# *Chuskor:* Traditional Water Mills of the Dirang Monpas of Arunachal Pradesh

Rashmirekha Sarma

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**Rashmirekha Sarma**
Assistant Archaeologist, ASI (Guwahati Circle), India

## ABSTRACT

The indigenous knowledge of any community covers the relationship of that community with nature as well as the social, cultural and economic practices of the community. This knowledge is the product of centuries of experience acquired and developed into a spectrum of information, skills and technology. The traditional water mill system is one such skill and technology that was developed by indigenous people interacting with nature. This paper explores the nature of the traditional water mill system, locally known as *chuskor*, of the Dirang Monpa group of West Kameng district, and its existence and sustainability for the near future. Will this traditional technology disappear with time's flow or regenerate itself in a new form?

## Keywords

Dirang Monpa, Water mill, Indigenous knowledge, Arunachal Pradesh, West Kameng, India, *chuskor*, Small hydro-power [SHP] systems

## Introduction

The root of modern technology is indigenous knowledge (Subramanyam: 2008, p. 1). This knowledge is an important natural resource that can facilitate development in cost-effective, participatory and sustainable ways. The traditional water mill system (*chuskor*) is just one such natural and sustainable technology that has developed through centuries of experience; throughout the Himalayan ranges of India, from Kashmir to Arunachal Pradesh, thousands of these water mills are still being used for grinding grain.

This case study of the traditional water mill system of the Dirang Monpa tribe is a part of research into the intangible cultural heritage of Arunachal Pradesh. The focus of this research is to discover whether this

traditional technology of the Dirang Monpas can survive the changing times, whether it will eventually disappear or whether it will regenerate itself in a new form.

## Background

Arunachal Pradesh, situated in the lap of great Himalayan mountains, is a North-eastern state of India. Inhabited by 31 indigenous groups along with their sub-groups (Singh: 1995), the Dirang Monpas are one of these groups, and they have been using a traditional water mill system for centuries. The Dirang Monpas of the West Kameng district of Arunachal Pradesh is one of the major sub-groups of the greater Monpa tribe. The 2001 census recorded the population of the Monpas in West Kameng district as 19,596. Monpa is the standard term, originally used by the Tibetans to describe the people living in the lowlands south of Tibet (Singh: 1995, p. 216). The Dirang Monpas are of Tibeto-Mongoloid stock and are the largest tribe in the West Kameng district. They live mainly in Dirang circle and are Mahayana Buddhists with close cultural and religious affinities with the Bhutanese and the Tibetans. The Dirang Monpas are agriculturalists, and pursue both nomadic and settled types of cultivation. Maize is their traditional staple food, while milk and milk products are also popular.

Sharing an international border with Tibet in the north and Bhutan in the west, the topography of the West Kameng district is mostly mountainous and a greater part of it falls within the higher mountain zone. Dirang, the place where this research was conducted, is both a subdivision and a circle of this district. Three villages of the Dirang circle—Namshu, the biggest village of the circle, Sangti and Rama camp, were visited for this study. There are around 100 households in Namshu but the other two villages are smaller. Rama camp is adjacent to Dirang town, Sangti is about 12 km away and Namshu is around 27 km away.

## Methodology

The fieldwork was carried out in 2012. The data was collected through unstructured and open-ended individual and group interviews and discussions. They were based on the primary research question and some descriptive and in-depth queries, but the questions were not fixed or closed, they were framed to best collect data. The queries were initially about the function and style of the traditional water mills and how they were constructed. We also discussed whether the younger generation were interested in the mills, enquired about any difficulties that the people now face in building and using them, and asked for their opinions on the sustainability of the water mills. To understand whether this system of mills could regenerate itself in a new form, we also tried to find out if the same technology could be used in different ways or if it could be improved by the application of modern technology.

We used the non-participant observation technique along with audio-visual techniques (photography) extensively in collecting this data. From fieldwork to analysis, the whole case study laid emphasis on local people's perceptions and observations about the mills as a part of their everyday lives.

## The traditional water mill system

Water is one of the most essential natural resources for any life form. In the hills of India, water-powered mills, used mainly for grinding grain, play a significant role in the daily life of local people. The Dirang Monpas live at high altitude, and because of the terrain and poor or inaccessible roads, the villagers are totally dependent on natural resources for their subsistence. To produce maize flour, the Dirang Monpas have traditionally used mills run by water-power. These mills are locally known as *chuskor*. The *chuskor* is the traditional grinding mill for agricultural crops like maize, millet etc.. The design of the traditional water mill is quite simple and they are built and maintained using locally available stone and wood and are constructed near or above a water source.

Water is led from the stream via a channel, extending towards the mill house through a wooden tube made of a hollow tree trunk. This tube is called a *chor* or a *chorong* and it can open or close as required. A wooden vertical shaft runs through the floor of the mill house and is attached directly to the grinding stones. This shaft has wooden blades or a wooden wheel and is known as a *grow*. It rotates the top pair of grinding stones which are called *rangthang* and are set on the floor of the mill house. [Plate 1]

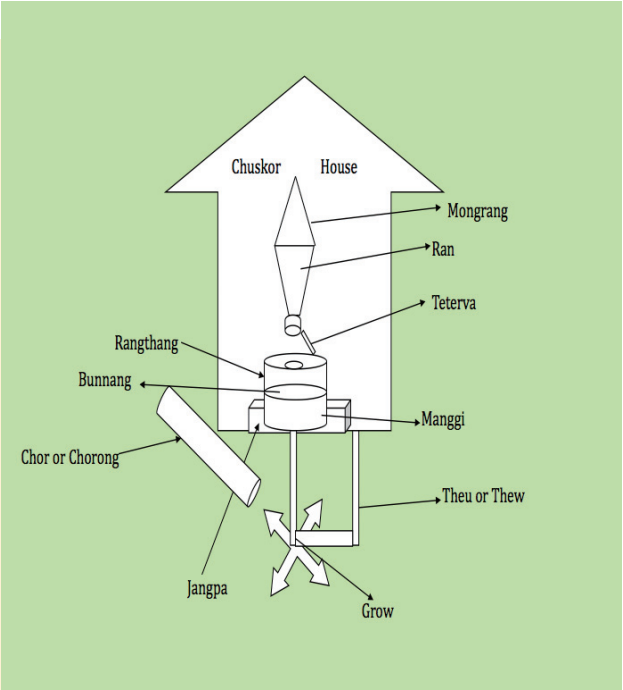


**Figure 1**
An Illustration of how a *Chuskor* works.
Source: Author, April 2012.

There are two grinding stones or *rangthang*; the upper stone is known as a *bunnang* and the lower stone is known as a *manggi*. Grooves are cut in both the grinding stones to make them rough and uneven. When the stones are worn flat they are reshaped. A wooden barrier is used to block the flow of water when the mill is not in operation. When the wooden barrier opens the mouth of the *chor*, the water flows quickly down and hits the *grow's* wooden blades or the wooden wheel, which then start to spin automatically. As the *grow* is attached to the *rangthang*, the grinding stones also start to turn. The *grow* is also attached to another shaft which is adjustable. This shaft is known as a *theu* or *thow* and it is used to control the flow of water. If fine flour is required then the flow of water is increased, and it is decreased to produce a coarser flour and a filter shield is used to protect the surface from debris as well as to regulate the water flow. A hole is carved in the centre of the upper grinding stone and grain is poured slowly into this hole through a conical shaped wooden basket hanging above the *rangthang*. This basket is called a *ran*. Sometimes *rans* are made of bamboo or cane. To make the flour fine or coarse, a wooden stick is attached to the *ran*. This wooden stick is called a *teterva*. The *ran* is hung from the ceiling of the *chuskor* house by a rope, called a *mongrang*, which is adjustable to regulate the fineness of the flour. The ground flour is collected in a wooden frame that encircles the *rangthang* and is called a *jangpa*. [Plates 1-7]

*Chuskors* are privately owned, but are made available by the owners for use by those families who do not have one. One village may have one or more *chuskors*. To use the *chuskor*, one has to pay by manual labour or with a portion of ground flour, or sometimes with cash. Using a *chuskor* for four days, or grinding 50 kg (or more) of any kind of grain costs one day of manual labour, or one portion of ground flour. Some people also pay in cash, though there is no fixed rate - it can vary from twenty or forty rupees up to one or two hundred. However, most of the owners we met preferred to be paid with manual labour rather than in money.

The knowledge of how to build a *chuskor* is passed on from one generation to the next. The local priest used to forecast the most auspicious dates for setting up the *chuskor* and this ritual of setting up the water mills was known as *Segrong*, but it has not been practised within living memory. The *chuskors* are built by local craftsmen mainly using locally-sourced wood and stone. However, not all stone is suitable for making grinding stones and the *chuskor*-maker has to know where to find the right sort of stone.

The operational capacity of any *chuskor* depends on the flow of water and the weight of the grinding stones. One medium-sized *rangthang* can grind up to 50 kg. The minimum cost of setting up a *chuskor* is around forty to fifty thousand rupees while the minimum cost of making the *rangthang* is approximately thirty thousand rupees. The *chuskor* house itself costs around ten to fifteen thousand rupees. The government used to give grants to help the villagers set up *chuskors*, but these grants are no longer available.

## Threats to the *chuskor*

Indigenous knowledge is the root of the culture and identity of any community. However, this knowledge is now under serious threat from globalisation (ICH Kit: 2010). Today, many indigenous knowledge systems are at risk of becoming extinct because of rapidly changing natural environments and the fast pace of economic,

**Plate 1**
*Chuskor* house.

**Plate 1-7**
The workings of a *chuskor.*
Photos: Author, April 2012.

**Plate 2**
*Chor.*

**Plate 5**
Water hitting the shaft.

**Plate 3**
The wooden barrier.

**Plate 6**
*Rangthang* and *jangpa* grinding flour.

**Plate 4**
The *grow* and *theu.*

**Plate 7**
The *ran* and *teterva.*

political, and cultural change on a global scale. UNESCO (ICH Kit: 2010) comments that rapid urbanisation, the increased use of land for agriculture, climate change, continuous deforestation etc. all have a noticeable effect on the natural environment and the community's knowledge of it. It is also apparent that the practices and skills are gradually vanishing, either because people are unprepared for the new challenges or because they adapt too slowly (www.worldbank.org/afr/ik/basic.htm). However, many practices only disappear because of the imposition of foreign technologies or ideas about developments that promise short-term gains or solutions to problems without being sustainable in the long term. The disappearance of indigenous knowledge harms those who held it, but others are also affected when skills, technologies, artefacts, problem-solving strategies and expertise are lost.

So, what are the effects of globalisation on *chuskors* ? Undoubtedly, urbanisation has an impact on the present condition of the *chuskor*. The conversations we had with villagers pointed out that the use of *chuskors* is now gradually decreasing in every village of the Dirang circle. The reason is the changing eating habits of the local people. Traditionally, maize was their staple food, but that has now been replaced by rice. Rice has to be de-husked before eating and that cannot be done in a *chuskor*. So, to de-husk rice (and also to grind maize and millet), they now use mechanical mills run by electricity, petrol or diesel. These mechanical mills have gradually replaced the traditional water mills in this area, and *chuskor* are now used mainly for making *lopani*, the traditional maize beer.

Beyond the external challenges to the social and natural environment, many underprivileged or marginalised communities are themselves inclined to adapt to a new way of life or to a purely economic model of development which is far removed from their own traditions and customs. This is visible in the present lifestyle of the Dirang Monpas. The villagers accept that their young people have no interest in the *chuskor* and its style of production and that they do not eat maize or drink maize beer. The local economy used to be based on a barter system, exchanging maize flour for other goods, and *chuskors* fitted into this system as their use was often paid for by manual labour – a cashless transaction. However, that has no appeal for the younger generation as their economic and cultural set-up is based on using currency. These days, the few who use *chuskors* mainly use them for making maize or millet flour for sale, not exchange.

With the declining use of *chuskors*, the number of craftsman who know how to build them is also decreasing rapidly. In the past, every village had at least one *chuskor*-maker, whereas today it is difficult to find one for every two or three villages. The *chuskor* owner of Sangti village says that the only *chuskor*-maker in their village is very old and now, even for repairing the *chuskor*, she has to call in *chuskor*-makers from distant villages. The *Segrong* is also now a forgotten ritual as it has not been performed for so many years.

Changes in the natural environment also affect the traditional water mill system. Climate warming has seen a decrease in rainfall and streams have gradually dried up. The low flow of water affects the *chuskors'* operating system. The situation has worsened because the government has now started to use the streams to supply water to the villages and the town. It not only affects the water mills but also affects the cultivation system, as irrigating the fields by traditional methods has become difficult.

## Will *chuskors* survive in the near future?

Safeguarding traditional knowledge and skill is more challenging than preserving the natural environment, performing arts or traditional crafts. The knowledge can be safeguarded only by retaining its use in everyday life, transmission to younger generations and transferring the use of that knowledge into different areas (ICH Kit: 2010).

Many of the Dirang Monpas, especially the villagers from faraway villages like Namshu, believe in the feasibility of preserving *chuskors* for the future. This is because their villages are so far away from the market and new technological devices. A number of the Dirang Monpas' villages are high up in the mountains. To carry the heavy sacks of grain to the electric grinding machine in Dirang town would be a herculean task for those villagers, and unnecessarily expensive. Again, most of the villages are small and cannot support electric grinding machines. On the other hand, as the villagers do not produce enough crops to require the capacity of electric (or petrol/diesel) machines, the *chuskor* is a handy and a practical option for them. They also think that the younger generation could easily learn the techniques of making *chuskors* as their mechanisms are not at all complex.

However, our observations tell a different story. The outward appearance of the *chuskor* has not changed much and neither has its traditional function, nor the technique of building it. *Chuskors* will soon disappear if they cannot be adapted. As rice becomes the staple food, the production of maize is gradually decreasing, and that has already begun to affect the *chuskors*. Grinding maize is now not much required and it is only occasionally done. Many villagers, especially from the lower villages, have now gone over to cultivating cash crops - they have started to grow kiwi fruit and apples in the fields where they used to cultivate maize. The changes in taste, the adoption of new patterns of cultivation and the development of a money economy are the main reasons behind the gradual disappearance of this traditional knowledge system. If this situation continues, the traditional technology of the *chuskors* will soon disappear. They will only survive by adapting.

## New types of *chuskors*

So, what is this new form likely to take? Popularly known as *gharats* in other Indian states, traditional water mills are an excellent alternative source of energy and do not require any complex or foreign technology. Many NGOs and government organisations like the Tata Energy Research Institute (TERI), the Alternative Hydro Energy Centre (AHEC), and the Indian Institute of Technology Roorkee (IITR) have been involved in the modification and development of water mills as small hydro-power[1] [SHP] systems to produce electricity. The basic mechanism of the traditional water mill is much the same as that used in large hydro-electric projects. The Himalayan Environmental Studies and Conservation Organisation (HESCO), the main organisation which is popularising modifying these water mills to produce electricity, has already upgraded about 150 water mills in the Garhwal region of Uttaranchal (another Himalayan state of India). These adapted water mills not only produce electricity, but have also increased grinding power - modified and upgraded water mills can coarse-grind grain in twenty minutes and fine-grind it in two and half hours.

The Ministry of New and Renewable Energy, Government of India, also gives a special package to Arunachal Pradesh to develop SHPs, and AHEC lists 550 SHP projects[2] in Arunachal Pradesh. The Government of Arunachal Pradesh has established a new department for managing hydro-power which gets funds from the Prime Minister's 'special package'[3] for developing SHPs.

However, in this case study, though there is nothing wrong with the government's working process, another question was raised about whether or not the new form of technical and scientific upgrading of traditional water mills affects the Dirang Monpas' way of life. The people from the villages where the fieldwork was conducted had never heard about these kinds of small hydro-power systems that can be based on their traditional *chuskors*. Our fieldwork revealed that no initiative has yet been instigated by any NGO or government department to educate the people to understand that with a little modification of their water mills, they could produce their own electricity. The villagers of Namshu village said that before the present researcher arrived, no representative of any NGO, no one from the government, nor any other researcher had visited their village to talk about their *chuskors*. They said the author was the first person from the outside world to visit their village. The *chuskor* owner of Sangti village said that it was the first visit she had had from someone interested in *chuskors* apart from a handful of foreign tourists.

## Conclusion

The fieldwork showed that none of the above projects and SHP initiatives have had any impact as yet on the Monpas of Dirang circle. HESCO points out that being a traditional activity of the mountains, knowledge, skill and infrastructure for managing these water mills are always accessible and available, and that power produced in a de-centralised manner would result in the transformation of development in the Himalayan region. In the absence of appropriate initiatives to popularise the technical modification and upgrading of water mills to produce electricity, the water mills in the Dirang area have so far never been used for any purpose other than milling grain. It has been proved in other Himalayan-Indian states that with only a minor technological change, the water mills can produce all the power villagers need, and the age-old *chuskors* can continue in use. However, there is scope for a more detailed and differently-designed study, as the more we know about this traditional indigenous knowledge the better chance there is of finding new ways to sustain and preserve the *chuskors*.

## ENDNOTES

1. Plants up to 25mw are termed 'Small Hydro Power' [SHP] systems by the first *National Convention of Water Millers*. The Ministry of Small Scale and Cottage Industry has recently announced the status of 'cottage industry' for the water mills. With the efforts of NGOs, many states like Himachal Pradesh, Uttaranchal, Bihar, J. and K. et al. are interested in developing SHPs.
   See http://www.goodnewsindia.com/Pages/content/discovery/waterwheels.html
2. AHEC list 550 SHP projects. Among these, 80 projects are commissioned, 25 projects are under implementation and 445 projects are planned for the future.
   See www.ahec.org.in/
3. The Government of India announced the Prime Minister's 'special package' of Rs. 550 crore for SHP development in Arunachal Pradesh. The Department of Hydro Power Development has been provided with Rs. 416.00 crore exclusively, and the amount already released to the Department of Hydro Power Development to complete 42 unfinished projects is Rs. 169.11 crore.
   See http://www.arunachalhydro.org.in/pms_package.html

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