



Kampung Naga

Integrated living system of a traditional
Sundanese hamlet in Indonesia.

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Figure 1 View of Kampung Naga.

Context.

Kampung Naga is located in between Garut and Tasikmalaya, West Java, Indonesia. The region is rich in water reserves and forest on mountainous topography.

Although it is located close to the main road connecting the two towns, the hamlet with 10,5 hectares area is not within urbanization's reach yet. To reach Kampung Naga, 20 minutes walk down the valley from the parking area for the visitors who wanted to experience one of the preserved traditional Sundanese village where the inhabitants still conform to nature and conserve traditional lifestyle as circular ecology including the water system.



Figure 2 Indonesia Archipelago



Figure 3 West Java

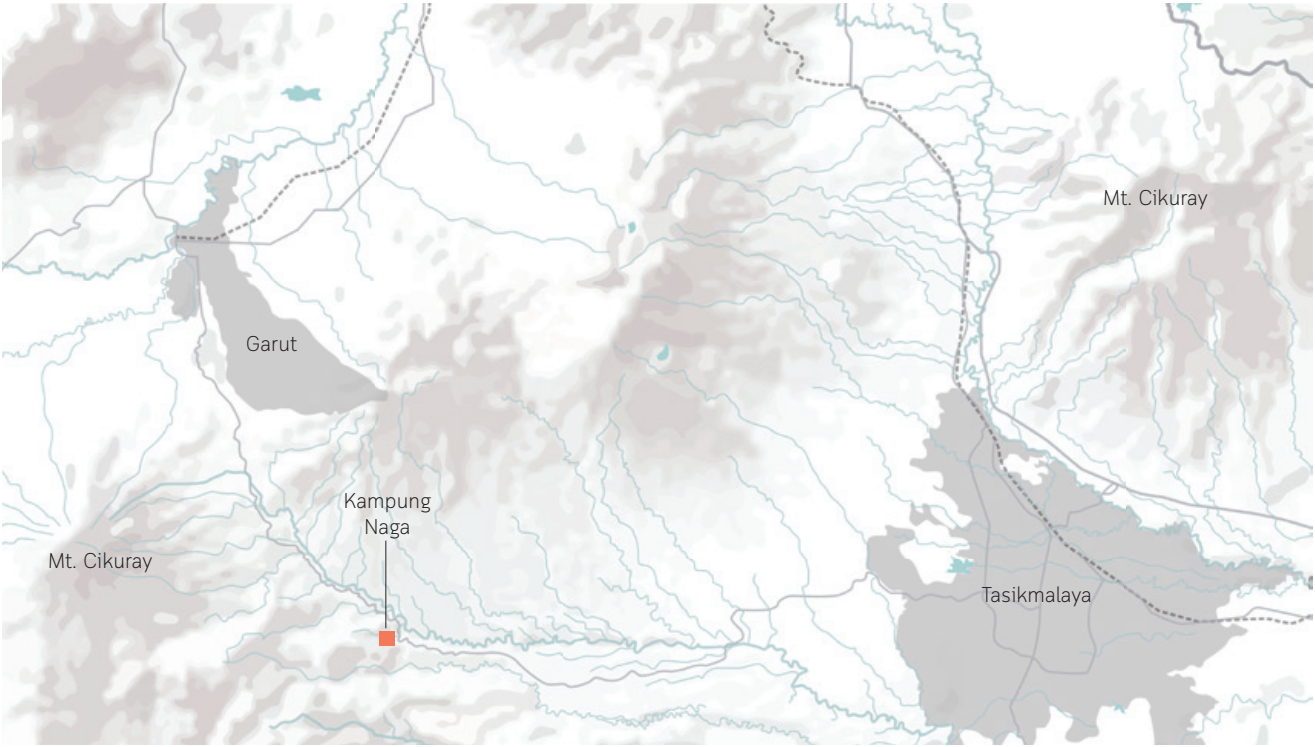


Figure 4 Garut - Tasikmalaya region

Life in Kampung Naga.

Kampung Naga maintains the traditional living with nature amidst modernity that develop around the area. No new technology such as the use of electricity and related devices is allowed in the hamlet. The boundary of Kampung Naga is strictly preserved to balance the number of people whose lives can be supported by the food supply and the ability to manage the wastewater inside the village. While maintaining the number of people who live inside, the rest of the family members can live outside the village.

Although almost all water-related activities are located on the outer area, water is treated as a major part of their lives. People keep its space to “breathe”, use it wisely, and purify the wastewater before finally being returned to its original place. Centralization of the activities are designed as an integrated system of water and ecological cycle.



Figure 9 Women use the only water found inside the Inner Area at the Mosque to clean food materials (above left).
Figure 10 Rice husking station is located above the fishpond (above center).
Figure 11 Rice terraces which are irrigated from the river (above right).
Figure 12 Man feeding the fishes (below left).
Figure 13 Woman washing dishes at the latrine building above the fishponds (below center).
Figure 14 Woman filling container with Nyusu Water (below right).

Climate.

Climate zone: tropical
Sub-climate: Mild Temperate humid

Climate & Weather Averages

High t°: 29.2°C
Low t°: 21.2°C
Mean t°: 23.4°C
Precipitation: 289 mm
Humidity: 76%
Dew point: 23°C
Wind: 4 km/h
Pressure: 1011 mbar
Visibility: 8 km
Hottest Month: April (25.8°C avg)
Coldest Month: August (19.9°C avg)
Wettest Month: March (409 mm avg)
Windiest Month: September (14 km/h avg)
Annual Rainfall: 3478 mm per year

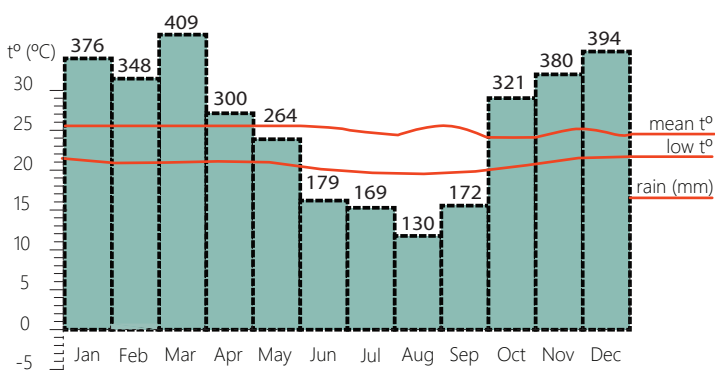


Figure 5 Climate of Kampung Naga

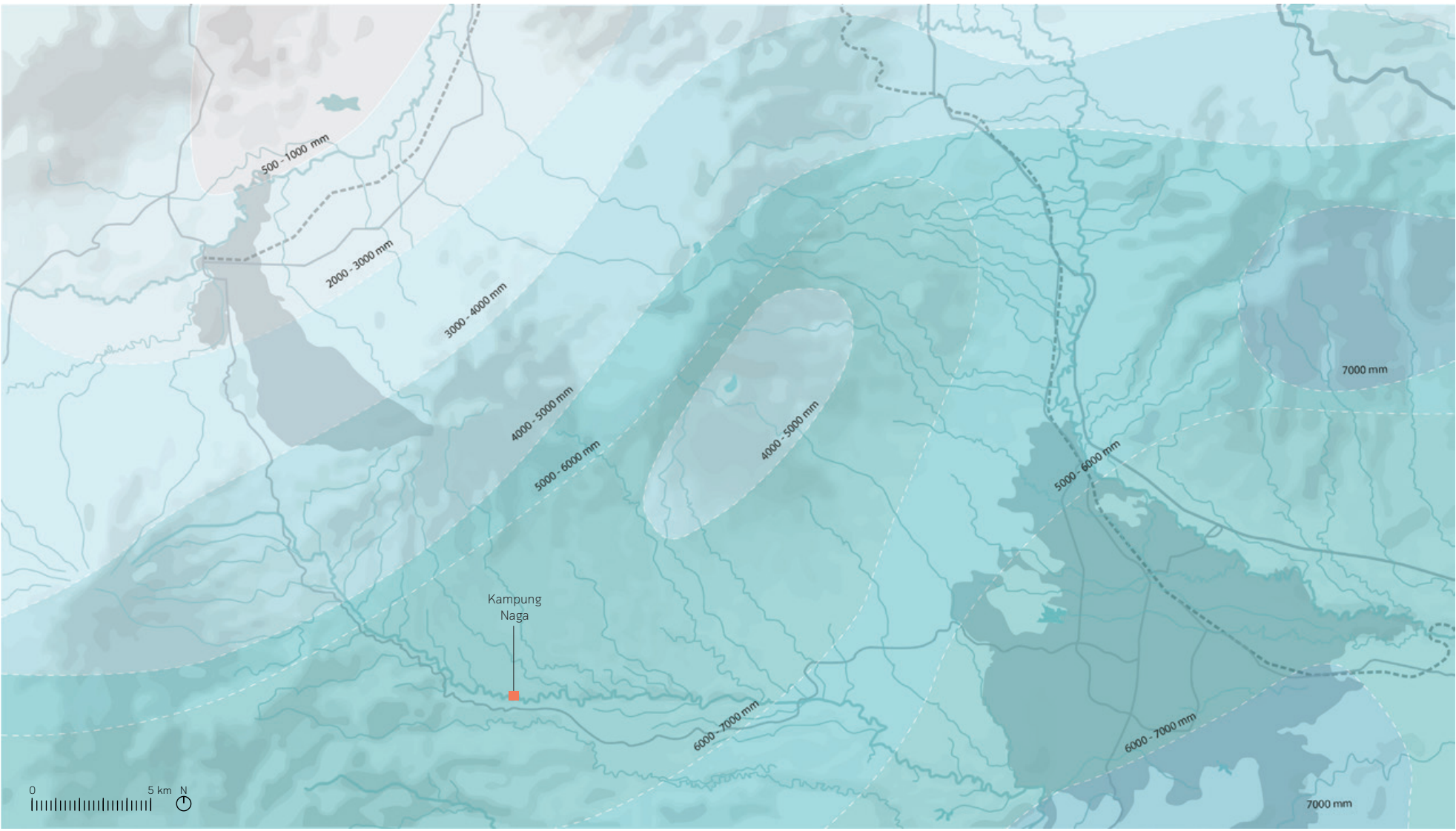


Figure 6 Rainfall map in Kampung Naga

Catchment area.

Kampung Naga is situated in the area of Ciwulan River Basin. It is the largest catchment area in the Tasikmalaya District with the total area of 59114,25 km². The Ciwulan river starts from Cikuray mountain and flows naturally following topography due to mountainous landscape, and passes Kampung Naga. Thereby, the Ciwulan river become the main water resources of Kampung Naga as it mostly always has sufficient water both in the quality and quantity all year long. The area is dominated with Inceptisols & Entisols soils which are cultivated into terraced agricultural fields.

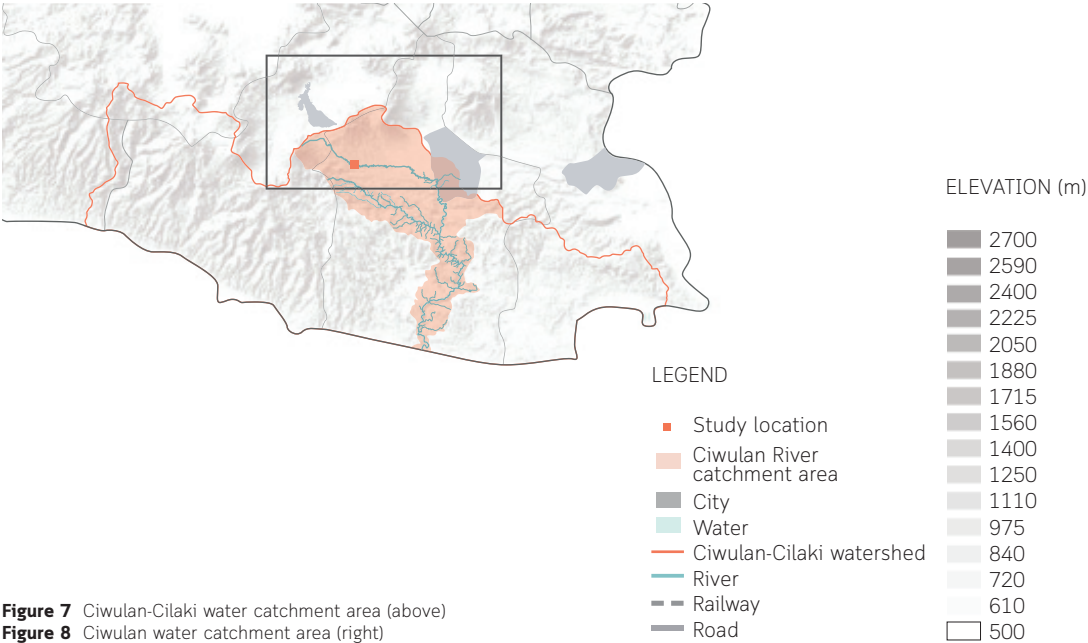
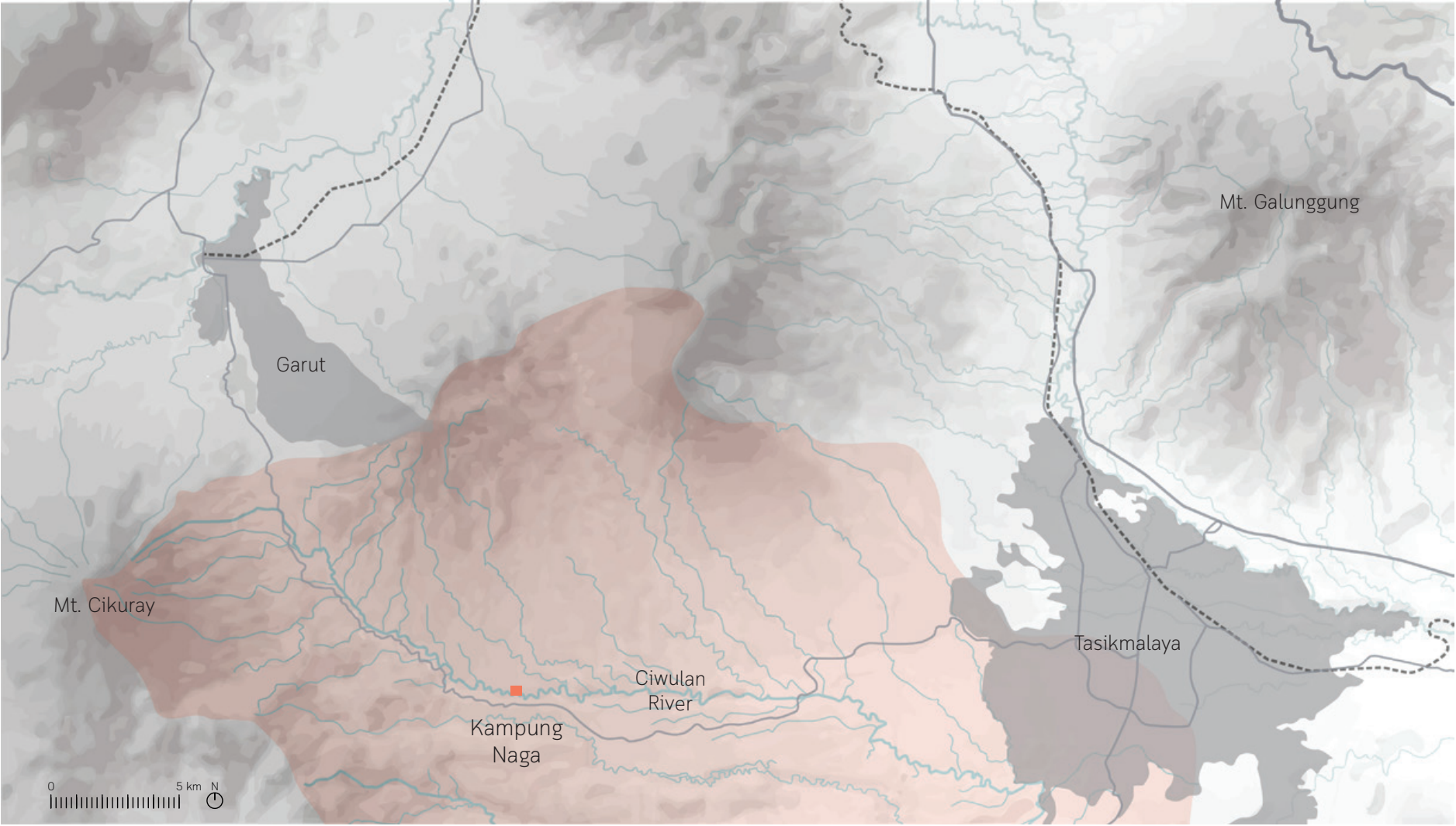


Figure 7 Ciwulan-Cilaki water catchment area (above)
Figure 8 Ciwulan water catchment area (right)



Water System Plan.

The spatial organization of Kampung Naga is influenced by its location on the valley. The topographical characteristics of the site defines the vertical zonation of the hamlet, which is closely related to the utilization of the landscape into the water management system.

Based on its spatial relation to the settlement area, Kampung Naga can be divided into 3 distinctive zones. The 'forbidden' forest, which is called the Sacred Area, is preserved at the top of the composition to infiltrate, filter and store the water through its roots. The accessibility to this area is strictly restricted. The settlement area (the Inner Area) is located in the middle with terraced soils following its natural topography. At the lowest level (the Outer Area), fish pond system become the location where almost all the water-related activities is taken place, while at the same time it is functioned to purify the wastewater before it is discharged back to the river. Bamboo fences are used as the boundary of the settlement area which at the same time clearly separates these three zones.

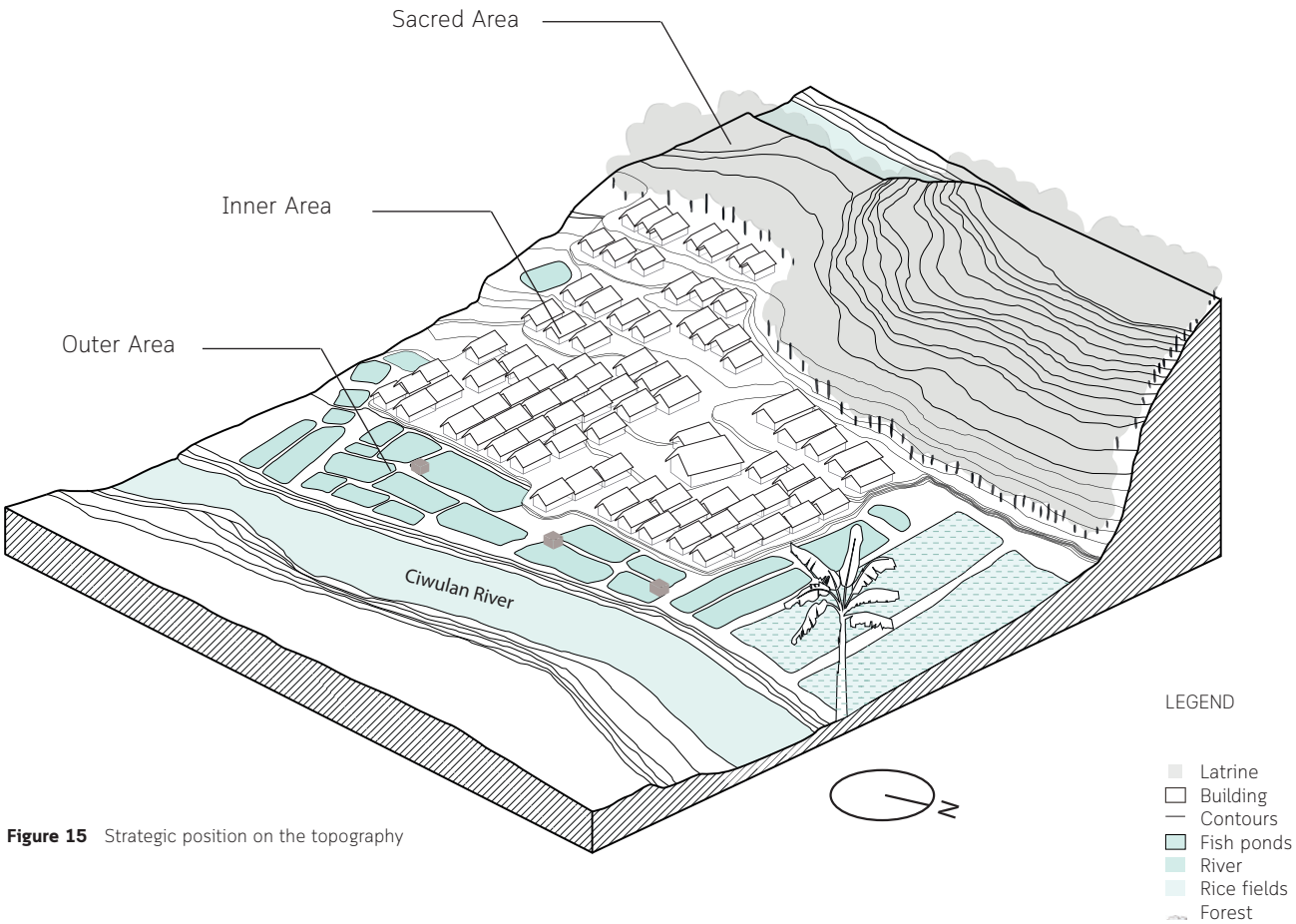
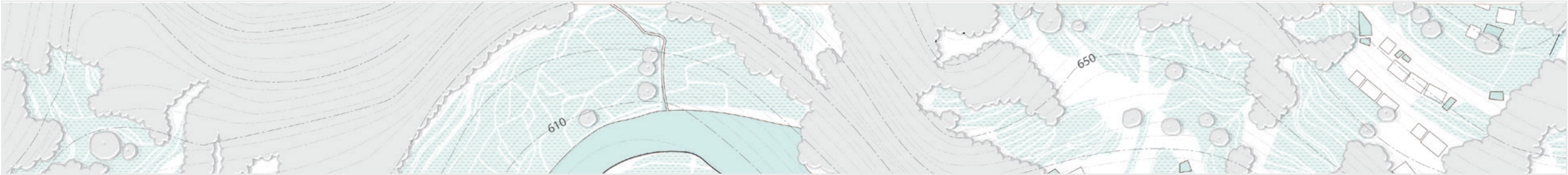


Figure 15 Strategic position on the topography

Figure 16 Kampung Naga floor plan.





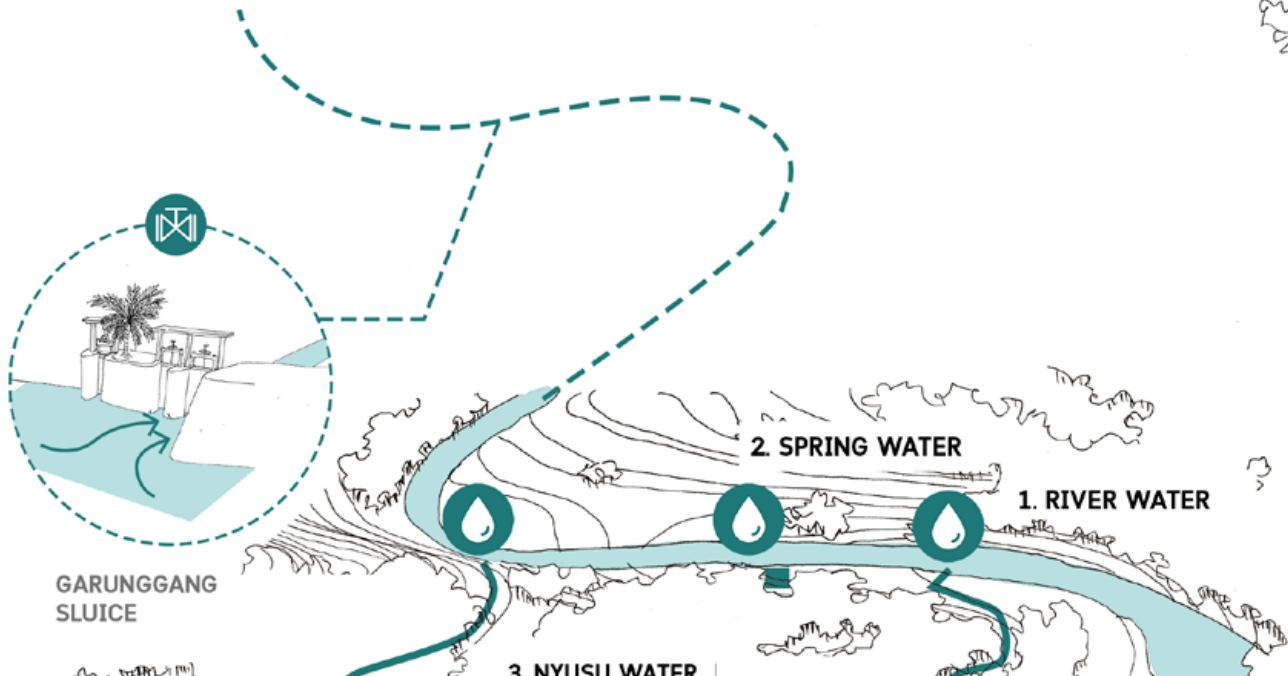
Source of Water.

Kampung Naga has three water sources for daily activities. The sources are from Ciwulan River and two springs on the hills which people diversify one to another (Spring Water and Nyusu Water) based on the consistency of its quantity and quality which influence the use of each water. Ciwulan River flows constantly all year round with two main sluices (Garunggang and Biuk Sluice) located close to Kampung Naga to regulate its stream. Water discharge from the river is regulated with piles of rocks towards two main channels. It is filtered naturally by wild grasses and gravels and distributed towards the agriculture area and water tubes at the latrines.

The spring water is located behind the hill at the back of the village. It is channeled towards two directions. First, it is channeled to the mosque, the only building in the center of the village which has access to water for the cleansing rituals before praying activities. Second, it is channeled towards the latrines in the Outer Area. While the rice fields only use the river water for irrigation, the spring water substitutes the river water for washing and bathing in the rainy season as the river water turns murky by rising muds and ploughing activities. With two kinds of water sources, each latrine has two separated cisterns to maintain the water quality.

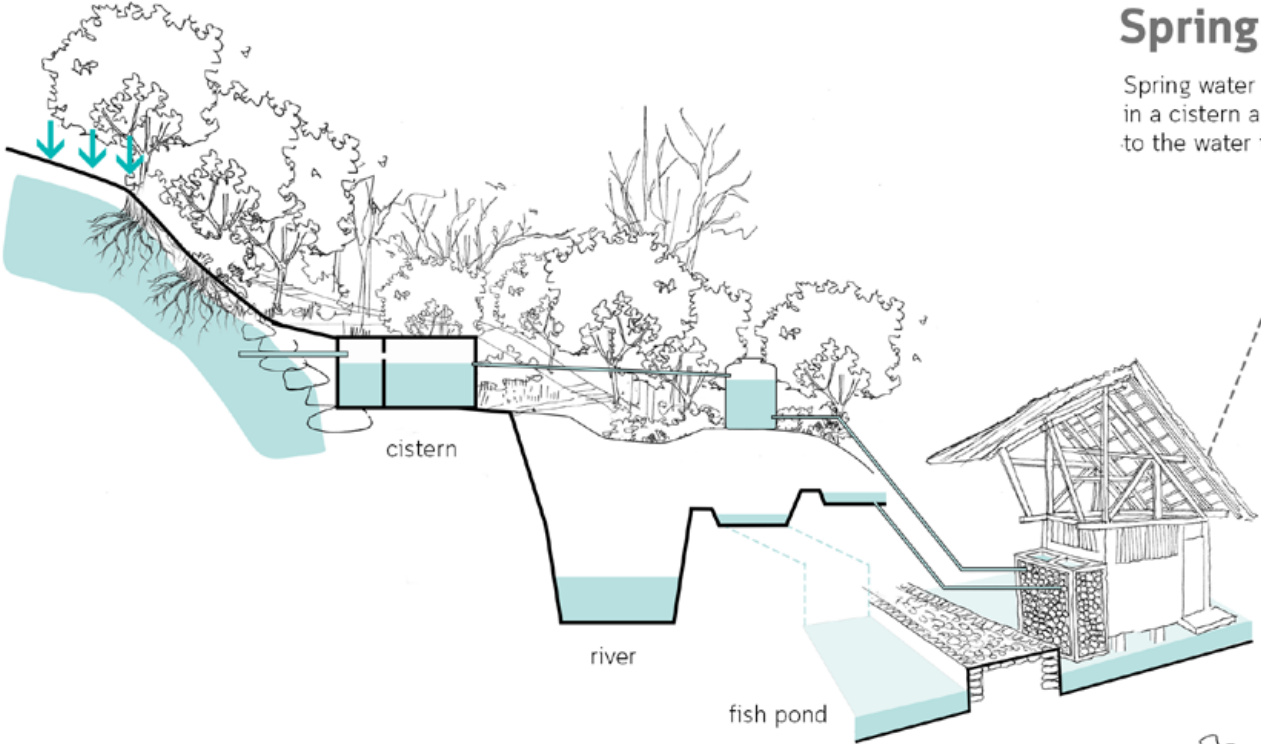
Located closer to the hamlet, another spring called Nyusu Water is utilized as the only source of potable water for the inhabitants. Nyusu water is a result of water infiltration through the roots of a pristine forest on the hill bordering the village on the western side. It is constant in both quality and quantity regardless of seasonal change.

Figure 17 Water source - Spring water



Spring Water

Spring water is collected in a cistern and distributed with pipes to the water tanks at the latrines.

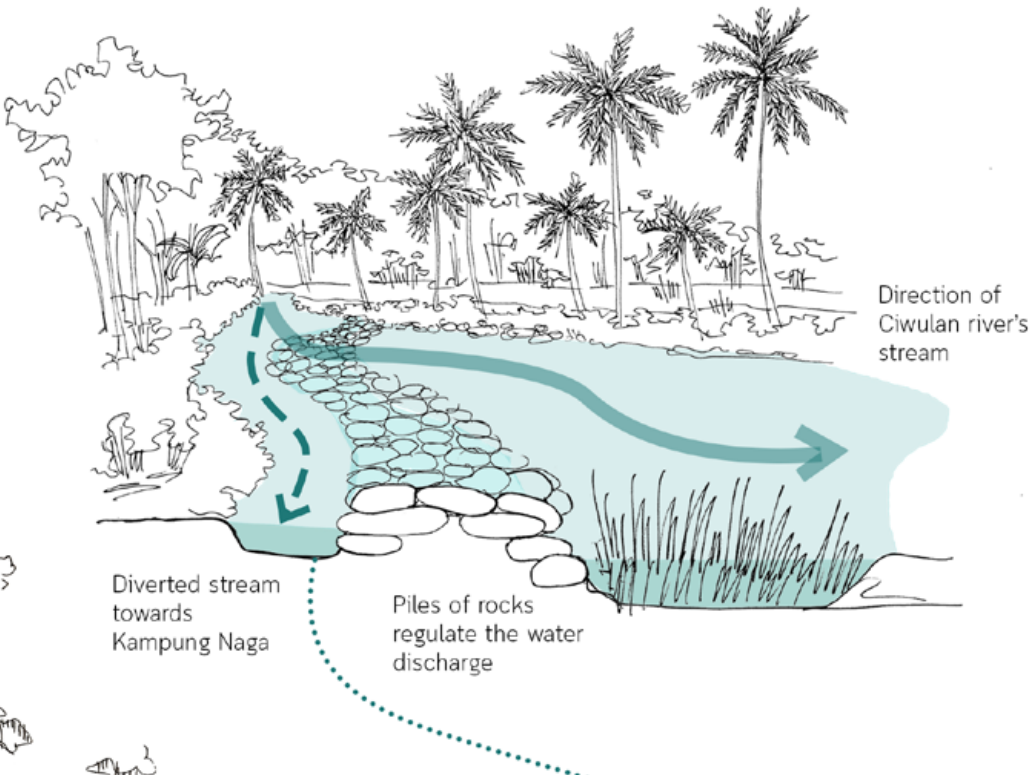


Each latrine has two tubs for water from the river and the spring

River Water

River stream is diverted by using piles of rock. It flows towards the main channels in Kampung Naga and be used for irrigation and daily activities.

Figure 18 Water source - River water



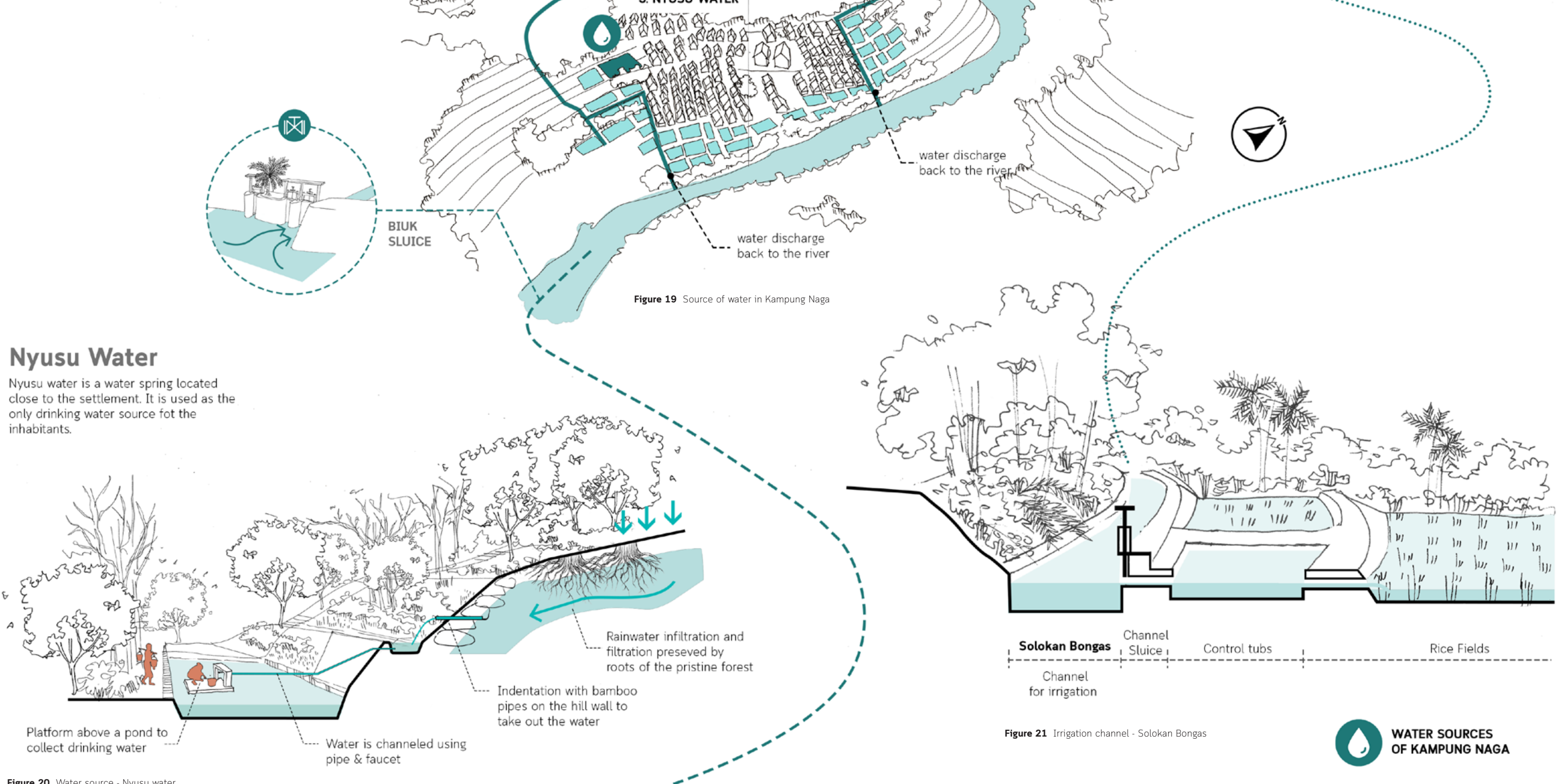


Figure 20 Water source - Nyusu water

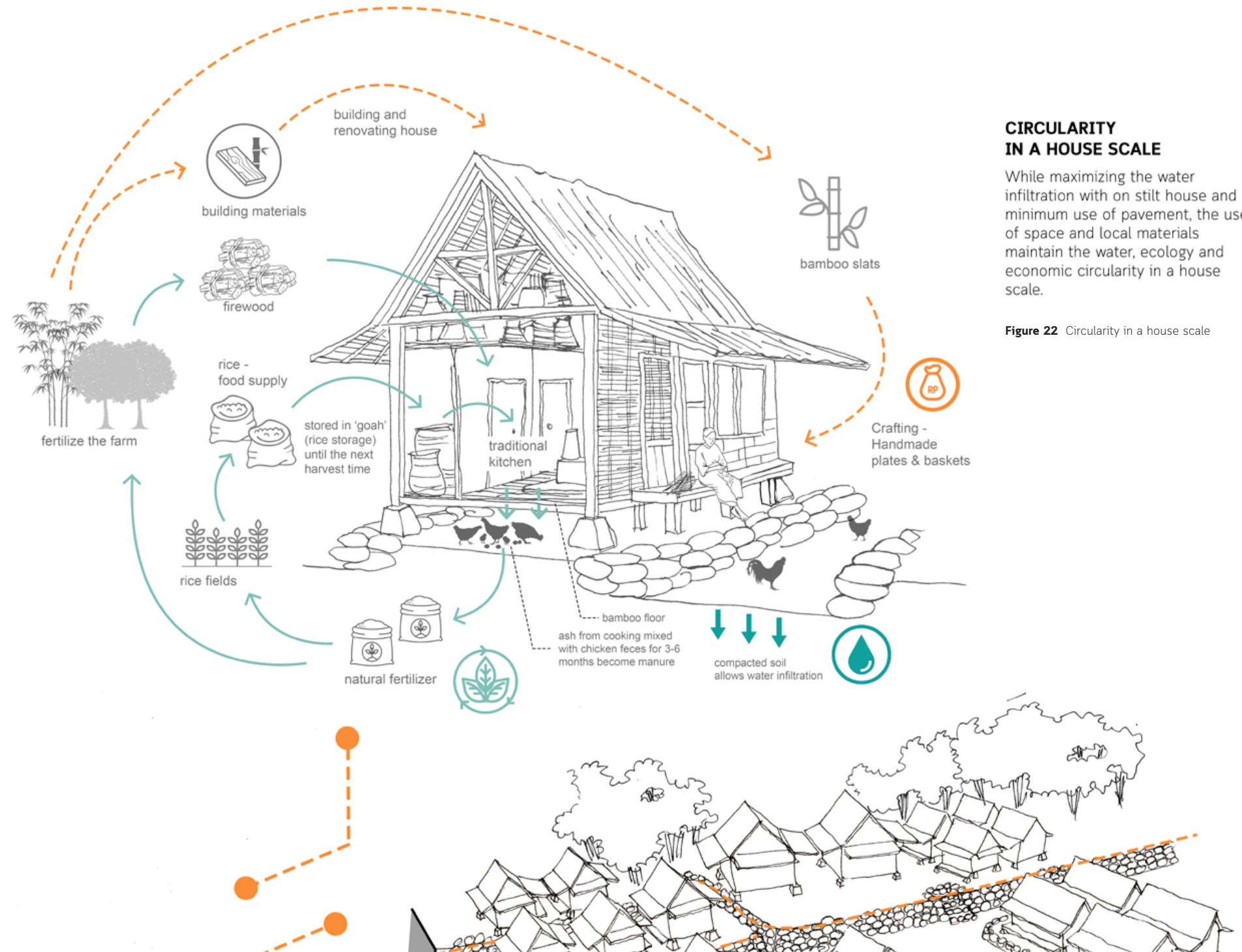
Figure 21 Irrigation channel - Solokan Bongas

Circularity

Nature works in circular systems. Living with nature, people in Kampung Naga believe that they need to understand thoroughly and preserve this circularity. Water, as one of the main resources of lives, is used wisely to maintain its circularity. The three water sources which are located on the higher parts of the topography are kept clean free from any activities that could contaminate the water quality. People are forbidden to cut trees in the forest on the hill to maintain its ability to absorb and purify the rainwater to the ground water table. In this case, myth and tradition are used by the community as rules that have to be obeyed. After the water is used for daily activities, it is purified by fishpond systems before finally being returned to the river.

In the Inner Area where the settlement is built, houses are organized in rows to form corridors where the tips of the roofs are meeting on lines. With this arrangement, rainwater is collected on the ordered gravel ditch lanes. Long standing water is anticipated by a continuous gutter following the higher to the lower contours, to the main drainage system that flows to the river. In support of this solution, houses are built above raised ground with stone borders which also function as the border of the gutter. The principle of using natural topography also influences the parallel pattern between houses and contour lines where the house width is determined by the width of the existing plains or the favorable position to build retaining boulder structure. It is built without any adhesive materials which make it possible for the rainwater to seep through. Minimum use of pavements inside the settlement area that maximizes the rainwater infiltration to the soil.

Stilt house design and the gravel gutter that support the storm-water management also maintain ecological circularity in a house scale. The stilt house avoids moisture from the ground to enter the house and avoid termites to destroy the wood structures. The space under the house is used to



CIRCULARITY IN A HOUSE SCALE

While maximizing the water infiltration with on stilt house and minimum use of pavement, the use of space and local materials maintain the water, ecology and economic circularity in a house scale.

Figure 22 Circularity in a house scale

store firewood and raise chicken which also become natural control for the termites. The kitchen area uses bamboo slats floors which have gaps in its order. Ashes from burning the firewood to cook will fall down through the floor gaps and be mixed with chicken feces naturally by the chicken under the house. Within 3-6 months, this mixture will form natural fertilizer for the community's crop. The wood from the inhabitant fields are used as firewood and building material, while bamboo slats are also used as handmade craft.

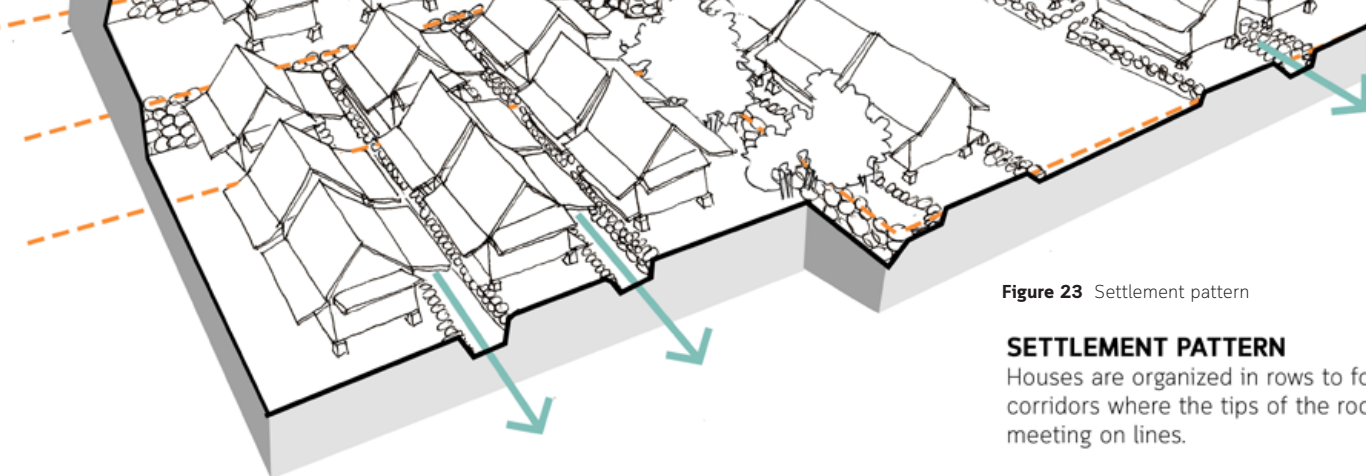
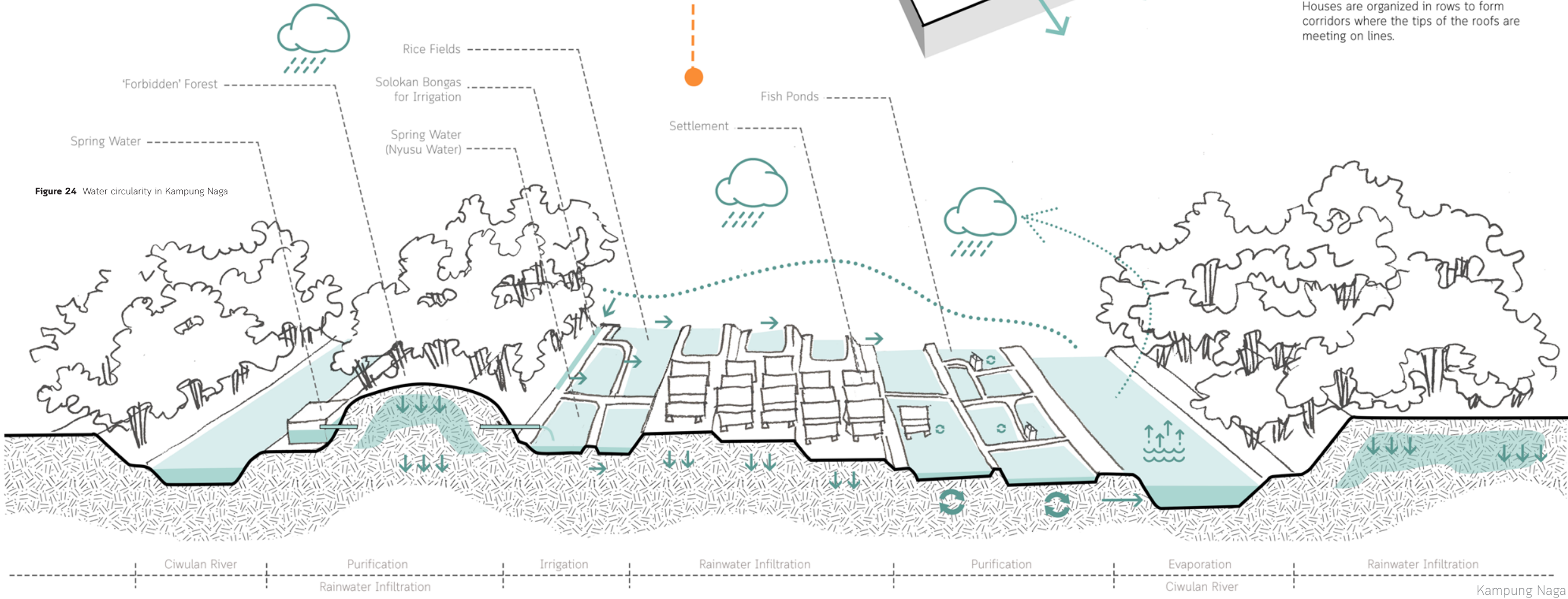
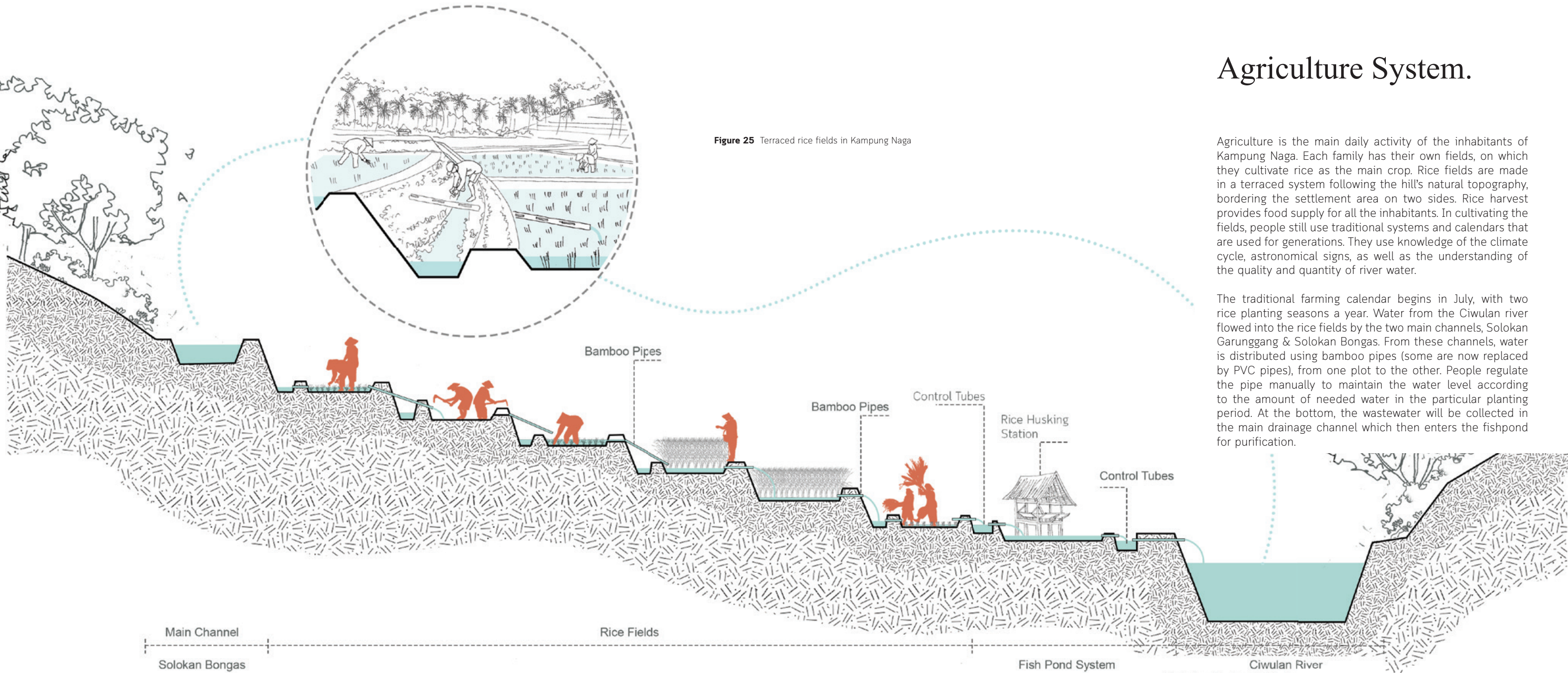


Figure 23 Settlement pattern

SETTLEMENT PATTERN
Houses are organized in rows to form corridors where the tips of the roofs are meeting on lines.

Agriculture System.

Figure 25 Terraced rice fields in Kampung Naga



Agriculture is the main daily activity of the inhabitants of Kampung Naga. Each family has their own fields, on which they cultivate rice as the main crop. Rice fields are made in a terraced system following the hill's natural topography, bordering the settlement area on two sides. Rice harvest provides food supply for all the inhabitants. In cultivating the fields, people still use traditional systems and calendars that are used for generations. They use knowledge of the climate cycle, astronomical signs, as well as the understanding of the quality and quantity of river water.

The traditional farming calendar begins in July, with two rice planting seasons a year. Water from the Ciwulan river flowed into the rice fields by the two main channels, Solokan Garunggang & Solokan Bongas. From these channels, water is distributed using bamboo pipes (some are now replaced by PVC pipes), from one plot to the other. People regulate the pipe manually to maintain the water level according to the amount of needed water in the particular planting period. At the bottom, the wastewater will be collected in the main drainage channel which then enters the fishpond for purification.

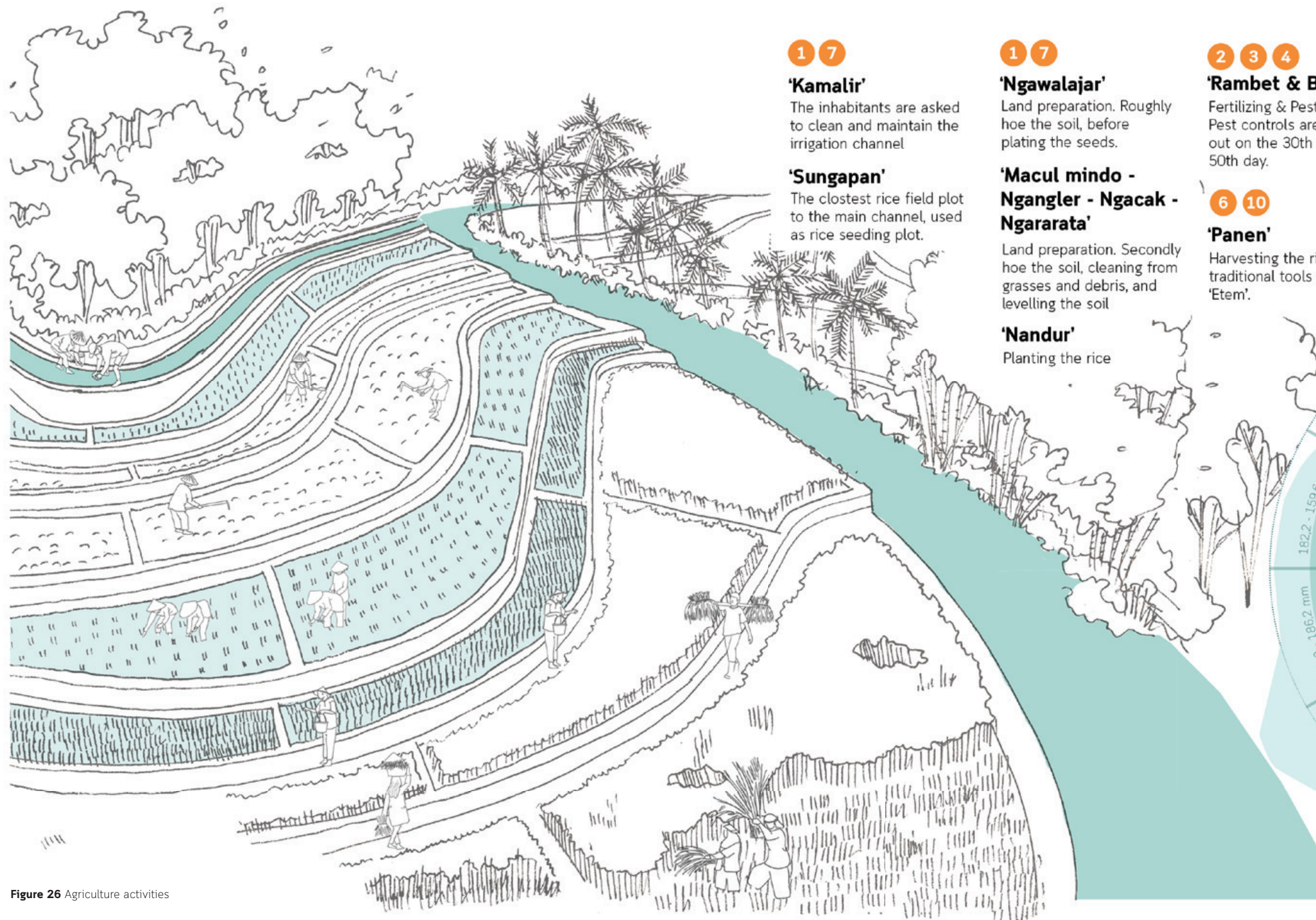


Figure 26 Agriculture activities

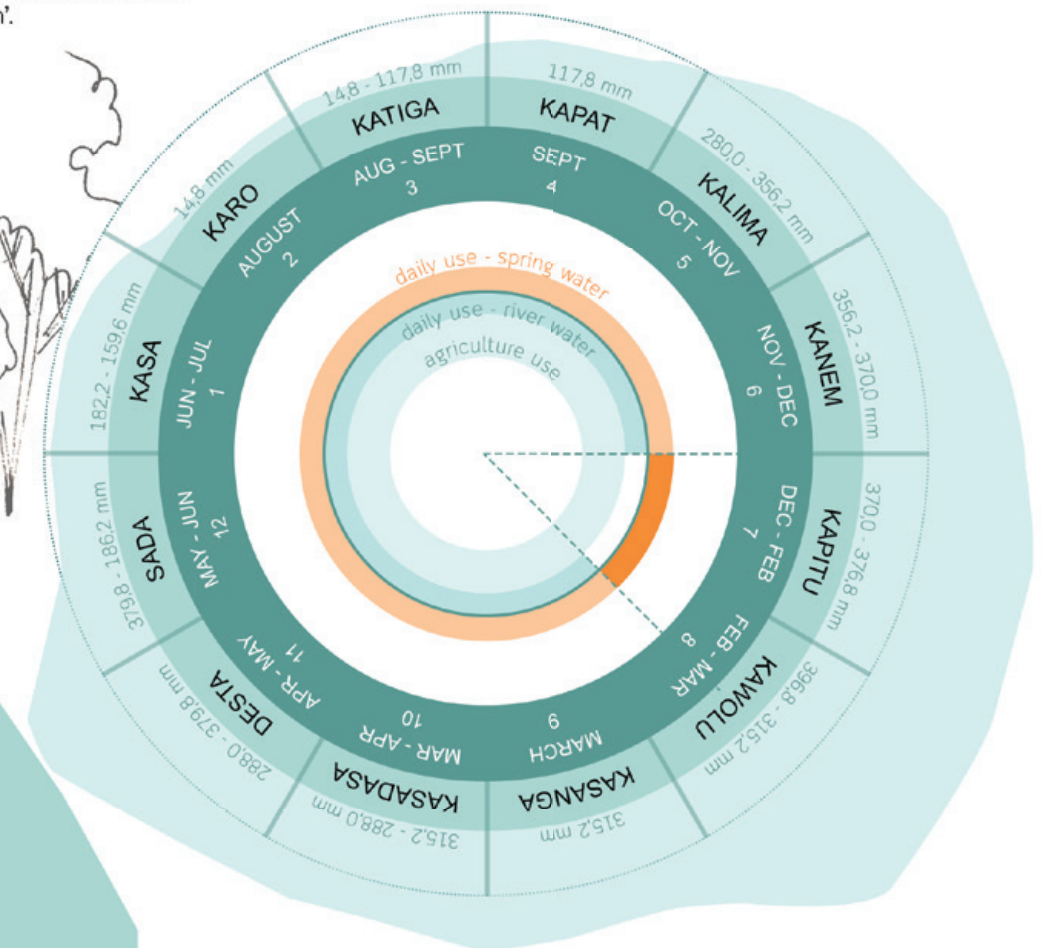


Figure 27 Traditional agriculture calendar of Kampung Naga

Fishpond System.

Fishpond system is the main component in the management of household wastewater in Kampung Naga. It is located at the Outer Area where the public bathrooms, rice husking station, and washing area are also located above it. The area is designed as an integrated system where people use and purify the water and maintain ecological cycles at the same place.

Each latrine has two water tubs outside to collect water both from the river and the spring. Wastewater directly flows from the latrine to the fishponds underneath. In its multi functionality, fishpond is a place to raise fishes. On the other hand, it naturally filters the wastewater from both feces and urine. Through a water distribution system between the ponds and control tubs, purified water flows to the main ditch towards the river.

A rice husking station is built above the fish ponds. In this station, the rice is manually pounded to separate the rice grains from the outer husk. The husks are thrown into the pond to feed the fish. Fishes are harvested to become a source of food for the community. Besides, the stems are collected and burned to be used as natural shampoo, cure some skin diseases and also used as a natural preservative for certain food.

Centralized location for the public interest is also applied in the fish pond system. The largest pond located in the center is owned by the village, raising fishes which can only be harvested for public consumption during special events, while the surrounding fish ponds are owned privately by the inhabitants.

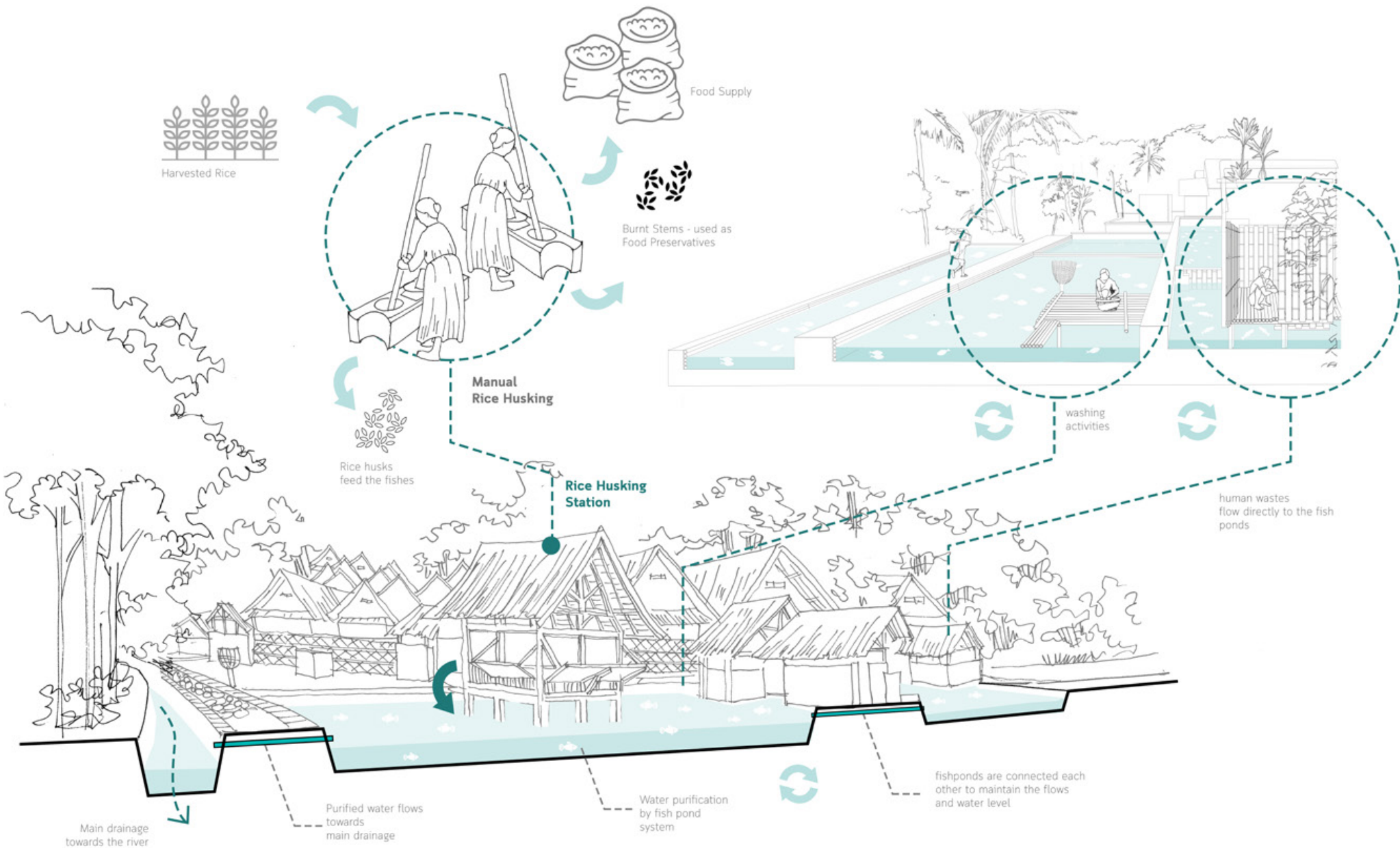


Figure 28 Fishpond system as an integrated water & ecological cycle (right)

Conclusion.

Landscape values - Built on a valley, the slopes are shaped into terraces to create space to build settlement and rice fields. The natural shapes are preserved, creating uneven platform size which determines the width of each house and the area of rice field plots.

Strategic values - Kampung Naga is located at the bend of meandering Ciwulan River which makes it covers two sides of the hamlet and makes it easier for the inhabitants to access the water. Topography-based zoning system supports the whole water management system in the village. The valley where the settlement is located is facing east with the forbidden forest on the western side at the back of the village. It protects Kampung Naga from the west sun exposure and the mountain wind that blows harder from the west direction. The forbidden forest on the highest area preserves and filters the rainwater through its roots into the groundwater table which then is extracted as a water source. The houses are built parallel to the contour line and arranged in linear rows perpendicular to the contour line to create drainage lanes inside the village.

Topography-based zoning also assigns the lowest part as the location of the purification system with fish ponds. It becomes the last place to collect and purify the wastewater before discharging back to the river without contaminating the water and the soil on the upper part where the water source and the living place are located.

Functional values - Gravel ditches are made linear as a space between the house rows. The ditches are also aligned as terraces following the topography to fasten the flows of the overflowed storm-water and prevent the humidity from entering the house that is made out of wood construction.

Square control tubs are located along the water distribution pipe to ease the identification when a problem occurs on

the lanes. Separated water tubs on the latrines are made to avoid mixing water from two different sources.

Material and tangible values - Local materials are widely used in the construction of water elements and waterworks. Fluvial boulders and gravels are used to build retaining walls without any adhesive materials. It holds the soil structure for the houses and forms ditches, as well as allows the rainwater to seep through. Bamboo was originally used to distribute the water in the rice fields, building the fishponds and the latrines, although in current situations, some of the bamboo structures are replaced by concrete and PVC pipes. Knowledge of soil characters found in the immediate environment also helps to shape the embankment of the plot to contain water at the terraced rice fields.

Values of sustainability - The water system in Kampung Naga shows that the inhabitants utilize water in a complete cycle. Water is infiltrated, gathered, used, and purified inside the village before it is brought back to the natural system with an equal quality. All the construction of water elements and waterworks use the technique and craftsmanship of the inhabitants. With the material that can be found around the village, all the maintenance of the water system can be done independently. Some features of the water management system are kept not only in the perspective of functionality, but also in the perspective of social tradition. For example, to regulate the water discharge from the river to the irrigation channel, piles of rocks are used. The maintenance activity of this construction is also used as a gathering activity to maintain the social cohesion in the community.

Ethnographic and identity values - The inhabitants of Kampung Naga is an agriculture community. As the main daily activity, agriculture also shapes the attitude of the people towards nature and how they form the cultural

landscape. The management of the water system both for the daily and agricultural activities are based on the belief that maintaining the natural cycle will ultimately make it provide all that they need to live with. With the inevitable development outside the village, local wisdom and tradition with rules and restrictions are held to keep the ecological balance and ensure the sustainability of the whole system.

Lessons to learn - Kampung Naga has succeeded in cohesive inhabiting with nature in the midst of the urban development around it. It maintains the balance interaction between water, ecology and athropo-systems which influences the spatial layout of the village, forms its cultural landscape, and shapes people's social life.

The case of Kampung Naga clearly shows that the role of users is imperative to maintain the circular water system and supported ecosystem services. Bonded by beliefs and tradition, rules and restrictions, the inhabitants of Kampung Naga maintain the local knowledge & the nature of circularity in the place they live in to become part of its ecosystem, which makes living with nature possible. The inhabitants thoroughly understand the limits and boundary on managing its community to keep certain balance of the needs and supply from the resources they have in the village, including the water circularity. This balance makes Kampung Naga defend themselves as a self-sustained living landscape. The management of the water system for the daily and agricultural activities is based on the belief that maintaining the natural cycle will ultimately make it provide all that they need to live with. With the inevitable development outside the village, local wisdom and tradition with rules and restrictions are held to keep the ecological balance and ensure the sustainability of the whole system.

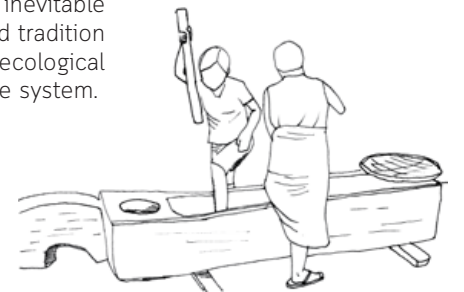


Figure 29 Traditional technique to pound rice.

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