

**architecture of the cold desert:  
documenting the domestic houses of  
the Zaskar valley | Ladakh**



*Figure 01 Zangla, a former capital town in the valley*

Folding and thrusting of the Indian and Asian tectonic plates around 70 million years ago convoluted masses into the mountain ranges and valleys of the northern flank of the Greater Himalayas, one of which is the Zaskar Range. The wide, high-altitude river valley of Zaskar covers an area of approx. 7000 square kilometres with a staggering elevation ranging from 3500m to 7000m. (Dèzes, 1999). Drained by the Stod, Zaskar, Lungnak, Tsarap and Kurgyak rivers and glacial activities over the centuries have shaped the glacio-fluvial mountainous landscape of the region.

The pace of the valley is based on the prevailing temperatures and weather conditions throughout the year. Summers months of June to September are the active months where the temperatures range from 1°C to 13°C (-33.8°F to 55.4°F), whereas winter comes in with stillness and limited mobility due to snow and low temperatures ranging from 1°C to -14°C (-33.8°F to 6.8°F) from October to February. With precipitation limited to 250mm, mainly in snow and minimal rainfall, the land depends on the glacial melt and springs water in the summer (India Meteorological logical Department, n.d.). Elevated above the timberline, vegetation is limited in the valley. Abundant sunlight, strong winds, low relative humidity, high evaporation rates, meagre precipitation and fluctuating temperatures characterise the general climate of the region. (Anup Raj, 2020).

Zaskar is a tehsil of the Kargil district in the union territory of Ladakh. Up to the late 1980s, the region of Zaskar was unperturbed by the country's and the world's industrialisation and economic shifts. People in the area lived and worked at the pace set centuries ago, a system deeply rooted in ingenuity, traditions and an understanding of the land, its limitations and resourcefulness. Distances in the region were measured in time rather than kilometres, as the only way to reach and move across the valley was on foot or horseback<sup>1</sup>. During the winter months, the passes and centuries-old trails would be under a couple of feet of snow, making the frozen river the only comfortable possible path to move from one village to another and in and out of Zaskar.



*Figure 02 First snowfall of the season at Padum, Zaskar 2022*

<sup>1</sup>Zaskar to Kargil was almost a seven-day journey on foot or horseback as the first motorable road to Zaskar was made around 1980s. Allowing access through Pensil-La.



Figure 03 The collision of the Eurasian and Indian plates resulted in the thrusting, contorting, and forming the jagged peaks of the Zaskar Range.

The study seeks to chronicle and comprehend the physical manifestations of the adaptation and evolution of the self-contained lifestyle. In addition, the changes to the built environment and lifestyle during the last few decades in the Zaskar district of Ladakh, India.

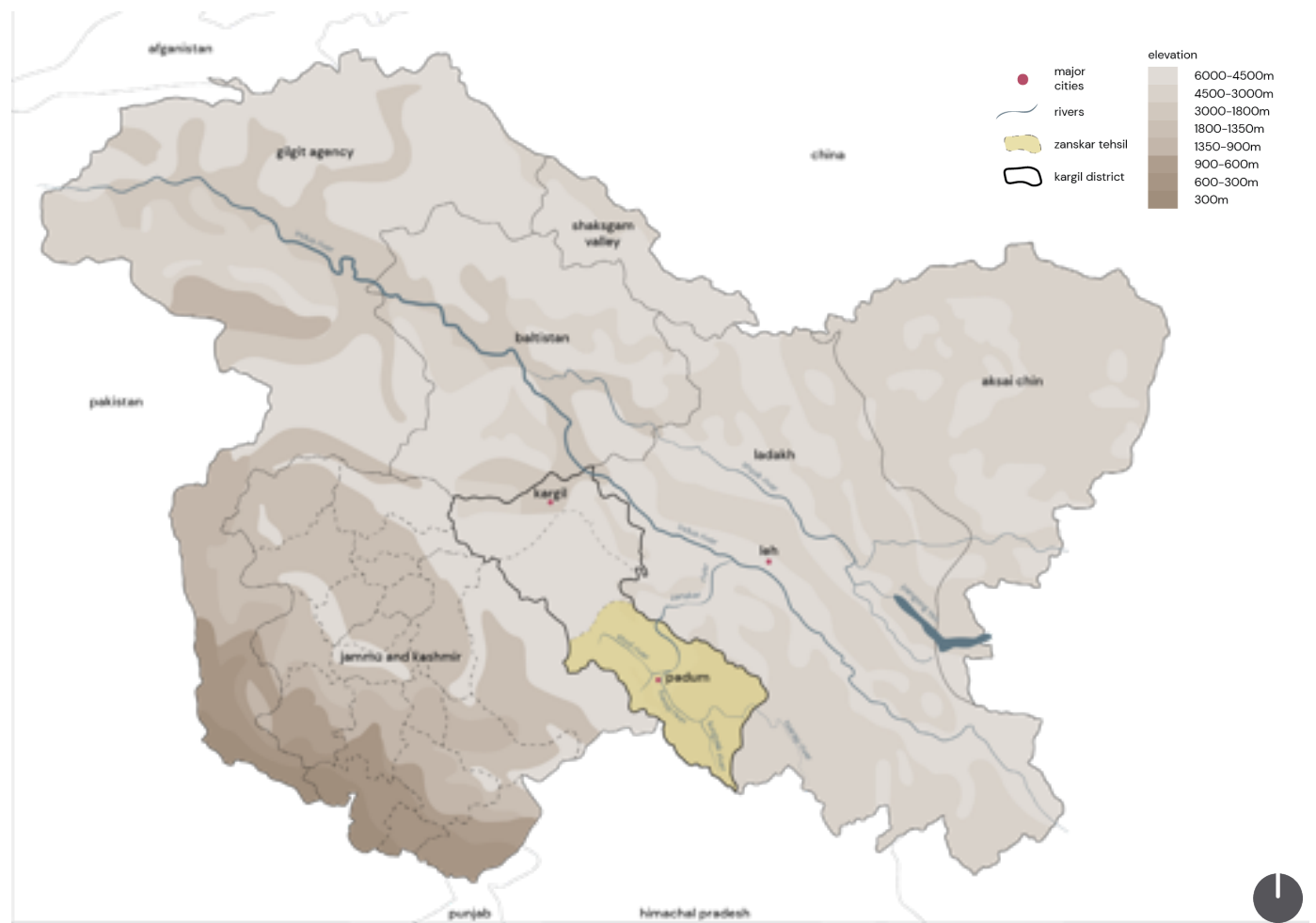


Figure 04 Zaskar, Ladakh (UT), India

## The human occupation in Zaskar

Human occupation in the valley can be dated back to the bronze age, based on the stylistic similitudes seen in the petroglyphs seen at the site at Zamthang and around Central Asia (Vernier, 2016). Accounts of the valley being occupied by the Mons and Dards (Shridhar Kaul, 2004) up until the seventh century is evident with the supposed remains of the ruins of fortresses (called *Mongyi mkhar* or "castle of the mons"), one such example is the remains of a fortress at Tarungtse near Sani. The mons are partially responsible for spreading the teaching and messages of pre-lamaist Buddhism. The examples of pre-lamaist Buddhism are visible in the remains of stupas and chaityas found near Stongde, the stone relief work seen in Karsha, Sani, Stongde, Mune, Padum and Zangla (Francke, 1987) (Osmaston J. H., 1994)<sup>2</sup>. The Tibetan occupation in the region began in the mid-9th century, bringing with them their practice of Buddhism and their cultural and lifestyle practices. The Tibetan influence remained up to the late 16th century, with the assistance of the local kings and chieftains. Post which valley was occupied by the descendants of the ruling family of Leh. Muslim influence and occupation in the region were followed by the conquests of Zorawar Singh from Kishtwar (Shridhar Kaul, 2004), along with the traders that settled in the past few centuries.

With strong Buddhist influences over the centuries, a significant part of the population in Zaskar practices Buddhism. The evolution of settlements is steeped in several religious and geographical factors and integrating factors of isolation, organisational axes of altitude, relief, climate, soil and geology and water supply to determine the placement of settlements in the valleys.



Figure 05 & 06 Petroglyphs are found in multiple locations in the town of Padum, Zaskar

Figure 07 Parts of the monastery at Phugtal are said to be 2500 years old, Phugtal, Zaskar

Traditionally a trifling local trade<sup>3</sup> supplemented the agricultural subsistent economy in Zaskar. People in the valleys practise sedentary agriculture with bovine transhumance, addressing the temporal and spatial scarcity of fodder and forage by relocating to the *doksa* , a settlement in the highlands during the warmer climatic calendar. A few people in the valley were involved in trade. With the centuries-old tradition and primogenital set-up, the younger kids of the household would join the monastery/ nunnery from a very early age.

Embedded in the climatic rhythm, the summer months are the most active months of the year, which includes household and sustenance activities which, includes agricultural and livestock-rearing, construction and maintenance of houses, food processing and storage for the winters (for animals and humans), fuel collection (dung and firewood) etc. The winter months are comparatively slower, with restricted movement and limited outdoor access. Life is constricted to everyday chores of cooking, taking care of livestock and spinning and immersive festivities like praying and indulging in home-brewed spirits.

<sup>2</sup>Accounts suggest that earliest monuments in Zaskar could be dated from the Kushan period (100 BC - 500 CE). Buddhism influence in Kashmir and Ladakh can be date to the reign of Kanishka, the Kushan emperor, who ruled northern India and central Asia during the first century CE.

<sup>3</sup>The men in the region were traders, traversing through the different regions in the Himalayan highlands with their flocks. A couple of trade routes passed this region: salt from Rupshu was exchanged for barley, some of the salt was further exchanged Padar and Pangri for rice, butter and skin, the salt was taken down to the Suru valley by the locals to exchange it for woolen cloth, barley and little cash and traders from Lahaul came into buy ponies, sheep and goats from the valley (Gazetteer of Kashmir and Ladakh, 1890); wool, salt and borax from western Tibet was exchanged for barley, wooden wares and other necessities. (Rizvi, 1999)

A temporary settlement in the high-altitude pastures for family/ community during the summer months; where the pastures help contributing to the domestic economy (Dorje Angchuk, 2020). And the animals are kept away from cultivated land parcels. It also acts as a collective dairy where dairy products like cheese and butter are made in bulk to be traded in.



Figure 08 Abran, Zanskar



Figure 09 Kumik, Zanskar



Figure 10 Chah, Zanskar



Figure 11 Padum, Zanskar

*Summer activities of the valley*

## Settlements in Zanskar

The heavily glaciated wide bottomed Zanskar valley is encompassed with rills, gullies, and scree-covered slopes merging into fans and low terraces. The elevation of the terraces within the valley range from 3300 to 3800m, 3800 to 4400m, and 4400 to 5000m approx. The first range is concentrated with humans and their settlements. The second range is for the summer grazing grounds and temporary shelters for humans and livestock (doksa). The third range is developing as grazing grounds over the past couple of years due to changes in summer weather conditions (Kou, 2011) and is a source for glacial-fed streams. Small changes in altitude impact the vegetation and domestic flora and fauna. Settlements and economics depend on access to resources and goods from various altitudinal zones. Integrating the different zones is essential for the region to be self-sufficient. Settlements are found in and around the capital towns or defence outposts like Padum, Stongde and Zangla (Dargyay, 1988) and near the significant monasteries like Karsha and Sani. A symbiotic relationship exists between the monastery and the people in the villages around it. Most of the villages / of Tanak, Bardan and Rangdum, where the gompa has been found.



Figure 12 Stongdey is located on the alluvial fan of the Lgnak valley

The size of the settlements ranges from mainly 50–200 households approximately (KASHMIR, 2011), with exceptions of 1-2 households in Purne to 261 households in Padum. The settlements are located in the limited tract of the alluvial floor along the rivers and streams. The land earmarked for dwellings is unsuitable for cultivation and on the rocky outcrops, mainly the apex and upper slopes of the alluvial fans, and in moraines (as seen in Padum). The verdant lower slopes of the alluvial fans, the main valley floor, and river terraces are the land used for agriculture, owing to the fertile tract of land and proximity to a water source.

According to the practice of Buddhism the lamas don't work cultivating for the monastery. And lamas help conduct and assist the religious and cultural activities in the settlements.

The connection between the settlements before direct road connectivity was through a series of graded tracks for the loaded animals and humans to pass, made by modifying the rockfaces with a skilfully placed stack of stone and wooden members. Forging rivers and streams in the summer months was arduous; thus, settlements across streams had bridges of different lengths and types connecting them.



Figure 13 Chortens and mani walls often mark the location of a settlement



Figure 14 Housing just two households, located along river Tsarap, Purne is on the crossroad to head northwards into the Zaskar valley and southwards towards Manali

## Settlement planning

The planning of the settlements is straggling, varying from a linear, isolated and dispersed concentration of built to highly compact and dense clusters depending on the topography and local conditions. Within the hamlets, the houses are placed within close proximity to break the flow of strong winds, reduce the chill factor and retain warmth within the buildings. Perched along the south-southwest facing gradient, the houses rise two or three storeys from the ground to ensure maximum sunlight exposure throughout the day. Several communal and religious buildings are seen within the settlements, like *gompas*, *count* *l* *chortens* and *mani walls* dotting the landscape.

Short bridges of up to 10m using long poles and flagstone twisted branchlets of bushes and shrubs found nearby; the ropes that were handmade by the families in rotation yearly. *Lonicera myrtillus*, a kind of honeysuckle or *Betula utilis*, a birch (Osmaston J. H., 1994)

The *gompas* / monastery are centres for learning, culture Buddhist society.

Chortens are structure built to symbolize the four basic of venerated lamas are entombed within the structure

Mani walls are constructed near a settlement as a sign walls are from the fifteen century AD. Mani walls was consists of number of stones and slabs, inscribed in Tibetan along with carvings done in hand carved stone relief work (Dorje, 2016).



Figure 15 Pipsta, Zaskar

Figure 16 Anmu, Zaskar

Settlements seen perched along the south-southwest facing gradient of the valley



Figure 17 Zaskar tehsil with locations of settlements, monasteries, rivers and access routes



Figure 18 The southwest facing clustered houses at Kumik, Zaskar

The utilities within the settlements combine a publicly and privately owned system that works in tandem. The uncultivated areas around the village in the uplands and main valley area are reserved for communal grazing and collection of firewood; these parcels are sometimes owned by the state or a monastery. A communal wolf trap or *samthang* is a pit constructed in stone abutting the village to allow the villages to catch the wolf using a sheep or goat as bait. Within the villages, there are communal spaces for threshing and oil removal from mustard seeds. (Osmaston J. H., 1994).



Figure 19 Icher village, Zaskar

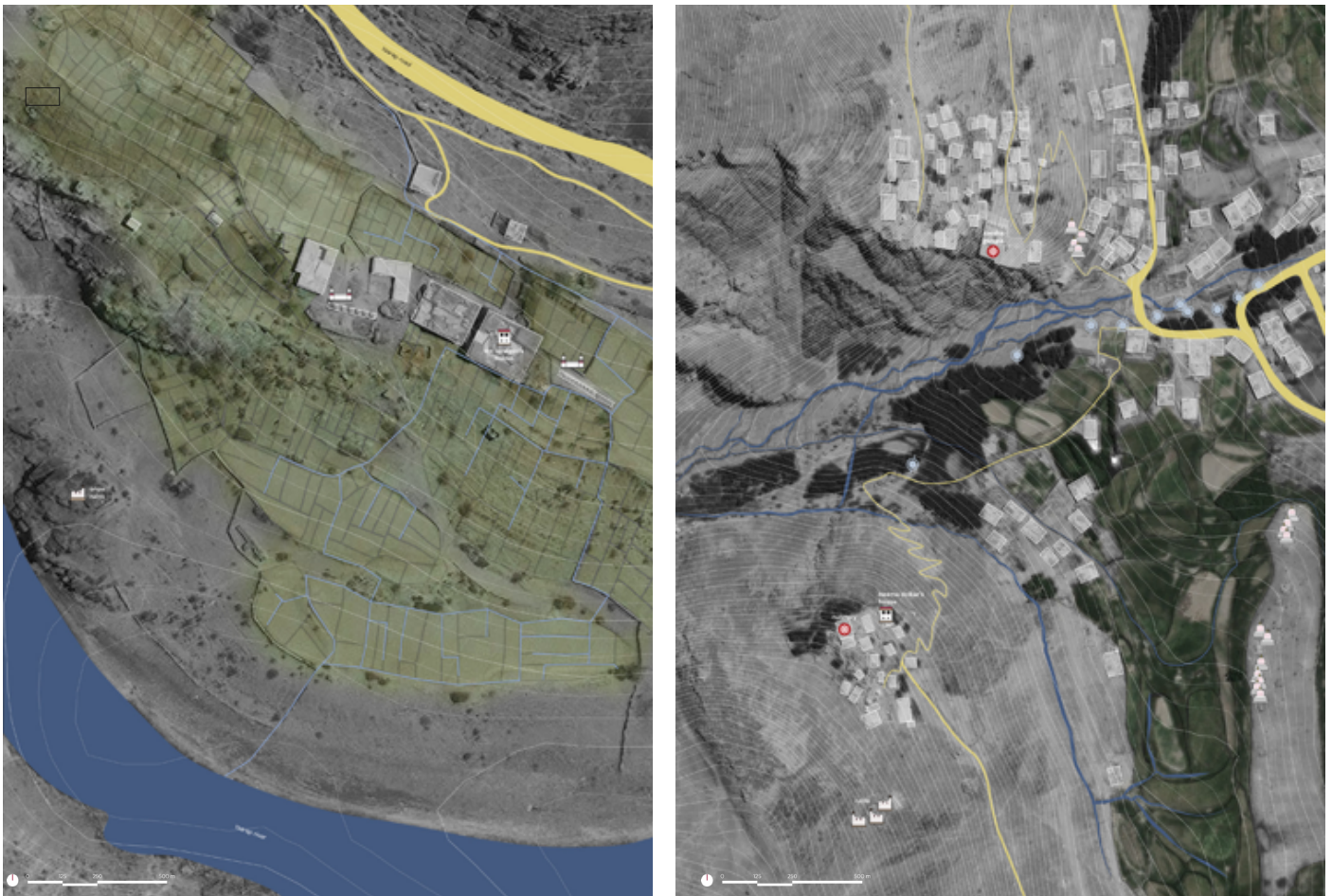


Figure 20 Maps of settlements at Purne (L) and Karsha (R) showing the proximity of the dwelling to the monastic structures, ranthaks and farmlands

#### Legend

	roads		mr. spalgon's house		karsha gompa		nunnery
	streams		mani wall		gharat		ruins
	houses		ruins		chortans		neema dolkar's house

Water supply<sup>1</sup> is managed through a gravity-based distrib hierarchical network of community-owned and managed<sup>11</sup> earthen channels<sup>12</sup> and an earthen pond called *zing*<sup>13</sup> to irrigate fields in the summer. During the winter, water is carried from the river or a distant spring or by breaking the layer of ice on the frozen river. Community or privately-owned water-run flour mills or *ranthak*<sup>1</sup> are strung along the val streams where the settlements are used for milling grains post-harvest.

Dok soatemporary summer settlements in the higher reaches are surrounded by grazing grounds and a source of water in the form of spring or a stream, housing multiple families and their livestock. The settlements have structures that have been around for centuries, maintained and repaired yearly.

<sup>1</sup> Water is rarely sourced from the large rivers running fans and settlements are in the uplands, thus longer channels and a mechanism to draw the water out turns out as a tedious process.

<sup>11</sup>Equitable water distribution and collective decision making is a customary practice governing the allocation and management of water.

<sup>1 2</sup> Water is deviated from the stream (tokpo) to the main

<sup>13</sup>Zing is an earthen storage pond, with an embankment of stone masonry with mud mortar that holds water that is filled overnight and released once full.

<sup>1</sup> Water from the stream is diverted through a channel t h in turn rotating a dislike stone placed over a stationary stone. The constantly falling grains turn into flour as they get ground in between the moving stone pieces in a small stone masonry and mud mortared structure. Ranthaks are generally seen in a cluster located in the direction of the flow of the stream

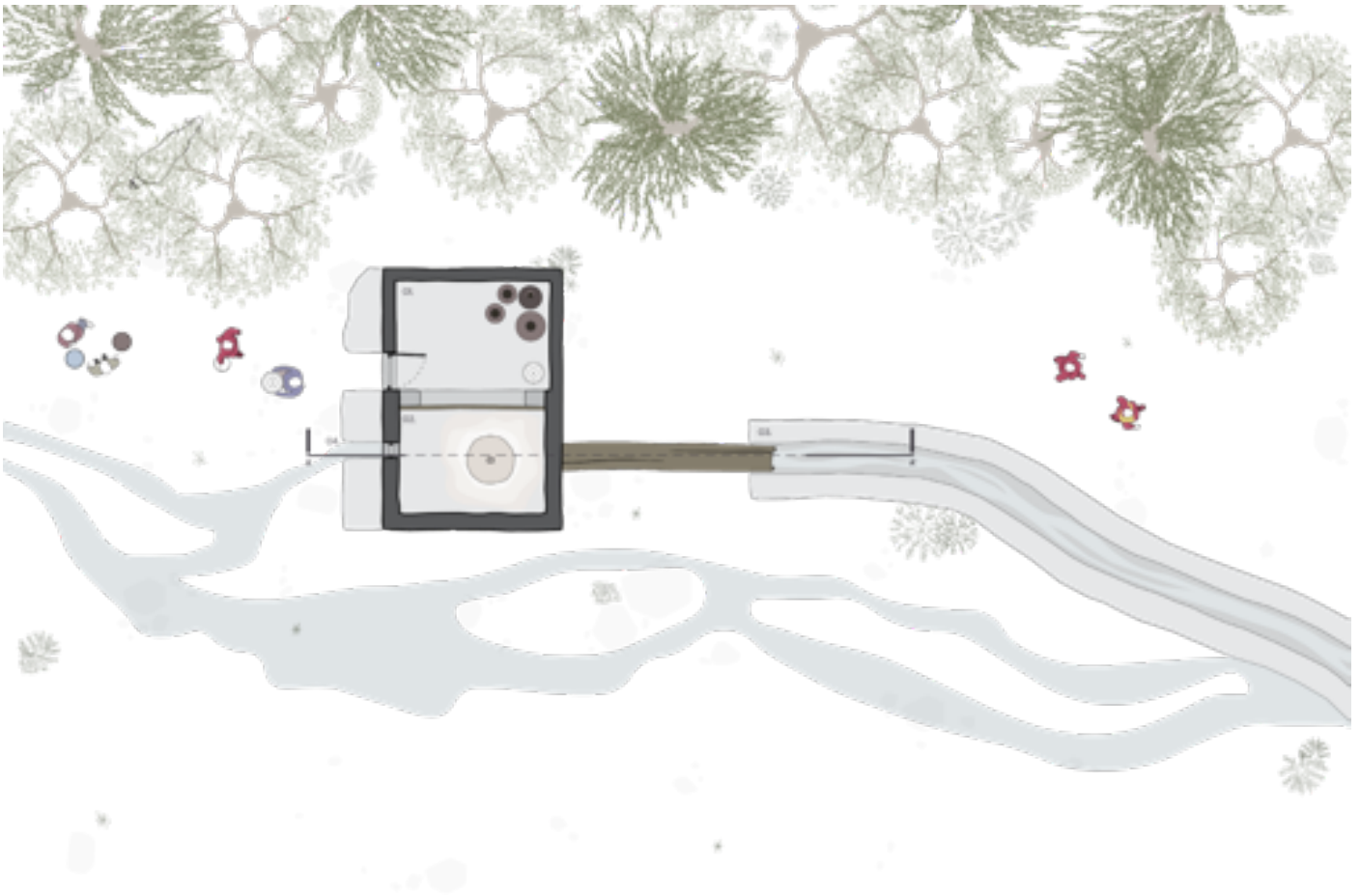


Figure 21 Plan of a ranthak along the stream in the valley at Karsha, Zanskar

Legend

- 01. **dzot** | storage room
- 02. **ranthak** | water mill
- 03. gharat water inlet
- 04. gharat water outlet

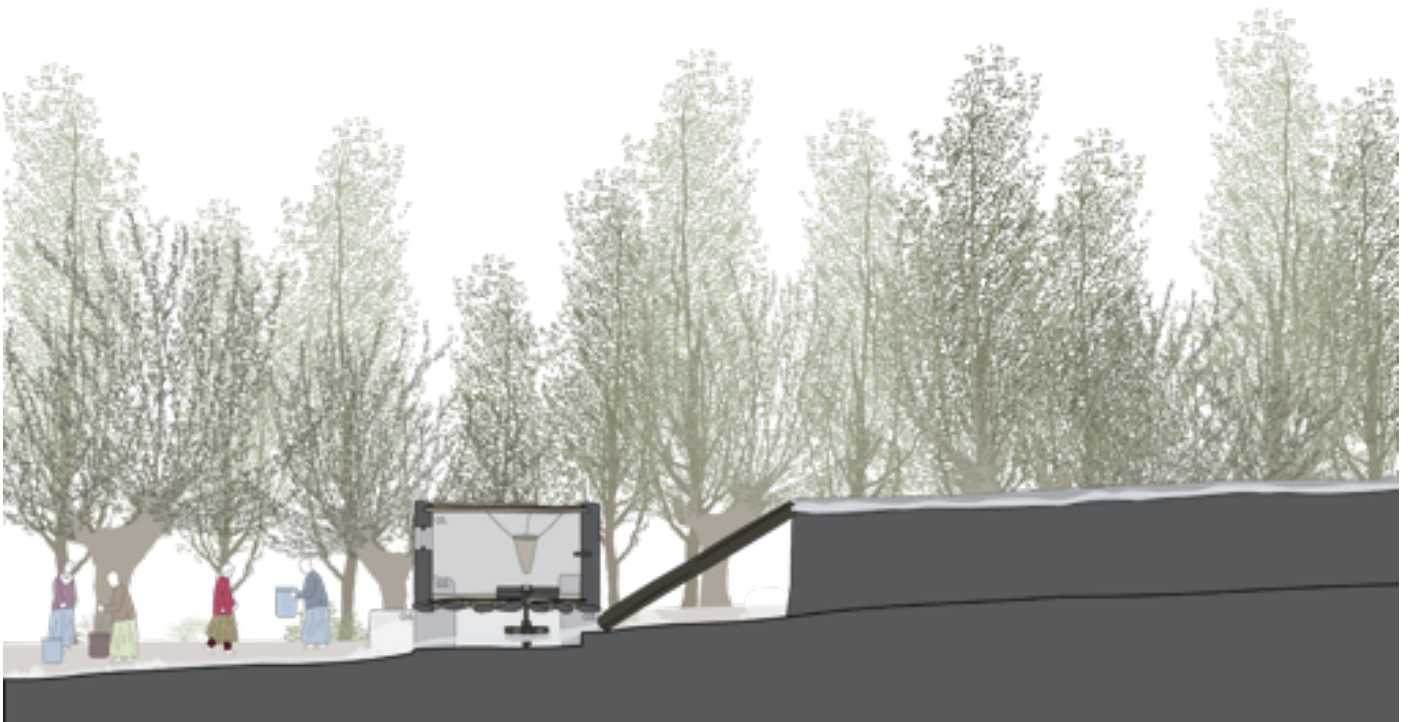


Figure 22 Section of the ranthak showing the different components of the ranthak at Karsha, Zanskar

The information and representation is based on the original use of the spaces.



Figure 23 Series of ranthaks along the stream Karsha, Zanksar



Figure 24 Dry stone masonry walls of the ranthak



Figure 25 The various working components of the ranthak. Wooden turbine

## Farming and pastoralism in the valley

The society was governed by feudalism and monastic guidelines and the principle of primogeniture, monastic celibacy and the practice of polyandry<sup>1</sup>. The monasteries, private held fields have been fostered by the inheritance arrangement; thus, the land, along with the water share, is not divided and is inherited by the eldest son (or son-in-law in the absence of a son in the family) along with the household's main house (*khang pa* or *khang chen*).

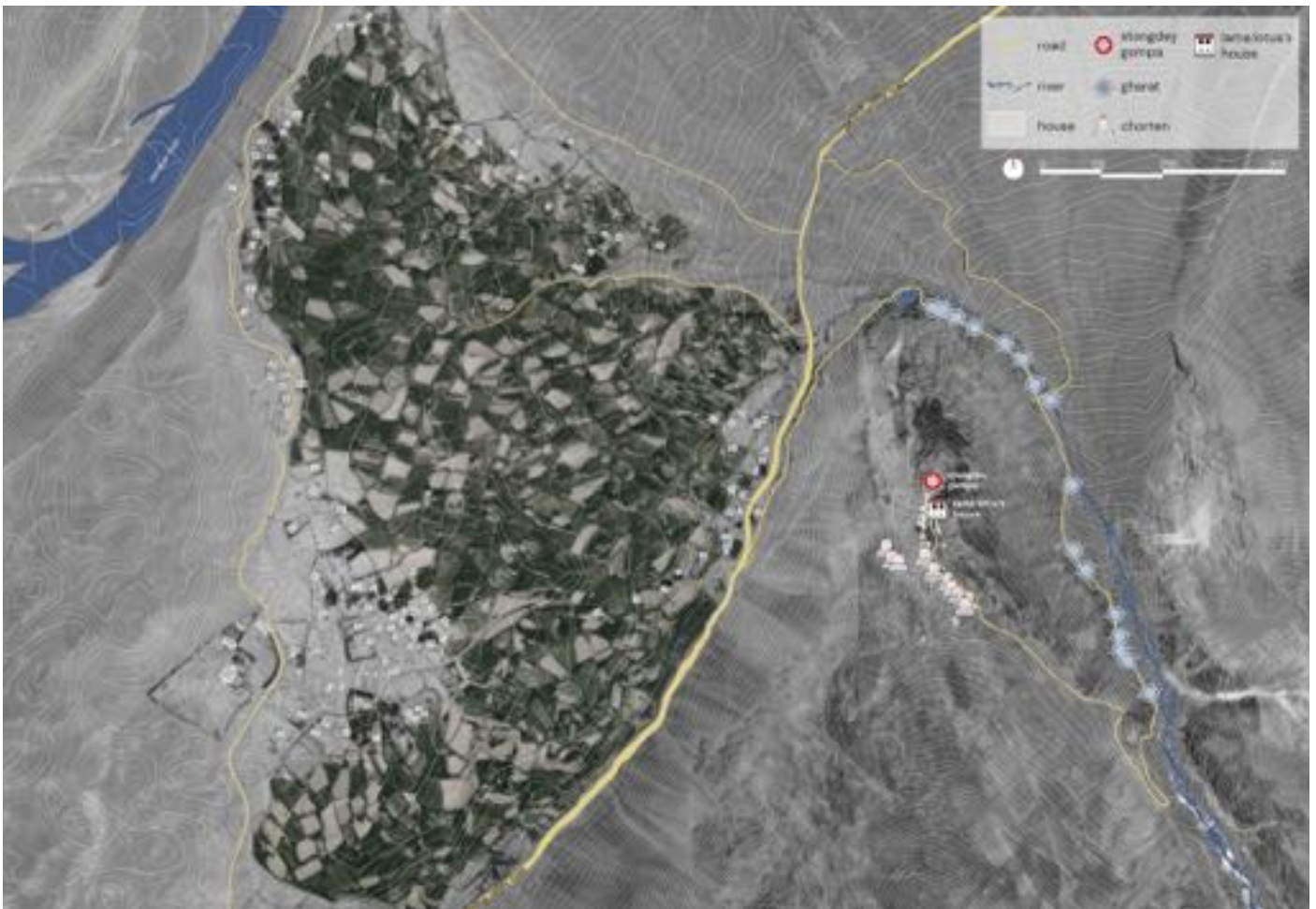


Figure 25 Map of Stongdey showing the proximity of the houses to the monastic structures, ranthaks and the farmlands



Figure 26 Farmlands at Purne



Figure 27 Farmlands at Sani

<sup>1</sup> With changed in the inheritance and outlawing of primogeniture, estates are divided amongst the siblings in the past couple of decades. The land remains unified to preserve the existing irrigational channel and ensure maximum area is cropped. (mankelow, 2010)

The vertical distribution is seen in the agricultural produce; the lower reaches have a variety of barley, wheat and peas, with a few places, mustard is also grown, whereas the higher reaches are limited to barley (Osmaston H. , 1985), making it a staple food<sup>1</sup> through the different households in the region. greens are foraged and dried for the winter months. Livestock is the muscle and backbone of life and economy in the valley. Playing an intrinsic role in trade, fulfilling food<sup>1</sup>, m ploughing and threshing grains. Livestock in the region comprises yak, dzo, dzmos, sheep, goats and horses.



Figure 28 Rangdum, Zanskar

Livestock across various locations in the valley



Figure 29 Karsha, Zanskar



Figure 30 Abran, Zanskar

The livestock is taken up to the doksa's during the summer months that house the livestock and the herders of the village or a family in dry stone masonry walled enclosures. The animals are grazed in the nearby areas, while the women milk the animals and make cheese and butter (Raj, 2017). The animals are brought down for threshing once before the first snow.

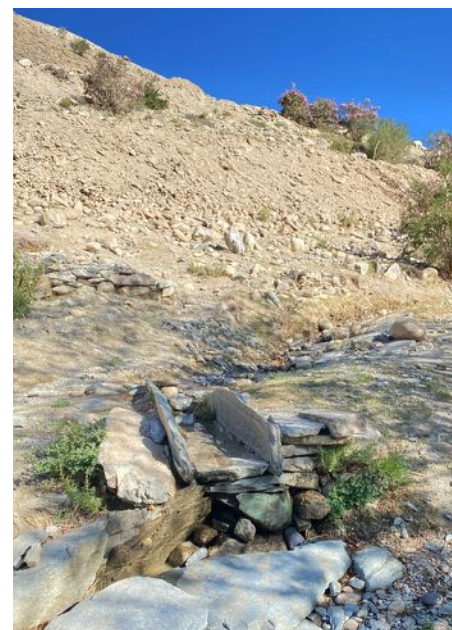


Figure 31 Zing, an earthen storage pond (L) and water channel feeding water to the fields (R)

<sup>1</sup> Barley is used to make staples like tsampa and chaang

<sup>1</sup> Dairy products make an essential contribution in their used in rituals as well as runs a part of economy as product to be traded. Meat consumption is limited due to religious beliefs of the Buddhist population

<sup>1</sup> With a limited vegetation palette and a paucity of fire heat during the winter months. Dung collected over the summer months in the doksa is also brought down to the house to be used as fuel.

## Resource library

Owing to the high altitude and arid landscape, resources are concentrated in favourable pockets along the valleys, resulting in a frugal material lifestyle, a derivative of the valley's inhabitants' ingenuity and intimate knowledge. With a paucity of timber in significant portions of the valleys, buildings are mainly with limited use of timber. With limitations in connectivity and transportation, a significant portion of the building material was locally sourced, other than timber that was transported from places within the timberline, the valley near a watercourse or a nearby district<sup>2</sup>. The trees found (shuipa), Poplar, apple, almond (Thompson, 1852). Timber was traditionally sourced from Juniper; it can still be seen in old houses and gompas in the region, along with members made of Willow trunks<sup>21</sup>.



Figure 32 Shila village



Figure 33 Zangla Palace, Zangla



Figure 34 Ruins at Karsha

Battering rammed earth and stone masonry walls were among the common process of construction for structures in and around the valley.

<sup>1</sup> With the road coming into Zaskar, materials like glass part of the material palette of the region.

<sup>2</sup> Timber is available around Shade, Shila, Ichar and gor river periodically. From outside the valley wood was brought in from Padar region in Kishtwar, Lahaul and Markha valley. The main pillars for Sani Gumpa from Kistwar over Umasi-La. (Osmaston J. H., 1994)

<sup>21</sup>In the recent years, the use of cultivated poplar for construction has increased in the region.



Dry stone masonry wall construction is one of the common process of construction. It is used in the walls of a zing near Lungmi (Figure 34); ranthak at Stongdey (Figure 35) & doksa at Abran (Figure 36). Figure 37 Earthen grain storage shaft at Purne, Zanskar

Wooden members support floors for the house's doors, windows and lintels<sup>22</sup>. A few types of grass and remains of agricultural produce are used to strengthen bricks and plasters as well as provide a layer of insulation in building floors<sup>23</sup>. Tectonic forces intensely folded and faulted, and mountains metamorphosed, denudated and sedimented mountain ranges are significant reserves of building stone and support earth formations. Tectonic allocation is a location that governs the type of stone available<sup>2</sup>. The use of irregular and larger blocks of s employed to create boundary walls or temporary shelters. Limestone found near Karsha, and Phuktal is powdered (sometimes burnt in a kiln) and mixed with water for white washes. The spotted shales below Stongde monastery are pounded in mortars of the erratic gneiss blocks. Gneiss blocks near Padum are used for building construction. The stone walls are constructed of rocks of varying sizes and types with different earthen whether it's permanent or temporary, and the construction period.



Figure 38 Walls of Phuktal monastery with natural based pigments from locally sourced stone and mud Figure 39 Stone masonry with natural based plaster at Karsha Figure 40 Wattle and daub

<sup>22</sup> Traditionally windows were made with wooden lattice work in the material palette of the region with the road connectivity to the area.

<sup>23</sup>Yagstee grass is used to provide a layer of insulation as well as absorb water that might trickle down the cracks of the roof.

<sup>2</sup> The region around Phuktal is concentrated with limestone east by the Panjal Trap, and bordered by several limestone belts. Dolomites are also seen in the south eastern region of Phuktal. And Testa. Gneiss and granite massif form the south western boundary. North eastern flanks are the Palaeozoic formations of the Lahaul group, mainly sandstones, in which the Stod and Lungnak valleys are carved out in. Igneous rocks of the Panjal Trap form the ridge-tops just north of the Stod and Lungnak valleys, including the one on which sTongde gompa is built and above Kumik. Quartzite is found near Zangla on the sides of the gorges or crests of the ridges. The sandstones and shales of the Giumal and Spiti formations however, which occupy a belt running from Lingshed to Sha-de.

<sup>2</sup> The households in the doksas were generally constructed

Earth and stone are used in various forms and recipes across the region. It is used in rigid forms as a binding material, as a part of unburned bricks, as rammed earth and as finishing for both vertical and horizontal surfaces. It is compressed and consolidated to achieve desired strengths in load-bearing walls (using sun-dried adobe bricks/ *pagbu*<sup>2</sup> or rammed earth)<sup>2</sup> the *chö* (clay) is sourced in the Zaskar has a 12 to 25.5 per cent, with low organic and humus content. (Gokhale, 1986). The earth used for making *pagbu* contains a higher proportion of clay than the one used in rammed earth (coarser earth with lower clay content). For the non-loadbearing/ structural walls, wattle (using a mesh of willow sticks) and daub are seen in the region. Traditionally, layers of local clays, mud and stone powders are used to create waterproof roofs and dust-free plastered interior and exterior surfaces.



Figure 41 & 42 Construction of structures have complemented and used the natural terrain. Big immovable boulders are accommodated within the structures as seen in Karsha and Padum

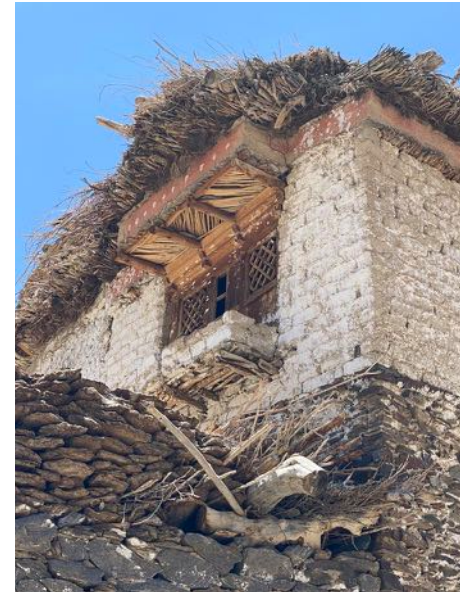


Figure 43 Ladakhi inspired window detail at old Icher



Figure 44 Sani Gompa at Sani is built on a flat terrain and can be considered as an exception to the other monasteries in the region

<sup>2</sup> Depending on the homeowner's financial capacity, raw m

<sup>2</sup> *Pagbu* is a sun-dried handmade adobe brick, mainly made of the bricks used in imperial and religious buildings are larger than the one seen in houses.

<sup>2</sup> Rammed earth practice is seen in the ruins seen at Ka settlement. (Sheikh, 1995)

## Construction processes

The architecture of the region emphasises the prudent use of scarce resources. Working extensively with mud and stone (stone and mud masonry walls, adobe brick with mud mortar, rammed earth, wattle and daub etc.). The origin and refinement of the techniques are rooted in the influences that travelled through religious and political channels from the present-day parts of Ladakh, Tibet, Kashmir, Baltistan, Afghanistan etc. The interrelationship between local material resources and applied techniques is seen as a direct response to the availability of resources and parameters of skills, use and human needs. Thus, the construction techniques and principles traditionally used in the forts, palaces, monasteries and houses denote a common ground with a difference in scale, decorative motives and volumes.



Figure 45 Houses at Kumik



Figure 46 Settlement at Karsha

Traditionally the construction and design practices are an inextricable combination of ritualistic and physical aspects followed in the region. The building processes included several ceremonial rituals and blessings from the lamas. The construction and building activities are carried out by experienced and skilled craftsmen and masons, as well as members of the family and neighbours coming together to support the building. Labour was done in exchange for materials or based on a mutual understanding of helping each other.

Religious symbolism and belief are used in the red ochre paint daubed on the walls with geometric motives. Every household and Buddhist monastery has its own protector, a space designated in a shrine on the rooftop of the space.



Figure 47 Ritualistic symbols are often found painted on the external walls of the houses. The symbols have various meanings and beliefs one of it being to ward off the evil.

## Built form

Buildings in the region are multi-storeyed load-bearing openings and flat roofs. Within every typology, some functions are common planning considerations: a space to house animals, food reserves for the harsh winter months, or a kitchen. Material palette and size availability define the design and planning of the spaces. Walls in the area played a double role in providing structural stability, seismic deterrence and increasing the insulating and temperature regulation. Timber posts and frames are limited to structural members throughout the buildings. Limitations in the availability of timber limit the room sizes. (Cunningham, 1854).



Figure 48 Purne

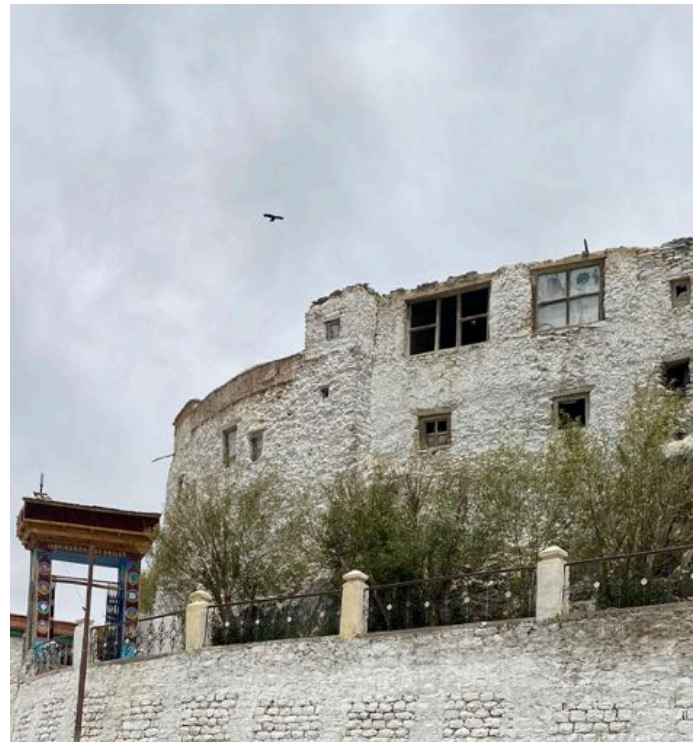


Figure 49 Stongdey

The substructure is generally made with hewn stone with constructed in sun-dried adobe bricks or pagbu. The walls are plastered in earth-based render called *zhala*, often mixed with plant-based additives like hay or mineral-based pigments to attain a specific colour and finish. The finished plaster is sometimes whitewashed with lime or *kartsi* obtained from direct grinding of limestone and mixing it with water. A decorative coloured low parapet or *thogrgyang* (either red or black band<sup>31</sup>) is built using *pagbu* with slate stones and compacted mud with a slope to prevent water from penetrating, as seen along the terraces creating a contrast as well as a stone coping. The configuration of wooden members varies and depends on the room's span, where they may be more than a single main beam<sup>32</sup>. A series of joists are placed at equal distances perpendicular to the main beams. Willow twigs or talu are usually placed in rows over the joist, covering the ceiling in a pattern. The wooden substrates are covered with a thick layer of local grass (*yaksee*). The finishing material is earth, which is poured and then compacted into several layers. The dwellings at the doksa are single storey dry random rubble masonry structures protected with a roof made using locally sourced twigs, branches and grasses (*Acantholimon lycopodioides* (lon-ze)) (Osmaston J. H., 1994) from the bushes nearby.

<sup>2</sup> Buildings are constructed with inclined walls, as the materials and provided stability to the load bearing walls.

<sup>3</sup> Sundried bricks have the tendency to fail under the im

<sup>31</sup> Buddhists associate black to civilians, called *milakpa* or for families related to the royals.

<sup>32</sup> Willow, poplar and juniper is used as structural member

## Climate adaptability

The community and their livelihood are entuned to the climatic pattern. The lifestyle is a clockwork rhythm of activities distributed over the different times of the year. The warm summer months are spent on trade, repair jobs and any such related work for the house and the household. These communities also prepare for the harsh winters with slow and steady stocking of food, fuel and reserves to last them the entire winter season. With heavy snow and low temperatures, the families are home bound for months at a stretch. The winter months are thus spent indoors, with family members cooking, eating, taking care of their animals, spinning wool, and most importantly reading scriptures and praying.

Spatial planning, structural orientation, settlement patterns are planned to respond and adapt to the climate. The structures are oriented to maximise solar gains, thus accordingly oriented to the sun path. In a settlement these multiple structures are closely placed, so as to cut and reduce the impact of the cold winds. Topography helps layer these structures in stepped profiles. The contours help earth berm the structures, added with thick mud and stone walls increase thermal lag and insulation during the harsh sub zero winter months.



Figure 50 Icher village, the structures are built facing the south/ south-west facing to get maximum exposure of the sun, and thus the maximum percentage of openings are along this facade.



Figure 51 The settlements are built using the terrain to its maximum advantage and in accordance with the localised climatic and topographical conditions.

## Spatial planning : domestic typology

The spatial hierarchy of the dwellings in Zanskar is a direct response to climate, occupation, location and the needs of the people and livestock that has shaped through the centuries. The spaces are designed for self-sufficiency, especially during the winter, accommodating an individual's food, shelter and hygiene needs and their livestock. Spaces are designed for storage, sustenance and comfort. The buildings in the region lack a direct water supply; thus, water was brought in from a source in containers and stored within the house.

The lower floors are reserved mainly for livestock and storage (with additional spaces for winter occupation). The organisation of the ground floor is based on the number and kind of animals in the household. Attached to the ground floor indoor stables and mangers are the open-air enclosures or *tangras*, mainly used in good weather conditions and provide a space for the animals to enjoy the winter sun along the south-facing side of the building. The different floors are traditionally connected using an internal staircase from the lower to the upper floor. Connecting the different spaces is a passage or *srol*. Within some parts of the valleys, spaces on the lower floor are used for human occupation during winter. It's a central living space with a hearth. With almost no window, the floor received light from its doors and passages, the ray of light from the blazing hearth, or a skylight in the ceiling of the summer floor.

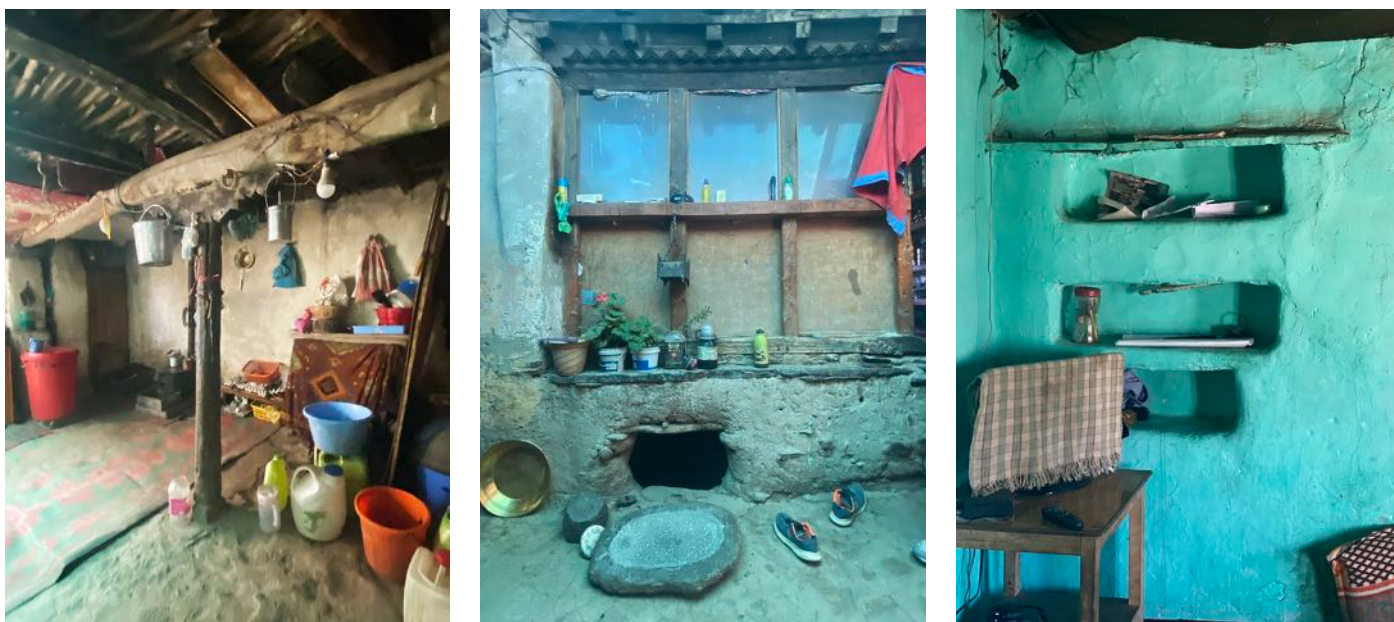


Figure 52 Living spaces seen in a house at Padum, Zanskar

In some houses, the winter living spaces or *ghansa* are seen on the house's first floor. The space is designed with minimal openings. The upper/ summer floor is occupied during the summer months with living quarters, stores, kitchen and grain storage, toilets, and prayer rooms. The summer floors are airier, with several windows, and some spaces are planned with a central open-to-sky courtyard (to bring in more light and air to the spaces) or a space designed with a series of skylights opening to the terrace. In the summer, a large portion of the day is spent outdoors. Families tend to sleep on the terrace or in the summer rooms. The flat terraces are used to dry grains and feed livestock before winter<sup>33</sup>, and store firewood and grass. Spaces are designed with limited furniture; thus, the window sills are low enough to provide a view of the outside while seated on the floor.

The modifications in terms of additions and subtractions in the spatial hierarchy of space depend on the occupant and their occupation<sup>3</sup>. The palatial homes are designed over three and logistical work. Within the old Zangla palace, the upper floor housed a library, and on the lower floor, there are spaces to accommodate the help (Orsolya Szabó, 2016). The current palace for rGyalpo<sup>3</sup> of Zangla has reception floor (Peissel, 1979).

<sup>33</sup> Pastoralist's house often has a double heighted fodder terrace, and is accessed through an openable shutter on the lower floor. The dried fodder is thrown into the space through the opening on the terrace.

<sup>3</sup> The permanent and seasonal households of the region are a rGyalpo along with a household in the doksas was studied as the seasonal settlements.

<sup>3</sup> rGyalpo is the ruler or head of state.



The information and representation shown in the ground floor plans is based on the original use of the spaces.



Figure 55 Passage leading up to the terrace at the house in Lungmi



Figure 56 Opening in the terrace floor to transfer hay to the floor below



Figure 57 Space on the ground floor is reserved for the livestock, Rangdum

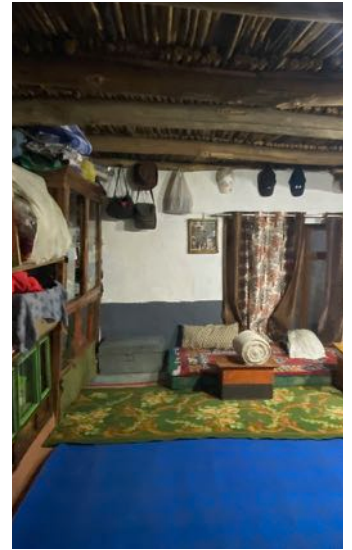


Figure 58 Living space in the house at Rangdum



Figure 59 Houses in Lungmi (L) and Rangdum (R)



Figure 59 Yard for the cattle seen outside the house at Lungmi (L) and chaang preparation in the backyard at Rangdum (R)

## Pulus

The encampment at the *doksa* is used by the family for approx. four months in the year. The shelter's design and make are subject to *doksa* *parmasence*. In some *doksa* across the region, tents are pitched with the animals tethered to pegs or rocks, or generations-old permanent series of enclosures called *pulu* made up of stone maintained yearly along with a freshly laid roof. The minimally furnished dwellings are used for storage, assisting the needs and spatial requirements for dairying. The *pulus* are irregularly shaped single-room enclosures that are isolated or clustered together. The *pulus* are designed without openings, a low ceiling, and niches within the wall for storage. The *pulus* is surrounded by an open pen with metre-high stone walls for the cattle and a more guarded enclosure for the calves, goats and sheep. Designated space within the pen is used for dung storage collected over the months.



Figure 60 Plan of a doksa at Abran

- 01. **tangra** | cow stable (outdoors)
- 02. **dzot** | storage room
- 03. **ichekhang** | cow dung storage
- 04. **pugraks** | hay storage
- 05. **chansa** | kitchen
- 06. **nyit tangsa/ zimskhang** | sleeping area



Figure 61 Dry stone masonry walls of the doksa at Abran

## Tashaks

The *gompa*, as an institution, had a variety of spaces to accommodate and sustain the *lamas* and the novices within its complex. The monk/ nun house or tashaks are located close to the main temple and communal spaces like the kitchen and dining. The scale and overall volume of the houses are smaller compared to the multi-human dwellings seen in the region. The detailing and planning are simple, with minimal ornamentation and utilitarian. Food for the *lamas* was generally prepared in the shared kitchen, and most of the time would be spent outside the house. The dwellings are designed and occupied by a single individual (sometimes, the novice also stayed with the *lama*). Multiple units are placed near each other. The spatial organisation and design followed similar principles of season hierarchy. The house was mainly a two/ three storeys high compact structure with the ground floor dedicated for winter occupation and the upper floor for summer occupation.

The ground floor houses the winter kitchen, a few stores for grains and *lchekhang* or dung storage, and a place to retire, rest and pray. The kitchen use was limited to preparing tea, providing warmth through the hearth and making a meal during the extreme winter when accessibility was limited. The access to the upper level was through a staircase within the unit. The ground floor was designed with very few openings. The first floor is designed as the summer floor with a summer kitchen/ *chansa*, a prayer room, a living space, a *chhaksa/ dry toilet* or *lchekhang*. The rooms on the second floor have several openings, bringing in light and ventilation. An additional third floor is seen in a few houses with a summer room or *nyimalakhang/ shelkhang* on the terrace with/ without a pavilion.



Figure 62 House of a lama at Stongdey monastery, Zanskar

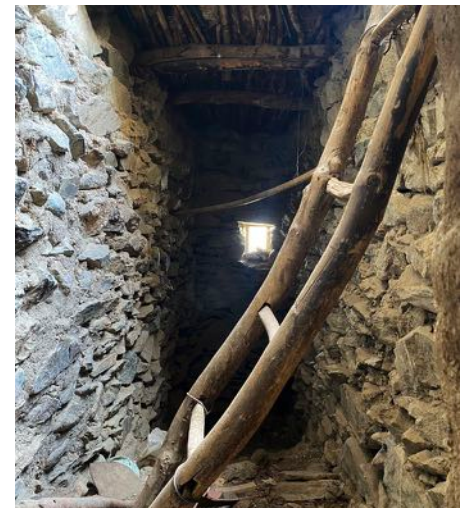


Figure 63 Stone masonry walls with mud based mortar and plaster. The floor is constructed by placing layers of willow sticks, dried shrubs and finished by levelling it with a mud mix

<sup>3</sup> *Chhaksa* in Zanskar serves a dual purpose of providing multiple levels, the lower level is used to collect and store the human excrement and the upper level is a ventilated space with a hole in the floor and some earth placed nearby to be dropped into the hole to reduce the smell and help with composting. The waste over a period of time decomposes and becomes manure that can be used to increase the fertility of the fields accessed through an opening on the lower level.



Figure 64 Ground floor plan



Figure 65 First floor plan  
Legend

- |                                             |                                                               |
|---------------------------------------------|---------------------------------------------------------------|
| 01. <b>dzot</b>   storage room              | 07. <b>nyimalakhang/ shelkhang</b>   summer room/<br>sun room |
| 02. <b>shingkhag</b>   wood storage         | 08. <b>chhotkhag</b>   prayer room                            |
| 03. <b>sangchot</b>   dry toilet pit        | 09. <b>nyit tangsa/ zimskhang</b>   sleeping area             |
| 04. <b>sangchot</b>   toilet                | 10. <b>rdoskas/ themha</b>   stone staircase                  |
| 05. <b>yarkhang/ yarsa</b>   summer kitchen | 11. <b>shraska</b>   ladders                                  |
| 06. <b>gunkhang</b>   winter fireplace room | 12. <b>shrol</b>   passage/ corridor                          |
|                                             | 13. <b>thok</b>   terrace/ flat roof                          |



The information and representation shown in the ground floor plans is based on the original use of the spaces.

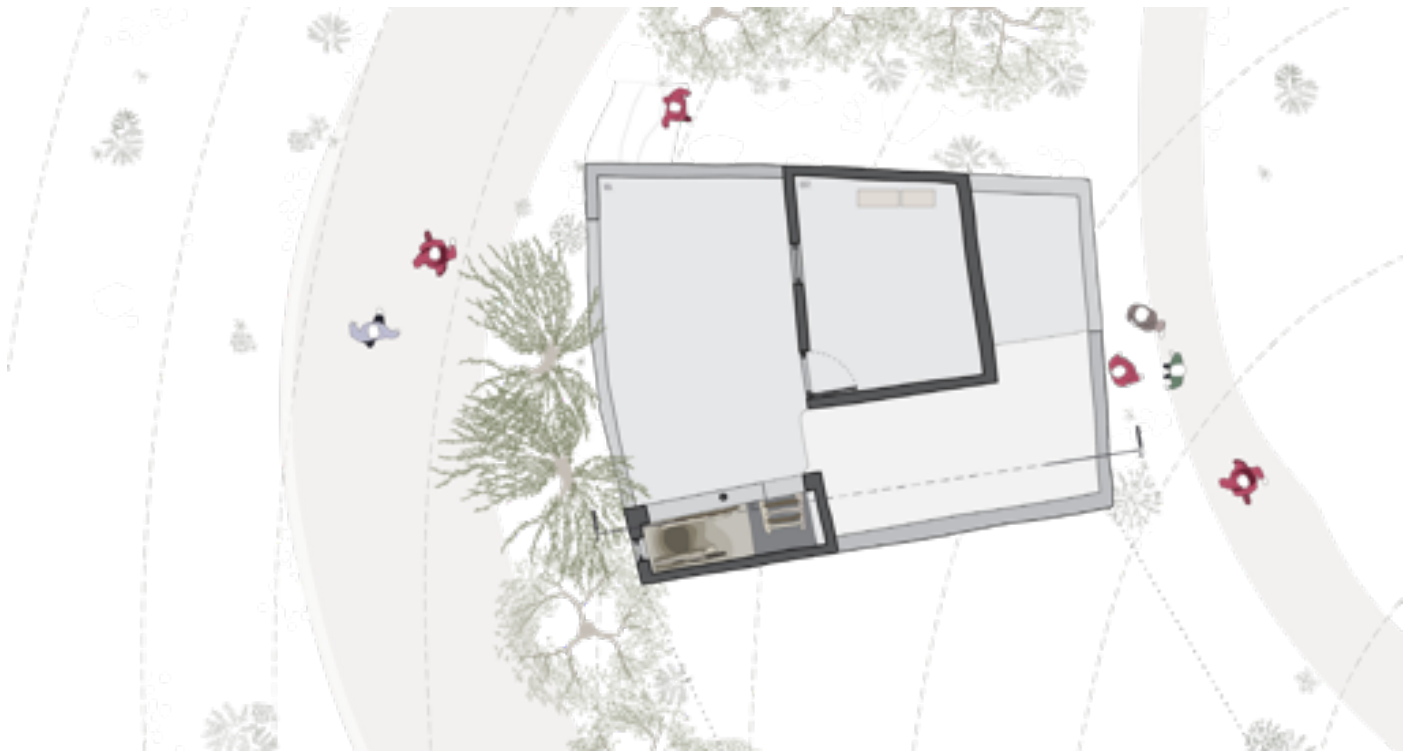


Figure 66 Terrace plan



Figure 67 Section AA'



Figure 68 North elevation

## NEEMA DOLKAR'S {NUN} HOUSE | KARSHA



Figure 69 Ground floor plan



Figure 70 First floor plan  
Legend

- |                                                  |                                                    |
|--------------------------------------------------|----------------------------------------------------|
| 01. <b>dzot</b>   storage room                   | 07. <b>nyit tangsa/ zims Khang</b>   sleeping area |
| 02. <b>chang Khang</b>   chang fermentation room | 08. <b>tsom</b>   gathering space                  |
| 03. <b>sangchot</b>   dry toilet pit             | 09. <b>shrol</b>   passage/ corridor               |
| 04. <b>sangchot</b>   toilet                     | 10. <b>rdoskas/ themha</b>   stone staircase       |
| 05. <b>chansa</b>   kitchen                      | 11. <b>thok</b>   terrace/ flat roof               |
| 06. <b>chhot Khang</b>   prayer room             |                                                    |



The information and representation shown in the ground floor plans is based on the original use of the spaces.

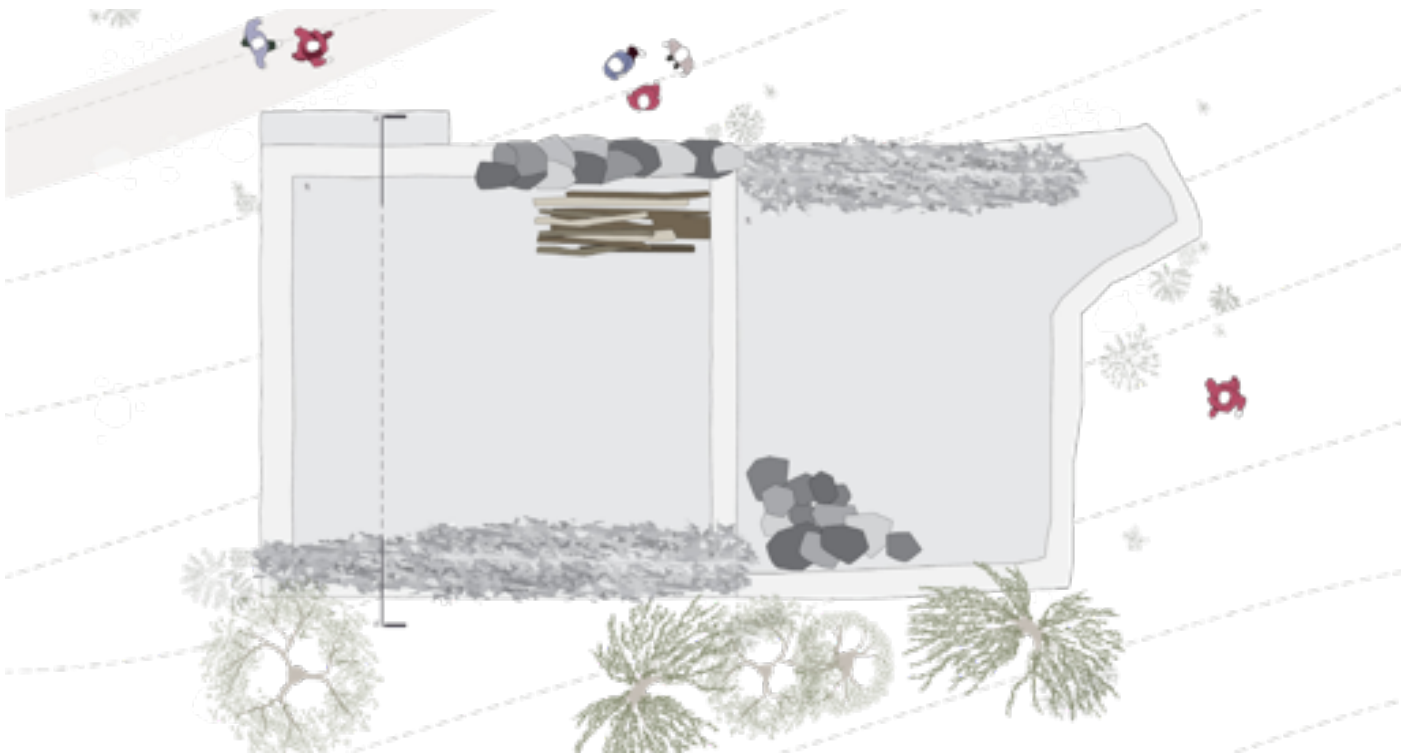


Figure 71 Terrace Plan



Figure 72 Section AA'



Figure 73 South elevation



Figure 74 & 75 West Elevation (L) entrance verandah (R) of the house



Figure 76 Main entrance, on the northern facade of the house.

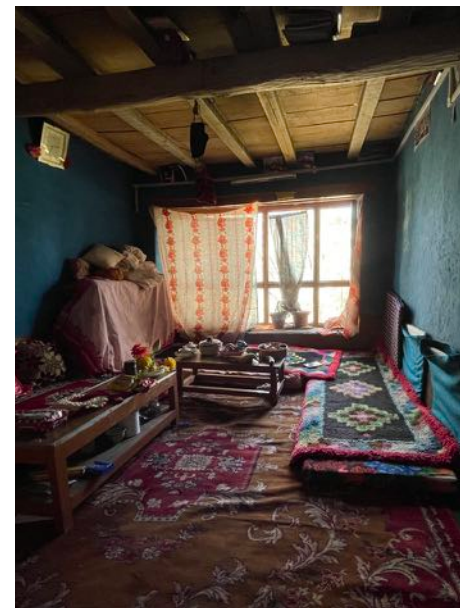


Figure 77 Living space (L), storage room (C) and prayer room (R)

## Khang.Chen

The head of the household lives with his spouse and children in the khang.chen, and the other family members, including the parents, occupy a separate building called khang.chung. The size, detailing, and spatial organisation of the houses are related to the economic status of the family and their occupational needs.

The dwellings are designed to house animals and humans and their needs under one roof. The ground floor was dedicated mainly to the winters for animals and humans (sometimes). The organisation of the ground floor was based on the number and kind of animals owned by the family. The spaces are divided amongst the double-height fodder storage, indoor and outdoor stables and managers for the different animals (horse stable or stara, dzo/ cow stable or paraa and sheep/ goat stable or lugraa). The stables are dark, dingy stone-walled spaces with a natural mud-lined floor. Often there are no openings on this level, except a few small ones for light and ventilation. The stock could be easily accessed in the winter to be fed and milked without stepping foot in the snow. The winter living quarters or gaunsa for the family are on the ground floor, surrounded by the stables. The only openings in the space are in the ceiling to let out smoke from the clay stove or thap and bring light in. Storage spaces include fodder storage, dung storage or i rooms<sup>3</sup>. Within the stores, there are a couple of feet-d

### TARSHI SPALGON'S HOUSE | PURNE



Figure 78 Walls uptill the first level are made in stone and further m



Figure 79 The house has a number of storage spaces for food, fuel, fodder, locally brewed alcohol and general household items. Subterranean potato storage pit (L), and other storage spaces as seen across the house at Purne.

<sup>3</sup> Locally brewed barley based alcoholic beverage.

<sup>3</sup> With an occupational shift seen over the past couple of years, the ground floors are converted and used as storage spaces.



Figure 80 Ground floor plan



Figure 81 First floor plan

Legend

- |                                                 |                                                            |                                              |
|-------------------------------------------------|------------------------------------------------------------|----------------------------------------------|
| 01. <b>paraa</b>   cow stable (indoors)         | 11. <b>sangchot</b>   dry toilet pit                       | 20. <b>rdoskas/ themha</b>   stone staircase |
| 02. <b>tangra</b>   cow stable (outdoors)       | 12. <b>sangchot</b>   toilet                               | 21. <b>shraska</b>   ladders                 |
| 03. <b>lugraa</b>   sheep & goat stable         | 13. <b>chansa</b>   kitchen                                | 22. <b>shrol</b>   passage/ corridor         |
| 04. <b>stara</b>   horse stable                 | 14. <b>yarkhang/ yarsa</b>   summer kitchen                | 23. <b>thok</b>   terrace/ flat roof         |
| 05. <b>dzot</b>   storage room                  | 15. <b>nyimalakhang/ shelkhang</b>   summer room/ sun room |                                              |
| 06. <b>ichekhang</b>   cow dung storage         | 16. <b>chhotkhang</b>   prayer room                        |                                              |
| 07. <b>pugraks</b>   hay storage                | 17. <b>dronkhang</b>   guest room                          |                                              |
| 08. <b>bangkhang</b>   grain storage            | 18. <b>nyit tangsa/ zimsckhang</b>   sleeping area         |                                              |
| 09. <b>shingkhang</b>   wood storage            | 19. <b>tsom</b>   gathering space                          |                                              |
| 10. <b>changkhang</b>   chang fermentation room |                                                            |                                              |



The information and representation shown in the ground floor plans is based on the original use of the spaces.



Figure 82 Terrace plan



Figure 83 Section AA'



Figure 84 East elevation

Through the summer months, the family move up to the upper floor, accessed through an internal winding staircase or a ladder with widely spaced rungs from the lower level<sup>3</sup>. The plan an open central courtyard or central space to a compact and dense plan designed with a labyrinth of rooms.

The central domestic space within the house is the *chansa* or the fireplace, which can even be considered the house's kitchen. The space is extensively used for cooking *chansa* is placed on the first deep floor, the room is centrally located with minimal openings (openings are in places opposite the wind draft and in adherence to the sun's orientation) or no openings on the walls and a probable ventilation opening in the ceiling (some winter spaces. The summer *chansa* is filled with air and light through the pillar of a single pillar is used *chansa* is segregated into the zones: the kitchen, the central fireplace, which the is the cooking area and the space after *ka* beyond, which is the living space. The male members congregate in the living space, whereas the female members are in the cooking area. In summer, people mainly lived outdoors, and families used to sleep on the terraced roof. The sunroom, glassroom, or *shelkhang*, is a new addition found on the house's upper floors. It is on the south side and brings sun and light during summer.

The first level has grain storage or *bangkhang*, a dedicated space with several silos (ceiling-to-floor length in height) on the floor covered with wooden hatches to maintain the yearly stock of grain. The *lcheskhang*, or dry dung storage, is a room used to store dried animal dung for fuel<sup>3</sup>. Several miscellaneous rooms are found on this level, attached to the main house, with its shaft going to the ground level. The space is ventilated with an opening in the main wall.

The roof or *thok* is plain and flat, broken by ventilation shafts and light wells with stacks of hay, grasses, dung fuel and sticks surrounded by a low parapet. Often the terraces house the guest room or *dronkhang*, *shelkhang* and the family temple/ shrine or *chhotkhang*.



Figure 85 200 years old Tarshi Spalgon's family house

<sup>3</sup> In the modified houses the access to first floor is through a ladder or a winding staircase.

The *chansa* can be located on different floors and the opening sizes have changed over the years with the modification.

<sup>1</sup> The opening sizes have changed over the years with the modification.

<sup>2</sup> The wooden pillar or *ka* is a structural, spatial and symbolic element.

<sup>3</sup> The *lcheskhang* can be found in different spaces in the house.

The *chhotkhang* is placed generally on the west or north side of the house.

## AXONOMETRIC VIEW OF THE SPACES AND THE ACTIVITIES CARRIED OUT



*The information and representation shown in the ground floor plans is based on the original use of the spaces.*

## Conclusion

The ensuing defile was relented with the crossing of the first truck in 1978 over the trans-Himalayas into the Zaskar valley, bringing a sea of people, resources and ideas that were foreign to the land and its people. The closed systems, static households, and limited production are now transitioning to the new economy and are no longer reliant only on the subsistence structure. The past couple of decades have seen a shift in the social order dominating the landscape; people have been working in the tertiary sector and moving outside the valley in search of better economic opportunities and changing the institutional, occupation and cultural structure that existed in the valley. Community systems and barter is now moving towards a cash economy, thus rendering some of the old systems and utility items obsolete and insufficient. People aren't dependent on pastoralism to sustain themselves .

The plans and designs of the houses in the valley have altered significantly in the past three decades. The planning has adapted to the modern lifestyle and development seen in the region. The traditional dwelling is supported and fitted with modern amenities and systems. The organization and use of the ground floor have changed with a change in occupation. The spaces initially reserved for the different animals of the house are now used as additional storage spaces, with a single room dedicated to the animals. Winter spaces have moved to the first level, and the internal staircase connecting the first floor to the ground floor is now seen outside the house. However, the imager



Figure 86 Over the past few decades, various industrial construction materials have been introduced, thus slowly but gradually changing the aesthetic of the region

With the road coming, a new material palette was introduced into the valley in the past three decades. The palette now includes materials from different states, like glass, tin, baked bricks, cement and steel. Foreign timber species are directly imported from neighbouring areas in trucks. The number of single-storey houses built on low plinths with large window openings, even on the ground floor, is increasing in the region. The houses are made with concrete frames and single brick thick walls of baked bricks or a *pagbu*. With the availability of glass, the window openings have increased in dimensions. There is an introduction of a sunroom alongside the south-facing corner of the buildings. The walls of the houses are not battered and uniform in thickness. The centuries-old sensitive and sensible approach of how to build, where to build and what one should build is getting lost in this fast-paced transition. The inherent character of the landscape is changing, although the facades maintain the traditional identity. The increased number of tourist facilities, army camps and newer developments in the areas has fostered a degree of change in the inherent character of the landscape while maintaining facades of traditional and cultural identity.

People in the region are still trying to cope with their newly acquainted industrial culture. The needs and aspirations are changing, thus altering the environment around them. A few still stand true to their centuries-old practice, although a degree of adaptation can ease the hardship and the struggle of the people. There is a need for a rationalized approach to mixing traditional practices with fruits of modern science and development to main the sanctity of the valleys of Zaskar.



Figure 87 One can witness attempts to fuse the local aesthetic with the modern. This fusion seems to be the preferred adaptation.

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