for reviving and developing traditional earth building techniques in a contemporary context.

and is trying to link the earthen building course, the World Heritage Site "Fujian Tulou" and China's Intangible Cultural Heritage Site "Craftsmanship for Hakka Tulou". The aim is to pass on traditional earthen build-

01 A Tulou – Earth tower – in Fujian Provinz, China

ing techniques under *genius loci* in a contemporary way and to develop them creatively.

Background

Fujian province

Fujian Province (Figure 1) often abbreviated as "Min", is an area on the south-east coast of mainland China opposite the island of Taiwan. With an area of 120,000 km², it is about a third of the size of Germany. The UNESCO World Heritage List includes three sites in Fujian Province: Mount Wuyi (1999) (cultural and natural), the Fujian Tulou (2008) (cultural) (Figure 1) and the historic international settlement of Kulangsu (2017) (cultural). At the same time, Fujian also has four intangible cultural heritage sites that are on



the UNESCO list: "Chinese traditional architectural craftsmanship for timber-framed structures" (2009), "Traditional design and practices for building Chinese wooden arch bridges" (2009), "Nanyin" (2009) and "The Mazu belief and customs" (2009) (Figure 3). In 2006, China also added "Hakka Tulou Construction Skills" to its national list of intangible cultural heritage.

Fujian Tulou World Heritage

The name "Fujian Tu-lou" translates literally as "Earth tower in Fujian Province" where "Tu" means "earth" and "Lou" means "high-rise residential building", though this generally means only three to four storeys. In former times, the "Fujian Tu-lou" were called "Hakka Houses" but they were not just built by the Hakka people but also by the Min-Nan. In Chinese, "Hakka" literally means "guest families" (i.e. from North China) while the Min-Nan were resident in South Fujian. The Min-Nan began building Tulou along the coast much earlier as protection against marauding pirates from Japan and it was only later that the Hakka built many more in the mountains. For this reason, the intangible cultural heritage is listed as the "Hakka Tulou Construction Skills", although since 2008, the Chinese Government have used the official term: "Fujian Tulou".

There are actually more than 30 thousand Tulou-like earth buildings in Fujian Province, but only 46 of them were selected for the UNESCO list. Built between the 15th and 20th centuries, these 46 World Heritage Tulou are located within a region up to 120 km inland from the cost of the Taiwan Strait. Originally, these fortified residential structures were built for large families as protection against enemies, bandits and pirates from Japan, especially in the 15th to 17th centuries, and could sometimes house as many as 800 people.

Each Tulou usually has only a single point of entry and no windows at all on the ground floor and first floor. The sole source of air and light is via the inner courtyard (Figure 2). The load-bearing outer walls are made of rammed earth and can often be up to 1.5 metres thick. To protect against erosion from rainfalls, the tiled roofs cantilever outwards sometimes as much as 3.5 metres. There are three principle types of Tulou: those with a rectangular plan and inner galleries, those with a circular plan and inner galleries and circular Tulou with separate units.

Each Tulou is effectively a small kingdom for a family or a busy village. They are not only an expression



02 Inner courtyard of a round tulou



03 A Mazu temple

of the Chinese building tradition but also of a specific collective way of life, effective defensive measures and a harmonious relationship between habitat and nature.

Intangible cultural heritage under threat

The load-bearing structure of the Tulou comprises two parts: the earth wall and a timber framework. The thick outer wall made of rammed earth bears half the load, the timber inner structure the other half. In contrast to the simplicity of the monolithic external walls, the timber structure is a sophisticated construction that is frequently also richly decorated. The "Chinese traditional architectural craftsmanship for timberframed structures" are listed as a UNESCO intangible cultural heritage (Figure 4), while the earth building technique is listed in China's National List of Intangible Cultural Heritage as "Hakka Tulou Construction Skills". The latter actually encompasses both earth and timber construction techniques.

In the 1980s, many Tulou structures were still being built in the mountainous regions. At that time manpower for agriculture was still very necessary. But with increasing industrialisation, many farmers left for the cities and agriculture in the mountainous areas swiftly declined. It was no longer necessary or possible for people and families to live together and help each other as a large community. In addition, people increasingly preferred individual dwelling units over fortified collectives. Improved infrastructure also made it possible to transport modern building materials such as steel, brick and cement more cheaply and easily into the region and since the 1990s fewer traditional Tulou have been built and ever more tasteless concrete apartment buildings. As the surroundings change, so too does the landscape with which



04 Inner timber skeleton construction of a tulou

the Tulou are connected. The lack of new Tulou also means that the craftsmen and their apprentices have little work, and the renovation and restoration work conducted on existing buildings is not sufficient to feed their families. Many skilled craftsmen have had no option but to take up new professions, and the few that remain can no longer find apprentices to whom they can pass on their intangible heritage. The situation since the end of the 20th century with respect to preserving the world heritage and passing on the intangible cultural heritage to the next generation gives cause for grave concern.

The problems of the Tulou tourist areas

Problems in the management of the world heritage sites

Since 2008, all the Tulou World Heritage sites have been made accessible to tourism. Visitors to the tourist destinations have to pay an entrance fee that is very high in relation to China's average income. It is therefore difficult to popularise the world heritage sites among a wider audience. In the region's Tulou Museum, the Tulou construction skills are shown only in photographs and pictures and the tourist guides are not sufficiently qualified to explain the techniques clearly. Currently, there are no institutions in the region for researching and documenting the Tulou or for teaching the construction techniques.

Problems in passing on intangible cultural heritage

Since the 1990s, there have been almost no new building projects for traditional Tulou. The only work for skilled craftsmen, journeymen and apprentices is restoration work. New generations of builders therefore lack the opportunity to design and build a new Tulou from foundation to roof, and therefore cannot fully understand the Tulou construction techniques. Many of the specific, sophisticated techniques have already been lost and the experienced Tulou masters still proficient in such techniques are now between 75 and 85 years old and no longer able to work on construction sites.

The majority of the local population now prefers new apartments made of concrete with tiled facades. Buildings made of earth bear the stigma of poverty and the hard times of the past. Few people are aware of the kind of modern earth buildings and interiors currently experiencing a revival in Europe, America and Australia. Without sufficient renovation and new construction projects, Tulou builders have nothing to do and the corresponding guilds have long been disbanded. In Europe, by contrast, qualified training and the continuing education of future generations in the knowledge and crafts skills has been instrumental in ensuring the stability and success of the building trades. The systematic passing on of skills from generation to generation through apprenticeship programmes is ingrained in the building trades. In Fujian, this form of educational system has no longer existed since the end of the 20th century and the communities to support them no longer exist. The immaterial cultural heritage is therefore exclusively the realm of museums and it is hard to find any evidence of its active propagation as lived experience.

05 Experienced tulou masters demonstrate the technique



Earth building education at the university

An intangible cultural heritage gives communities a sense of identity and continuity that is passed on from one generation to the next. To date, however, the Fujian government has invested comparatively little in cultural preservation, devoting its attention primarily to economic sectors. At present, too little is being done to pass on traditional Tulou construction skills and creatively develop them further for future generations, whether by the supporting communities, the government or even the old Tulou masters. Against this background, an earth building course in a university context offers a potential means of taking a step towards passing on the skills and building culture of the Fujian to younger generations.

The university

TKK College (named after Mr TAN, Kah Kee, the founder of Xiamen University in 1921) is located in the city of Xiamen on the south-east coast of China. The city of Xiamen was opened to British and then international trade after being defeated by Britain in the First Opium War of 1842. The historic international settlement of Kulangsu (literally "Kulang Islands") is located in Xiamen and became a UNESCO World Heritage Site in 2017. At present, some 40,000 students study at Xiamen University. TKK College is a separate part of Xiamen University founded in 2003 and currently has 20,000 students. As such, it is on the scale of a university within a university.

The faculty

The Faculty of Architecture at the TKK College has approximately one thousand students and comprises three departments: Architecture, Landscape Architecture and Urban Planning. The Tuluo are a twohour car journey from the college while Kulango Islands are just 15 minutes away by boat. The staff organise trips to both for first-year students from all over China and over the course of their studies, students have the opportunity to visit and conduct research at these two UNESCO World Heritage Sites.

Earth building courses

In winter semester 2016, the Faculty of Architecture at TKK College began offering "earth building" as an elective course for students in semesters 6 to 8. The courses, which comprise field trips, lectures, workshops, design exercises and practical building experience, have an average of 30 students each semester.



06 Students at the Faculty of Architecture try out earth building techniques from other ancient cultures

During field trips, the students visited, photographed and sketched the Tulou at several of the world heritage sites. We were fortunate enough to be able to enlist some of the old masters, most of whom were over 75 years old, to demonstrate rammed earth building techniques. The students were able to practice and take notes (Figure 5).

The lectures on campus provided information on the history and background of the Tuluo as well as theories and examples of earth building, both traditional and modern. Students were also available to use the labs to learn about the various earth building techniques including rammed earth, adobe bricks, fibrous additives and earth mortar, as well as to procure and test different soil samples from the surrounding area.

After this ground, the students were asked to develop their own ideas and design small objects, some serving specific functions, others for decoration, for example plant pots, street furniture, pavilions, gazebos, and so on. These they could also realise at true scale or a smaller scale on the campus. In the various courses to date, students have experimented with building techniques from other ancient cultures, such as Nubian or Afghanistan arches, and compared them with Tulou building techniques (Figure 6).

Designing and building is not a simple, linear process but frequently an iterative process of experimentation and refinement. Through the experience of building, students are able to identify problems in their design that can inform their future design decisions. At the end of the course, an exhibition of the objects made of earth was held (Figure 7–9). The earth building course communicate a better understanding of the sustainability of traditional earth building techniques to younger generations of architects. The hope is that they can draw on this knowledge of earth as a building material in their later professional careers. Students of architecture are, however, not the engineers and materials specialists of the future. The course can only provide an introduction and cannot be compared to the training and further education of specialist engineers. There is still a long way to go to pass on and develop the construction skills and techniques used to build the Tulou.

The LTLT – Lee's Tu-Lou Team

Professor Lee is the main organiser of the earth building course and head of LTLT. Born in Taiwan, he studied architecture at the TU Berlin in Germany, where he also undertook his doctorate. In 2017, he became vice dean of the Faculty of Architecture at TKK College in China. He has lectured widely on the Tulou and modern earth building in China and Taiwan. Alongside the earth building course, LTLT has organised several earth building workshops for non-architecture students as well as exhibitions on earth, wood, the Tulou and modern earth building (Figure 9). In April 2018, Xiamen University hosted a conference, Global Humanities Festival as well as the first Executive Committee Meeting of the UNESCO International Council for Philosophy and Human Sciences, which also included an official trip to TKK College. Two guests, Prof. Klaus Mühlhahn (Vice President of the Free University of Berlin, Germany) and Prof. Philip Buckley (Chair of the Department of Philosophy, McGill University, Canada) attended LTLT's earth building workshop and visited the exhibition on the



07 Rammed-earth bench with flower pot



08 Chair with integral light



09 Experimental earth cubes produced by the students



10 und 11 Prof. Klaus Mühlhahn (FU Berlin) und Prof. Philip Buckley (McGill University, Kanada) erleben und probieren die Stampflehm-Technik beim Besuch der LTLT Lehmbau-Workshop und Tulou-Ausstellung.

Tulou, experiencing the traditional process of ramming earth first hand (Figure 10) (Figure 11).

Although LTLT is a young team, its goals are:

- 1. To preserve traditional earth building culture in Fujian and to develop it further in a contemporary way,
- 2. To present and disseminate knowledge on the World Heritage Site of the Fujian Tulou and its intangible cultural heritage,
- 3. To become a local education centre and possibly a member of the UNESCO Chair of Earth Building
 - for sustainable earth building in China.

Postscript

The LTLT cordially invites participants of LEHM 2020 to visit Fujian and the Tulou to experience, to conduct joint research and to provide advice on how to pass on and develop the construction technology of the Tulou in a modern way. Opportunities to exchange opinions and cooperate on projects of all kind are very welcome.

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