

# Social restriction in traditional forest management systems, and its implications for biodiversity conservation in Bhutan

SONAM WANGDI<sup>1\*</sup>, NAWANG NORBU<sup>2</sup>, SANGAY WANGCHUK<sup>3</sup> AND KINGA THINLEY<sup>3</sup>



Mountain closure ritual ceremony in Eastern Bhutan  
(Photo Credit: Riam Kuyakanon Knapp)

## Abstract

Knowledge about social restrictions in traditional forest management systems and how they were organised within the social setup of the day are limited. With the gradual integration of new scientific forest management policies, traditional forest management systems are either ignored or over-ruled. The objective of the study was to document three

main social restriction forms (*Reedum*=closing of mountains, *Sokdum*=restriction of killing animals, and *Tsadum*=restriction of grazing in pastureland) that may have contributed to the conservation of biodiversity in Bhutan prior to 1969. The study was based on interviews of 56 community elders and local leaders who were above 60 years of age in three districts (Bumthang, Lhuntse and Tashi Yangtse).

<sup>1</sup> Department of Spatial Information Centre, Ugyen Wangchuck Institute for Conservation and Environment, Lamai Goempa, Bumthang, Bhutan

<sup>2</sup> Ugyen Wangchuck Institute for Conservation and Environment, Lamai Goempa, Bumthang, Bhutan

<sup>3</sup> Department of Sustainable Forestry, Ugyen Wangchuck Institute for Conservation and Environment, Lamai Goempa, Bumthang, Bhutan

\*Corresponding author's email: swangdi@uwice.gov.bt

The study revealed that the three restriction systems were not directly enforced for the sustainable management of forests or for the conservation of biodiversity. Instead, their enforcement was primarily driven by a need to pacify local deities and thereby avoid natural disasters such as floods and storms, thus ensuring good agricultural harvests. *Sokdum* was also a tool to avoid killing of living creatures during the auspicious month of the year. Interestingly, however, the *Reedum* period corresponds to the growing season (spring to autumn), and *Sokdum* promotes wildlife conservation through prevention of man-made forest fires during the highly susceptible forest fire season (February–March). Similarly, *Tsadum* helps ensure regrowth of the grasslands as it corresponds to the regeneration period for grazing lands. We document that restriction systems historically practiced have promoted regeneration and conservation of biodiversity in Bhutan.

**Keywords:** Social restriction, *Reedum*, *Sokdum*, *Tsadum*, *Tsamdro*

## Introduction

Traditional Forest Management Practices (TFMP), particularly social restriction systems, that contribute to biodiversity conservation have not been documented before, although it was strongly practiced at a local level in Bhutan prior to 1969. TFMP is a customary practice of forest resources management, which has been passed across generations. Social restriction is an informal social customary sanction of local communities that restricts the use of forest resources. With the endorsement of Bhutan's Forest Act of 1969, all forests were nationalised as Government Reserved Forests (GRF) except for land under shifting cultivation (Chhetri et al. 2009; Ministry of Agriculture and Forests [MoAF] 2011). Similarly, the enactment of the Land Act of 1978 and Forest and Nature Conservation Act of 1995 had a huge impact on the disappearance of local forest management social restriction systems (Wangchuk 2001), as the government gradually took over management of the country's forest resources and commenced scientific forest resources

management (Heinimann et al. 1997; Dorji et al. 2003).

Traditional Forest Management Practice throughout the globe has moved in major ways to integrate new values and policies (Mery et al. 2005; Parrotta & Trostler 2012). This change is mostly driven through the progressive accumulation of experiences and adaptive responses to internal and external economic, political, social and ecological change (Menziez 2006; Hundera 2007; Berkes 2008). Bhutan is no exception; however, these changes have caused TFMP, particularly the social restriction systems, to gradually disappear from society.

In Bhutan, prior to 1969, these traditions served to meet the basic needs of forest resources for communities and contributed in maintaining equilibrium between environmental resources and the growing population's needs (Dorji et al. 2006). We lack a comprehensive understanding of these systems and their importance for biodiversity conservation and sustainable use of forest resources. If these traditional practices of Bhutan supported biodiversity conservation, they could be usefully integrated with modern conservation efforts.

Traditional social restriction systems—particularly *Reedum*, *Sokdum* and *Tsadum*—were highly prevalent and strongly practiced within local communities in Bhutan, across generations. Before enactment of the Forest Act of 1969, most local communities across the country exercised a customary social restriction system called *Reedum*. It refers to closing of mountains (*Ree*=mountains, *Dum*=restriction). The term "*Reedum*" has been used interchangeably with "*Phudum*", "*Serdum*", and "*Ladum*". The complexity and nature of restriction practices involved were exactly the same across communities, except for the use of different terminologies. *Reedum* was enforced to prevent agricultural crops from natural disasters such as floods and storms, which were believed to be caused by local deities residing in the mountains (Wangchuk 2001). During the *Reedum* period (generally from March to October), the entire community is prohibited from any forestry related activities within the *Reedum* area.

The first month of the year in the Bhutanese calendar (generally falls in February or March) is considered to be auspicious according to Buddhist beliefs, and *Sokdum* is enforced for the entire month. *Sokdum* refers to restriction of killing animals (*Sok*=life, *Dum*=restriction). The *Sokdum* period was intended to avoid killing living creatures during the auspicious month, such as through deliberate setting of forest fires and poaching of wild animals. As it was the beginning of the year, peasants would not want to begin the year with a negative virtue.

*Tsadum* (*Tsa*=grasses, *Dum*=restriction) refers to restriction of grazing in pastureland. It was not as prevalent as *Reedum* in the local communities of the study area. Generally, we recognise only one type of *Tsadum*, but in fact there were two types of *Tsadum*, classified based on the usage of pastureland. *Tsadum* in *Tsamdro* (grazing pastureland) areas were for

cattle, and other pasturelands identified by community people were for ploughing bulls to graze during agricultural crop cultivation. Both the *Tsadums* were implemented to stock a fresh grazing pastureland.

## Methods

### Study area

The study was conducted in Bumthang, Lhuntse and Tashi Yangtse (Fig. 1). These regions were selected for the study because they are known to have strong traditional customary laws and social restriction systems still being practiced. Although historically these traditional systems were prevalent in other parts of Bhutan, after endorsement of the Forest Act of 1969, practice of these traditions seem to have gradually decreased.

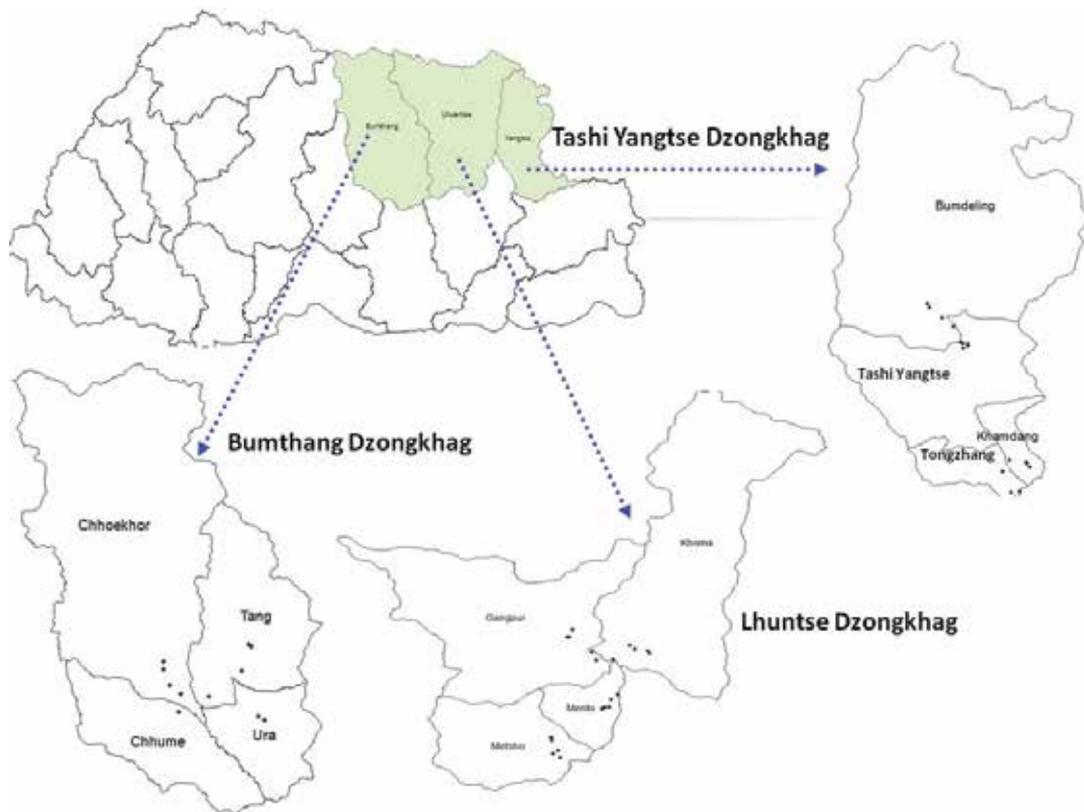


FIGURE 1 Map of the study area.

## Method of data collection

There are twenty geogs (sub-districts) across the three districts of this study. We randomly selected four geogs from each district. A semi-structured interview questionnaire was designed to collect data. All the data were collected by the primary author. Prior to data collection, the questionnaire was presented to research committee members at the Ugyen Wangchuck Institute for Conservation and Environment and piloted within three geogs of Bumthang district. A few questions were changed after the pilot test in consultation with research committee members at the Institute.

Data were collected from November to December 2013. A total of 56 elders and local leaders above 60 years of age were interviewed (Fig. 2). Each of the 56 interview respondents came from a different village. An audio recorder was used to record interviews to cross-check the translation of local language to English at a later stage of data processing. A snowball sampling method was used for the

study. This method allowed us to select the next interviewee (but always from a different village) based on the previous interviewee's recommendation. The data were summarized qualitatively and are presented descriptively in this paper.

## Results and discussion

### Reedum

A large number of respondents' villages had practiced *Reedum* in their locality prior to 1969, suggesting *Reedum* was historically prevalent in local villages throughout the study area (Fig. 3a). In Tashi Yangtse district, *Reedum* was practiced in all villages surveyed. *Reedum* is still being practiced in the study area, though not as much as it was four decades ago (Fig. 3b).

The *Reedum* enforcement period begins immediately after sowing until harvest (March–October). However, a few communities enforce it only for a few months during sowing (March–April) and during the harvest season

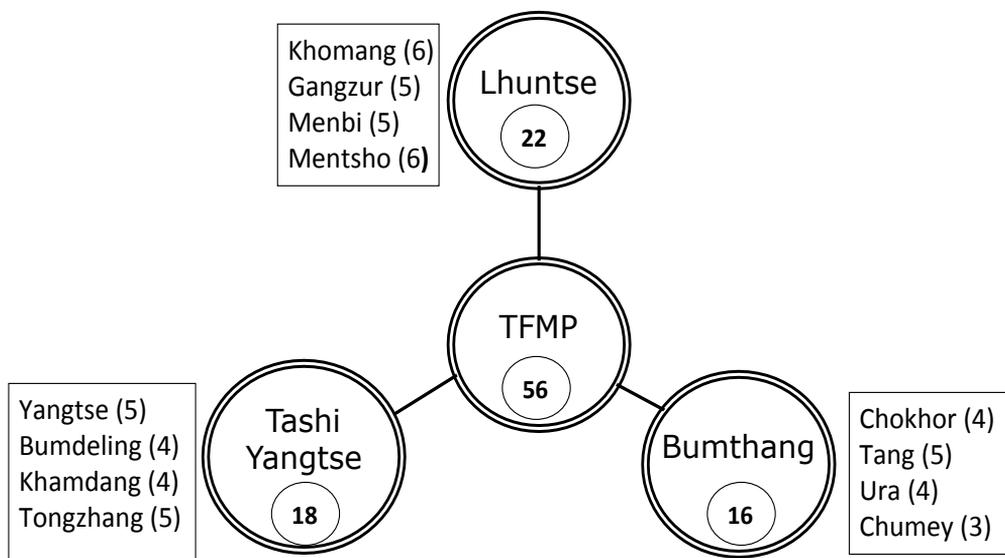


Figure 2 Distribution of interview respondents across the three study districts (Bumthang, Lhuntse and Tashi Yangtse). For each district, the corresponding box shows the number of respondents (in parentheses) from each of the four randomly selected geogs. Each respondent represents a different village in the geog. The total number of respondents for each district is shown in the circle for each district.

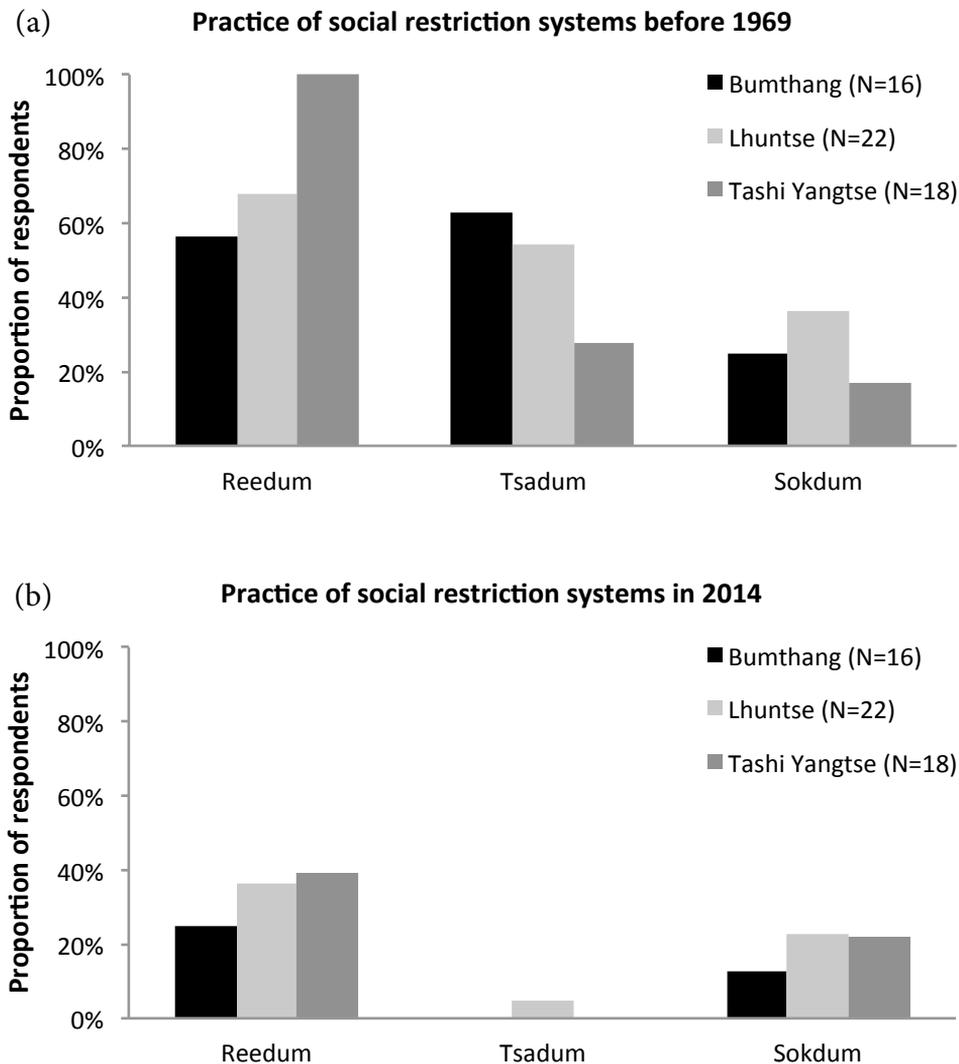


FIGURE 3 Practice of social restriction systems (a) before 1969 and (b) in 2014, in the three study districts. Number of respondents interviewed is given in parentheses for each district. Each respondent represents a different village.

(September–October). To commence the period, communities invite a shaman or a local *gomchen* (lay priest) to perform an annual ritual to appease the local deities. Representatives from every household attend the ritual, while some communities celebrate a local festival to begin *Reedum* (for example, in Numbaring village of Tashi Yangtse, *Reedum* begins immediately after *Purchoe* festival). On that day, some communities select a stone to mark a seal

and unanimously agree to compensate with *betam* (Tibetan coin) equivalent to the sealed stone’s weight, if anyone violates the period.

The head of a family is responsible to inform other family members about the date of *Reedum* period commencement. However, in some villages, people are informed during a religious gathering. To end the *Reedum* period, some villages consider the Blessed Rainy Day

celebration (generally celebrated on 22<sup>nd</sup> September) as the last day for *Reedum*, while others simply end the period after harvesting their crops. Generally, the beginning and end of the *Reedum* period is known through the culture and tradition of *Reedum* practice in the community.

During the *Reedum* period the entire community is prohibited from any forestry related activities. Mani Tshering, from Yangthang (Tashi Yangtse) said “During the *Reedum* period, both local community people and outsiders are restricted from collecting any forest resources from our mountain areas. We are also not allowed to make noises in the valleys during the period, as it disturbs the local deities.” The restriction extends even to the cremation of dead bodies in the community, as it is believed that smoke and smell produced during the process of cremation may disturb local deities, thereby instigating natural disasters. During this period, dead bodies are generally buried underground until the *Reedum* period passes, after which cremation processes are performed. It is even considered a serious offence for relatives of the recently deceased or newly born to walk through the restricted areas. However, cattle herders and mountain dwellers are accepted, as they reside and depend for most of their livelihood on the forests.

A severe penalty system is in place to enforce the *Reedum* operation. To penalize the offender, the communities have to apprehend the offender during the time of natural disaster occurrence, otherwise without a strong eyewitness communities cannot accuse the person for violation of the *Reedum* period. Severity of penalty depends on the intensity of crop damage based upon the records of the previous year’s production. For example, the penalty to compensate for the entire community’s crop and seedling damages are to feed the whole community for the year. However, Sonam Chodra from Baytsamang (Tashi Yangtse) argued that “I have witnessed the occurrence of major natural disasters in our community during one of the *Reedum* periods, but never observed any offender being charged with severe penalty for the disaster.”

More frequently, offenders are imposed with minor penalties such as apologizing to the entire community with a few *betams* and a *palang* (container to store locally brewed alcohol, generally made of bamboo and wood) of *ara* (locally brewed alcohol) or to incur the cost of the following year’s annual ritual ceremony. Namgay Dorji, from Tangmachu (Lhuntse) stated, “A few years back, a person from Metsho Geog cremated his son’s dead body in the hilly area during the *Reedum* period, and heavy rainfall and storm destroyed entire community’s crops. As a punishment, neighbours refused to return his cereals borrowed in the previous year and he apologised to the entire community for his misconduct.” If the offender declines to apologize, then the case is forwarded to the *Gup* (local leader) and ultimately to the Dzongkhag. This rarely happens because cases are solved at the local level through a local elder’s negotiation. A severe penalty system in place seems to have played a key role in smooth implementation of *Reedum* practice prior to 1969; however, only minor penalties are imposed at present.

The practice of *Reedum* now seems to be gradually disappearing from communities. Pasang Tshering, from Tashi Yangtse, stated that “Today, people obtain permits from forestry officials and walk into the forests during the *Reedum* period. A couple of years back during the *Reedum* period, a man was searching for *Bawa* (local terminology for burr) after which we received a heavy storm and rainfall that destroyed our entire crops. Since he had permits to collect *Bawa*, we could not do anything.” During the process of our study we realized that the government’s forestry related rules and regulations are not aligned with some of the customary social restriction systems that have been passed down across generations. This may be one plausible rationale for the gradual disappearance of traditional forest management practices in the country.

### *Sokdum*

Before 1969, *Sokdum* was enforced mainly to restrict killing of animals and insects such

as through deliberate forest fires during the first month of the Bhutanese calendar, as it is considered to be an auspicious month of the year. *Sokdum* was not as prevalent as commonly held views, as evident from Fig. 3a; only 15 out of 56 respondents practiced *Sokdum* in their villages prior to 1969.

During other (less auspicious) months of the year, deliberate forest fire setting within the *Tsamdro* area and around agriculture fields was a common practice to ensure regrowth of fresh grasses for cattle (Chhetri 1994). Furthermore, fire reduced tick and leech populations in grazing areas. Setting forest fires in nearby agriculture fields helped the community to protect their crops from wild animals such as wild boars and also reduced crop pests and diseases. Forest bushes around an agriculture field acted as protective cover for wild animals, which facilitated attack of agriculture crops by wild animals. For forest fire setting, communities nominated a person to set the fire and the entire community collected a kilogram of butter and cheese per household to reward the person for the task. Generally, cattle herders volunteered for the task, as they required fresh grazing pasture for their cattle. In the past, the fundamental principle of *Sokdum* ensured that deliberate forest fire setting did not occur during the auspicious month of the year. Nowadays, due to prohibitions against setting fires and due to changes in policies related to *Tsamdro*, deliberate forest fire setting is no longer practiced by communities.

Before 1969, the entire community took responsibility in monitoring the violation of the *Sokdum* period. Severe physical punishments such as whipping were imposed. At times, if peasants were unable to apprehend a culprit, then the entire community was liable for mass physical punishment. However, this rarely happened, as communities strictly observed *Sokdum*. The penalty for *Sokdum* period violation was not as prominent as for violation of *Reedum* and *Tsadum*, since accumulation of positive virtue for our own benefit through saving animals' lives is each individual's responsibility.

The number of villages currently practicing *Sokdum* is less than prior to 1969 (Fig. 3b). A plausible explanation could be that, at present, the government prohibits killing of wild animals irrespective of the auspicious month. Moreover, the ban extends to killing of animals and sale of meat during the first and fourth months of the Bhutanese calendar, as per the Livestock Act of Bhutan 2001 (MOA 2001). We may infer that *Sokdum* practice has been integrated within the government's policy to be abided by every Bhutanese citizen. With this, the *Sokdum* practice has become stronger than before, although the word "*Sokdum*" is no longer used in the villages of our study area.

### *Tsadum*

Within our study area, Bumthang district (as a proportion of surveyed respondents) enforced more *Tsadum* than did Lhuntse and Tashi Yangtse prior to 1969 (Fig. 3a). Now, *Tsadum* is rarely practiced in the study area, except by a few villages of Lhuntse (Fig. 3b). Through our interviews, we realised that two types of *Tsadum* had been implemented in the communities of our study area. *Tsadum* for cattle was implemented within the *Tsamdro* area, mainly to ensure *Tsamdro* owners' cattle access to fresh pasturelands. *Tsadum* for ploughing bulls was enforced within a certain area identified by communities. This ensured equal access to fresh grazing pasture to all the ploughing bulls of the community during the agriculture crop cultivation season. *Tsadum* for cattle was mostly practiced in Lhuntse district due to the fact that the villages have a significant number of *Tsamdro* areas (Fig. 4). Alternatively, *Tsadum* for ploughing bulls was prominent in Bumthang district as buckwheat cultivation was popular in this area.

*Tsadum* period for cattle was mostly enforced by powerful families such as *Choeji* and *Dungji* (noble hereditary families), *Nagtshang* (resident of noble hereditary family) and *Gups* (local leader) hereditary families, since they owned more cattle and *Tsamdro* areas. For example, the people of *Ugyen Choling* in Bumthang implemented *Tsadum* in Menbi Geog in Lhuntse. Cattle of the Menbi community were

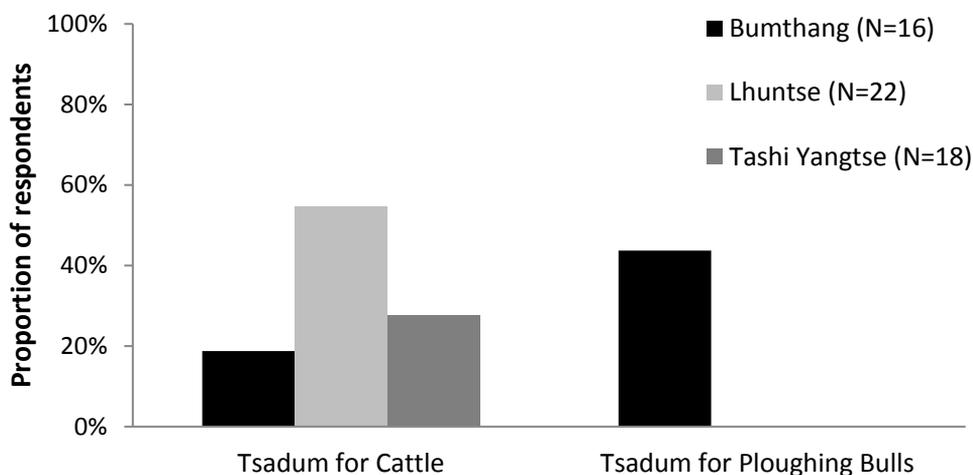


FIGURE 4 Practice of *Tsadum* (restriction of grazing in pastureland) in the three study districts, prior to 1969. Number of respondents interviewed is given in parentheses for each district. Each respondent represents a different village.

not allowed to graze the *Tsamdro* area until the cattle of *Ugyen Choling* grazed the pastureland. Generally, cattle herders implemented the period and imposed penalties, if violated. The offenders may have been penalised with a *betam* (Nu. 104.6) per cattle or five *betams* for the violation, which was a severe punishment during those days, as they didn't have any source of income. Sometimes a *Tsadum* area was shared with other *Tsamdro* non-holders' cattle. In return, these persons helped the *Tsamdro* owner pay cattle tax. For instance, all the *Tsamdros* around Lhuntse community belonged to the people of Bumthang and some of the Lhuntse community shared it with them.

*Tsadum* for ploughing bulls was prevalent in Bumthang district. For instance, the current Chamkhar ground and the area below Lamai Goempa Institute used to be *Tsadum* area for the people of Bumthang during crop cultivation season (spring). To commence the *Tsadum* period, the local *gomchen* (lay priest) was invited to perform a ritual and hoist a small flag along with stones and wooden sticks at key locations to signify that whosoever violated the period would be dealt with. During the ritual, the community also nominated a person or group

of men called a *Sungjab/Langzip* (ploughing bull's herder) to monitor and observe the period. Lhadarla, from Nangar (Bumthang) added that "*Langzips* were appointed from every household for a week on a rotational basis." These implementers imposed a variety of penalties if anyone violated the period. The offenders were usually charged with a *drey* (traditional cereal measuring bowl, 1 *drey*=1.4 kg) of buckwheat or any other cereals per cattle and sometimes they seized an entire day's milk production. Alternatively, the offender had to apologise to the community people and implementers with a *palang* of *ara* and a few bowls of cereals. These cereals were then ground into flour and fed to ploughing bulls.

Until 1952, every household was subjected to annual taxation (Wangchuk 2000), particularly with agriculture crops and cattle (butter and cheese) taxes to the central and district administrations (Ardussi & Ura 2000). Implementation of *Tsadum* ensured peasants had adequate crops and milk production to pay these taxes on time. Karma Thinley, from Phomrong (Bumthang) stated, "We enforced *Tsadum* period, otherwise our *Tsamdro* would be grazed by local community cattle and our

cattle's milk production would be decreased and eventually we would be penalized for not being able to pay cattle tax." Heavy taxation for agriculture crops and cattle seemed to be a driving force behind the evolution of *Tsadum*.

*Tsadum* practices now seem to have virtually disappeared from the communities of the three study sites. A possible explanation for this might be that cattle and agricultural taxes are no longer levied. More importantly, the Land Act of Bhutan 2007 "deleted all the *Tsamdro* rights" and converted the lands to Government Reserved Forest lands (RGoB 2007). The rationale was that *Tsamdro* lands belonged to the state although they were reflected in the private and community land register. The government also reasoned that peasants were permitted to graze the pasture but not the *Tsamdro* land (Kinga 2010). Therefore *Tsamdro* owners were not required to pay taxes for *Tsamdro*, unlike other categories of landholdings. Furthermore, in general, native cattle have been largely replaced by the new hybrid brown Swiss cattle, which do not follow seasonal migrations as native cattle did.

### *The role of social restriction systems in biodiversity conservation*

Only 3 of 56 respondents in this study believed that the three social restriction systems were directly intended to protect and conserve forest resources and biodiversity. Sherub Wangdi, from Tamzhing (Bumthang) stated that, "We had adequate forest resources within the vicinity of our community and our primary concern was to ensure good food production to sustain our livelihoods rather than to protect and conserve forest resources." However, the *Reedum* period coincides with natural regeneration and sprouting (spring to autumn) for most plant species. This ensured the integration of sustainable management concepts within *Reedum* practice that ensured the management of forest resources without a management plan. A peasant's respect for certain hilly areas and mountains as a local guardian deity's abode not only benefited biodiversity conservation, but also acted as a measure to control use of forest resources

locally (Colchester 1994; Upreti 2008). As a result, this tended to generate a clear picture that *Reedum* prevented harvest of forest resources during the natural regeneration and sprouting season, ensuring conservation of forest resources.

*Sokdum* was never intended to benefit wildlife conservation. Rather, it was to avoid killing living creatures during the auspicious months to avoid accumulation of negative merits. However, *Sokdum* corresponded with a period of high risk of forest fires (February–March). During *Sokdum* period, hunting and killing of animals was prohibited, and the observed ban on deliberate forest fire setting also protected wildlife during the auspicious month. Thus the Buddhist belief of saving and respecting other living beings may have acted as an important element in wildlife conservation.

*Tsadum* seems to have played an important role in grassland conservation in the communities as it corresponded with the regeneration and sprouting season of grasslands (March–April). It was also an effective mechanism to ensure equal access of pasturelands within communities, which then ensured *Tsamdro* owners could pay their annual taxes to the government. Research suggests that most *Tsamdro* may now be overgrazed (Norbu 2002). Restoration of *Tsamdro* rights and implementation of *Tsadum* period may be one way to prevent continued overgrazing of pasturelands.

Though the social restriction systems in question were never enforced directly with an objective to conserve natural resources and biodiversity, they seem to have played an indirect role in managing forest resources for biodiversity. The decline of these social restriction systems may have unexpected (negative) conservation consequences, which may or may not be addressed by current scientific management systems.

### **Acknowledgements**

We thank the *Gups* of the following geogs for arrangement of interviewees and logistic

assistance: Chokhor, Chumey, Tang, Ura (Bumthang) Gangzur, Khomang, Menbi, Mentsho (Lhuntse) Bumdeling, Khamdang, Tongzhang, and Yangtse (Tashi Yangtse). We would like to express our gratitude to UWICE for funding the study. We are highly indebted particularly to Norbu (UWICE), Tashi Dendup and Kumbu Dorji of Khoma Park Range Office (Bumdeling Wildlife Sanctuary) for their assistance in data collection. We are also very grateful to all the participants and reviewers for providing comments and suggestions.

## Literature cited

- Berkes, F. 2008. Sacred ecology: Traditional ecological knowledge and resource management. Routledge, New York.
- Chhetri, B. B., K. Schmidt, and D. Gilmour. 2009. Community forestry in Bhutan – Exploring opportunities and facing challenges. paper for the community forestry international workshop, Pokhara, Nepal, 15-18 September 2009. Social Forestry Division, Ministry of Agriculture.
- Chhetri, D. B. 1994. Seasonality of forest fires in Bhutan. *International forest fires news*. In M. Colchester, editors. *Sustaining the forests: the community based approach in South and South-East Asia*. *Development and Change* 25:9–100.
- Dorji, L., E. L. Webb, and G. P. Shivakoti. 2003. Can a nationalised forest management system uphold local institutions? The case of leaf litter forest [sokshing] management in Bhutan. *Asian Studies Review* 27(3):341–359.
- Dorji, L., E. L. Webb, and G. P. Shivakoti. 2006. Forest property rights under nationalised forest management in Bhutan. *Environmental Conservation* 33(2):141–147.
- Hundera, K. 2007. Traditional forest management practices in Jimma Zone, South West Ethiopia. *Ethiopian Journal of Education and Sciences* 2(2).
- Kinga, S. 2010. Sounds of sokshing: Revisiting the contested provisions of the land act 2007. *Centre for Bhutan Studies* 23:1–26.
- Menzies, C. R. 2006. Ecological knowledge, subsistence, and livelihood practices: The Case of the Pine mushroom harvest in North western British Columbia. In C. R. Menzies, editors. *Traditional ecological knowledge and natural resource management*. University of Nebraska Press, Lincoln, Nebraska 87–106.
- Mery, G., R. Alfaro, M. Kanninen, and M. Lobovikov. 2005. Forests in the global balance—changing paradigms. IUFRO World Series. International Union of Forest Research Organizations [IUFRO], Helsinki, 17.
- Ministry of Agriculture and Forest. 2011. Forestry development in Bhutan, policies, programmes and institutions. Thimphu.
- Ministry of Agriculture. 2001. The Livestock Act of Bhutan 2001. Royal Government of Bhutan, Thimphu.
- Norbu, L. 2002. Grazing Management in Broadleaf Forests. *Journal of Bhutan Studies* 7:99–129.
- Parrotta, J. A. and R. L. Trosper. 2012. Growing importance of traditional Forest-related knowledge. Pages 1–36 In J. A. Parrotta and R. L. Trosper, editors. *Traditional Forest-Related Knowledge: Sustaining Communities, Ecosystems and Bio-cultural Diversity*. Springer Science, London.
- Royal Government of Bhutan. 2007. The Land Act of Bhutan 2007. Thimphu, Bhutan.
- Uprety, L. 2008. Role of institutions and organizations for the sustainable management of forest and pasture as common property resources in Nepal: an overview of the indigenous and traditional practices. *Dhaulagiri Journal of Sociology and Anthropology* 2:31–64.

Wangchuk, S. 2001. Local resource management institutions: A case study on sokshing management. *Journal of Bhutan Studies* 3(1):1-44.

Wangchuk, T. 2000. Change in the land use system in Bhutan: ecology, history, culture, and power. *Journal of Bhutan Studies* 2(1):1-31.

## About the authors



**Sonam Wangdi** is head librarian of Ugyen Wangchuck Institute for Conservation and Environment, and is also chair the of the Bhutan Library Consortium. He serves as the country coordinator for the

International Librarians Network and as a validation team member for the Library and Information Management program in Samtse College of Education, Bhutan.



**Nawang Norbu** is Director of the Ugyen Wangchuck Institute for Conservation and Environment under the Ministry of Agriculture and Forestry Services. He received his Ph.D. from the Max-Planck Institute of Germany, for

his research on movement ecology of altitudinal migrants in high altitude birds and mammals.



**Sangay Wangchuk** is a researcher and chair of the Sustainable Forestry department for the Ugyen Wangchuck Institute for Conservation and Environment. He is also Program Director of the UNESCO

Madanjeet Singh Center for South Asia Forestry Studies. Mr. Wangchuk's research brings together social components and ecology to understand the intricate relations between these two important elements to unlock some of the mysteries pertaining to current scenarios.



**Kinga Thinley** is a research assistant under the Department of Sustainable Forestry at Ugyen Wangchuck Institute for Conservation and Environment. He is currently studying growth

rings of rhododendrons and blue pine trees in Bumthang, Bhutan.