

Documenting Heritage at Risk: Vernacular Farm Houses in the Eastern Tibetan Cultural Region

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ABSTRACT Tibetan architecture is largely associated with the impressive monastic buildings scattered over the Tibetan Plateau and the adjoining mountain ranges. While these buildings have long attracted the interest from travellers and researches, the rural vernacular architecture has been grossly neglected. Accounting for more than 90 percent of the cultural heritage vernacular farmhouses incorporate an immeasurable wealth of traditional knowledge and local craftsmanship that is increasingly threatened by the impacts of modernisation. The article draws on a research project on vernacular architecture in the Tibetan cultural region and presents four examples of rural houses in former Kham, that is nowadays spread across Sichuan, Qinghai, Yunnan provinces and the Xizang (Tibet) Autonomous Region. The examples show a surprising diversity in terms of style, size, layout, building materials and structural systems that are perfectly adapted to local climatic and topographic conditions as well as the resources available in a particular environment. As examples for this diversity the article presents a rammed earth building in Chatreng, a house in stone masonry from Dabpa, a house in Pome built with timber log walls, and a house from Gyalrong with a mixed stone/timber construction. The richness of vernacular farmhouse architecture in Kham deserves special recognition and support on various levels.

KEYWORDS Tibetan culture, vernacular architecture, farmhouse, diversity, cultural heritage, preservation, Kham

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Introduction

This article presents four examples taken from a five-year research project at the TU Berlin on vernacular farmhouses in the Himalayan region, the Tibetan Plateau and the mountain ranges forming its borders to the east. The focus of this project was on documenting a species that—except from few remote areas—is risking extinction. The generous support by the German Research Foundation (DFG) allowed for extensive field work¹ and desk analysis.

In the context of our research the traditional region of Kham turned out to be one of the most fascinating parts of the vast area covered by the project, because of its rich diversity in terms of geographic and climate conditions as well as its cultural features. As a result, the valleys of Kham display a surprising diversity of architectural styles and traditional construction techniques that are hardly known to the outside world. Much of the previous research on Tibetan architecture has concentrated on monastic buildings

and forts and on the Xizang (Tibet) Autonomous Region. From the early 20th century European visitors, only a few such as Tafel (1914), Heim (1933) and Imhof (1974) were fascinated by the uniqueness of vernacular houses in Kham. In the late 1990s Ryser published his seminal book on Tibetan farm houses in Sichuan (Ryser 1999) that illustrates the immense variety in styles and ecological backgrounds. The relevant chapters in Paul Oliver's *Encyclopedia of Vernacular Architecture of the World* from 1997 tend to be incomplete and are currently under revision (Oliver 1997)². Only in recent years Himalayan vernacular architecture has gained a broader attention by scholars (Zurick and Pacheco 2006; Handa 2009).

This article tries to demonstrate the cultural richness of this area by presenting four examples of vernacular farmhouses. There is no claim to contribute to the discussion about necessary action nor to the general debates on vernacular or the anthropological aspects. While these facets of research on vernacular are undoubtedly highly



Figure 1 Map of the Eastern Tibetan region showing the locations of the presented houses. (Source: the authors, background map approved by National Bureau of Surveying and Mapping Geographic Information, map approval code: GS[2018]4876).

important, we gave priority to the physical rather than covering all aspects in a sweeping and superficial way.

No architects have been involved in building and their builders remained unknown. These buildings have been built by local craftsmen using local resources. A rich body of knowledge about materials, techniques and ecological efficiency was handed down from generation to generation despite the political turmoil that characterised this area over hundreds of years. Even today many of these buildings fit into the local surroundings 'instead of trying to "conquer" nature as we do' as Bernard Rudofsky (1965), one of the first to recognise the beauty and sustainability of vernacular architecture, noted more than 50 years ago. We follow his definition of the term 'vernacular' as put forward in the preface to his classical book on *Architecture Without Architects*, which 'attempts to break down our narrow concepts of the art of building by introducing the unfamiliar world of nonpedigreed architecture. It is so little known that we don't even have a name for it. For want of a generic label we call it vernacular, anonymous, spontaneous, indigenous, rural, as the case may be' (Rudofsky 1965).

From the sample houses of the above mentioned research project we chose four examples located in former Kham (Herrle and Wozniack 2017) (Figure 1). The selection is based on the use of particular local building materials and structural criteria only. The underlying assumption is that building materials and structural systems of houses mirror local characteristics such as climate and the availability of resources and can be an indicator even for certain local cultural traditions. The four chosen types present the following characteristics :

1. The extensive use of rammed earth for the outer walls with an interior timber structure separated from the enveloping walls is a typical arrangement that dominates a fairly large area stretching from the Chatreng valley into neighbouring valleys and parts of Yunnan.
2. Another 'type' of buildings represented by our example from Dabpa is built of natural stone with an interior timber structure similar to the houses of Chatreng. This type shows both the intensive use of timber (that was abundant in this area in the past) and local granitic stone for the outer shell. A specific characteristic of the Dabpa region is the skilfully crafted unplastered pattern of the masonry created with various sizes of stone.
3. Our third example located in Gyalrong stands for a load-bearing stone construction with no posts and only minor timber elements. Given the steep slopes, this area is characterised by the vertical rise of the house structure.
4. Our fourth example located in Pome demonstrates a building tradition dominated by the use of timber. Houses of this type are entirely built with wood and have timber log walls with structural details known from other mountain forest areas in the world. They prevail in the forested valleys of the southern fringes towards the Indian plains.

The 'types' mentioned above show an impressive diversity in terms of size and orientation. The areas where those types prevail do not have strict boundaries and tend to overlap.

It may be worth mentioning that, following the focus of our research project providing the material for our examples, there is a limitation on areas with a Buddhist

tradition. Among other aspects, this has a significant impact on the layout of floors (each house has a separate richly decorated sacred room), certain structural details (such as the special lintel construction) and shows certain decorative elements (particularly around the windows) that, although varying in shape and colour, express a sense of belonging to greater cultural-religious group. These and other elements such as prayer flags, chorten and shrines for the spirits are expressions of a cultural background shared by the inhabitants of the four houses shown below as examples.

Diversity in Kham

As a political or administrative unit, Kham is no longer existing. From the 13th until the 19th century Tibetan sources have mentioned Kham together with Amdo as Dokham, a term denoting the region beyond the central provinces of Ü and Tsang. Historically, Kham included areas around the headwaters of the rivers Yangtze (tib. Dri Chu), Mekong (tib. Dza Chu), Salween (tib. Gyalmo Ngul Chu) and the Yellow River (tib. Ma Chu). Nowadays it is spread among the Chinese provinces of Yunnan, Qinghai, Sichuan and the Xizang (Tibet) Autonomous Region. The area includes contrasting topographic features ranging from the rugged terrain with deep gorges cut into soaring mountain ranges (culminating at 7,782-m altitude with the Namche Barwa) in the south to the gently rolling grasslands in the northwest.

In addition, geographical and climatic conditions differ from valley to valley and so do traditions, building styles and materials. In the words of Rolf Alfred Stein (1972, 22), renowned early Tibetologist, ‘... there can be no generalising. The lie of the valley and the folds of the mountain ranges, as well as the particular latitude and altitude of a place, give rise to a host of micro-climates with a vast diversity of local conditions. “Every ten *li* (i.e. every three miles) heaven is different”, according to the maxim reported by an 18th-century traveller.’³ In the easternmost parts of Kham, the people of Gyalrong have maintained their identity and traditions including their own language. The diversity typical for the whole of Kham appears most pronounced in Gyalrong where the design of houses, the elaboration of details and decoration vary from one village to another even at short distances.

Geographic fragmentation is considered the main reason why following the fall of the Central Tibetan Yarlung Dynasty in the mid 9th century Kham was subject to countless rivalries between small kingdoms, chiefdoms and tribal territories over the centuries. Even today the

fragmentation rooted in history and geography is mirrored in the contemporary cultural landscape and the existence of several Tibetan Autonomous Prefectures and Tibetan Autonomous Counties.

Unlike other geographic parts greater of the Himalayan region or the Tibetan Plateau, climatic conditions in Kham cannot be generalised. *Cum grano salis* one can say that in most parts of Kham the climate is comparatively mild when compared to Central Tibetan Plateau. Humid monsoon winds sweep through the river gorges of southern Kham reaching places such as Chatreng, Gyalrong and even Dabpa. Even areas with an altitude higher than 3,000 m such as Pome enjoy temperatures well above the freezing point throughout the year and allow for rainwater-based agriculture.

Given the diverse geographic, climatic and ethnic patterns, no standard settlement pattern can be identified in this region. In most villages houses are spread or loosely clustered amidst the cultivated land. Dense settlements around monasteries accommodating traders, craftsmen and other lay people are a rather an exception.

As an outstanding landmark the rural settlements in eastern Kham (e.g. in Minya and Gyalrong) show star- or cross-shaped stone towers. They are either directly connected to the individual house or rise separately in the cultivated land surrounding the houses. Most of them have been dated from 10th to the 13th century. It is assumed that they served protective purposes during times of frequent invasions and battles between local chiefdoms.

Example 1: Farmhouse in Chatreng

The cultural region of Chatreng is located at the fringe of the Tibetan Plateau in the south of the Hengduan Mountain System in the far south-west of Sichuan Province near the border to Yunnan Province. The cultural region is largely consistent with the present day administrative region of Xiangcheng County. Chatreng is situated at an altitude of 2,800 to 3,500 m with the mountain ranges dropping towards the south. Due to the decrease of altitude the climate here is relatively mild and the region receives a lot more rainfall than the plateau resulting in an increased vegetation coverage that even includes some evergreen oak forests. The annual average temperature is around 10°C, while the annual average precipitation is close to 500 mm.

The region is characterised by white farmhouses scattered within a green landscape (Figure 2). The white-washed rammed earth houses of the villages form a strong contrast to the surrounding green fields and vegetated



Figure 2 Village in the region of Chatreng (Source: the authors).
Figure 3 View of the farmhouse in Chatreng from the southeast (Source: the authors).

mountain slopes. White, monolithic, cube-like farmhouses are the specific architectural characteristic of Chatreng. The external walls of the rammed earth buildings are built directly on site using the local loam. They are constructed by tamping a soil mixture inside a wooden formwork. The tamping was traditionally done by hand using long wooden rammers with various ends, designed for different purposes. Though the walls are built entirely with loam they do not feature a frieze or any element designed to protect their tops from the intrusion of rainwater. This uncommon feature hints at a specific material property of the locally available clay (Figure 3).

The example presented here, is typical for a building style and method practiced in the past decades. Inhabited by three generations it was estimated by its residents to be about 90 years old. The house presents several architectural features that are no longer common for newly built houses.

This house is situated at an altitude of 3,370 m in the village of Seragung, that lies on the terraced and cultivated riverbank of the Schu River (Shuoyi He) at the northern outskirts of the region's main town, now named Xiangbala. The settlement of Seragung is a nucleated village with narrow footpaths winding through the dense cluster of



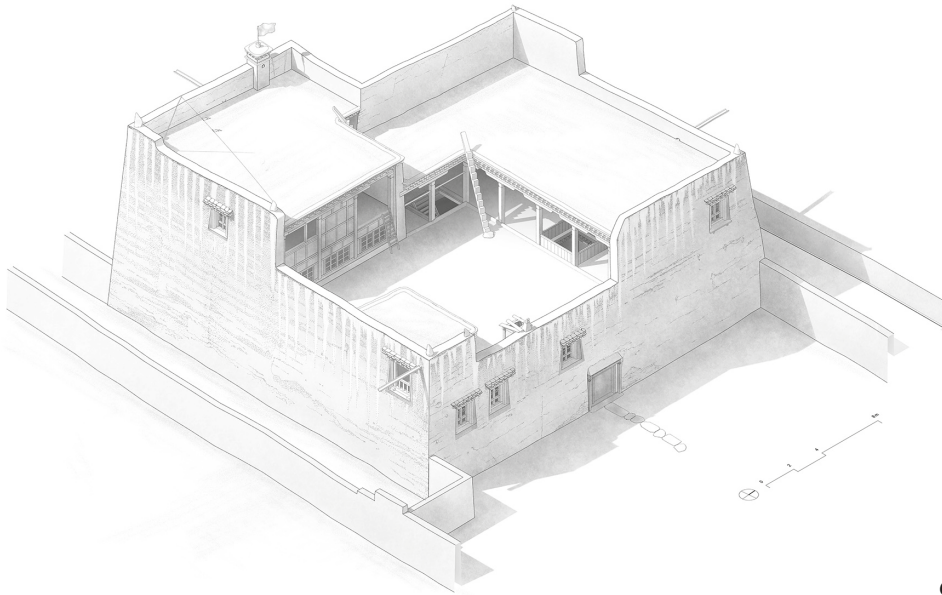
Figure 4 Site plan of the farmhouse in Chatreng (Source: the authors).

Figure 5 Section A-A through the sacred room of the farmhouse in Chatreng (Source: the authors).

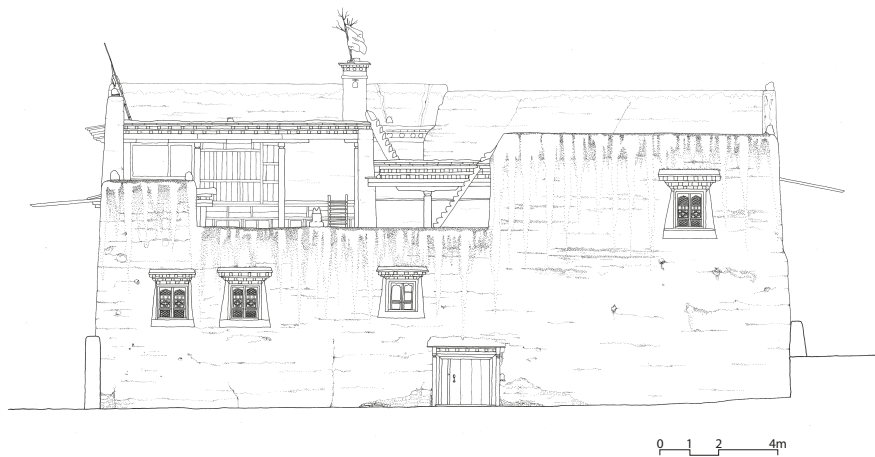
houses surrounded by walled-in yards (Figure 4). In 2012 the village consisted of about 45 houses. The village features an old 20 m high rammed earth tower in its midst which obviously once served defensive purposes. Similar towers are frequently found in other villages of the Chatreng valley. The villagers cultivate barley and wheat on the fields outside of the village, keep pigs in their yards and herd goats in the nearby mountains. Some families grow vegetables for subsistence within their yards. Seasonal cash income of significant economic importance is generated by the collection of caterpillar fungus and the Matsutake mushroom that is exported mostly to Japan, where it is prized as a delicacy.

Following the region's most common and widespread construction method the main shell of the building consists of rammed earth walls, covered with a flat earth

roof. The battered rammed earth walls have a thickness of 80 cm at their base and recline to about 50 cm at the top. The house is comparatively large with a gross floor area of 465 m². The building is three levels high, with one room exceeding the overall height, due to varying ceiling heights (Figure 5). A large part of the third level is made up of an open terrace (Figure 6). Parts of the terrace and roof are sealed with *arga*, a special mineral that is well-known over the entire Himalaya for its capacity to improve the water resistance of an earth roof. The massive walls have a few irregular openings that are adorned with delicate, handmaid timber grid windows (Figure 7). The delicate timber grid windows feature complex patterns composed of many fine elements, and their craftsmanship demonstrate the high level of traditional carpentry feature in this region (Figure 8). The interior post and lintel structure is



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Figure 6 Isometric view of the farmhouse in Chatreng from the southeast (Source: the authors).

Figure 7 East elevation of the farmhouse in Chatreng (Source: the authors).

laid out in a regular grid, with the dimensions of 2.80 m * 2.80 m, filling the entire space enclosed by the earth walls. The main beams of the timber structure are not connected to the walls but weigh on additional posts along the wall. The interior space is arranged and divided by light timber partition walls set within the post grid (Figure 9).

The ground floor space of the house is mostly undivided and is typically used as a stable and for storage, whereas the first floor serves as the family's main living space holding a multitude of rooms of different sizes, each designed for a different purpose (Figure 10, Figure 11). The entire first floor has a wooden flooring laid out with thick timber planks. The family's kitchen and main living room is oriented toward the east and has three significant window openings. A low traditional earthen stove, ventilated by an in-built chimney in the wall, is used for cooking and heating. The largest room on the first floor, located in the north-eastern corner, serves as a sleeping room for several

family members and for storing personal belongings and textiles, such as blankets and cloths. This room has a small window towards the east and is additionally ventilated by a traditional timber skylight. The most outstanding room on this floor and the entire house is the spacious sacred room with four interior posts and an increased ceiling height. The room is richly painted and decorated. All the rooms are connected to a central hall that holds the two flights of steep timber stairs that provide access to all three floors. The terrace is used for food processing, drying and storing harvested crops and (nowadays less frequently) for ceremonial purposes (Figure 12). Over time two additional sleeping rooms were constructed under the roofed part of the terrace. The roof holds several elements that the family regards as protectors keeping negative influences off the house, such as an offering stove that is used for burning incense, prayer flags and white stones set on each corner (Figure 13). Other elements applied for protective

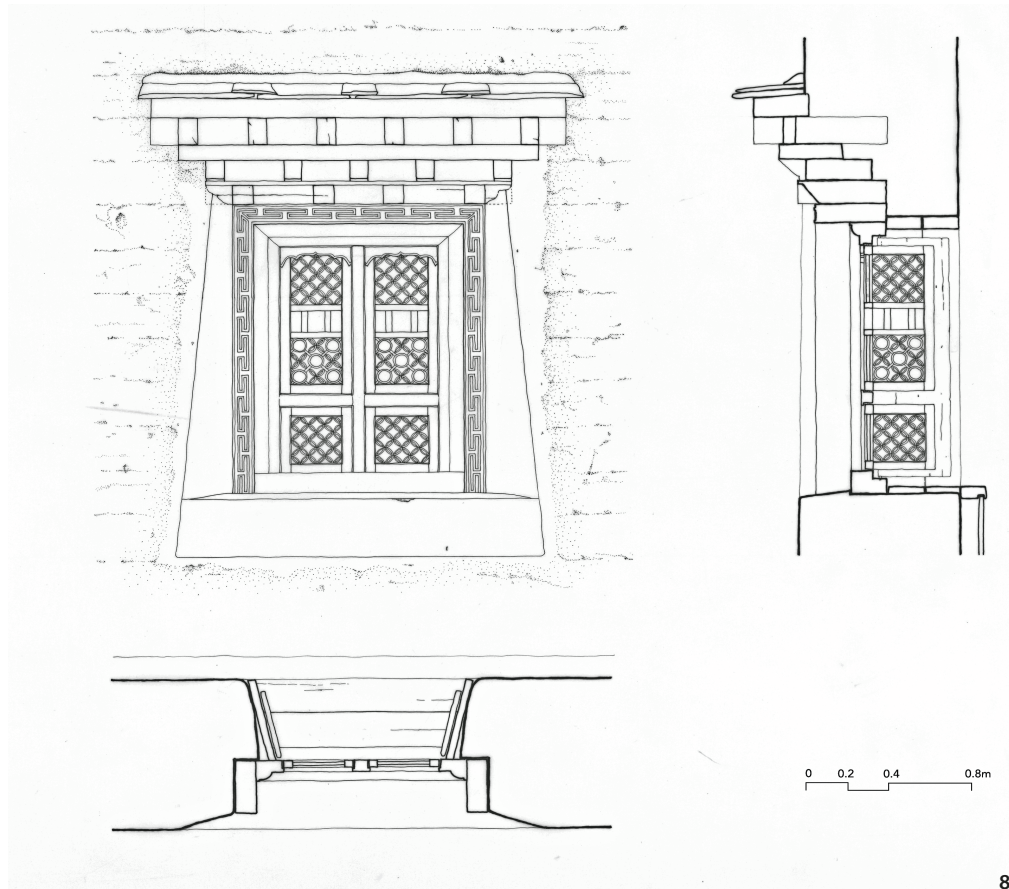
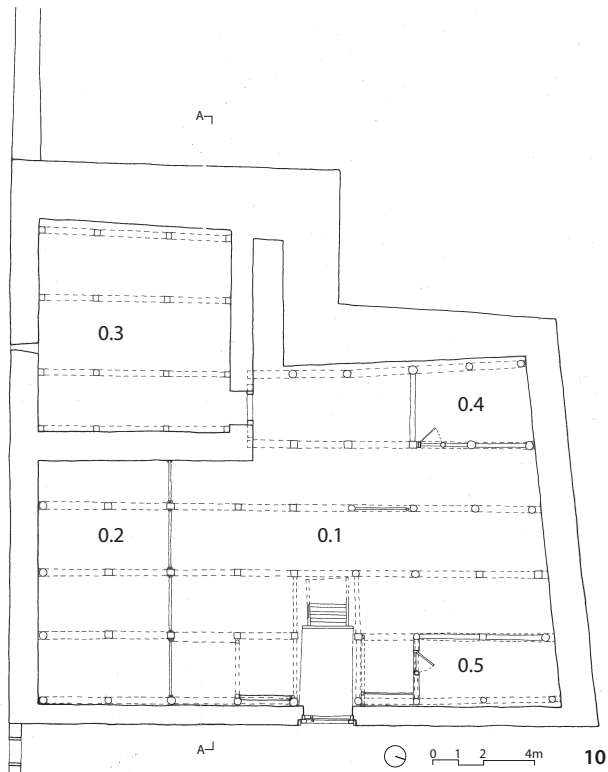


Figure 8 Details of the window of the farmhouse in Chatreng (Source: the authors).

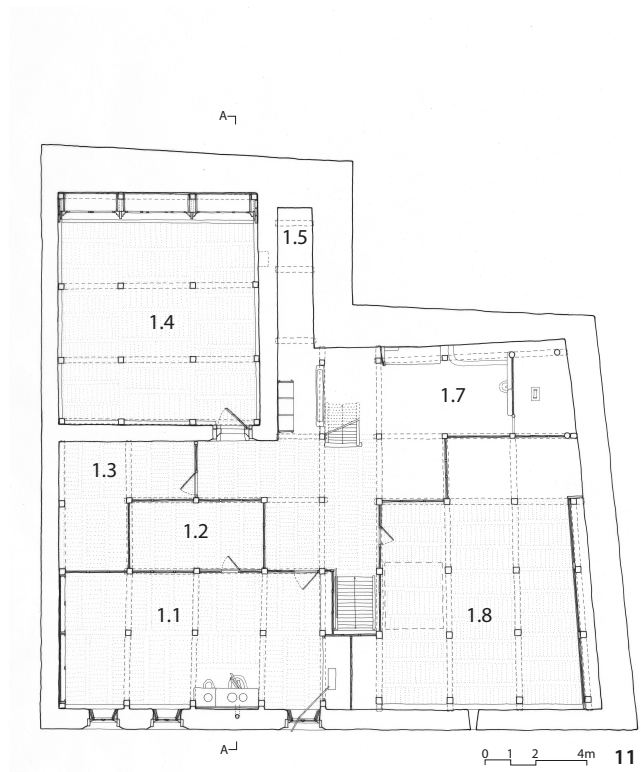


Figure 9 Interior of central hall of the farmhouse in Chatreng (Source: the authors).



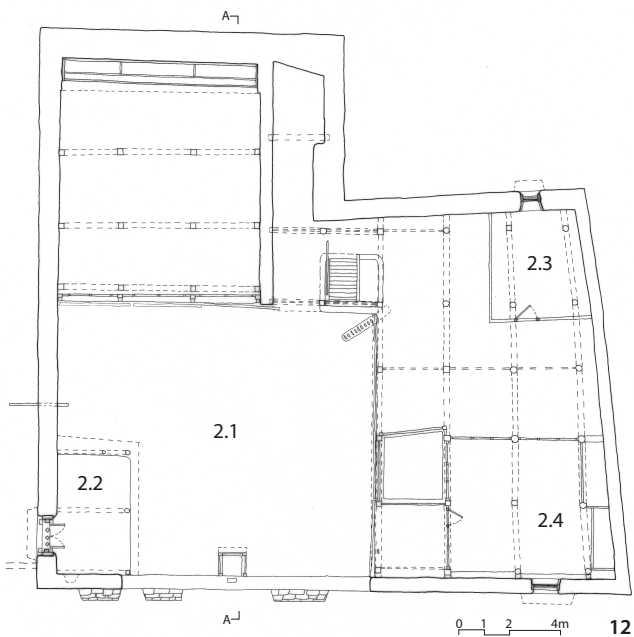
- 0.1 Cow and horse stable.
 0.2 Storage for dried leaves.
 0.3 Storage for dried grass.
 0.4 Toilet composting chamber.
 0.5 Storage for tools and metal equipment.

Figure 10 Ground floor plan of the farmhouse in Chatreng (Source: the authors).



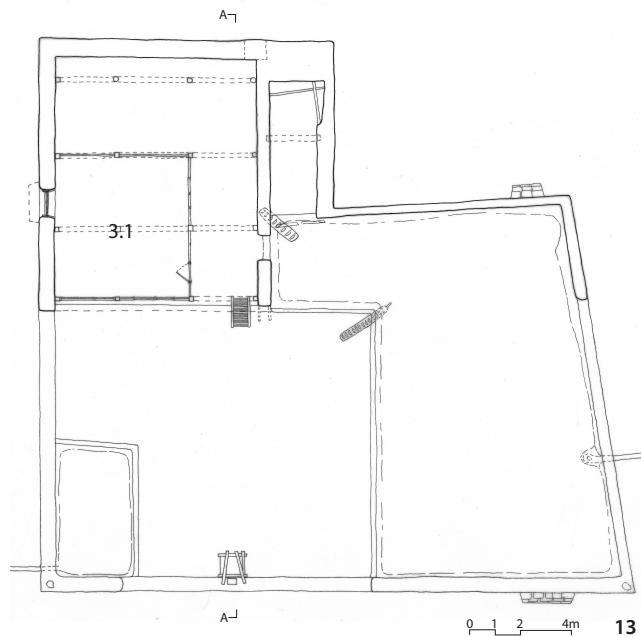
- 1.1 Kitchen and living room.
 1.2 Sleeping room.
 1.3 Storage.
 1.4 Sacred room.
 1.5 Former tower entrance.
 1.6 Central hall connecting all levels.
 1.7 Toilet and washing area.
 1.8 Sleeping room.

Figure 11 First floor plan of the farmhouse in Chatreng (Source: the authors).



- 2.1 Terrace.
 2.2 Wind door. Area for beating grain.
 2.3 Sleeping room.
 2.4 Sleeping room.

Figure 12 Second floor plan of the farmhouse in Chatreng (Source: the authors).



- 3.1 Sleeping room for monks.

Figure 13 Third floor plan of the farmhouse in Chatreng (Source: the authors).



Figure 14 View of the farmhouse in Dabpa from the south (Source: the authors).

Figure 15 Sumdu Village in the region of Dabpa (Source: the authors).

purposes are the white stripes on the outer walls that are distinctive for the region's building style of the past. The irregular stripes are applied by pouring buckets of liquid chalk from the roof parapet (Figure 3, Figure 7).

Example 2: Farmhouse in Dabpa

The region of Dabpa spreads south of the grasslands of Litang across a high-altitude region with an average elevation exceeding 4,000 m towards the provincial border of Sichuan and Yunnan. The cultural region is largely consistent with the present day administrative region of

Daocheng County. The region is flanked in the south by the three sacred mountain peaks of Chenrezig (6,032 m), Chana Dorje and Jampelyang, (both around 5,958 m), before moving into the lower altitude regions of Chatreng and Dechen in the southwest and Mili in the southeast that are each characterised by their own unique styles of local houses. Whereas the high-altitude meadows of Litang were traditionally inhabited mostly by nomadic pastoral communities, the region of Dabpa, progressively dropping in elevation towards the south, has an increasing farming population with a distinctive local style of houses.



Figure 16 Site plan of the farmhouse in Dabpa (Source: the authors).

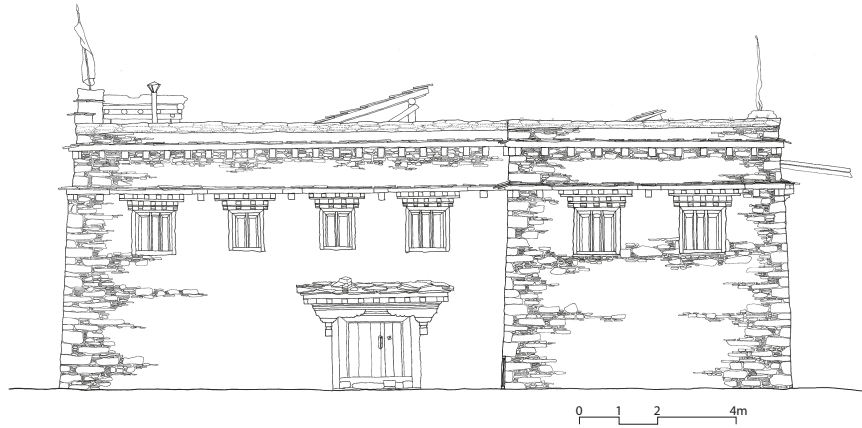
This high-altitude region is characterised by distinctive microclimatic conditions. Influenced by the western monsoon from the Sichuan Basin it receives an increased precipitation resulting in a climate that can be described as humid and cold. The annual average precipitation is 646 mm while the annual average temperature is as low as 4.8 °C⁴. Despite the high altitude and low temperatures the region has a considerable coverage of coniferous forest, with a tree line reaching as high as 4,400 m, due to the increased precipitation.

The availability of timber is reflected in the sturdy post and lintel structure of the houses. Another important resource for the construction of the local houses is stone. Locally available igneous and metamorphic types of rock are used for the construction of buildings elements. A specific local kind of slate, that can be spilt into very thin cleavage planes is used for roof covering and other building elements that are designed to lead rainwater away from the building. The construction of gabled roofs covered with slates was traditionally restricted to buildings with sacred functions, as the dressing of the stone was time consuming, expensive and required the skills of a master craftsman. More affluent farmhouses built with a significant sacred room feature such a gabled roof covering the religious part of the building only. Stone is also commonly used to cover the elaborate entrance gates.

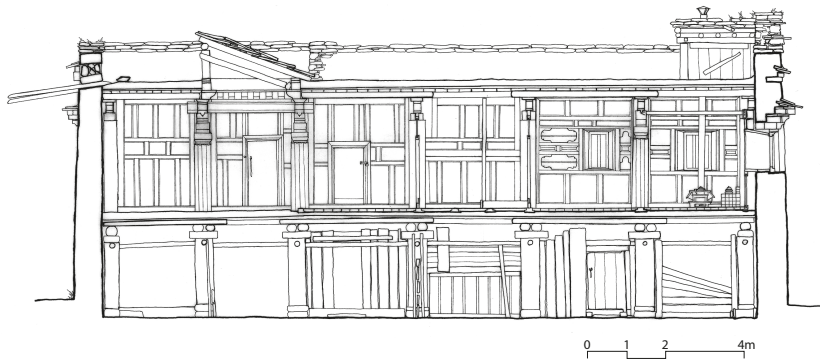
The elaborate stone masonry is a strong feature of most local houses in Dabpa. The visible exterior wythe is laid in a distinctive style of chipped broken range rubble

masonry that results in a characteristic pattern of the wall. The central and interior wythes serve structural purposes while the exterior wythe is treated mostly for its appearance. The stones used on the exterior are roughly squared and laid in irregular courses whose height is determined by larger riser stones while their beddings are filled with small chip stones. Large trapezoid capstones are laid with very thin or no gaps in the corners. Remaining unplastered and uncoloured, which is common practice in many other regions building with stone, the pattern remains visible representing a strong architectural feature.

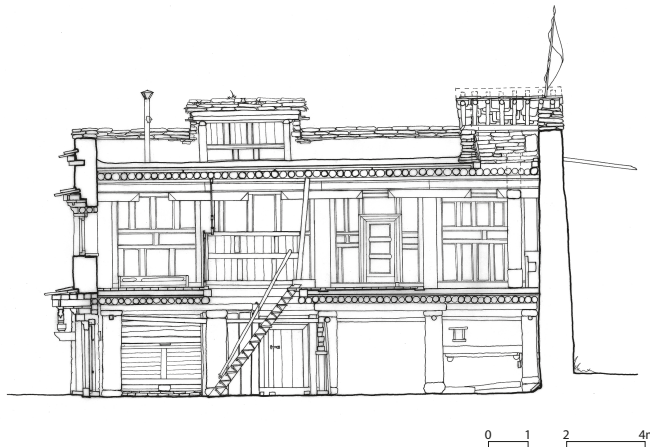
The example presented here follows the traditional local building style (Figure 14). It is located at an altitude of 3,950 m in the village of Sumdu. Though not more than 20 years old, the building displays the same typical architectural elements and construction methods as an approximately 180 years old building we surveyed in the same village. The settlement of Sumdu is dispersed throughout a wide valley flanked by mountains on all its sides. The reference monastery Banpu is located on the mountain slopes south of the village. The houses scattered over the valley floor are interspersed with barley and potato fields located in close proximity to the owners' houses (Figure 15, Figure 16). Vegetables are cultivated within the walled-in yards of each house. Large herds of yaks belonging to villagers are grazing on the surrounding high pastures. As in other places of Kham some of the family members live a semi-nomadic lifestyle. Similar to neighbouring



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Figure 17 Southeast elevation of the farmhouse in Dabpa (Source: the authors).

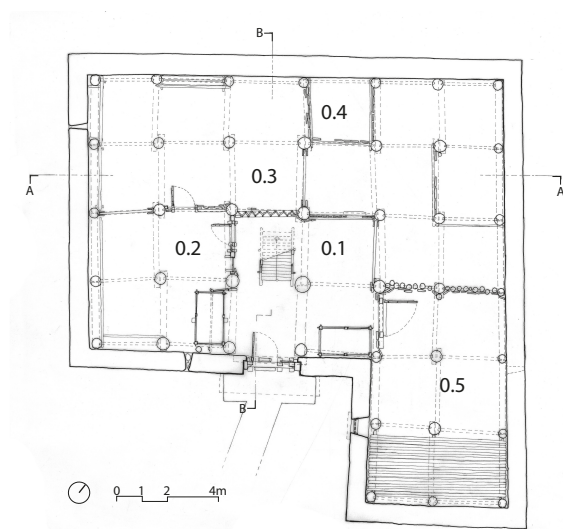
Figure 18 Section A-A (Source: the authors).

Figure 19 Section B-B (Source: the authors).

regions the collection of caterpillar fungus and the Matsutake mushroom provide an important source of cash income for the villagers.

The house is two floors high with a gross floor area of approximately 280 m². The battered stone walls are covered with a flat roof, giving the building a distinctive trapezoidal shape (Figure 17). The house has a compact structure without differing heights or any incisions or recesses into the building body, such as terraces, that are a common element in other Tibetan cultural regions (Figure

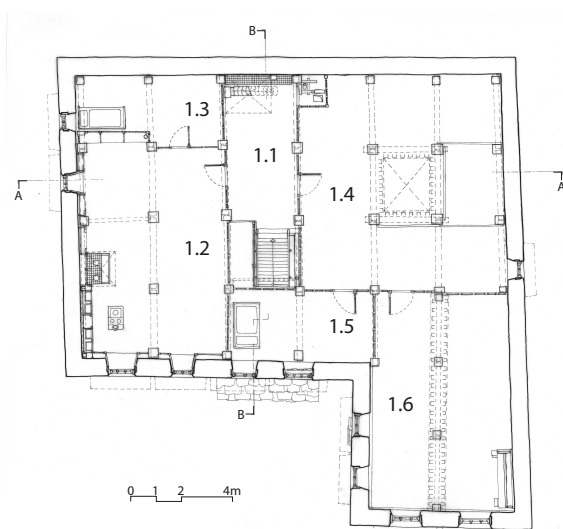
18, Figure 19). The window openings characteristic for Dabpa have one or two vertical struts with decorative curved tops in contrast to lattice windows typical for other regions. The wall tops are adorned with two timber frieze bands that create a slight overhang directing the rain off the wall surfaces. Typically for this region, the protruding arrayed timber heads are placed directly into the stone masonry. The roof is constructed with several layers of specific soils compacted on top of the beamed ceiling structure arranged with wooden beams and joists. The



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- 0.1 Entry with stairway.
- 0.2 Storage for tools.
- 0.3 Storage for dried grass and leaves.

- 0.4 Toilet composting chamber.
- 0.5 Stable for cows.



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- 1.1 Central hall with toilet.
- 1.2 Kitchen/living room.
- 1.3 Sleeping room.
- 1.4 Storage room with open skylight.

- 1.5 Sleeping room.
- 1.6 Sacred room and grain storage.

Figure 20 Ground floor plan of the farmhouse in Dabpa (Source: the authors). Figure 21 First floor plan of the farmhouse in Dabpa (Source: the authors).



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Figure 22 Interior of the kitchen/living room of the farmhouse in Dabpa (Source: the authors).

ceiling claddings of the first floor are made with wooden boards, whereas left over timbers of lower quality are used to clad the ceiling of the ground floor.

The beamed ceiling structure of both floors is supported by a regular grid of sturdy timber posts. Additional rows of post are placed along all the walls, relieving the walls from ceiling and roof loads. Compared to the ground floor which is mostly used as stable, the post and lintel structure on the first floor has a more elaborate design. While the posts of the ground floor are round with an average diameter of 50 cm the posts of the first floor are squared to the dimensions of 40 cm × 40 cm and decoratively fluted with vertical grooves. The timber elements of the facade, such as door and window frames and the timber of the frieze band are of a dark, almost black colour, that is typical for the region of Dabpa. Traditionally no other colours were applied to farm houses in this area. The dark colour results from the treatment of the timber with a broth consisting mainly of charcoal, sour yoghurt and salt. The charcoal is smashed and mixed into the broth and is boiled for some time. The treatment serves as an impregnation against rot, rain and insects.

Massive stone walls envelope the interior space that is divided by light wooden partition walls only. The ground floor is used as stable and storage (Figure 20). Where necessary it is partitioned by rough boards, round timbers as well as left over timbers attached between the posts. Just opposite the entrance door is a steep timber stairway providing access to the first floor. The first floor constitutes the family's living space and almost its entire surface is laid out with thick wooden planks as flooring. The main rooms have a wooden wall panelling (Figure 21).

Next to the stairs there is the family's most frequently used room serving both as living room and kitchen with two window openings towards the southeast and one towards the southwest. Its interior holds two stoves: A traditional earth stove has been covered with ceramic tiles, it is set against the southwestern wall, whereas a newer metal stove stands next to one of the windows. The room is characterised by darkened wooden panelling along all its walls and two sturdy timber posts supporting the beamed ceiling structure (Figure 22). It is furnished with decoratively painted in-built kitchen cabinets. A small adjacent room is used for sleeping.

The largest room on this floor is unfurnished and mainly used for drying meat and storing food supplies. It is dominated by four posts with carved heads supporting an open, unglazed skylight that serves as a light source and ventilation. This room provides access to two adjacent

rooms, one small sleeping room facing southeast and one large multipurpose room with two window openings towards the southwest and two towards the southeast. The better-lit part of the room is used as a sacred room, holding a sacred images and some sitting furniture. The sacred function of this room is also expressed by the more intricate design of the ceiling structure and adorning carvings of the post heads. The other part of the room serves as storage space for all kinds of household items and bags with grains and tea.

Example 3: Farmhouse in Gyalrong

The region of Gyalrong covers part of the Hengduan Mountain System that stretches from north to south, forming the eastern boundary of the arid Tibetan plateau. The mountain system consists of several mountain ranges, separated by deep river gorges. The headwaters of the Salween, Mekong and Yangtze rivers have created a unique gorge-and-ridge topography with some of the deepest gorges bordered by high mountains. Major parts of the cultural region of Gyalrong lie in the present-day administrative county of Danba.

Gyalrong lies the catchment area of Dadu River in the Daxue Mountains, that are situated in the transition zone between the elevated regions of the plateau and the low plains of the Sichuan Basin. This geographical transition zone, characterised by topographical diversity with drastic differences in altitude and climate, has developed a complex and rich ecoregion with many rare endemic plant and animal species, including e.g. the red panda. Its climate is influenced by the warm and humid winds flowing from the Sichuan Basin and can be described as a subtropical highland climate. The average annual precipitation here is as 689 mm and the annual average temperature is 13.4 °C⁵.

The villages of Gyalrong are scattered along steep slopes of mountains with altitudes ranging from 1,700 to 6,000 m. The steep slopes are covered with complex forests consisting of several canopies. While the highest canopy consists of tall conifers including species of hemlock, spruce, fir and larch, a closed canopy of evergreen and deciduous broad-leaved trees such as maple, birch, rowan and oaks growing over large shrubs of rhododendron, subalpine bamboo species and ferns prevails in the lower parts. In sun-exposed parts species of endemic evergreen oaks can grow at an altitude as high as 3,500 m in this region (Figure 23).

As a consequence of the diverse natural conditions the design of vernacular farmhouses may differ from village to village even within close proximity. One of the few common characteristics is that the houses are constructed



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Figure 23 Zhonglu Village in the region of Gyalrong (Source: the authors).

Figure 24 View of the farmhouse in Gyalrong from the southwest (Source: the authors).

with a similar type of stone and have a vertical building structure. The masonry skills of this region are manifested in tall stone towers that have been constructed all over the mountain slopes. Many of the towers have a star shaped geometry and some rise to heights exceeding 60 m, thus becoming strong landmarks within the surrounding landscape.

The example of a farmhouse, representing the local building style, is located at an altitude of 1,870 m in the village of Zhake (Figure 24). As typical for this region, the walls are built with stones, arranged in a style of chipped broken range rubble masonry. Though irregularly coursed to the heights of distinctive larger stones,

generally the stones have rather irregular shapes and large gaps are filled with mud mortar. Some parts of the masonry are white washed while others are left unrendered. This variation in treatment of outer façades seems to be a common theme of vernacular architecture in Gyalrong. In our example a specific triangular pattern is applied on the back wall and the corners, representing the symbol of the unity of sun and moon. In contrast to the whitewashed patterns, black frames are painted around the window openings. Their varying shapes are another specific characteristic of Gyalrong's design. The window frames have a distinctive design and their protruding overhangs are constructed in a principle found unique to Gyalrong. Another

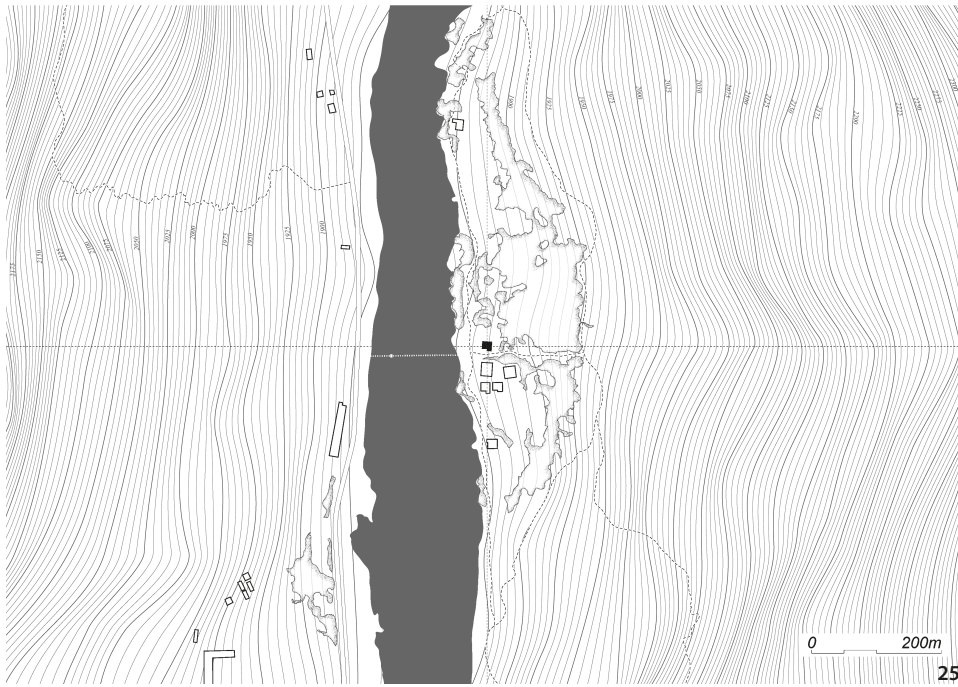


Figure 25 Site plan of the farmhouse in Gyalrong (Source: the authors).

typical architectural feature of this region are the timber facades and protruding balconies on the top floors.

The small village of Zhake is comprised of a cluster of six households, situated at the bottom of a steep mountain slope at the bank of the Dajin River (Figure 25). About 6 km to the south the Dajin River joins the Xiajin River and continues to flow south as Dadu River. The region's main town and county seat Zhanggu (tib. Chaggo) extends at this confluence. Due to the village's location on the roadless side of the river it has so far only been marginally influenced by the rapid development of the town. The villagers use a simple ropeway that has been installed across the river for transport of people and the delivery of food supplies and small household items. Following a narrow foot path a few kilometres south from the village a narrow footbridge provides another access across the river and a connection to the road. The narrow strip of land between the bottom of the mountain slope that rises steeply to an altitude of 3,800 m and the river is cultivated by the villagers primarily with corn, vegetable, fruit and walnut trees. Due to the mild climate the cultivation of chili is very common in the region and bundles of drying red peppers are hanging from the balconies of the houses of Zhake.

Compared to the other houses presented here the floor of 95 m² area is relatively small. The vertical rise of the house to a fourth level is rather exceptional in the Tibetan cultural area (Figure 26, Figure 27). Another unique design feature is created by the strong recess of the terrace and the existence of a tower rising above the topmost

terrace. This tower is obviously not just a visual addition to the building's main body on the top floor, but rather forms a structural unit of its own. The whitewashed roof corners rise about 50 cm high above the roof terrace. The loadbearing structure is composed of walls and beams only and does not have any posts on the interior as many other farmhouses in the Tibetan cultural region have. The joists of the beamed ceiling and roof structures are interlocked with the walls' masonry. They are laid so tightly on the first floor that they constitute the ceiling's cladding. The ceilings of sleeping rooms on the second floor are decoratively clad with timber panelling. The flat roof is covered with several layers of soil.

The interior space of the house is mostly determined and divided by the massive load bearing stone walls. The ground floor dug into the slope is used as a stable for the family's pigs and is divided by two thick interior walls into three rooms (Figure 28). Those walls simultaneously serve as a foundation for the entire structure. Due to the location of this house leaning on the slope the main entrance door is reached via a small terrace that is accessed by a stone stairway from one of the village paths climbing up the slope. In contrast to many other Tibetan cultural regions the main entrance door of the house is not emphasised but rather imperceptible. The first floor is dominated by a kitchen room and adjacent storage rooms holding food and household items (Figure 29). The kitchen room has two window openings towards the west and two towards the south. In the middle of the kitchen room is

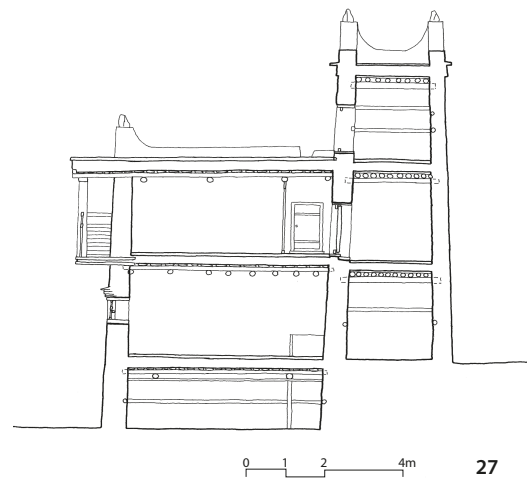
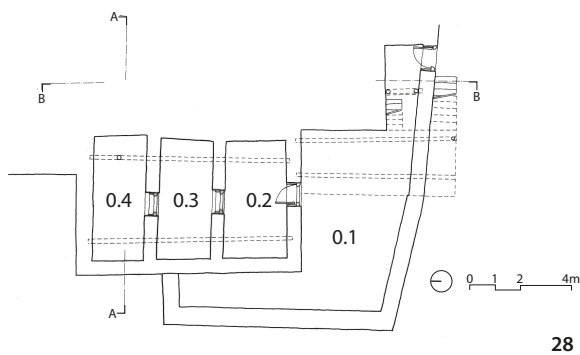
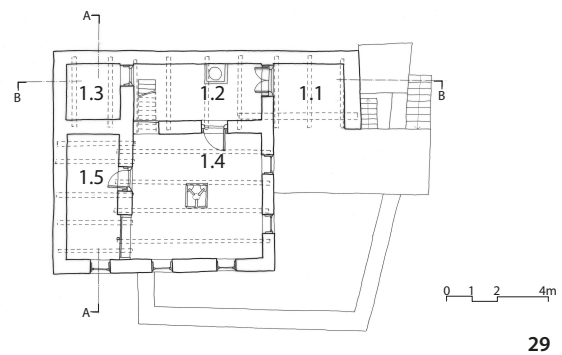


Figure 26 West elevation of the farmhouse in Gyalrong (Source: the authors).
Figure 27 Section A-A through the tower (Source: the authors).



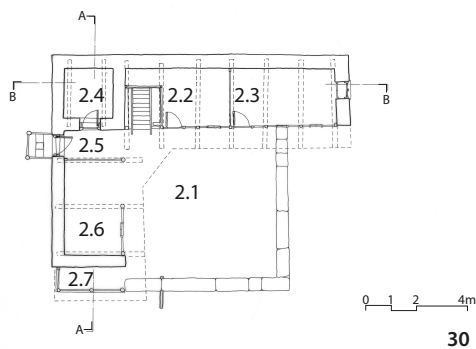
0.1 Open yard.
 0.2 Stable for pigs.
 0.3 Stable for pigs.
 0.4 Stable for pigs.

Figure 28 Ground floor plan of the farmhouse in Gyalrong (Source: the authors).



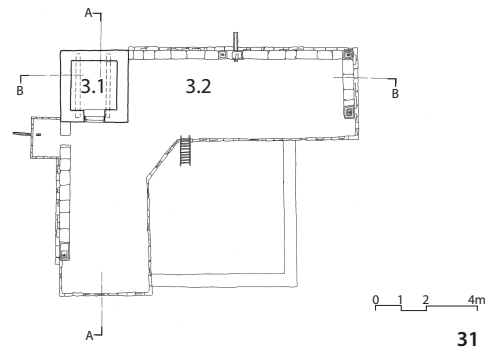
1.1 Entry.
 1.2 Hall with stairway.
 1.3 Storage.
 1.4 Kitchen/living room with open fireplace.
 1.5 Storage for tools.

Figure 29 First floor plan of the farmhouse in Gyalrong (Source: the authors).



2.1 Terrace.
 2.2 Sleeping room.
 2.3 Sleeping room.
 2.4 Storage.
 2.5 Toilet.
 2.6 Roofed storage for drying crop and corn.
 2.7 Balcony for drying crops.

Figure 30 Second floor plan of the farmhouse in Gyalrong (Source: the authors).



3.1 Sacred room/ storage.
 3.2 Flat roof with offering stove.

Figure 31 Third floor plan of the farmhouse in Gyalrong (Source: the authors).



Figure 32 Interior of the fire place room on the first floor of the farmhouse in Gyalrong (Source: the authors).

an open fireplace that is another feature that makes the house design of Gyalrong different from other Tibetan areas (Figure 32). Traditionally this fireplace expresses a special sitting order which is determined by the different sizes of the arms of the stone tripod holding the cooking pot above the fire. The head of the household would sit at the longest leg of the tripod, that is situated opposite the room's entrance. This stone leg would be further emphasised by an offering placed on top of it. Other family members would take a seat to the right of the household head, while the cook would sit to the left. The fire would be attended from the place opposite the head's seat, and the firewood would be stored in the vicinity of the entrance door. Children were not assigned a specific sitting place. Traditionally the room would also have a designated place for a large wine barrel, though it was not found in our sample house. The sleeping rooms are located on the second floor that can be reached via a steep timber stairway, leading from the first floor directly to the open terrace (Figure 30). The two rooms face toward the west and have decorated timber facades with lattice windows. Typically, the terrace extends to a balcony that is used for drying and storing harvested crops. These balcony structures form a unique element of the architecture in this

region. Together with massive stone walls, terraces and towers they contribute to a unique identity of the local vernacular architecture. The room inside the top of the tower on the third level is reached via a steep trunk ladder from the terrace (Figure 31). It used to perform a sacred function though in the case of the example shown here it was found to be empty and no longer used for prayers. The flat roof of this level holds several protective elements such as an offering vase, an incense stove, as well as some prayer flags.

Example 4: Farmhouse in Pome

The region of Pome (also Poyul or Powo) spreads out to the east of Namche Barwa (7,782 m) the easternmost high peak of the Himalayas that marks the rapid decline of the mountain range, along the drainage basin of the Parlung Tsangpo River. The southern boundary of the region is formed by Kangri Karpo Mountain Range that does not exceed the altitude of 4,000 m. The decline of the mountain range and the deeply cut gorge of the Yarlung Tsangpo River around Namche Barwa allow the humid air masses of the southwest monsoon to reach further north onto the ridges of the plateau, thus creating unique



Figure 33 Site plan of the farmhouse in Pome (Source: the authors).

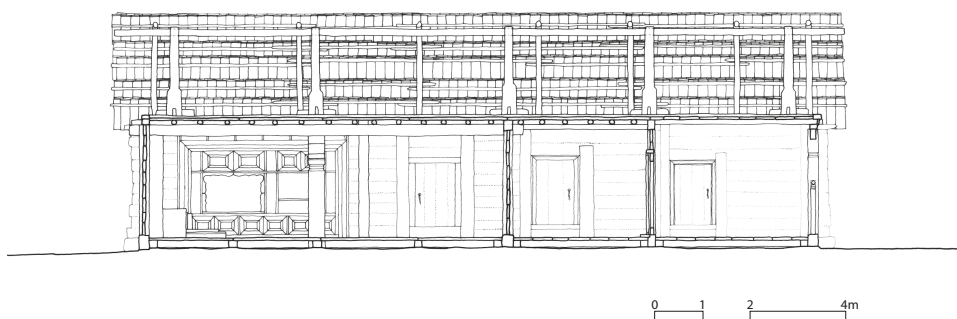
Figure 34 Southeast and north-east view of the farmhouse in Pome (Source: the authors).

climatic conditions and a large biodiversity, with many endemic species. The region is largely consistent with the present day administrative county of Bomi.

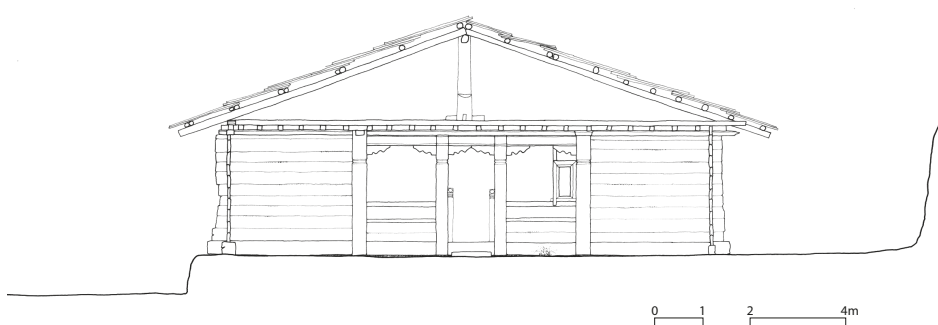
Slightly lower in altitude than the neighbouring regions, though still ranging around 3,000 m, Pome has the warmest annual average temperatures of 10.8 °C and the highest precipitation of an annual 946 mm, compared to other regions on the plateau⁶. There are such heavy snowfalls here that parts of the region were cut off in the past during winter months. Due to impassable geographical barriers such as deep river gorges, thick forests and glaciers the region has not been situated along one of the major trade routes of the

past. The trade routes connecting the settlements of the Sichuan plain and Lhasa bypassed the region in the north via other main towns in Kham such as Dege and Chamdo.

Pome is drained by the large basin of the Parlung Tsangpo River and its many tributaries. These numerous riverbanks provide the ground for human settlements, mostly in the form of dispersed villages that are spread all over the region. The region has numerous lakes and glaciers, the largest being the Rawok Tso and Ngagung Tso at the foot of the Lhagu Glacier. The glacier situated in the very south east of the Kangri Karpo Mountain Range, spreads over an area of 30 km in length and 2–5 km in



35



36

Figure 36 Section A-A of the farmhouse in Pome (Source: the authors).

Figure 35 Southeast and north-east elevations of the farmhouse in Pome (Source: the authors).

width, with an average elevation of 4,000 m and peaks as high as 6,882 m (Mount Ruoni). Large sections of the Parlung Tsango flow in a broad basin at an altitude between 2,900 to 2,500 m that is richly cultivated providing crops like highland barley, wheat, oil seed rape and corn. The villagers also cultivate fruit trees such as apple and peach and nut trees, such as walnut. The regions is also known for its richness of medical plants and fungus. The agricultural yields of Pome are so high that surplus is provided to the neighbouring regions.

In this part of the Himalayas the tree line reaches as high as 4,500 m. The mountain slopes of the Parlung Tsangpo and Nyang River valleys have a dense vegetation cover with a great variety of plants and a significant coverage of subalpine conifer forest. Dominant conifer species growing at elevations between 4,500 to 2,500 m are hemlock, spruce and fir, less widespread are species of larch, pine and yew trees. Species of junipers might grow at even higher elevations, while birches are found among the dominant conifers. Lower elevations have canopies of evergreen and deciduous broadleaf forests consisting of species of oak, walnut, maple, magnolia, whitebeam and a great variety of rhododendrons that flourish at elevations above 2,000 m. The availability of timber and the mild climate is reflected in the construction of the local houses which are often constructed entirely with timber. Timber

is also widely used for the construction of furniture and a variety of tools. Wooden bowls from the region were highly desirable goods in the past. The high precipitation and heavy snowfalls of the region have resulted in a tradition of constructing sloped shingle clad roofs. Most commonly the houses feature one or two floors with walls mostly constructed as a mix of log structures combined with post and plank construction. The log structures are built with circular and/or planed timbers. The gable walls are closed with light structures made of woven twigs, that are characteristic for the region. Many houses feature balconies and recessing or circulating open verandas with decorative timber railings typical for the region. The window openings are adorned with a great variety of timber lattice designs and decorative frame carvings. An outstanding feature of the region is a special variation of the post and lintel structure whereby two parallel beams are carried by one post. Another characteristic is that the posts are often placed not only on the interior of the main shell but also on the exterior. The houses are enclosed with wooden fences and stacks of firewood piled up to voluminous walls. Secondary timber log structures, unattached to the main house, function as stables or storage rooms in the yards.

Our reference house for this article is located in the village of Dzhongsa lying about 30 km west of the town



37

- | | |
|--------------------|-------------------------------------|
| 0.1 Veranda. | 0.5 Sacred room. |
| 0.2 Storage room. | 0.6 Living room/kitchen with stove. |
| 0.3 Entry hall. | 0.7 Sleeping room. |
| 0.4 Sleeping room. | |

Figure 37 Ground floor plan of the farmhouse in Pome
(Source: the authors).

of Zamu (tib. Zhamog), the seat of present day Bomi County. It is situated at an altitude of 2,666 m. The village of Dzhongsa sits at the foot of a forested mountain slope, that has been partially cleared for cultivation, at the bank of the Parlung Tsangpo. In recent years the road beneath the village has been connected to a national highway (G318) providing a faster connection between Chengdu in the east and Lhasa in the west, placing the village along a major travel route (Figure 33).

The house has only one floor with a gross floor area of 175 m², providing home for four people, two adults and two children. Its timber walls are raised about 50 cm from the ground by a dry stone plinth and covered with a gable roof structure. The roof is clad with wooden boards weight down with field stones. An outstanding feature of the house is the open veranda that recesses into the compact rectangular layout in the northeast, serving as the house's main entrance. It is one of the oldest houses in the village, the adze tool marks on the timber's surface of the beams and planks of the house provide evidence of manual craftsmanship, which has now been replaced by mechanically sawn timber. The beams and planks applied for the construction of the house were squared by hand with a foot adze tool, commonly used by carpenters in the Tibetan cultural region.

All of the walls, that is the outer shell and interior partitions, are constructed with thin timber planks that were hewn to a dimension of approximately 18 cm × 8 cm. The planks are horizontally aligned and fixed into place by a v-shaped tong and groove joint. While the corners of the building are interlocked with saddle notch joints, the log structure is intersected by vertical posts along the long

sections of the wall, forming a post and plank structure. The window and door openings are set between the supporting vertical posts. The top of the outer timber wall is decorated with a frieze that clearly reveals the Tibetan cultural background of this building. It consists of evenly spaced out protruding square timbers whose heads are further enhanced by a white colouring. The space between the heads are painted with a triangular pattern in black white and red. The frieze of the entry wall is further adorned with an additional band painted with the half-round lotus symbol (Figure 34).

The entire house has wooden flooring made of thick timber planks that are raised about 30 cm from the ground by a supporting structure (Figure 35). The beamed ceilings are clad with timber boards (Figure 36). The interior space is arranged by load-bearing timber walls built in the same way as the exterior walls, carrying the ceiling and roof loads.

A rare but not uncommon feature in the Tibetan cultural region is the distribution of functions on the ground floor (Figure 37). As previously mentioned the main entrance is provided by the open veranda that holds one adjacent storage room on its right side. The main door to the house, situated in the back of the veranda, only slightly accentuated by an additional jamb ornamented with a lotus flower motif, provides access into a central hall. The hall in turn provides access to the scared room, the family's main living room/ kitchen and a small sleeping room. The family's main living room/kitchen has an approximate dimension of 6 m × 6 m and is dominated by a sturdy squared post in its centre that supports two beams running in parallel. The post is crowned with a large head, that set at a 90° angle supporting one beam on each of its ends (Figure 38). This is a regional particularity of Pome seems to be a unique specialty of Pome. The room is further dominated by a large earthen stove set at the southwestern wall, that has been clad with tin sheets that are richly embossed with ornaments. The cooking steam is discharged through an open skylight. The room is amply furnished with two large inbuilt cabinets that are colourfully painted, and various sitting furniture and tables .

Some Thoughts on the Future: Decline or Development?

The architectural beauty and high level of traditional craftsmanship of the houses shown in this article raise the question about the potential of vernacular architecture as part of a broader preservation strategy focusing not only on individual buildings but also on traditional knowledge



Figure 38 Interior of the main living room/ kitchen of the farmhouse in Pome (Source: the authors).

and building techniques. Vernacular architecture in rural areas has long been denied recognition as an important factor of the cultural heritage. It appears to have been perceived as something ‘naturally’ and ubiquitously available similar to the natural environment with no need for preservation efforts. Current developments in many countries shows that this is a serious fallacy.

In contrary to the common perception, rural vernacular architecture forms an essential, however extremely vulnerable part of what has been called ‘cultural landscapes’ (UNESCO 2012). Moreover, with its symbiotic adaptation to local climate conditions and its reliance upon local natural resources, rural vernacular buildings can provide a reference for the development of modern environmentally sensitive and sustainable architecture. The lessons embodied in this kind of building practice have hardly been studied let alone been utilised for bridging the gap to modern development.

The past decades have brought a large number of changes to the entire area of Kham. Increased accessibility, modern communication facilities, tourism and the mass media have exposed even remote villages to new building

materials, new life styles and value systems. Many of those changes have made life easier by reducing the hardship of daily life for the residents, for example by providing access to piped drinking water, medical services, infrastructure and monetary incomes. On the downside, the price that had to be paid for rapid modernisation are a loss of identity, broken families with the elders left behind in villages with little income opportunities and a rapid decay of traditional building cultures.

Social and economic changes entail changes in building technologies and the aesthetic preferences of local people. For example, traditional windows become increasingly replaced by glass windows with plastic framing, traditional roofing materials such as shingles or slates are supplanted by corrugated tin. All those material changes bear implications on value systems, local markets and the aesthetic value of cultural landscapes.

Reviewing the four reference cases presented in this article and drawing on broader evidence from our research project three general tendencies can be identified:

1. Neglect and lack of maintenance: There are cases where the houses of families who have been more affluent in

the past, which becomes visible in spacy and beautifully adorned buildings often including special building parts for religious purposes, are neglected and can no longer be properly maintained by the family. This is partly due to the increasing prices of building materials and lack of traditional technical knowledge, partly because modern 'solutions' are poorly adapted to traditional technologies, leading to unexpected structural damages and also to the fact that some families abandon their traditional houses to build new ones with higher ceilings, larger windows and a different use of floor space.

2. Changing values: A plastic window may be functionally superior to the traditional window with a wooden frame and lattices, but the more important argument is that it also conveys the notion of technical advancement and thereby prestige and self-representation. In a society which is increasingly relying on mundane signs of status representation this is an important argument. Interestingly this leads to hybrid forms of architecture: Not only are traditional building materials changed by new ones, sometimes, the excessive use of old decorative elements is being used to express wealth and prestige. The excessive application of adornment to facades and in the interior and also the oversizing of certain structural elements such as posts provide evidence for this trend.
3. Adaptation to new requirements: A positive trend opposite to the general decline of local building cultures is, that in many rural parts of Kham people stick to their traditional way of building houses. These houses may be bigger in size, have larger windows and show intricate adornment borrowed from monastic architecture, but they still follow the same construction methods and floor layout as has been used in the past. The building activities in the valley of Chatreng are a case in point. Traditional rammed-earth techniques are still applied for new (and bigger) houses as well as for the vertical and horizontal extension of old houses. These activities proof that both the preservation and further development of a unique cultural heritage are possible in a continuous line without destroying the local identity.

However, one has to concede that the above-mentioned trends cannot be generalised. While in more urbanised areas one may diagnose that the diversity in terms of styles, building materials and construction techniques is vanishing and giving way to stereotype modern concrete buildings, the richness of vernacular architecture is still visibly alive in many parts of Kham.

After all, vernacular architecture has never been static. There have always been changes according influences triggered by cultural exchanges, fashion and technical developments albeit over much longer periods of time. What makes the present-day situation in Kham and other areas around the rim of the Tibetan Plateau serious is the threat of extinction of the traditional architecture.

It may therefore be worth considering strategies for the preservation and developing of rural vernacular architecture building on the local knowledge that is still available, and the appreciation of traditional customs, rites and symbols practiced by the rural population.

As final remark it should be added that rural vernacular architecture in Kham as a cultural asset cannot be safeguarded with methods appropriate for one individual building. One-dimensional technical measures alone would fail or produce an artificial environment that can spoil the identity and the dynamic potential of indigenous cultures. Effective measures would rather include elements on different levels such as university courses and vocational training and in different fields such as e.g. building guidelines, demonstration projects, competitions and advisory services, support programs.

Notes

1. We wish to express our sincere thanks to Prof. Dr. Qing Chang and Prof. Dr. Zhenyu Li from the College of Architecture and Urban Planning of Tongji University in Shanghai for their invaluable help and advice.
2. The new edition is coordinated by Marcel Vellinga. The authors of this article are authoring new chapters on parts of the Himalayan region.
3. Quoted from *Tibetan Houses: Vernacular Architecture in the Himalayas and Environs* by Herrle and Wozniak, 2017.
4. Climate data see: <https://de.climate-data.org/location/45432>. Accessed 5 July 2018.
5. Climate data see: <https://en.climate-data.org/location/483087>. Accessed 5 July 2018.
6. Climate data see: <https://zh.climate-data.org/location/51047>. Accessed 5 July 2018.

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