



Darwin Initiative: Final Report

*To be completed with reference to the “Writing a Darwin Report” guidance: (<http://www.darwininitiative.org.uk/resources-for-projects/reporting-forms>). It is expected that this report will be a **maximum** of 20 pages in length, excluding annexes)*

Darwin Project Information

Project reference	23 009
Project title	Sustainable rangeland management to protect red pandas and herder livelihoods.
Host country(ies)	Bhutan
Contract holder institution	Charles Sturt University
Partner institution(s)	Department of Livestock (DOL), Department of Forests and Parks Services (DOFP), World Wildlife Fund Bhutan, Red Panda Network (RPN), Australian Landcare International (ALI)
Darwin grant value	£290,000
Start/end dates of project	1st May 2016 to 30th April 2019
Project leader’s name	Dr Joanne Millar
Project website/blog/Twitter	https://redpandabhutan.wordpress.com/
Report author(s) and date	Joanne Millar, Karma Tenzing, Tshering Dorjee, Thinley Wangdi 7 August 2019

1 Project Rationale

The project was designed to address severe land degradation, red panda habitat loss and herder wellbeing in the winter rangelands bordering Sakteng Wildlife Sanctuary (SWS) in eastern Bhutan. SWS is rich in biodiversity and home to the globally threatened red panda. However, little is known about red panda status or habitat threats in this remote part of Bhutan (Dorji et al., 2012). Over-exploitation of resources and climate change are the main drivers of pasture decline, land erosion and forest fragmentation in the area (Thapa and Nidup, 2010). SWS is also home to 5,000 semi-nomadic Brokpa herders, a unique indigenous population whose livelihoods depend on livestock raising (yaks and cattle). Brokpa herders from Merak village in SWS have been caught in a vicious poverty cycle caused by decline in rangeland resources, labour, and poor access to services (United Nations Development Program, 2013). The poverty rate of Merak district is 58%, double the rate of most districts in Bhutan (NSSB and WB 2010). The project used the community landcare approach developed in Australia to achieve sustainable land management, red panda conservation and improvement in Brokpa livelihoods, thereby addressing a new biodiversity-development linkage in the Darwin Initiative portfolio.

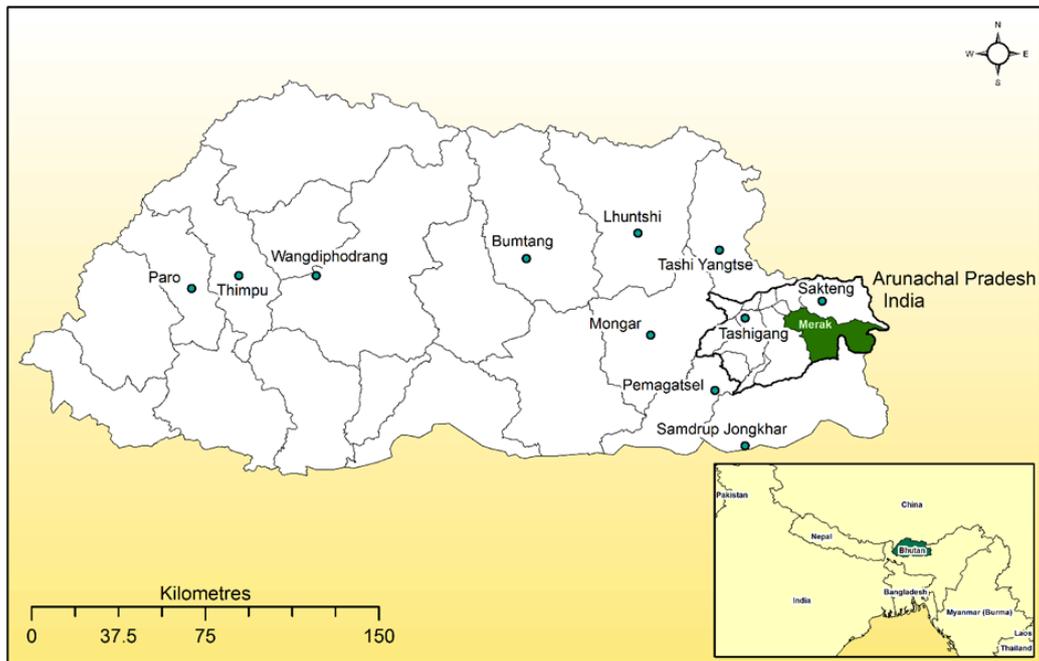


Figure 1 Location map

Dorji, S., Rajaratnam, R. and Vernes, K. (2012). The Vulnerable Red Panda *Ailurus fulgens* in Bhutan: distribution, conservation status and management recommendations. *Oryx* Volume 46, Issue 4, pp. 536-543.

United Nations Development Program (UNDP) (2013) Country Programme Landscape Strategy COMDEKS Bhutan. Restoring and Managing Landscapes in Gamri Watershed Trashigang.

Thapa, P., and Nidup, J. (2010). Forest Related Policy Implications in Bhutan with special reference to the Brokpas. Sustainable Forest Management and Poverty Alleviation: Roles of Traditional Forest-related Knowledge. IUFRO World Series Volume 21.

National Statistics Bureau of Bhutan and World Bank (2010) Small Area Estimation of Poverty in Rural Bhutan. Technical Report jointly prepared by National Statistics Bureau of Bhutan and the World Bank. June 21, 2010.

2 Project Partnerships

The project was jointly implemented by the Department of Livestock (DOL) and Department of Forest and Parks Service (DOFPS/SWS) under the Ministry of Agriculture and Forestry (MOAF) at the Bhutan government's request. DOL, the Regional Livestock Development Centre (RLDC) and District Livestock Office at Tashigang were responsible for land demarcation, fencing, pasture improvement, silage training, and biogas technology. SWS were responsible for land restoration and zoning, red panda monitoring, red panda awareness and education, and red panda ecotourism development. CSU conducted group management training and developed savings groups along with overall monitoring and evaluation. A close working relationship developed between CSU and both Departments in administering funds and ensuring effective on-ground implementation. The project provided a rare opportunity for livestock and forestry staff to work together on an integrated project. This positive outcome was voiced regularly by national and local staff at meetings.

The World Wildlife Fund and Red Panda Network gave advice, materials and financial support for red panda education activities, formation of two Red Panda Junior Ranger Clubs, the Red Panda Action Plan workshop and editing of the plan. ALI donated funds to establishing a tree nursery and shared landcare related information.

Annual project meetings were held in Trashigang to review and plan activities and outputs. Three project meetings were held in the final year whilst CSU staff were in-country and because there were many activities to complete (see Annex 7.1 for Minutes/Actions from November 2018 meeting). The project team including all partners kept in touch via email, phone and WeChat throughout the project. All partners were involved in preparing the final report. DOFPS, WWF and RPN have been working with CSU on a new Darwin project application submitted on 16th July to further address red panda conservation in Bhutan and transboundary areas using a landscape and livelihoods approach.

3 Project Achievements

3.1 Outputs

Output 1: Restoration of eroded gullies, regeneration and zoning of critical red panda habitat, and red panda research

1.1 The largest eroded gully at Drana covering 20 ha was fenced and planted with 23,000 trees and bamboo/willow cuttings over two years by herders and SWS staff. A total of 136 checkdams were built by herders (83 in 2018, and 53 in 2019 over an additional 15 ha at Sheytemi in smaller gullies, total 35ha). Flash flooding occurred in 2018 resulting in an estimated 70% loss of cuttings within the main gully floor and damage to 20 checkdams. The plants were replanted after renovation and installation of more checkdams that proved effective in slowing run-off and retaining sediment (Figure 1). Plant survival rates were better on the banks and above the gully (estimated at 80%) as shown in the before and after photos below (Figure 2). Some fencing collapsed but was rebuilt and no grazing or lopping has taken place within the gully.



Figure 1 Checkdam construction and sediment control at Drana Gully



Figure 2 Section of Drana gully in 2016 (before project) and in 2019 (after restoration works)

At the final project meeting, herders and staff estimated that groundcover had increased by 30-40% in some areas. The final household survey showed that most respondents estimated soil erosion control at between 80 to 100%, possibly interpreting the question as aspirational (Figure 3). About a third of respondents were more conservative and perhaps more realistic in their estimate of 20-60% current erosion control. The following benefits were expressed by respondents.

“It has helped prevent flash floods and make clean water”

“The restoration of degraded land due to plantation of trees will prevent natural calamities like soil erosion and flood.”

“It prevents soil erosion and landslide and protects the plants and animals.”

More photos and stories on land restoration works over the project period can be found at <https://redpandabhutan.wordpress.com>.

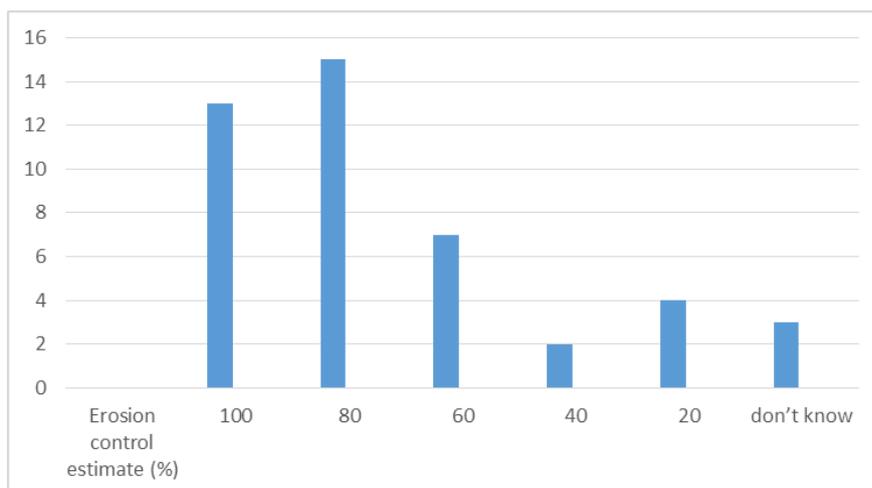


Figure 3 Household estimate of erosion control in Drana Gully (N = 45).

Source: Final household survey 2019

1.2 The project area is a mosaic of winter grazing meadows and degraded forest which is red panda habitat. Transects were made by SWS staff across an area of 200ha to look for evidence of red panda. Scats were found in only 3 locations (Figure 4). Ten camera traps were set around these locations and moved every six months for 2.5 years (Figure 4). However, no photos of red panda were obtained. SWS staff concluded that overgrazing of bamboo, a recent bamboo flowering event and lack of roosting trees have forced red pandas to migrate further into the park. In 2019, SWS established a Special Protection Zone over the entire area which bans logging and extraction of non-timber forest products. The new zoning has been incorporated into the Sustainable Timber Harvesting Plan for Sakteng Wildlife Sanctuary (2019-2029). Despite the lack of camera trap evidence, several herders reported sighting red panda in the project area over the project lifetime. One location is on the western boundary which adjoins good quality habitat that is not grazed. An area of 90 acres has been fenced and bamboo is growing back (Figure 4). The two herders that lease this area plan to only strategically graze so that bamboo can thrive. They have submitted a management plan to SWS for approval. SWS will continue to monitor for red panda presence in this area.

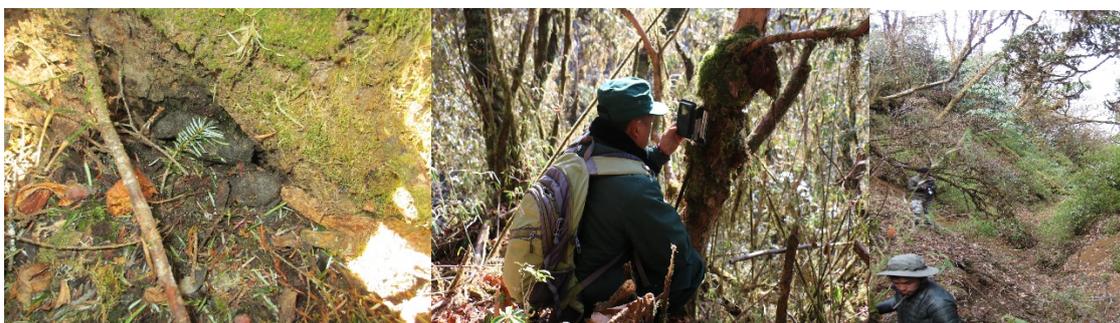


Figure 4 Red panda scats, camera traps and bamboo regrowth

1.3 The tree nursery failed to establish due to lack of commitment from the owner/manager whose wife was ill. SWS staff concluded that a nursery was not needed as seedlings and cuttings could be readily sourced from other areas.

Output 2 Sustainable rangeland management and pasture production

2.1 All 120 households in the project (including men and women) were involved in land management training, including building of check-dams, fencing and tree planting (see reports and photos at <https://wordpress.com/post/redpandabhutan.wordpress.com/390>
<https://wordpress.com/post/redpandabhutan.wordpress.com/678>
<https://wordpress.com/post/redpandabhutan.wordpress.com/776>

Regular working bees were held each year to complete land restoration with a high level of satisfaction in terms of soil erosion control expressed by most respondents in the final survey (Figure 3 above). The 2018 study tour to Bumthang in central Bhutan involving 12 herders (4 female, 8 male) and two district officers (forestry and livestock), introduced households to perennial pasture establishment, fodder conservation and livestock management (see report at Annex 7.2 and blog story at <https://wordpress.com/post/redpandabhutan.wordpress.com/708>

The study tour inspired households to adopt pasture improvement and silage production as shown in 2.2 below.

2.2 Merak households decided it was more equitable to give everyone the option of growing improved pasture from the start instead of having trials with a few households that might create jealousies. The Regional Livestock Development Centre (RLDC) facilitated land demarcation of 800 acres for potential pasture development at Chebling and Sheytemi winter grazing areas in 2017. In 2018, 25 households at Sheytemi successfully sowed 132 acres (54ha) to ryegrass and cocksfoot with lime and superphosphate incorporated into the soil before sowing. A fertiliser trial showed responses to lime, superphosphate and potash. Training in silage making was conducted by RLDC and DLO staff and 800kg of silage produced and used over the winter months. The pasture was grazed by 35 head of dzo/dzom/yaks and 30 sheep over winter 2018/19. A pasture field day was held in November 2018 which inspired another 20 households at Chebling to sow 62 acres (25ha) in 2019. Water pipes (40 bundles/4000 metres) have been distributed to irrigate pastures in dry winter months and supply drinking water.

For stories and photos on output 2.2 go to;

<https://wordpress.com/post/redpandabhutan.wordpress.com/744>

<https://wordpress.com/post/redpandabhutan.wordpress.com/792>

<https://wordpress.com/post/redpandabhutan.wordpress.com/818>

<https://wordpress.com/post/redpandabhutan.wordpress.com/885>

<https://wordpress.com/post/redpandabhutan.wordpress.com/904>

Output 2 indicators related to selling unproductive animals and increasing milk/cheese production were deleted as it will take a couple more years for an increase in winter fodder to impact significantly on livestock production. Culling of animals remains a sensitive issue in Bhutan due to the Buddhist sentiment of not killing living beings. However, the baseline household survey revealed that herders do cull or lose 5% of the herd each year (eg culling of sterile yak/cattle cross males, old animals, predation of calves by wolves).

Output 3 Alternative energy technology

3.1 Two portable biogas units were installed by DLO staff (one at Sheytemi, one at Chebling) in April 2019, with one operational (Figure 5). Delays with installation occurred due to 1) reaching agreement on the type of biogas units needed to suit high altitude and the semi-nomadic lifestyle of herding families, and 2) in sourcing flexible portable units from Nepal. The efficiency of biogas and reductions in firewood consumption are yet to be determined.

3.2 The high level of community interest in biogas has continued. The baseline household survey in 2016 showed 88% of respondents were interested in biogas (Annex 7.8). The final household survey in 2019 revealed a similar level of interest (84%) as shown in Figure 6 below. Of these 44 respondents, 75% had seen the biogas units and 23% had not. Demonstrations will be held later in 2019 when herders are back from summer pastures which may stimulate further interest to invest in biogas units.



Figure 5 The biogas unit at Sheytemi soon after installation (April 2019)

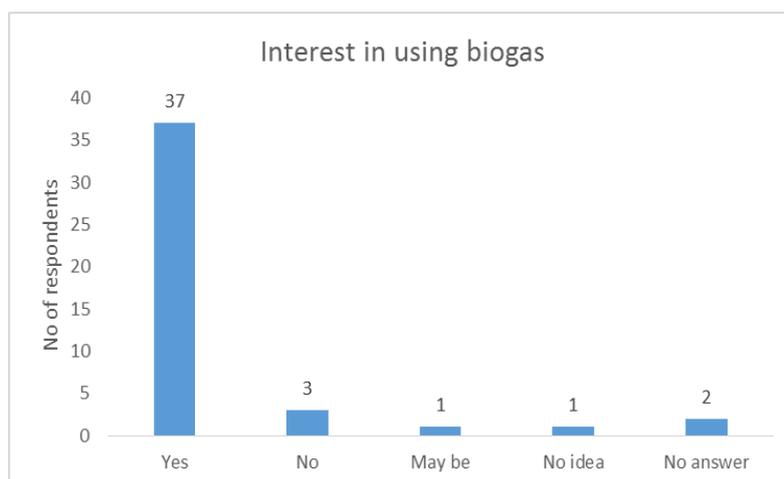


Figure 6 Community interest in using biogas (N = 44).
Source: Final household survey 2019

Output 4 Competent community-based landcare group established with two women’s savings groups enabling investment in small enterprises, and community education

4.1 The group dynamics and management training held in 2016 with 90 herders (55% male, 45% female) and formation of two savings groups in 2017 increased community confidence and skills in working together on rangeland and livelihood issues. The 2019 final household survey showed that 86% of respondents thought community cohesiveness had improved (Figure 7), and most respondents (77%) rated community capacity as very good or good (Figure 8). As one respondent said,

“People are listening to each other; they share ideas and come up with good solution to the problem.”

“Because of the group training, we came to know about the importance of group work; we also gained new knowledge and ideas toward conserving nature.”

See related story at;

<https://wordpress.com/post/redpandabhutan.wordpress.com/83>

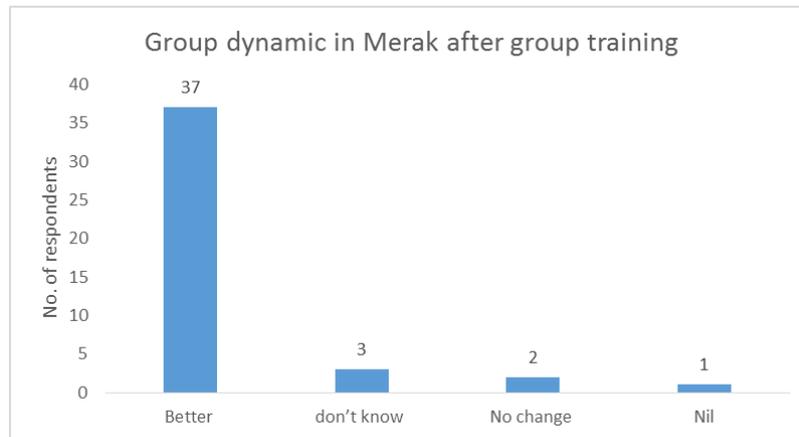


Figure 7 Perceptions of change in Merak community cohesiveness after group training (N =43)

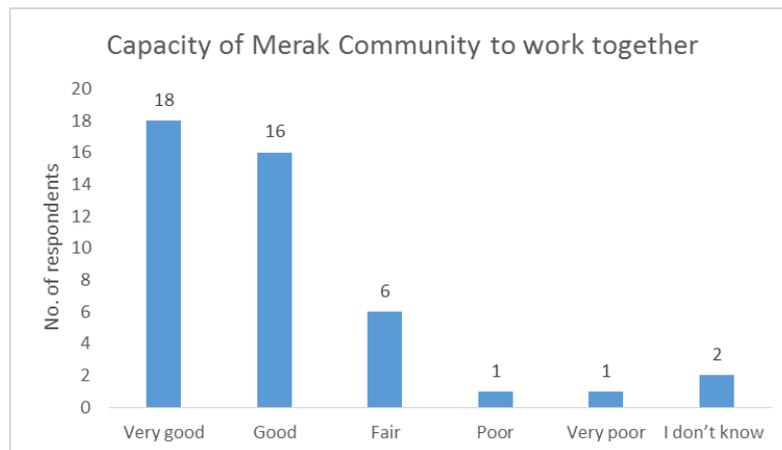


Figure 8 Perceptions of capacity of Merak community to work together (N = 44)

4.2 Two womens savings groups (Gengu and Merak) were formed following a 3 day training course involving 98 households in August 2017. Each group formed a committee with office bearers and were given an iron safe, passbooks and ledger books.

<https://wordpress.com/post/redpandabhutan.wordpress.com/461>

The Gengu savings group now has 89 members and the Merak group has 59 members (total 148 members with 60% women). Each member invests 100-150 Ngultrum per month. Over the last 18 months, the groups have saved a total of 381,000Nu (\$5,500AUS) with approximately 200,000 Nu (\$3,500AUS) borrowed by 10 households. Households can borrow up to 30,000Nu/year (\$500AUS). Case studies of households (women and men) who have borrowed funds for new and existing enterprises such as cheese making, wooden bowls, small shops, carpentry and livestock can be seen at;

<https://wordpress.com/post/redpandabhutan.wordpress.com/658>

<https://wordpress.com/post/redpandabhutan.wordpress.com/834>

<https://wordpress.com/post/redpandabhutan.wordpress.com/837>

<https://wordpress.com/post/redpandabhutan.wordpress.com/842>

<https://wordpress.com/post/redpandabhutan.wordpress.com/851>

Respondents in the final household survey expressed high to medium level of satisfaction from being savings group members (Figure 9). The following quotes demonstrate how members perceived they are benefiting from the savings scheme.



Figure 9 Savings group member satisfaction (N = 21)

“We can save for our children; we don’t need to worry about losing it”

“Helps in paying medical bills if required; paying for food; can provide money if there is death in

The Gengu savings group successfully applied for Helvetas funding to establish a wool processing centre with technical assistance from the Darwin project and the Trashigang district livestock office. For more information on how this venture came about as a ‘spin off’ from our project go to

<https://wordpress.com/post/redpandabhutan.wordpress.com/730>

<https://wordpress.com/post/redpandabhutan.wordpress.com/800>

<https://wordpress.com/post/redpandabhutan.wordpress.com/924>

The CSU research officer also helped the Merak savings group and primary school in obtaining a UNDP grant to control water erosion through the village and establish a waste management system.

4.3 The study tour to Sikkim in 2018 showed 12 herders (4 women, 8 men) how communities can benefit from and to red panda conservation through ecotourism, homestays, recycling, waste management, handcrafts and sustainable agriculture (Annex 7.2).

<https://wordpress.com/post/redpandabhutan.wordpress.com/708>

Since the study tour, Merak village has revised an ecotourism strategy to encourage more visitors to the area. One herding family were inspired to improve their homestay, create a handicraft shop and make rhododendron wine (see Annex 7.3). Two brothers who went on the study tour decided to fence off their rangeland lease to allow bamboo regeneration for red panda habitat and a nature trail for potential nature visitors. They have submitted a management plan to SWS for approval. At the final project meeting in April 2019, herders and SWS staff and local government officials discussed the need to form a community tourism association to ensure homestay standards are met and equitable distribution of tourists to homestays.

<https://wordpress.com/post/redpandabhutan.wordpress.com/695>

Thirteen officials from Merak, Sakteng, Trashigang, SWS, and RLDC visited Red Panda Network sites in eastern Nepal in June 2018. They visited communities near Ilam and Gorkhe to talk with homestay owners and forest guardians about red panda conservation. This visit led to SWS consulting with three local communities within the park regarding red panda conservation, ecotourism and forming junior ranger clubs at primary schools (see 4.4 below). SWS also held a meeting with tour operators in Thimpu to discuss how to promote Merak-Sakteng as a tourist destination. Several tour operators are now promoting trips through their websites, facebook and brochures. See example at <https://www.facebook.com/bhutan2020visit/> and

<https://www.bhutanvirtualtravel.com/>

4.4 Red panda conservation education over the 3 years involved film showings, SWS presentations, formation of two junior ranger clubs, a school play, field trips, posters and a signboard. (see blog stories at www.redpandainbhutan.wordpress.com). The primary school teachers and students have been very enthusiastic and supportive.

The baseline household survey in 2016 found very little community knowledge of red panda ecology, movements or population changes (Annex 7.8). However most people interviewed (60%) knew red panda ate bamboo and 42% suggested protecting habitat and restoring bamboo was important (see story at <https://wordpress.com/post/redpandabhutan.wordpress.com/317>)

The final household survey in 2019 showed that 88% of the 45 people interviewed had learnt more about red panda threats, habitat requirements and breeding from SWS presentations or indirectly via word of mouth as shown in the following quotes.

“We were told about the red panda being endangered; they also told about their habitat, vegetation and what food they eat; we also now know about their benefit in attracting tourists.” Deki, female herder from Sheytemi.

“Our village (Merak) is the main habitat of red pandas; they mainly feed on grass and red berries (labreb); they are herbivorous; they are harmless; endangered species; sometimes they fall victim to our dogs.” Jurmey, male herder from Sheytemi.

“Their habit and food should be protected; plantation of bamboo should be done; people should not harm or kill red pandas.” Jamyang Dema, female from Sheytemi

“There were many species once in Chebling but it decreased; destruction of forest caused decrease of the red pandas and we need to protect them by allocating boundary for them and planting or protect their vegetation.” Dendup Wango, female herder from Chebling.

“I did not attend the presentation but my son did; My son taught me that red pandas eat bamboo; not to kill them if you encounter red pandas.” Nencho Dema, older female from Chebling.

When asked if they had learnt about red pandas from their children, 54% said yes (figure 10). These respondents talked about the school play in terms of what they had learnt.

“They are fragile and sensitive animal; they are on the verge of extinction; If we protect their habitat, they will thrive well.” Uygen, male from Chebling

“We learnt that we humans tend to encroach in the territories of the panda (red) which led to decrease in their population. If we protect them by planting their food and making boundaries we can save them.” Deki from Sheytemi

“Dogs hunt (by chance) on red pandas as dog tag along with the cow herders; humans kill them; Habitat get destroyed due to deforestation (by grazers).” Tenzin Dorji, male from Chebling.

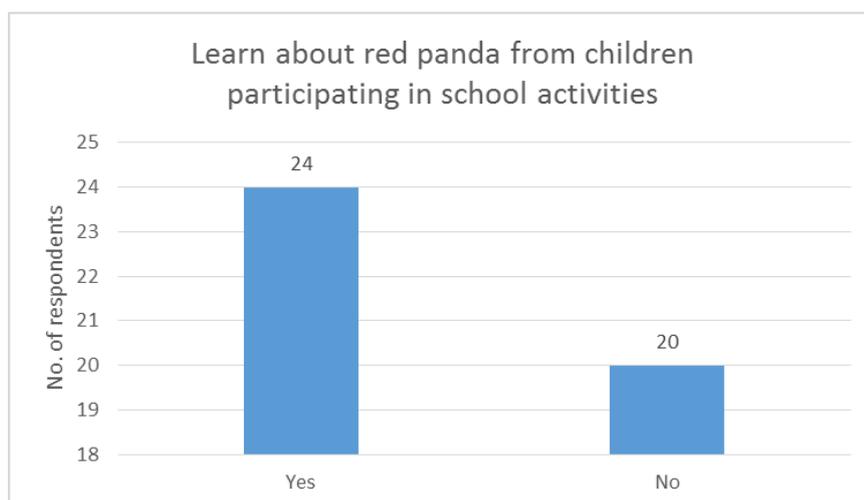


Figure 10 Impact of school red panda education activities on parental awareness (N = 44)

Output 5 Project results and lessons learned from the landcare approach and red panda conservation documented and disseminated.

5.1 The Merak community was regularly involved in meetings regarding project implementation, and representatives attended annual project planning meetings in Trashigang (see reports on blog site). SWS also organised community red panda awareness meetings at Joenkar and Sakteng villages within SWS. Another junior ranger red panda club was formed in Sakteng in April 2019 <https://wordpress.com/post/redpandabhutan.wordpress.com/895>

<https://www.facebook.com/Sakteng-Wildlife-Sanctuary-631622723625858>

A primary school teacher at Sakteng wrote on SWS facebook timeline in May 2019

We are very excited and grateful to Sakteng Wildlife Sanctuary's staffs for giving a golden opportunity to know about protection of our nature from waste and to protect world endangered animals like red panda and how can we care.

Through this information, our students has learned valuable knowledge and skills to awareness to our communities as well.

Thank you so much.

A signboard was erected in Merak village about red panda conservation, and several signboards about the project along the road from Phongmey to Merak. Jurmey from Merak had this to say about the signboard in Merak *"I cannot read English but from my friends, I came to know that the signboard is helpful in creating awareness about the endangered red panda to foreign visitors; the pictures are quite attractive."*

A site inspection for downstream villages and officials is planned later in the year when sites are more accessible, and pastures are well grown.

5.2 The project regularly disseminated information on project events and outcomes on national TV (Bhutan Broadcasting Service), radio, newspaper (Kuensel) and DOFPS website. Examples include;

- Launch of project article in Kuensel newspaper 24 October 2016 and BBS coverage
- Herder training article in Kuensel newspaper 23 October 2016
- News clip on the Annual Review and Planning Workshop for 2016-17 for the project featured on Ministry of Agriculture and Forests website which can be found at <http://www.moaf.gov.bt/page/44/> posted on 8th August, 2017.
- Bhutan Broadcasting Service story from 13th August 2017. "SWS works to save the endangered Red Panda."
- Kuensel newspaper article on current status of red panda conservation in Bhutan and the Darwin project 14th August 2017.
- BBS coverage and the Ministry of Agriculture and Forests reported on the National Red Panda Conservation Workshop May 2018. <http://www.moaf.gov.bt/red-panda-conservation-workshop>
- Kuensel article on May 2 2018, May 2, 2018. "Sightings of the red panda in the highlands have decreased in recent years."
- Kuensel article on 2 November 2018. "First junior ranger club forms in Merak."

5.3 Project briefs were presented to the DG DOFPS and DG Livestock each year (see outcomes summary brief at Annex 7.4). The Red Panda Conservation Workshop in 2018 invited several senior officials from the Dept of Forest and Parks Service. The Red Panda Conservation Action Plan was presented to the Nature Conservation Division in March 2019 <https://wordpress.com/post/redpandabhutan.wordpress.com/862> and the Technical Advisory Committee endorsed the plan for publication and implementation in June 2019 (see Annex 7.5).

NCD (2019). Red Panda Conservation Action Plan (2018-2023): Ensuring the future of red panda landscapes through national and regional collaboration. Nature Conservation Division, Department of Forests and Park Services, Ministry of Agriculture and Forests, Thimphu, Bhutan. Available at;

https://www.researchgate.net/publication/335022124_Red_Panda_Conservation_Action_Plan_for_Bhutan_2018-2023

<https://wordpress.com/post/redpandabhutan.wordpress.com/934>

5.4 Project annual reports and a 2019 conference paper (Annex 7.6) with presentation have been published on the following websites;

<https://www.csu.edu.au/research/ilws/research/summaries/2016/sustainable-rangeland-management>

<https://www.researchgate.net/project/Sustainable-rangeland-management-and-red-panda-research-in-Bhutan>

<https://www.iasc2019.org/paper-guidelines>

A journal paper titled “High altitude rangeland degradation in eastern Bhutan: yak herder perspectives and management responses” based on the first household survey results was submitted to *Land Degradation and Development* and rejected. The paper will be revised to include results from the final household survey and project outcomes. It will be submitted to *International Journal of Agricultural Sustainability*.

3.2 Outcome

Restoration and protection of 150ha of red panda habitat, watershed and grazing areas for 120 herding households leading to improved rangeland management, biodiversity, and livelihoods.

The outcome was largely achieved with most indicators surpassing the targets set, and some indicators falling short of set targets for reasons explained below against each outcome indicator. In summary, we achieved restoration and protection of 113ha of red panda habitat, watershed and grazing areas. The capacity of 120 households to understand and improve rangeland management and red panda conservation increased. Livelihoods improved in terms of increased savings and investment in new or existing enterprises for 148 savings group members or 125 households. Biodiversity enhancement is in the early stages due to time needed for habitat regeneration and significant fodder production to alleviate grazing and lopping pressure.

0.1 The area of eroded gully restored by revegetation and checkdams measured 35ha and resulted in an estimated average 30% groundcover increase and 50% reduction in soil erosion from the baseline condition in 2016, thereby exceeding targets set in the logframe. Photo points and herder/staff estimates were used as means of verification (see section 3.1). No property damage was reported downstream and SWS staff reported a reduction in flash flooding in the valley below. However there was rain damage to plantings and some checkdams in the main gully channel in 2017 which were fixed in 2018. No cattle or yak damage was reported. An additional 73ha has been fenced for pasture improvement and some habitat restoration. Total area restored and protected from continual grazing is now 108ha.

0.2 Fifty households (42% of total 120 households) have increased their winter fodder supply by 80% from sowing 79ha of improved pasture for grazing and silage production, thereby exceeding the estimated 50% increase in fodder production. Pasture measurements were taken of the fertiliser trial area and bagged silage (see section 3.1 and annual reports). Photos taken every two months provided a record of growth and Sheytemi herders recorded grazing intensity over winter.

0.3 Household savings for 148 savings group members (125 households or 86% of total 120 households including 60% women) has increased from an initial deposit of \$2US to an average of \$50US per household in 18 months (far exceeding the expected 20% increase for 60% of households). Borrowings have varied from \$20US to \$500US enabling 10 households to increase income from trading products, buying livestock, and carpentry. Income generated has been spent on food and medicine, household items, and school expenses. Level of satisfaction from savings groups is medium to high (see section 3.1) from final survey.

Of the households interviewed in the final survey, 70% reported that income had increased in the last 3 years (Figure 11) and 58% stated they had started new livelihood activities.

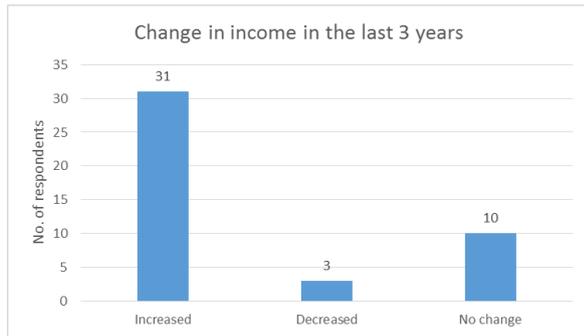


Figure 11 Change in income (N = 44)

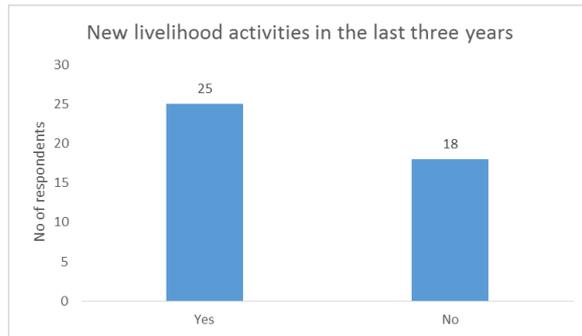


Figure 12 New livelihood activities (N = 43)

0.4 There has been no reduction in tree lopping and winter fodder shortage continues as shown in the final survey results (Figure 13 and 14) due to limited pasture production at this stage. It will take several years for herders to produce enough pasture and silage for all their livestock unless they reduce numbers. Figure 15 shows 47% of respondents actually increased their livestock numbers over 3 years, 25% decreased numbers and 25% had no change. However, 60% of those interviewed have already sown pasture and 32% intend to sow pasture in the future, so fodder shortage and tree lopping should reduce over time if pasture is managed well.

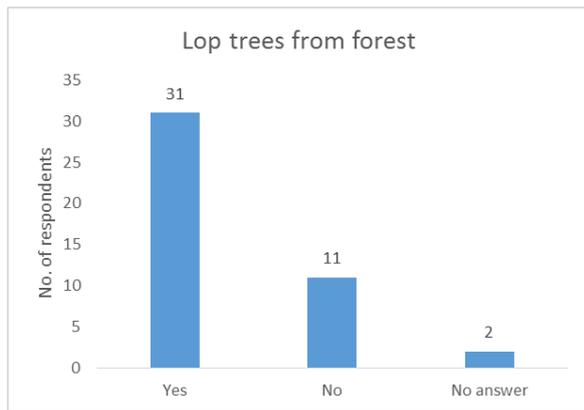


Figure 13 No of respondents lopping trees

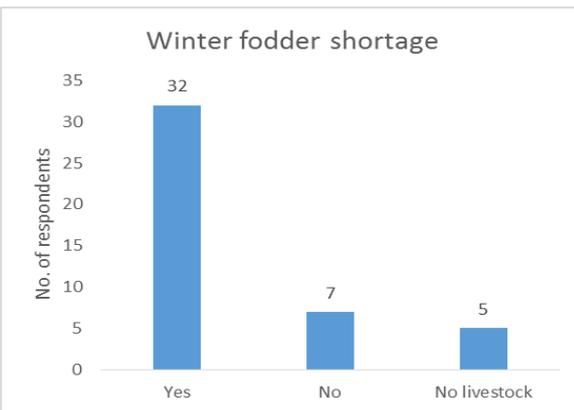


Figure 14 Winter fodder shortage (N = 44)

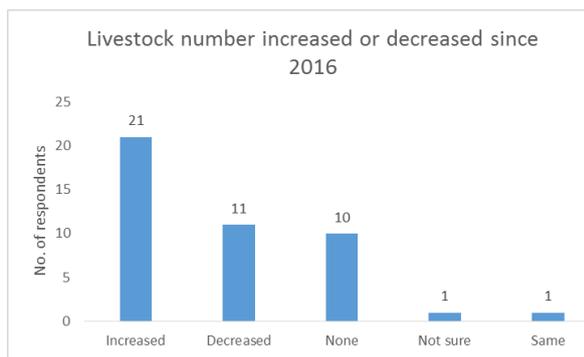


Figure 15 Changes in livestock numbers.

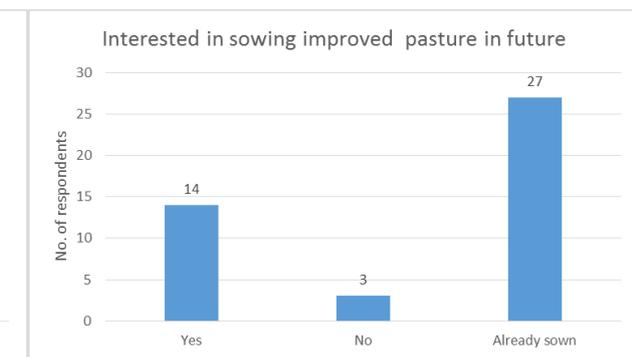


Figure 16 Interest in pasture sowing (N=44)

Fodder availability for red pandas has increased by 100% within fenced areas (total 108ha) with bamboo plantings and successful bamboo regeneration after removal of livestock. The challenge will be to encourage herders to strategically graze and not set stock areas so bamboo can thrive.

0.5 Group capacity and motivation to manage rangelands using the landcare approach improved significantly as evidenced by good attendances at training courses, land restoration works, adoption of pasture improvement and red panda education sessions. Motivation to improve livelihoods, welfare and conservation increased after herders joined savings groups and visited community conservation programs in Sikkim. Figures 7 and 8, and quotes in section 3.1 show

respondent perceptions of how group capacity has improved. Agency staff worked closely with the community at all times to facilitate decision making and resolve conflicts (see Millar and Tenzing 2019 paper presented at IASC conference in Peru, Annex 7.6).

3.3 Impact: achievement of positive impact on biodiversity and poverty alleviation

Community landcare approach enables Bhutan's semi-nomadic herders and agencies to restore and protect high altitude rangelands, wildlife habitats and watersheds, and improve livelihoods through sustainable livestock and forest management.

The project has embedded the community landcare approach in the Merak community to the extent that semi-nomadic herders and agencies are now confident to work together on restoring and protecting rangelands (section 3.2). The on-ground works contributed to reforestation, erosion control and habitat restoration for biodiversity (section 3.1). With good management these areas will act as best practice demonstration sites to encourage further investment in red panda conservation and sustainable grazing management. The Red Panda Conservation Workshop and Action Plan has raised the profile and urgency of red panda protection in Bhutan. Government officials, NGOs and communities are now more aware of the need for more national action and collaboration with transboundary partners. The Action Plan will drive further investment and biodiversity impact. A Stage 1 Darwin application has been submitted (Round 26).

The project contributed to poverty alleviation and wellbeing by facilitating two savings schemes where households are building income, investing in enterprises and using profit for household welfare expenditure. Establishing improved pasture for the first time has increased the potential for livestock improvement and more sustainable rangeland management. Herders can now see a way out of the poverty cycle they have been caught in for the last 30 years with declining pastures and milk production due to overstocking.

4 Contribution to Darwin Initiative Programme Objectives

4.1 Contribution to Global Goals for Sustainable Development (SDGs)

SDG 1. No Poverty. Livelihoods improved from investing in savings schemes and enterprises (section 3.1 and 3.2).

SDG 4. Quality Education. Capacity building of local community members and students in rangeland management and red panda conservation (section 3.1 and 3.2)

SDG 5. Gender Equality. Men and women equally involved in all training activities and benefitting from savings schemes and enterprise development (section 3.1).

SDG 7. Affordable and clean energy. Biogas production introduced to reduce reliance on firewood (section 3.10).

SDG 8. Decent work and economic growth. Improved enterprise development and labour opportunities from working on the project (section 3.1 and 3.2).

SDG 15. Life on Land. Rangelands restored, soil erosion reduced, habitat protected by fencing, pasture improved (section 3.1 and 3.2).

4.2 Project support to the Conventions or Treaties (CBD, CITES, Nagoya Protocol, ITPGRFA)

The project contributed to the five strategic goals in the **CBD Strategic Plan for Biodiversity 2011 to 2020** and **Bhutan's National Biodiversity Strategy and Action Plan 2014** national targets as follows;

CBD SG A: All partners worked with herders to jointly implement landcare activities that yielded livelihood benefits. Herders engaged in red panda conservation and adapted to climate change by restoring eroded land. (National Targets 1, 10, 11, 17, 19)

CBD SG B: The project increased pasture fodder production and regenerated forests and trialled biogas production (Targets 4, 7, 15)

CBD SG C: On-ground works, management zoning, research and education on red pandas helped to protect habitat. Development of Red Panda Conservation Action Plan (Targets 5, 12, 14)

CBD SG D: Gully rehabilitation and forest regeneration protected downstream communities and herding communities. (Targets 14, 19)

CBD SG E: Gender sensitive group training and mentoring in social and technical skills built long term confidence in land management and biodiversity conservation. (Targets 1, 19)

A copy of the Final Report and Red Panda Conservation Action Plan will be sent to the CBD focal contact, Mr. Karma C. Nyedrup, National Environment Commission, P.O. Box 466 Thimphu, Bhutan.

4.3 Project support to poverty alleviation

The project contributed to poverty alleviation and wellbeing by facilitating two savings schemes where households are building income, investing in enterprises and using profit for household welfare expenditure. Two womens savings groups (Gengu and Merak) were formed with officebearers. The Gengu savings group now has 89 members and the Merak group has 59 members (total 148 members with 60% women). Each member invests 100-150 Ngultrum per month. Over the last 18 months, the groups have saved a total of 381,000Nu (\$5,500AUS) with approximately 200,000 Nu (\$3,500AUS) borrowed by 10 households. Households can borrow up to 30,000Nu/year (\$500AUS). Borrowings have varied from \$20US to \$500US enabling 10 households to increase income from trading products, buying livestock, and carpentry. Income generated has been spent on food and medicine, household items, and school expenses as shown in case studies of households (women and men) at the project blog site. Establishing improved pasture for the first time for 45 households has increased the potential for livestock improvement and indirect poverty alleviation. The wool processing centre will substantially reduce labour for women and increase textile production for local consumption and sale. The project has encouraged revival of tourism to Merak through red panda education, improvement of homestays and campsites, and promotion with tour operators. This will indirectly lead to further poverty alleviation via income and capacity building.

4.4 Gender equality

The project had equal gender representation at all community training and on-ground events (group dynamics, land restoration, savings schemes, pasture improvement, silage making, pasture field day, red panda awareness, tree planting, biogas and wool processing centre construction). See blog stories for details on number of women and men participating in each of these events. The school activities also had equal gender representation (film showings, drama play, junior ranger club launch and field trip). See blog stories for reports and photos. Project meetings had men and women participating to review activities, make plans and resolve issues.

The two savings schemes were set up for mainly for women as household representatives, and membership currently consists of 60% women. Each committee has at least 50% female office bearers depending on roles and capabilities. Savings benefits flowed to the whole household (see case studies on blogsite) via family herding enterprises, men's carpentry or bowl trading, women's shop trading and textiles, and family homestays. The biogas unit at Sheytemi has been set up in a household headed by a woman with her extended family. Both household surveys had equal numbers of women and men participating (47% female, 53% male in 2016 survey; 51% female, 49% male in 2019 survey).

4.5 Programme indicators

- **Did the project lead to greater representation of local poor people in management structures of biodiversity?**

No

- **Were any management plans for biodiversity developed?**

DOFPS (Nature Conservation Division) (2019). *Red Panda Conservation Action Plan (2018-2023): Ensuring the future of red panda landscapes through national and regional collaboration*. Nature Conservation Division, Department of Forests and Park Services, Ministry of Agriculture and Forests, Thimphu, Bhutan.

- **Were these formally accepted?**

The Red Panda Conservation Action Plan (2018-2023) was formally endorsed by the Technical Advisory Committee of the Department of Forests and Parks Services in June 2019.

- **Were they participatory in nature or were they 'top-down'? How well represented are the local poor including women, in any proposed management structures?**

N/A

- **Were there any positive gains in household (HH) income as a result of this project?**

Two womens savings groups (Gengu and Merak) were formed with officebearers. The Gengu savings group now has 89 members and the Merak group has 59 members (total 148 members with 60% women from 125 households). Each member invests 100-150 Ngultrum per month. Over the last 18 months, the groups have saved a total of 381,000Nu (\$5,500AUS) with approximately 200,000 Nu (\$3,500AUS) borrowed by 10 households. Households can borrow up to 30,000Nu/year (\$500AUS). Borrowings have varied from \$20US to \$500US enabling 10 households to increase income from trading products, buying livestock, and carpentry. Income generated has been spent on food and medicine, household items, and school expenses as shown in case studies of households (women and men) at the project blog site.

- **How many HHs saw an increase in their HH income?**

125 households

- **How much did their HH income increase (e.g. x% above baseline, x% above national average)? How was this measured?**

Household income has increased from an initial deposit of \$2US per household to the savings scheme to an average of \$50US per household in 18 months (from savings group ledger records).

4.6 Transfer of knowledge

Knowledge generated from the project was shared with red panda researchers and development practitioners via the project blog site, RPN website, ILWS website, ResearchGate and media coverage. Several researchers are now following the wordpress stories and ResearchGate, and accessing information regularly. Project briefs were presented annually to the DG DOFPS, DG Livestock, and the Director of the National Biodiversity Centre (see section 3.1, output 5). The Red Panda Conservation Workshop in 2018 was a national and international platform involving several senior policy officials from the Dept of Forest and Parks Service and Department of Livestock. Practitioners from WWF, RPN and Bhutan government were also present. This platform provided an excellent forum for sharing all known research and experiences with red panda conservation in Bhutan, India and Nepal. It resulted in development of the *Red Panda Conservation Action Plan (2018-2023): Ensuring the future of red panda landscapes through national and regional collaboration*. Nature Conservation Division, Department of Forests and Park Services, Ministry of Agriculture and Forests, Thimphu, Bhutan.

4.7 Capacity building (staff)

Mr Sonam Tobgay (male), Senior Forestry Officer at SWS was inspired by the project to do a Masters at AIT Bangkok, Thailand in 2018-19. His thesis is “A study of the potential habitat distribution of Red panda *Ailurus fulgens* and connectivity in Sakteng Wildlife Sanctuary using MaxEnt and Least Cost modelling.”

Mr Thinley Wangdi (male), CFO SWS was promoted to head of Samtse Division in 2019 in recognition of his key role in implementing the Darwin project and other initiatives at SWS. He is enrolled to do a Masters of Philosophy at Charles Sturt University, Australia pending obtaining a scholarship. He was invited to attend the 4th Asia Protected Area Partnership (APAP) Technical Workshop in Pyeongchang, Korea from 19-21, June 2018. He also attended the Asia Pacific Forestry Week 2019: Forest for Peace and Wellbeing in Incheon, Korea, 17-21, June 2019.

Ms Norbu Yangdon, Forestry Officer, SWS (female) was inspired by the project to apply for an ADB scholarship in 2019 to do a Masters in Ecosystem Management at the University of Melbourne, Australia.

5 Sustainability and Legacy

The project provided a catalyst and methodology for land restoration, red panda conservation, pasture development, energy conservatoin and improved livelihoods in Merak, Bhutan. SWS, RLDC and DOL are committed to continued support for the Merak Community with group training, technical advice, funding applications, on-ground works and monitoring. The savings scheme will continue to build wealth for households guided by competent and committed local committees. SWS have already extended red panda education and awareness programs to Sakteng and Jongkhar villages within SWS. Land restoration, red panda habitat zoning/regeneration, biogas and pastures will take several years to bring biodiversity and productivity returns, but they will form a vital demonstration area for scaling out works to other districts. SWS and RLDC are planning to use the project site as an exemplar for visiting officials and farmers.

The national and transboundary Red Panda Workshop held in Tashigang and development of the Action Plan laid the foundation for increased government and NGO commitment to red panda research, policy and management across the country and with neighbouring states of Sikkim and Arunachal Pradesh. Individual parks can now incorporate actions into their annual workplans and budgets. A new Darwin project application has been submitted to conduct red panda and social research outside protected areas and in transboundary areas. The new project aims to expand rural livelihood opportunities in areas where red panda habitat is under threat by taking lessons from this project. CSU staff will continue to mentor DOL and DOFPS staff in career and funding opportunities. As there were no project staff employed by the project in Bhutan, government and NGO staff will remain working with the communities. All physical resources will remain with the Merak community and SWS (eg camera traps, biogas units, signboards, iron safe, school materials etc).

6 Lessons learned

A paper presented at the IASC conference in July 2019 (Annex 7.6) provides reflections on **enablers and challenges to collective action** between stakeholders involved in the project, and outcomes achieved. Factors that enabled collective action and led to effective outcomes included;

- Credibility of the project team (government staff) who had a history of working with Brokpas. Trust was already established but had to be continual reinforced with regular communication to address concerns and resolve conflicts. Bringing in new project staff to work with remote communities is not recommended.
- Capacity building in group dynamics, conflict resolution and group management laid a strong foundation for collective action. The savings groups then put group learning into practice with a constitution, agreements and transparency. Setting up community savings schemes is highly recommended for remote, small and low income households

- Acknowledging and incorporating cultural and religious ceremonies into the project gave significance to activities and outcomes (eg monastic blessing of the Drana Gully; inaugurations and celebrations). Cultural aspects and indicators could be more strongly built into Darwin Fund project design and reporting requirements.
- Bringing staff together from different disciplines and organisations to work together on finding integrated solutions to environmental and social problems. Highly recommended for Darwin projects if possible but depends on political and social contexts and capacities.

Challenges experienced during the project and recommendations included;

- Historical jealousies and conflict (needs constant and good communication to resolve issues)
- Uncertainty over commons user rights (beyond our control but RLDC managed to get approval for land demarcation for pasture improvement). Property rights need to be thoroughly understood for new Darwin projects.
- Slowness of fund transfers (If multiple government agencies are involved in a project, we recommend transferring funds to each department for respective works instead of routing funds through one department to another which caused us delays and minor issues between the two departments.)
- There are many demands on households and local officials so be aware and realistic as to how much time stakeholders can devote to a Darwin project along with all their other commitments.
- There is often a lack of 'development' memory regarding failures and successes of past projects. We recommend doing a thorough background investigation of what has worked and not worked in the past before designing new interventions. Expose people to successes and failures in other areas so they learn what to do and how to do it (eg our tour to Sikkim inspired people to adopt community conservation enterprises).
- Dependency on aid programs to fix problems creating a 'waiting' attitude in government and communities with reluctance to invest own savings for private or public improvements. The key here is to have cost-sharing schemes where people have to invest something to get a return. Give people the control to manage projects with guidance from experts.

Administration recommendations based on our experience with managing a Darwin project include;

- Allow a few months before project start date to get contracts and funds transfers organised. Valuable time is often taken up with these inevitable delays.
- Fully cost large implementation activities when budgeting and add buffer % for cost increases over time. Be realistic with timeframes for habitat regeneration and agricultural production.
- Clearer guidelines are needed from Darwin Fund on how much detail is required for in-country expenditure by partners.
- Taking opportunities to value add to the project by seeking additional grants for community projects, policy workshops and ideas (eg red panda workshop, wool processing grant). Darwin projects should be seen as providing a catalyst for long term action and capacity building, not just completing the stated activities, outputs and outcomes.

6.1 Monitoring and evaluation

The project logframe was changed and approved in 2018 to reflect changes in the total area restored due to costs, and more realistic indicators of on-ground impacts due to climatic events. Livestock production indicators were deleted due to time taken to get land officially demarcated

and pasture established. Vegetable growing indicators were deleted as most households were already growing vegetables via another project. (see Annex 7.7 Change request form 2018).

The M&E system was practical, continuous and adaptive. On-ground change was evaluated using photo points, simple measurements and regular reports from stakeholders. This approach was necessary to not overburden government staff or herders who were already busy with their work responsibilities. The baseline and final household surveys collected qualitative and quantitative data, and provided a descriptive assessment of change over 3 years. Government staff and undergraduate students were trained in social research techniques to carry out the surveys. Case study interviews by CSU staff proved effective in telling more indepth stories on household income from savings and impacts on the family. Community meetings were held every few months which provided a forum for decision making with households and feedback on how things could be improved. An example was the decision to give all households an opportunity to trial improved pasture instead of setting up a few trials and scaling out from there. The decision to use portable biogas units came about from discussions with herders regarding their movements during the year. All monitoring and evaluation information was shared on the project website <https://redpandabhutan.wordpress.com>

6.2 Actions taken in response to annual report reviews

Issues raised in the first annual report review were addressed. There were no issues to respond to in the second annual report review.

7 Darwin identity

In all communications, the project has been recognised as a distinct project funded by the UK Darwin Initiative. The project publicised the UK Darwin Initiative logo, website and facebook page on the project Blog site <https://redpandabhutan.wordpress.com>

In 3 years, the project blog pages have been viewed 340 times by 215 visitors (including repeat visitors) from 30 countries. Most frequent visitors were from Bhutan, Australia, USA, India, Japan, UK and Thailand.

The Red Panda Network, Sakteng Wildlife Sanctuary, Redpandzine and Australian Landcare International provided links to our Blog and stories about the project and Darwin funding on their websites including

<https://redpandanetwork.org/red-panda-network-in-bhutan/>

<https://saktengws.wordpress.com/>

<http://redpandazine.com/2017/02/21/red-pandas-bhutan-conservation/>

<http://alci.com.au/>

The UK Darwin Initiative and project has also been promoted on the CSU's Institute of Land, Water and Society website, newsletters and facebook pages.

<https://www.csu.edu.au/research/ilws/research/summaries/2016/sustainable-rangeland-management>

<https://www.csu.edu.au/research/ilws/news/connections-newsletter>

<https://www.facebook.com/ILWS.CSU>

The Darwin Initiative logo was used on the project launch banner, on signboards (see photo below), in savings passbooks (see photo below), reports and presentations. International and Bhutan partners at the national level were already familiar with the Darwin Initiative Fund due to previous projects in Bhutan and Nepal. Local staff and herders in Bhutan are now very familiar with the Darwin Fund. We found that colleagues in Australia were not aware of the Darwin Initiative as there have been very few Australian organisations leading Darwin projects. We have actively promoted the Fund within ILWS and were successful in getting a second project grant with partners in Timor Leste. A Stage 1 Round 26 application has been submitted for a new project in Bhutan.



8 Finance and administration

8.1 Project expenditure

Project spend (indicative) since last annual report	2018/19 Grant (£)	2018/19 Total actual Darwin Costs (£)	Variance %	Comments (please explain significant variances)
Staff costs (see below)			+14%	Extra time spent in Bhutan to finalise activities, and annual leave loading
Consultancy costs			0	
Overhead Costs			-42%	Final CSU levy waived due to increase in required travel costs.
Travel and subsistence			+184%	Includes M&E costs. Druk Airfares rose in 2018/19 including domestic fares to the east. 3 trips made in final year to conduct evaluations since only one trip was possible in 2017
Operating Costs			-16%	Payment to third party in Bhutan. Open access journal fee not used. Paper submitted and waiting outcome.
Capital items (see below)			0	
Others (see below)			-100%	This was included in travel budget to conduct final household survey
TOTAL				

Staff employed (Name and position)	Cost (£)
Karma Tenzing,	
TOTAL	

Capital items – description	Capital items – cost (£)
TOTAL	

Other items – description	Other items – cost (£)
Monitoring and evaluation costs	

TOTAL	
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8.2 Additional funds or in-kind contributions secured

Source of funding for project lifetime	Total (£)
Australian Landcare International (cash for tree nursery)	
Charles Sturt University (inkind) Charles Sturt University (cash for red panda education) Charles Sturt University (cash for conference attendance)	
Department of Livestock Bhutan (in kind) RLDC (cash for ceremonies and meetings) RLDC (cash for additional pasture seed and fertiliser)	
Department of Forests and Parks Bhutan (in kind)	
World Wildlife Fund Bhutan (in kind) World Wildlife Fund Bhutan (cash grant for workshop)	
Red Panda Network (in kind and travel costs)	
Merak Rangeland Group (in kind labour)	
Helvetas (cash for wool processing centre)	
Yoga class donations (spinning wheel for womens group) (Joanne Millar) (Printer for savings group) (Concrete for wool centre floor)	
TOTAL	

Source of funding for additional work after project lifetime	Total (£)
TOTAL	

8.3 Value for Money

The project focussed on investment in group development and herder training for 120 households to sustainably manage resources, ecological research and on-ground works that deliver long term environmental services to biodiversity. More than 50% of the budget was spent on in-country operating costs to ensure effective implementation and capacity building. Government and NGO staff in Bhutan contributed their inkind time to manage the project, and CSU provided significant leverage in terms of inkind salary and time from the project leader. Additional cash was provided by CSU, WWF, RPN, RLDC and Helvetas to add value to the project (see Section 8.2 above). We maintained low capital cost with items remaining with country partners for ongoing use. Hence, the project provided good value for money invested by the Darwin Initiative.

Annex 1 Project's REVISED logframe

Project summary	Measurable Indicators	Means of verification	Important Assumptions
<p>Impact:</p> <p>Community landcare approach enables Bhutan's semi-nomadic herders and agencies to restore and protect high altitude rangelands, wildlife habitats and watersheds, and improve livelihoods through sustainable livestock and forest management.</p>			
<p>Outcome:</p> <p>Restoration and protection of 150ha of red panda habitat, watershed and grazing areas for 120 herding households leading to improved rangeland management, biodiversity, and livelihoods.</p>	<p>0.1 20ha of eroded gully revegetated achieving 20% increase in groundcover, 20% reduction in soil erosion by April 2019 from 2016 levels.</p> <p>0.2 50% increase in winter fodder availability for 30% of households by April 2019 from 2016 baseline survey.</p> <p>0.3 Household income increases by 20% from savings investment and womens enterprises for 60% of families in savings groups leading to 30% increase in wellbeing satisfaction by April 2019 from 2016 baseline survey.</p> <p>0.4 30% of households reduce lopping of trees and 50% increase in fodder availability for red pandas in fenced areas by March 2019 from 2016 baseline assessments.</p> <p>0.5 Group capacity and motivation to manage landcare projects, welfare and conservation programs enhanced by 50% by 2019 from 2016 baseline survey.</p>	<p>0.1 Photo points at strategic locations and transect walks will record visual estimates of % groundcover every 6 months over 3 years. Property damage data from local government records and annual household survey.</p> <p>0.2 Pasture measurements of dry matter yield in winter grazing areas and fodder plots taken every six months.</p> <p>0.3 Income and wellbeing data recorded in annual household surveys including disadvantaged families.</p> <p>0.4 Annual household surveys and on-ground habitat condition assessments.</p> <p>0.5 2016 and 2019 household survey, interviews with group committee and agency staff, observations, committee records, feedback from group training workshops.</p>	<p>Favourable climatic conditions for re-vegetation and pasture establishment. Cattle and yaks do not break through fences into gully areas.</p> <p>DOL take accurate pasture measurements</p> <p>Yak/cattle herding continues to be the main source of livelihood and occupation for semi-nomadic yak herders in the area</p> <p>Can distinguish between enterprises generated from savings scheme from other enterprises.</p> <p>Bamboo plantings and regeneration has high survival rates and is not grazed by cattle, yaks or goats.</p> <p>Good leadership, minimal conflict and cooperative committee that works well with agency staff.</p>
<p>Output 1</p> <p>Restoration of eroded gullies, regeneration and zoning of critical red panda habitat, and red panda research conducted.</p>	<p>1.1. One major gully (20ha) fenced off with 80 check dams and planted with 22,000 trees and bamboo seedlings with 60% survival rate by April 2019.</p> <p>1.2. 200 ha of red panda habitat surveyed annually for condition, forage</p>	<p>1.1. Records of plantings and survival rates included in annual project reports with photos.</p>	<p>Herders do not breach fenced degraded areas for illegal grazing and lopping. No flash flooding or drought that eliminates plantings.</p> <p>Good implementation and co-ordination between SWS rangers, UWICE and ILWS</p>

	<p>availability, presence/absence, and roosting/feeding sites, with zones established for conservation management by 2019.</p> <p>1.3. One private tree nursery established by end of 2018.</p>	<p>1.2. Annual research reports on red panda habitat condition, sightings, scat presence, feeding and roosting sites.</p> <p>1.3. Record of materials used in annual project reports with photos.</p>	<p>researchers, herders, WWF and Red Panda Network.</p> <p>Community willingness to establish and manage nursery. Suitable site and available water.</p>
<p>Output 2</p> <p>Sustainable rangeland management and pasture hay production achieved, with improved livestock management.</p>	<p>2.1 Four training events for 120 households and one study tour for 15 people held in 2017 (at least 50% women) in sustainable rangeland management, perennial pasture development, fodder conservation and livestock management.</p> <p>2.2 Five (1ha) pasture trials established in 2018 producing average of 1000kg/ha of silage annually.</p> <p>2.3 Sale of unproductive animals deleted</p> <p>2.4 Milk and cheese production increases deleted.</p>	<p>2.1 Training course attendance records and participant evaluation information for each course and study tour on what they learnt and level of confidence and ability to implement.</p> <p>2.2 Cadastral survey of leased plots. Results of plant survival rates, dry matter yields, pasture composition, and soil tests included in annual project reports.</p>	<p>Training courses held at suitable times with at least one household representative attending including women.</p> <p>Government support for leasing plots for establishment of improved pasture.</p> <p>Environmental conditions suitable for pasture sowing with adequate weed control. Livestock do not break into pasture plots.</p>
<p>Output 3</p> <p>Alternative energy technology piloted to reduce firewood consumption</p>	<p>3.1. Two biogas units fully operating in two households with 40% reduction in firewood consumption by April 2019 from baseline survey in 2016.</p> <p>3.2. Biogas units create interest from 60% of households by 2019 from 2016 baseline survey.</p>	<p>3.1 Pilot household interview report and technical operating information in annual project reports.</p> <p>3.2 Number of expressions of interest to purchase a biogas unit,</p>	<p>Biogas technology works for high altitude areas and is available at a reasonable cost.</p> <p>Pilot herders are willing to cease dependence on traditional open mud stoves for cooking and heating, and take proper care and maintenance of biogas plants.</p>
<p>Output 4</p> <p>Competent community-based landcare group established with two women's savings groups enabling investment in small enterprises and community education.</p>	<p>4.1 Six training events held during 2016 in group organisation and management skills for selected group members (at least 50% women) and extension staff, with 80% increase in confidence and skills by 2019.</p> <p>4.2 Two women's groups formed involving 130 women participating in savings scheme by end of 2017 and 50% (60 women) benefiting by April 2019.</p> <p>4.3 One study tour for 12 people to Sikkim in 2017 to learn about red panda</p>	<p>4.1 Group training reports for each workshop with participant evaluation of what they learnt and level of confidence to implement group activities.</p> <p>4.2 Register of women's attendance at training events and meetings. Results of individual interviews and focus group discussions in annual project reports. Register of women's enterprises with video</p>	<p>The selected group management committee has adequate gender balance and skills over time to manage landcare activities.</p> <p>Trained local extension agents and park rangers stay committed to group.</p> <p>Women have time and willingness to attend training sessions, invest savings and start new enterprises or build on existing ones.</p>

	<p>conservation from village communities. One study tour for 15 staff and local officials to Nepal to learn about community red panda conservation.</p> <p>4.4 80% increase in awareness of red panda conservation by 120 households and Merak primary school students by April 2019.</p>	<p>and documented case studies on their experiences.</p> <p>4.3 Study tour report included in annual project report. Short video produced.</p> <p>4.4 Annual household surveys and school participant evaluation of conservation activities.</p>	<p>Security situation in eastern Nepal is safe allowing travel to and from sites.</p> <p>School teachers are willing for school children to engage in red panda conservation activities. Villagers attend film events showing camera trap results and videos and attend field walks.</p>
<p>Output 5</p> <p>Project results and lessons learned from the landcare approach and red panda conservation disseminated.</p>	<p>5.1. Project results and lessons presented to Merak and Sakteng villages, and downstream Radhi and Phongmey villages with local government officials.</p> <p>5.2. Information on red pandas and landcare outcomes distributed regionally and nationally every year via websites, posters, brochures, radio and TV.</p> <p>5.3. One workshop to inform senior government officials of project findings and outcomes and make policy recommendations.</p> <p>5.4. Two journal papers published in open access journals and red panda data shared with conservation organisations.</p>	<p>5.1. Information and photos in final project report.</p> <p>5.2 Information and photos in project annual reports.</p> <p>5.3 National workshop proceedings on sustainable rangeland management and Red Panda habitat conservation policy recommendations.</p> <p>5.4 Journal papers and datasets published by open access.</p>	<p>At least 70% of all households and government officials at village meetings.</p> <p>Government of Bhutan adopts policy recommendations.</p> <p>Papers accepted</p>
<p>Activities</p> <p>1. Restoration of eroded gullies, regeneration and zoning of critical red panda habitat, and red panda research conducted</p> <p>1.1. Conduct on-the-job training for herders (120 herders, 50% women) in sustainable land management methods and techniques based on the Landcare approach</p> <p>1.2 Conduct five land management campaigns in critical landslide areas which are successfully fenced and planted with 25,000 tree seedlings/bamboo rhizomes and 25 major and 60 small stone check dams constructed inside the gullies</p> <p>1.3 Conduct three surveys on Red Panda population and habitat condition (200 Ha) using camera traps, scat detection, sightings and roosting sites in strategic locations and at strategic times.</p> <p>1.4 Establish one community nursery with a capacity to grow 10,000 seedlings and saplings/year</p> <p>1.5 Conduct policy dialogue with DOFPS, MOA to explore the potential to declare the project site as a critical watershed.</p>			

2. Sustainable rangeland management and pasture hay production achieved, with improved livestock management and household income.

- 2.1. Conduct baseline household survey in 2016 of 120 herders to determine livestock numbers, milk/cheese production, problems, household income, firewood consumption, tree lopping, vegetable consumption and red panda awareness/knowledge.
- 2.2. Organise an 8 day in-country study tour (25 herders, 50% women) to sites in other districts where successful sustainable rangeland management and leasing programs have been implemented.
- 2.3. Arrange 4x3 day training program for 120 herders (50% women) on sustainable rangeland management, improved pasture development, fodder conservation and livestock management.
- 2.4. Establish five (1ha) pasture trials in 2016 to demonstrate weed control, sowing technique, pasture management and hay curing in 2016 and scale out to 120 plots by 2019.

3. Alternative energy technology and vegetable production piloted to reduce firewood consumption and improve family nutrition.

- 3.1. Construct 2 high altitude backyard pilot biogas plants (1 in Cheabling and 1 in Sheytemi) of 6 m³ capacity for effective use of manure to reduce firewood consumption.
- 3.2. Construct 2 improved cattle sheds (semi-permanent) for collection of night manure for biogas production and to promote clean milk production.
- 3.3. Construct 2 greenhouses (polytunnel 4x6 metres) for retaining heat during winter and growing winter vegetables for improving nutritional status of semi-nomadic yak herders.

4. Competent community-based landcare group established with two women's savings groups enabling investment in small enterprises, and community education.

- 4.1. Conduct training program in group development and management including drafting of group constitution and by-laws
- 4.2. Establish two women's self-help groups and savings schemes to improve access to a credit facility and enhance capacity to undertake small enterprises.
- 4.3. Supply home wool processing tools and equipment to needy households (4 Wool Handcarders, 4 Wool Combs and Hackles, 1 Drum Carder and 4 Yarn Ball Winders, and Carding Cloth to reduce wool processing time and drudgery for women and children, and enable continuation of traditional Brokpa cloth.
- 4.4. Organise a 7 day ex-country study tour for 6 herders, 1 extension agent, 1 park ranger and 1 UWICE researcher and ILWS researcher to visit successful red panda conservation and sustainable forest management projects in eastern Nepal in 2017.
- 4.5. Conduct red panda awareness activities in schools and villages within SWS.

5. Project results and lessons learned from the landcare approach and red panda conservation documented and disseminated.

- 5.1. Conduct meetings at local villages to disseminate information on project results and gain feedback from participants.
- 5.2. Distribute educational material to schools and government offices in the region.
- 5.3. Publicise project activities and results on national media.
- 5.4. Conduct a consultative workshop with Ministry of Agriculture and Forests officials to share lessons learned and discuss mainstreaming sustainable land management and Red Panda conservation into national and local natural resource plans and programs of the Ministry.
- 5.5. Conduct 3 Annual Monitoring and Planning workshops to review achievements in the past one year and plan for the following year.
- 5.6. Publish two peer reviewed journal articles

Annex 2 Report of progress and achievements against final project logframe for the life of the project

Project summary	Measurable Indicators	Progress and Achievements
<p>Impact:</p> <p>Community landcare approach enables Bhutan's semi-nomadic herders and agencies to restore and protect high altitude rangelands, wildlife habitats and watersheds, and improve livelihoods through sustainable livestock and forest management.</p>		<p>The project achieved restoration and protection of 108ha of red panda habitat, watershed and grazing areas. The capacity of 120 households to understand and improve rangeland management and red panda conservation increased. Livelihoods improved in terms of increased savings and investment in new or existing enterprises for 148 savings group members or 125 households. Biodiversity enhancement is in the early stages due to time needed for habitat regeneration and significant fodder production to alleviate grazing and lopping pressure (see section 3.3).</p>
<p>Outcome</p> <p>Restoration and protection of 150ha of red panda habitat, watershed and grazing areas for 120 herding households leading to improved rangeland management, biodiversity, and livelihoods.</p>	<p>0.1 20ha of eroded gully revegetated achieving 20% increase in groundcover, 20% reduction in soil erosion by April 2019 from 2016 levels.</p> <p>0.2 50% increase in winter fodder availability for 30% of households by April 2019 from 2016 baseline survey.</p> <p>0.3 Household income increases by 20% from savings investment and womens enterprises for 60% of families in savings groups leading to 30% increase in wellbeing satisfaction by April 2019 from 2016 baseline survey.</p> <p>0.4 30% of households reduce lopping of trees and 50% increase in fodder availability for red pandas in fenced areas by March 2019 from 2016 baseline assessments.</p> <p>0.5 Group capacity and motivation to manage landcare projects, welfare and conservation programs enhanced by 50% by 2019 from 2016 baseline survey.</p>	<ul style="list-style-type: none"> • 35ha of eroded gullies restored and revegetated • Average 30-40% groundcover increase • Average 50% reduction in soil erosion • 80% increase in winter fodder supply by 42% of total 120 households • Household savings for 148 savings group members (125 households including 60% women) has increased from an initial deposit of \$2US to an average of \$50US per hh. Borrowings have varied from \$20US to \$500US enabling 10 households to increase income from trading products, buying livestock, and carpentry. Income generated has been spent on food and medicine, household items, and school expenses. Level of satisfaction from savings groups is medium to high (see section 3.1) from final survey. • No reduction in tree lopping due to ongoing winter fodder shortage • Fodder availability for red pandas has increased by 100% within fenced area of 70 acres. • The 2019 final household survey showed that 86% of respondents thought group landcare capacity to work together had improved and most respondents (77%) rated community capacity as very good or good. • See section 3.2 for detail on findings and indicators
<p>Output 1</p> <p>Restoration of eroded gullies, regeneration and zoning of critical red panda habitat, and red panda research conducted.</p>	<p>1.1. One major gully (20ha) fenced off with 80 check dams and planted with 22,000 trees and bamboo seedlings with 60% survival rate by April 2019.</p> <p>1.2. 200 ha of red panda habitat surveyed annually for condition, forage</p>	<ul style="list-style-type: none"> • 35ha of eroded gullies restored with 136 checkdams • 23,000 seedlings planted with 70% survival rate • 100ha of winter grazing tsadrog surveyed for red panda presence • Evidence of scats in 3 locations but no camera trap photos

	<p>availability, presence/absence, and roosting/feeding sites, with zones established for conservation management by 2019.</p> <p>1.3. One private tree nursery established by end of 2018.</p>	<ul style="list-style-type: none"> • 70 acres fenced off for red panda habitat restoration • Bamboo regeneration from 0 to 0.5m height in places • Special Protection Zone declared over Chebling, Sheytemi and Drana, no timber or NTFP harvesting allowed. • Tree nursery not operational
<p>Activities</p> <p>1.1. Conduct on-the-job training for herders (120 herders, 50% women) in sustainable land management methods and techniques based on the Landcare approach</p> <p>1.2 Conduct land management campaigns in critical landslide areas which are successfully fenced and planted with 25,000 tree seedlings/bamboo rhizomes and 25 major and 60 small stone check dams constructed inside the gullies</p> <p>1.3 Conduct three surveys on Red Panda population and habitat condition (200 Ha) using camera traps, scat detection, sightings and roosting sites in strategic locations and at strategic times.</p> <p>1.4 Establish one community nursery with a capacity to grow 10,000 seedlings and saplings/year</p> <p>1.5 Conduct policy dialogue with DOFPS, MOA to explore the potential to declare the project site as a critical watershed.</p>		<ul style="list-style-type: none"> • All households (50% women) trained in erosion control, tree selection and planting, gully fencing and checkdams in 2017 and 2018. • 35ha of eroded gullies fenced and restored with 136 checkdams (83 in 2018, and 53 in 2019) • 23,000 seedlings planted (see section 3.10) • 100ha of winter grazing tsadrog surveyed for red panda presence annually using scat detection, camera traps and sightings. • Tree nursery built in 2018 but not operational (see section 3.1) • Dialogue with DOFPS regarding critical watershed declaration resulted in recommendation to create a Special Protection Zone to avoid lengthy parliamentary delays.
<p>Output 2</p> <p>Sustainable rangeland management and pasture hay production achieved, with improved livestock management.</p>	<p>2.1 Four training events for 120 households and one study tour for 15 people held in 2017 (at least 50% women) in sustainable rangeland management, perennial pasture development, fodder conservation and livestock management.</p> <p>2.2 Five (1ha) pasture trials established in 2018 producing average of 1000kg/ha of silage annually.</p>	<ul style="list-style-type: none"> • On the job training for 45 households in perennial pasture establishment, fodder conservation and feeding in 2018 and 2019. One study tour for 12 households to Bumthang in 2018 to see pasture improvement and silage making (Annex 7.2) • 132 acres sown to improved pasture with lime and superphosphate in 2018, 62 acres in 2019 (total 192 acres or 79ha). • 800kg of silage produced in trial area and fed to livestock in 2018 • Water pipes (40 bundles/4000 metres) distributed to 25 households
<p>Activities</p> <p>2.1. Conduct baseline household survey in 2016 of 120 herders to determine livestock numbers, milk/cheese production, problems, household income, firewood consumption, tree lopping, vegetable consumption and red panda awareness/knowledge.</p>		<ul style="list-style-type: none"> • Baseline survey conducted in October 2016 (see Annex 7.8)

<p>2.2. Organise an 8 day in-country study tour (25 herders, 50% women) to sites in other districts where successful sustainable rangeland management and leasing programs have been implemented.</p> <p>2.3. Arrange 4x3 day training program for 120 herders (50% women) on sustainable rangeland management, improved pasture development, fodder conservation and livestock management.</p> <p>2.4. Establish five (1ha) pasture trials in 2016 to demonstrate weed control, sowing technique, pasture management and hay curing in 2016 and scale out to 120 plots by 2019.</p>		<ul style="list-style-type: none"> • Study tour in 2018 combined with red panda tour to Sikkim due to costs. 12 herders (30% women) visited Bhumthang pasture and silage production farm (see section 3.1 and Annex 7.2) • Completed in 2018 and 2019 (see section 3.1) • Completed in 2018 and 2019 (see section 3.1 and 3.2)
<p>Output 3</p> <p>Alternative energy technology piloted to reduce firewood consumption</p>	<p>3.1. Two biogas units fully operating in two households with 40% reduction in firewood consumption by April 2019 from baseline survey in 2016.</p> <p>3.2. Biogas units create interest from 60% of households by 2019 from 2016 baseline survey.</p>	<ul style="list-style-type: none"> • Two biogas units installed in 2019. No data on reduction in firewood consumption yet. Needs to be operational for a year (see section 3.2). • The high level of community interest in biogas has continued. The baseline household survey in 2016 showed 88% of respondents were interested in biogas. The final household survey in 2019 revealed a similar level of interest (84%)
<p>Activities</p> <p>3.1. Construct 2 high altitude backyard pilot biogas plants (1 in Cheabling and 1 in Sheytemi) of 6 m3 capacity for effective use of manure to reduce firewood consumption.</p> <p>3.2. Construct 2 improved cattle sheds (semi-permanent) for collection of night manure for biogas production and to promote clean milk production.</p> <p>3.3. Construct 2 greenhouses (polytunnel 4x6 metres) for retaining heat during winter and growing winter vegetables</p>		<ul style="list-style-type: none"> • Completed in 2019 (see section 3.1) • Not completed yet • Greenhouses included in biogas design and construction (see photo in section 3.1)
<p>Output 4</p> <p>Competent community-based landcare group established with two women's savings groups enabling investment in small enterprises and community education.</p>	<p>4.1 Six training events held during 2016 in group organisation and management skills for selected group members (at least 50% women) and extension staff, with 80% increase in confidence and skills by 2019.</p> <p>4.2 Two women's groups formed involving 130 women participating in savings scheme by end of 2017 and 50% (60 women) benefiting by April 2019.</p>	<ul style="list-style-type: none"> • Completed in 2016 with total of 98 households (48% women). • 86% respondents thought group capacity, skills and confidence had improved (see quotes in section 3.1). • 77% respondents rated group management was good or very good (section 3.1). • Two womens savings group formed in 2017 with 148 members (60% or 89 women) from 125 households. (see section 3.2) • All members benefiting from savings and 10 households benefiting from taking loans (see section 3.1)

	<p>4.3 One study tour for 12 people to Sikkim in 2017 to learn about red panda conservation from village communities. One study tour for 15 staff and local officials to Nepal to learn about community red panda conservation.</p> <p>4.4 80% increase in awareness of red panda conservation by 120 households and Merak primary school students by April 2019.</p>	<ul style="list-style-type: none"> • Study tour conducted in 2018 to Sikkim (see section 3.1) and Annex 7.2) • Study tour to Nepal conducted in 2018 (see section 3.1) • Revision of SWS and Merak ecotourism strategy • Adoption of homestay improvements (see section 3.1 and Annex 7.3) • 88% of the 45 people interviewed in final survey in 2019 had learnt more about red panda threats, habitat requirements and breeding • Two Junior Ranger clubs formed in Merak and Sakteng with increase in awareness of red panda conservation by 50 students.
<p>Activities</p> <p>4.1 Conduct training program in group development and management including drafting of group constitution and by-laws</p> <p>4.2. Establish two women’s self-help groups and savings schemes to improve access to a credit facility and enhance capacity to undertake small enterprises.</p> <p>4.3. Supply home wool processing tools and equipment to needy households (4 Wool Handcarders, 4 Wool Combs and Hackles, 1 Drum Carder and 4 Yarn Ball Winders, and Carding Cloth to reduce wool processing time and drudgery for women and children, and enable continuation of traditional Brokpa cloth.</p> <p>4.4. Organise a 7 day ex-country study tour for 6 herders, 1 extension agent, 1 park ranger and 1 UWICE researcher and ILWS researcher to visit successful red panda conservation and sustainable forest management projects in Sikkim</p> <p>4.5. Conduct red panda awareness activities in schools and villages within SWS.</p>		<ul style="list-style-type: none"> • Completed in 2016 • Savings groups established in 2017 (see section 3.1 and case studies) • Wool processing equipment distributed in 2017 • Wool processing centre established in 2019 (see section 3.1 and blog site) • Study tours completed in 2018 to Sikkim and Nepal. • Two film showings, three SWS presentations, formation of two junior ranger clubs, a school play, one field trip, posters and a signboard. (see blog stories at www.redpandainbhutan.wordpress.com)
<p>Output 5</p> <p>Project results and lessons learned from the landcare approach and red panda conservation disseminated.</p>	<p>5.1. Project results and lessons presented to Merak and Sakteng villages, and downstream Radhi and Phongmey villages with local government officials.</p> <p>5.2. Information on red pandas and landcare outcomes distributed regionally and nationally every year via websites, posters, brochures, radio and TV.</p> <p>5.3. One workshop to inform senior government officials of project findings</p>	<ul style="list-style-type: none"> • The Merak community was regularly involved in meetings regarding project implementation, and representatives attended 3 annual project planning meetings in Trashigang (see reports on blog site and Annex 7.1). SWS held community red panda awareness meetings at Joenkar and Sakteng villages within SWS. Radhi and Phongmey to be visited later in 2019. • Five articles in Kuensel national newspaper, 3 BBS TV stories and radio coverage, 4 websites used to disseminate information (see section 3.1). One poster and two factsheets, one activity book distributed. • Project briefs presented to the DG DOFPS and DG Livestock each year (see Annex 7.4). • Red Panda Conservation Workshop held in 2018 with senior policy officials, rangers and forestry staff from the Dept of Forest and Parks Service. The Red Panda Conservation Action Plan presented to the Nature

	<p>and outcomes and make policy recommendations.</p> <p>5.4. Two journal papers published in open access journals and red panda data</p>	<p>Conservation Division in March 2019 and endorsed by Technical Advisory Committee in June 2019 (see Annex 7.5).</p> <ul style="list-style-type: none"> • Conference paper presented and published in 2019 (Annex 7.6). • Journal paper submitted but rejected in 2019. To be resubmitted.
<p>Activities</p> <p>5.1. Conduct meetings at local villages to disseminate information on project results and gain feedback from participants.</p> <p>5.2. Distribute educational material to schools and government offices in the region.</p> <p>5.3. Publicise project activities and results on national media.</p> <p>5.4. Conduct a consultative workshop with Ministry of Agriculture and Forests officials to share lessons learned and discuss mainstreaming sustainable land management and Red Panda conservation into national and local natural resource plans and programs of the Ministry.</p> <p>5.5. Conduct 3 Annual Monitoring and Planning workshops to review achievements in the past one year and plan for the following year.</p> <p>5.6. Publish two peer reviewed journal articles</p>		<ul style="list-style-type: none"> • Completed for villages within SWS • Red panda education materials distributed to Merak and Sakteng primary schools. • Project events publicised on national media (see section 3.1) • Red Panda Conservation workshop conducted in 2018 with development of Action Plan 2018-2023. New Darwin project application submitted to further research on red panda conservation in Bhutan and transboundary areas. • Annual review and planning meetings held (see Annex 7.1) • Conference paper published in 2019, journal paper rejected.

Annex 3 Standard Measures

Code	Description	Total	Nationality	Gender	Title or Focus	Language	Comments
Training Measures							
1a	Number of people to submit PhD thesis						
1b	Number of PhD qualifications obtained						
2	Number of Masters qualifications obtained	1	Bhutan	Male	Study potential habitat distribution of Red panda <i>Ailurus f. fulgens</i> and their connectivity in Sakteng Wildlife Sanctuary using MaxEnt and Least Cost model	English	AIT Bangkok
3	Number of other qualifications obtained						
4a	Number of undergraduate students receiving training	4	Bhutan	1 Male, 3 Female	Interviewing households for final survey	English	

4b	Number of training weeks provided to undergraduate students	1	Bhutan	1 Male, 3 Female	Interviewing households for final survey	English	
4c	Number of postgraduate students receiving training (not 1-3 above)						
4d	Number of training weeks for postgraduate students						
5	Number of people receiving other forms of long-term (>1yr) training not leading to formal qualification (e.g., not categories 1-4 above)						
6a	Number of people receiving other forms of short-term education/traini	110 hhs	Bhutan	Male/F emale	Group dynamics, Savings scheme,	Sharchop	

	ng (e.g., not categories 1-5 above)	60 students			Pasture development Land restoration School education		
6b	Number of training weeks not leading to formal qualification	5	Bhutan	Male/Female	As above	Sharchop	
7	Number of types of training materials produced for use by host country(s) (describe training materials)	3	Bhutan	Male/female	Posters Red panda activity book Signboards	Dzongkha	Red panda conservation
Research Measures		Total	Nationality	Gender	Title	Language	Comments/ Weblink if available
9	Number of species/habitat management plans (or action plans) produced for Governments, public authorities or other implementing agencies in the host country (ies)	1	Bhutan	N/A	Red Panda Conservation Action Plan 2018-2023	English	https://www.researchgate.net/publication/335022124_Red_Panda_Conservation_Action_Plan_for_Bhutan_2018-2023 https://wordpress.com/post/redpandabhutan.wordpress.com/934

10	Number of formal documents produced to assist work related to species identification, classification and recording.						
11a	Number of papers published or accepted for publication in peer reviewed journals						
11b	Number of papers published or accepted for publication elsewhere	1	Australian	Female	IASC conference paper	English	https://www.csu.edu.au/research/ilws/research/summaries/2016/sustainable-rangeland-management
12a	Number of computer-based databases established (containing species/generic information) and handed over to host country	1			Household surveys database	English	
12b	Number of computer-based databases enhanced (containing species/genetic						

	information) and handed over to host country						
13a	Number of species reference collections established and handed over to host country(s)						
13b	Number of species reference collections enhanced and handed over to host country(s)						

Dissemination Measures		Total	Nationality	Gender	Theme	Language	Comments
14a	Number of conferences/seminars/workshops organised to present/disseminate findings from Darwin project work	3	Bhutan	Male/Female	Annual meetings	Dzongkha, English	
14b	Number of conferences/seminars/ workshops attended at which findings from Darwin project work were presented/ disseminated.	1	International conference Peru	Female	IASC Conference paper	English	

Physical Measures		Total	Comments
20	Estimated value (£s) of physical assets handed over to host country(s)	6,700	10 Camera traps, 2 binoculars, 2 biogas units, 2 iron safe, wool processing equipment
21	Number of permanent educational, training, research facilities or organisation established	1	Wool processing centre
22	Number of permanent field plots established	45	Improved pasture

Physical Measures		Total	Comments				
		1	Fenced and rehabilitated eroded gully				
		2	Portable, flexi-biogas units				
Financial Measures		Total	Nationality	Gender	Theme	Language	Comments
23	Value of additional resources raised from other sources (e.g., in addition to Darwin funding) for project work	£207,764	Australia, Nepal Bhutan				

Annex 4 Aichi Targets

	Aichi Target	Tick if applicable to your project
1	People are aware of the values of biodiversity and the steps they can take to conserve and use it sustainably.	<input checked="" type="checkbox"/>
2	Biodiversity values have been integrated into national and local development and poverty reduction strategies and planning processes and are being incorporated into national accounting, as appropriate, and reporting systems.	
3	Incentives, including subsidies, harmful to biodiversity are eliminated, phased out or reformed in order to minimize or avoid negative impacts, and positive incentives for the conservation and sustainable use of biodiversity are developed and applied, consistent and in harmony with the Convention and other relevant international obligations, taking into account national socio economic conditions.	
4	Governments, business and stakeholders at all levels have taken steps to achieve or have implemented plans for sustainable production and consumption and have kept the impacts of use of natural resources well within safe ecological limits.	
5	The rate of loss of all natural habitats, including forests, is at least halved and where feasible brought close to zero, and degradation and fragmentation is significantly reduced.	
6	All fish and invertebrate stocks and aquatic plants are managed and harvested sustainably, legally and applying ecosystem based approaches, so that overfishing is avoided, recovery plans and measures are in place for all depleted species, fisheries have no significant adverse impacts on threatened species and vulnerable ecosystems and the impacts of fisheries on stocks, species and ecosystems are within safe ecological limits.	
7	Areas under agriculture, aquaculture and forestry are managed sustainably, ensuring conservation of biodiversity.	<input checked="" type="checkbox"/>
8	Pollution, including from excess nutrients, has been brought to levels that are not detrimental to ecosystem function and biodiversity.	
9	Invasive alien species and pathways are identified and prioritized, priority species are controlled or eradicated, and measures are in place to manage pathways to prevent their introduction and establishment.	
10	The multiple anthropogenic pressures on coral reefs, and other vulnerable ecosystems impacted by climate change or ocean acidification are minimized, so as to maintain their integrity and functioning.	
11	At least 17 per cent of terrestrial and inland water, and 10 per cent of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well connected systems of protected areas and other effective area-based conservation measures, and integrated into the wider landscapes and seascapes.	
12	The extinction of known threatened species has been prevented and their conservation status, particularly of those most in decline, has been improved and sustained.	
13	The genetic diversity of cultivated plants and farmed and domesticated animals and of wild relatives, including other socio-economically as well as culturally valuable species, is maintained, and strategies have been developed and implemented for minimizing genetic erosion and safeguarding their genetic diversity.	

14	Ecosystems that provide essential services, including services related to water, and contribute to health, livelihoods and well-being, are restored and safeguarded, taking into account the needs of women, indigenous and local communities, and the poor and vulnerable.	<input checked="" type="checkbox"/>
15	Ecosystem resilience and the contribution of biodiversity to carbon stocks has been enhanced, through conservation and restoration, including restoration of at least 15 per cent of degraded ecosystems, thereby contributing to climate change mitigation and adaptation and to combating desertification.	<input checked="" type="checkbox"/>
16	The Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization is in force and operational, consistent with national legislation.	
17	Each Party has developed, adopted as a policy instrument, and has commenced implementing an effective, participatory and updated national biodiversity strategy and action plan.	
18	The traditional knowledge, innovations and practices of indigenous and local communities relevant for the conservation and sustainable use of biodiversity, and their customary use of biological resources, are respected, subject to national legislation and relevant international obligations, and fully integrated and reflected in the implementation of the Convention with the full and effective participation of indigenous and local communities, at all relevant levels.	
19	Knowledge, the science base and technologies relating to biodiversity, its values, functioning, status and trends, and the consequences of its loss, are improved, widely shared and transferred, and applied.	<input checked="" type="checkbox"/>
20	The mobilization of financial resources for effectively implementing the Strategic Plan for Biodiversity 2011-2020 from all sources, and in accordance with the consolidated and agreed process in the Strategy for Resource Mobilization should increase substantially from the current levels. This target will be subject to changes contingent to resource needs assessments to be developed and reported by Parties.	

Annex 5 Publications

Type * (e.g. journals, manual, CDs)	Detail (title, author, year)	Nationality of lead author	Nationality of institution of lead author	Gender of lead author	Publishers (name, city)	Available from (e.g. web link, contact address etc)
*Threatened species conservation action plan	Red Panda Conservation Action Plan 2018-2023 NCD (2019)	Bhutan	Bhutan	Male	Nature Conservation Division Department of Forests and Park Services Ministry of Agriculture and Forests, Bhutan	https://www.researchgate.net/publication/335022124_Red_Panda_Conservation_Action_Plan_for_Bhutan_2018-2023 https://wordpress.com/post/redpandabhutan.wordpress.com/934
*Conference paper presented at IASC conference, Lima, Peru 2-5 July 2019	Millar, J and Tenzing, K. (2019) Two steps forward, one step back: Enabling collective action to rehabilitate rangeland	Australian	Australian	Female	International Association for Study of the Commons	https://www.csu.edu.au/research/ilws/research/summaries/2016/sustainable-rangeland-management Digital Library of the Commons

	commons in Bhutan					
*Baseline household survey report	Tenzing, K. and Millar, J. (2018). Baseline household survey report	Bhutan	Australian	Male	Charles Sturt University	https://www.csu.edu.au/research/ilws/research/summaries/2016/sustainable-rangeland-management

Annex 6 Darwin Contacts

Ref No	23009
Project Title	Sustainable rangeland management to protect red pandas and herder livelihoods.
Project Leader Details	
Name	Joanne Millar
Role within Darwin Project	Project Leader
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Phone	
Fax/Skype	
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Partner 1	
Name	Kuenga Namgay
Organisation	Department of Livestock (DOL)
Role within Darwin Project	Focal person for DOL
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Email	
Partner 2 etc.	
Name	Thinley Wangdi
Organisation	Department of Forest and Parks Services
Role within Darwin Project	Focal person for DOFPS
Address	
Fax/Skype	
Email	

Checklist for submission

	Check
Is the report less than 10MB? If so, please email to Darwin-Projects@itsi.co.uk putting the project number in the Subject line.	Yes
Is your report more than 10MB? If so, please discuss with Darwin-Projects@itsi.co.uk about the best way to deliver the report, putting the project number in the Subject line.	
Have you included means of verification? You need not submit every project document, but the main outputs and a selection of the others would strengthen the report.	Yes
Do you have hard copies of material you want to submit with the report? If so, please make this clear in the covering email and ensure all material is marked with the project number.	No
Have you involved your partners in preparation of the report and named the main contributors	Yes
Have you completed the Project Expenditure table fully?	Yes
Do not include claim forms or other communications with this report.	