Darwin Initiative Main Project Annual Report

Important note: *To be completed with reference to the Reporting Guidance Notes for Project Leaders:*

it is expected that this report will be no more than 10 pages in length, excluding annexes

Submission Deadline: 30th April 2018

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
Reporting period (e.g., Apr 2016 – Mar 2017) and number (e.g., Annual Report 1, 2, 3)	1st May 2017 to 30th April 2018 Annual Report 2
Project Leader 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.

1. Project rationale

The project is addressing 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) as shown in the Figure 1 below.
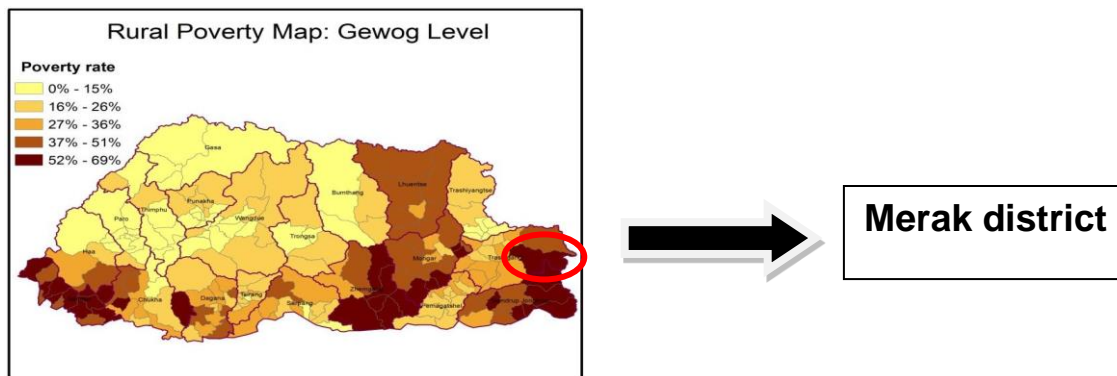
Figure 1   Location map

The project is using 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.

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 Department of Livestock (DOL/RLDC) and Department of Forest and Parks Service (DOFPS/SWS) are dedicated to leading the project, despite their commitments to much larger donor projects and government programs. We keep in constant communication via email with RLDC and SWS Directors, the senior district livestock officer and parks staff. Dr Karma Tenzing communicates regularly with the Merak herders via WeChat. The DOL focal person (Kuenga Namgay) continues to be very helpful in facilitating invoices, funds transfers and supporting RLDC. We meet with Directors of DOL and DOFPS on each visit. We have had to work through budgetary challenges together as funds are often not enough to cover the scale of the work required. Materials have proved more expensive than anticipated so partners have had to adapt using local materials and labour (see section 3.1). The annual review and planning meeting was held in August 2017 in Trashigang where both partners worked out an annual workplan to submit to their agencies (see Meeting Report at Annex 4.1 and blog story at (https://redpandabhutan.wordpress.com/)

The World Wildlife Fund and Red Panda Network have become more engaged over the last year with their commitment to supporting the National and Transboundary Red Panda Conservation workshop in Bhutan (see program attached as separate file). WWF Bhutan provided contacts for the herder tour to Sikkim where they were hosted by WWF Sikkim staff (see blog story and report attached separately). The Red Panda Network conservation officer, Damber Bista gave a presentation at the workshop about community involvement in red panda conservation in Nepal including forest guardians, ecotourism and homestays. ALI have been kept informed of project progress and invited to comment on plans and reports. They have included our updates in their newsletters (www.alc.com.au).

3.   Project progress

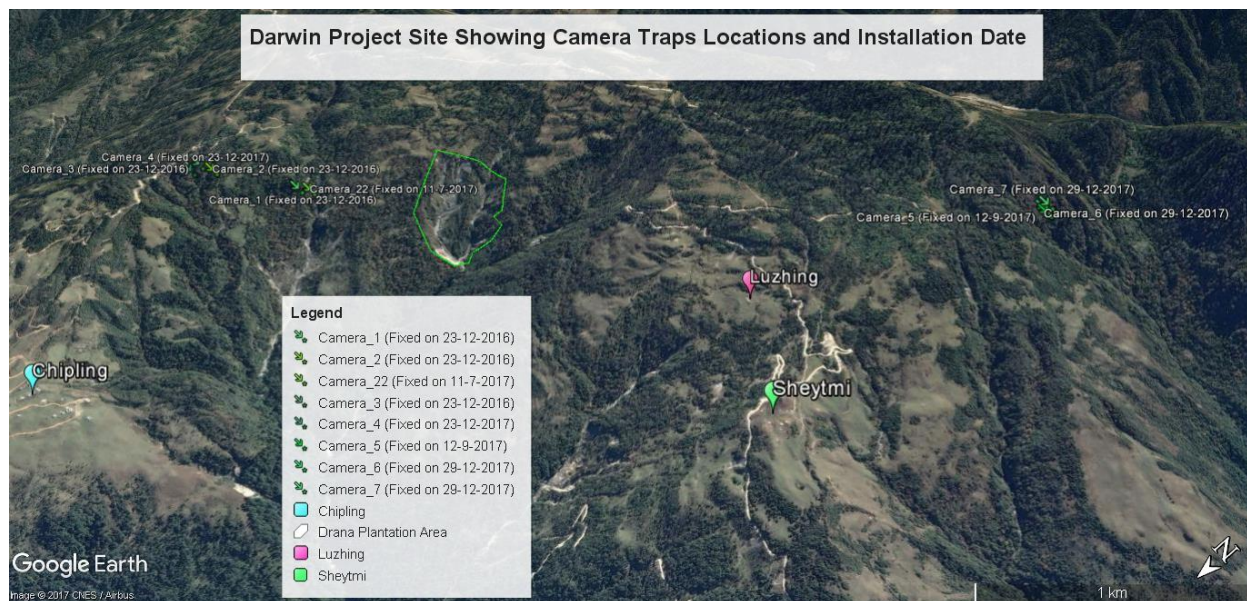### 3.1   Progress in carrying out project Activities

Activities implemented in the last year relate to Output 1 (Land restoration, red panda habitat zoning and research), Output 2 (Sustainable rangeland management), Output 4 (Community

landcare training, savings groups and community education) and Output 5 (Dissemination of project results). Output 3 (Alternative energy technology) has been deferred to next reporting period due to technical considerations.

Output 1 Land restoration, red panda habitat zoning and research

1.1/1.2 Fencing and initial planting of 10,000 seedlings in the main Drana gully (20ha) was completed in May 2017 by 130 herders and SWS staff. Some of the plantation washed away in August 2017 so 55 checkdams were installed by herders in Feb-March 2018 under supervision of SWS staff (see blog story at https://redpandabhutan.wordpress.com). Another 12,000 plants were added in March-April 2018 including willow stems and pasture seed, local trees and bamboo rhizomes, bringing the total planted to 22,000 seedlings/cuttings. Herders are now well trained in how to carry out erosion control works for future land restoration works.

1.3 Ten infrared camera traps were purchased of which seven were installed across the red panda habitat zone throughout 2017 as shown in the Figure below (note: the green zone is the Drana gully). To date, there have been no photos of red panda despite fresh and old scats evident at some sites. Last year's bamboo flowering event combined with overgrazing have led to lack of bamboo supply. We suspect red pandas seasonally move to more favourable areas further into the park. Monitoring of red panda and bamboo regeneration will continue in fenced and rehabilitated areas to the west but not in degraded areas. We will also map corridor areas connecting the project area with more pristine forest to research red panda presence/absence along the corridors.

1.4 Public land for a community nursery was not granted by the Land Commission so a private operator agreed to develop and manage the tree nursery on his land at Karma Gonpa. The site has been fenced and seedbeds prepared for sowing of local tree seeds (see blog story). The nursery owner and manager is receiving technical assistance from SWS staff.

1.5 Discussions on declaring the watershed as critical have been postponed until a meeting can be organised with the community and DOFPS Watershed Division. A site inspection is needed to show relevant officials the extent of land degradation and the need for critical watershed declaration to ensure future protection.
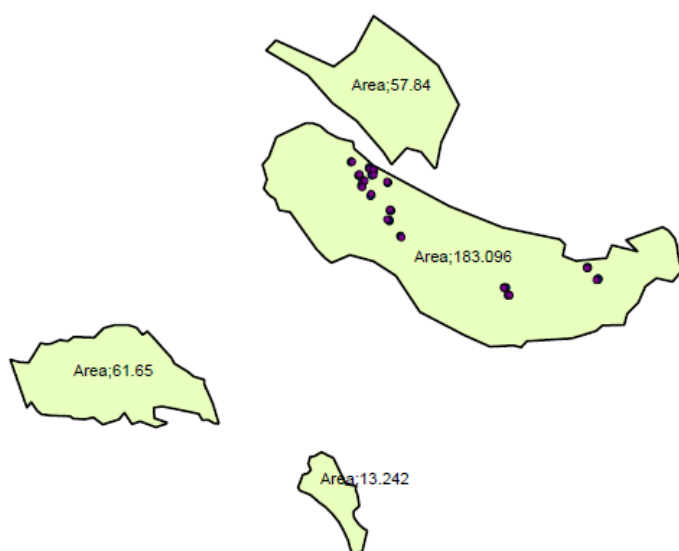
Output 2 Sustainable rangeland management

2.1 The baseline household survey report was completed in April 2017 and distributed to partners. A journal paper based on some of the results is currently being drafted and will be submitted to the *International Journal of Agricultural Sustainability* in 2018.

2.2 The planned tour of sustainable rangeland management sites was combined with the March 2018 red panda conservation study tour as there was not enough budget to cover both trips. Twelve Merak herders (4 female and 8 male) and two district officers (forestry and livestock) visited the Bumthang dairy farm to learn about pasture establishment, making silage, cattle shed

and hygiene management (see blog story). They also visited Phobjika where pasture improvement is combined in rotation with potato growing. Leasing is already underway in Cheabuling and Sheytemi so there was no need to visit other leased sites.

2.3/2.4 A cadastral survey of pasture plots was undertaken between December 2017 and February 2018. Thirty two households at Sheytemi elected to sow improved pasture (ryegrass and cocksfoot) over a potential area of 316 acres (140 ha) as shown below. They have completed fencing, ploughing, lime application, pasture sowing and fertiliser application under supervision from district livestock officers (see blog story). Willow saplings have also been planted for fodder production (see photos below). Cheabuling households have not been able to reach consensus yet as they have a more complex communal grazing arrangement. A field day will be held in October which may encourage Cheabuling herders to also trial pasture improvement.

Allotment of state land (Tsamdro) at shetaymey under merak for fodder plantation

Area;57.84

Area;183.096

Area;61.65

Area;13.242

Surveyed by; Dorji Wangchuk (land Inspector)   Verified by; Gyembo(LRO)

A soil test revealed low acidity and phosphorous levels so lime, SSP and potash were recommended. A fertiliser trial is underway with the following treatments;

Plot 1- 5 tonnes/ha lime plus 125kg super
Plot 2- 3 tonnes/ha lime plus 125kg super
Plot 3- 1 tonne/ha plus 125kg super
Plot 4- No lime plus 125kg super
Plot 5 - No lime plus 250kg super
Plot 6- No lime plus 125kg super and MOP

2.5 Selling or culling unproductive livestock is a sensitive issue due to the Buddhist sentiment of not killing living beings. Discussions will be held after successful pasture establishment to ensure productivity compensation for loss of animals. If herders can see the benefits of investing in productive animals, they will more likely be willing to reduce unproductive livestock by selling to India.

Output 3 Alternative energy technology

Portable biogas units will be purchased and trialled during the next reporting period. It has taken time to source a suitable unit and decide on where to trial it, due to the requirement of a household to be permanently settled to take advantage of ongoing gas production. The baseline survey showed that most households already grow vegetables so this activity will not be implemented.

Output 4 Community landcare training, savings groups and community education

4.1 Group development training completed in previous year report.

4.2 Dr Karma Tenzing (CSU research officer) and Dr Kuenga Namgay (Chief of Animal Nutrition, Dept of Livestock and our focal DOL person) visited Merak in August 2017 to train herder families how to set up saving schemes. Two staff from RLDC, Khangma and three from the Dzongkhag Livestock sector, Tashigang assisted with facilitating the training. About 98 herders attended the two day training program. At the end of the second day, two savings groups (Merak and Gengu) were officially launched by the Merak Gup (mayor). Two iron safes were handed over along with main ledgers and members savings passbooks (see blog story). Each group has appointed office bearers and they manage the record keeping. Twenty five and 12 founding members initially came forward to join Merak and Gengu savings groups respectively. The founding members from both the savings groups agreed to deposit Nu.500 as membership fee. Merak members decided to deposit Nu.100 monthly whereas Gengu group decided to deposit Nu. 150.00 monthly. Gengu members earn 10% interest whilst non-members earn 5% interest. Merak members earn 3% interest with loans requiring 1% interest for members and 2% interest for non-members. Interest is paid annually. Some households deposit annually (Nu1-1,500) as they are away herding livestock for most of the year. If households do not continue to deposit after 2 months, they are fined Nu50.

4.3 The Gengu group are very keen to introduce new technology for wool processing to reduce labour and increase textile output for traditional clothes. The President, Mr Nima who is a carpenter requested we fund carding cloth for a manual drum that he made which has enabled more wool to be carded in preparation for spinning. In addition, hand carders and combs have been purchased. Last month, Joanne Millar donated a spinning wheel from Australia and trained women how to use it (see blog story). Dr Karma Tenzing was successful in getting a Helvetas grant on behalf of the Gengu group to purchase an electronic wool processing machine to the value of 30,000Euro. A site has been demarcated for a building to house the machine and training will be provided when the machine arrives later in 2018.

4.4 Twelve Merak herders (4 female and 8 male) and two district officers (forestry and livestock), went on a 14 day study tour to Sikkim, India to learn about community benefits from red panda conservation (see blog story and trip report attached separately). At the villages of Yuksum (1300m) and Okrey (2300m), herders learnt how local communities were benefiting from ecotourism by offering homestays, trekking services, food, and even Rhododendron Wine! With more than 6,000 visitors per year, solid waste has become an issue so a resource recovery centre was established. Herders were shown how to segregate waste and use materials for making handicrafts to sell back to tourists. They walked through Barsey Rhododendron Sanctuary bordering Singalila National Park, famous for rich diversity of Rhododendron and conservation of Red Panda. Last stop in Sikkim was the Sikkim Himalayan Zoological Park located 3 km from Gangtok to observe captive Red Panda breeding and other charismatic wildlife species. At Phobjikha in Bhutan, herders interacted with bee keeping farmers and learnt about the benefits and challenges in rearing bees. They also visited the Black Crane Information Center to learn about community based conservation initiatives to protect crane habitat in the valley leading to enhancement of income generation from tourism. Participants visited Bumthang dairy farm where the farm manager showed silage preparation and storage process, milking machine, cattle shed and hygiene management process to maintain the health of the animals. Participants also visited improved pasture sites. Participant feedback revealed the following plans to adopt some practices;

- Install waste bins in strategic locations to manage waste in Merak.
- Generate income by brewing Rhododendron wine
- Host visitors to Sakteng Wildlife Sanctuary
- Start apiculture in their pasture land in the coming year to diversify income
- Request to be trained in how to make silage to overcome winter fodder shortage

4.5 Red panda education has remained focused on Merak primary school and the Brokpa community over the last year to build local awareness and support for red panda conservation in SWS. A school play was developed by Dr Joanne Millar and performed by Grades 4 to 6 recently (see blog story). Wearing masks, the children acted out the story of a mother red panda and her two cubs who become hungry from lack of bamboo. They are chased by dogs, attacked by a leopard and their habitat is degraded by yak/cattle grazing. A parks officer comes to talk to the community and they start fencing and planting bamboo. The red pandas are able to return to their forests again! Two films were also shared with the school and community (POKCHI the Red Panda cartoon from Sikkim; and The Forgotten Panda).

Output 5 Dissemination of project results

5.1 Meetings with other villages within SWS and downstream will occur in 2019 once we have project impacts. A site inspection will be organised in October 2018 for district officials and village leaders. Three signs have been installed at the Merak turn off, at Sheytemi and at the top of the Drana Gully as shown below.

5.2 Educational material about red panda conservation will occur in the coming year with support from WWF Bhutan.

5.3 The Bhutan Broadcasting Service (BBS) did a story on the project on 13th August 2017 (http://www.bbs.bt/news/?p=78321) as shown in Annex 4.2. BBS also did a segment about the project on August 15th 2017. Go to https://www.youtube.com/watch?v=TOxkX4fN3u0 Segment starts at 1.30 mins. A 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.

An article was published in the national Kuensel newspaper on current status of red panda conservation in Bhutan and the Darwin project (see Annex 4.3). The Ministry of Agriculture and Forests reported on the National Red Panda Conservation Workshop. http://www.moaf.gov.bt/red-panda-conservation-workshop/ There have been 400 views. Sakteng Wildlife Sanctuary posted on their Facebook page on the workshop. There was a short news segment on the red panda workshop on BBS.

The RedPandazine published an update on the project at https://redpandazine.com/2018/05/14/red-pandas-bhutan-conservation-project/

The project wordpress blog site continues to attract interest from 42 countries with average 40 visitors per month. https://redpandabhutan.wordpress.com

5.4 Meetings with senior Ministry officials will be conducted in the coming year once project impacts have developed.

5.5 The Annual Review and Planning Workshop for 2016-17 and 2017-18 was conducted on 4th and 5th August 2017 at Tashigang (see Annex 4.1). A total of 30 participants participated in the workshop including herders from Merak (n=12), Gup, Gewog Administration, Merak (n=1), staff from Department of Livestock (n=1), Regional Livestock Development Centre, Khangma (n=4), Sakteng Wildlife Sanctuary, Phongmey (n=6), Dzongkhag Livestock Sector (n=4) and Land Record Officer (n=1), Dzongkhag Administration, Tashigang and research officer, Charles Sturt University. WWF Bhutan and Red Panda Network partners were unable to attend. (see meeting report in Annex 4.1 and blog story)

A Red Panda Conservation Workshop was held in Trashigang from 1-3 May 2018 with 35 delegates from Bhutan, Sikkim, Arunchal Pradesh and Nepal (see blog story and program with list of delegates attached as separate file). A draft national and transboundary action plan was developed which will be completed by July 2018 by a working group of representatives from SWS, WWF Bhutan, CSU, the Uygen Wangchuk Institute for Environment and Conservation and DOFP Nature Conservation Division. It will be presented to the Ministry of Agriculture and Forests by October 2018. See workshop resolutions at Annex 4.4.

5.6 A journal paper based on some of the baseline household results is currently being drafted and will be submitted to the *International Journal of Agricultural Sustainability* in 2018. A second journal paper covering livelihood impacts and red panda awareness changes will be written after the final household survey is completed in 2019. It will be submitted to *Human Ecology*.

3.2   Progress towards project Outputs

Output 1. Land restoration, red panda habitat zoning and research

1.1 The largest landslide/gully at Drana has been fenced off, planted with cuttings and 55 checkdams installed over 20 hectares (see blog stories). The decision was made to focus on this gully as it poses the greatest threat to the winter rangeland area and downstream communities. A diversion channel has been installed at the top of the gully to divert water from the road to the other side of the saddle. Further work will be required to keep the water diverted and revegetate the degraded area at the saddle. If budget allows, we will fence a second landslide in 2018/19. We will not be able to fence five eroded areas as originally planned due to the high cost of rehabilitation. Photopoints, planting and survival data will continue to provide means of verification. Flash flooding in August 2017 destroyed 50% of the plantings which have been replanted in March-April 2018. Flooding will continue to be a risk but we anticipate the checkdams will reduce the impact this year.

1.2 Most of the winter rangeland area of 400ha has been assessed as degraded due to overgrazing and lopping of trees for fodder. Bamboo clumps have died off due to flowering and any regeneration is grazed (see photos below). Red panda presence in the form of fresh and old scats has only been detected at two sites with no camera trap records, despite moving the cameras to more likely places in December 2017 (see blog story and section 3.1). However, one area of about 50ha contains good red panda habitat and provides a corridor to the west where there is extensive dense forest (see map below). This area was fenced off by herder brothers, Nima and Dawa in March for bamboo rehabilitation (see blog story) and is already showing signs of regrowth (see photo below). Nima has seen scats in one location near a bamboo gully and his neighbour saw a red panda in the area recently. We will focus monitoring in this area in the coming year with the herders.

The brothers plan to host a red panda ecotourism program with guided walks through their forest and improved pasture area. This may encourage additional households to protect a portion of their rangeland for red panda habitat if it provides good connectivity, and can lead to livelihood benefits. The limited budget and staff availability has meant we have been unable to carry out indepth scientific research on red panda habitat and distribution. The national action plan will provide opportunities to seek funding for population distribution research within SWS and in the transboundary area with Arunchal Pradesh. Mr Thinley Wangdi, SWS Director has been admitted to Charles Sturt University to do a Masters degree on transboundary red panda conservation pending a scholarship application to the World Wildlife Fund. He plans to propose incorporation of Sheytemi and Cheabuling within the Sakteng Wildlife Sanctuary to ensure ongoing restoration and protection of red panda habitat.
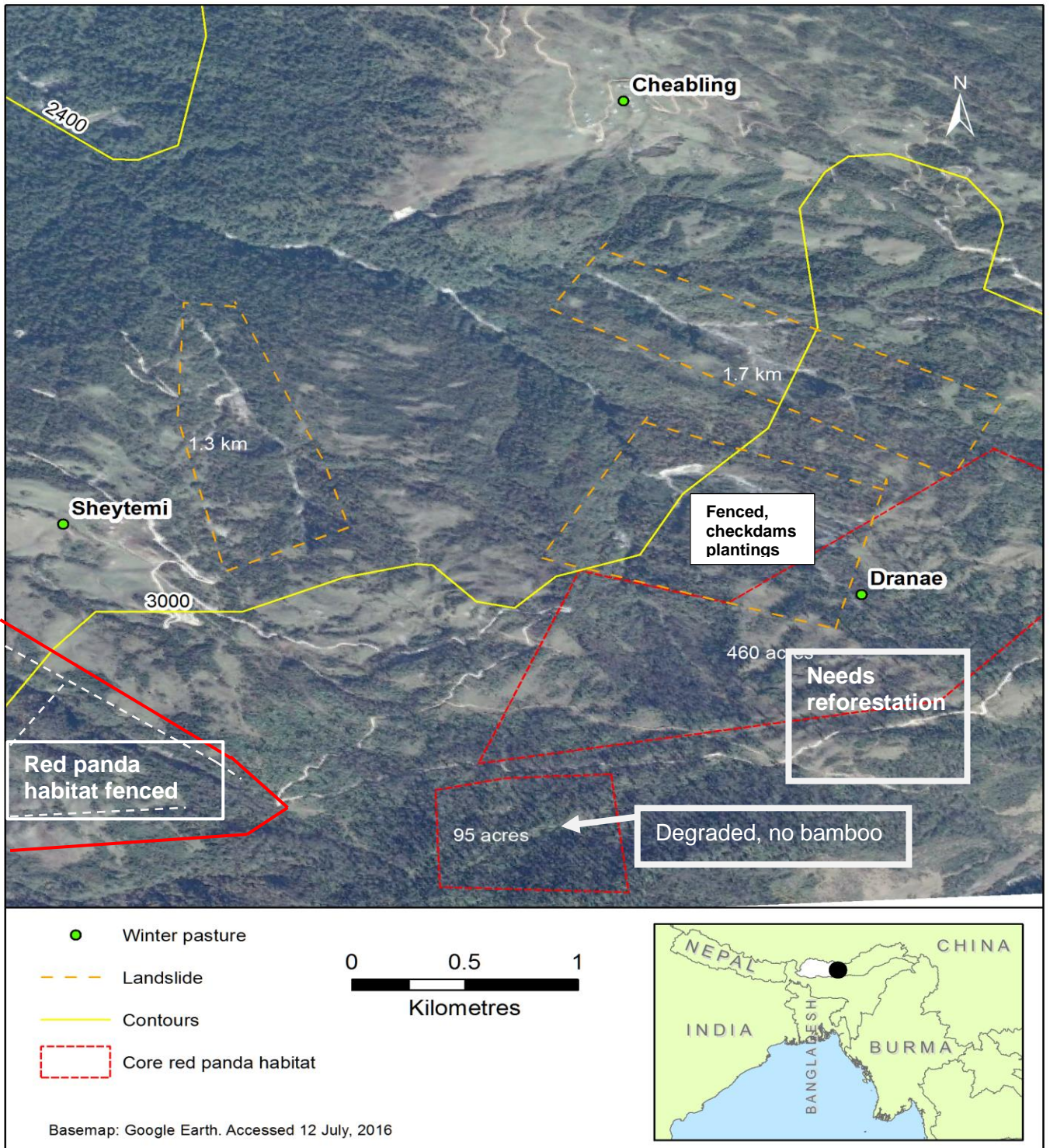
Bamboo dieback   **Grazed bamboo**   **Regeneration post fencing**

1.3 The tree nursery has been established on private land with an owner/manager for reasons stated in section 3.1. Seedlings will be available for planting in 2019. Records of plants raised and sold along with income will be documented along with photos.

Output 2. Sustainable rangeland management

2.1 Training in pasture establishment has been conducted on the job with 32 households during April 2018. This method is deemed most effective as herders have had no prior experience with pasture establishment and learn better in the field. Three livestock officers camped at Sheytemi for a month to guide families in soil preparation, lime incorporation, broadcasting seed and fertilisers (see blog story). Women were present at each site as it took most family members to carry bags to the site and broadcast the inputs by hand. Power tillers were hired from the Agricultural Machinery Centre at Trashigang and operated by an experienced technician who showed herders how to use the machine (see photo below). Training in pasture management and silage production will occur in September/October 2018, followed by livestock management during winter 2018/19. An evaluation of herder learning outcomes will be conducted in October 2018 with site inspections.

2.2 Herders would not agree to five pilot pasture trials as they thought this was inequitable. So the option to establish 2.5 acres (1ha) for each household was presented and a cadastral survey conducted. Thirty two households took up the offer, sowing a total of 80 acres (32ha) this year with plans to sow another 236 acres (100ha) by themselves if pasture improvement is successful. It is hoped that Cheabuling herders will decide to sow pasture in 2019 which would enable us to reach the target of 120 ha. Site inspection in late April showed grasses had germinated (see blog story). There will be competition from local pasture re-growing but the improved varieties should grow faster and higher then local species. DOL staff will measure plant survival and composition, dry matter yields, silage and hay production (depending on which fodder conservation method is chosen by herders). Winter fodder will be devoted to reducing calf mortality and increasing milk production. Budget has been allocated to supply watering points for livestock within pasture areas in the coming year.

2.3 The 2016 baseline survey revealed that herders sell on average 137 animals per year (approx. 411 over 3 years). In addition, they consume all yak/cross males (Dzo) that are not required for pack animals since they are sterile (estimate 50 per year or 150 over 3 years). Herders also consume yak (97 per year or 291 over 3 years). Hence, our target of selling 500 unproductive animals to India by 2019 needs to be reframed within the context of current attrition rates, restocking rates and carrying capacity over the tsamdro area. Once herders start to produce winter fodder and improve production, there will be more incentive and understanding of the need to focus on productive animal within a more sustainable carrying capacity.

2.4 Changes in milk production and cheese sales will be determined from the final household survey in 2019. Given the delay in pasture improvement, there may not be significant increases in milk or cheese production within the project timeframe. Any increase in cheese sales is more likely to occur from improved marketing (see output 4 below).

Output 3. Alternative energy technology

3.1 Two portable biogas units will be purchased and trialled this year in Merak village. Reduction in firewood consumption will be monitored. Vegetable consumption will not be monitored now as most households already grow their own or purchase vegetables each other or from Trashigang town.

3.2 If successful, we anticipate interest in biogas production from those households with permanent livestock in Merak. Interest and adoption of biogas will also depend on the upfront cost of purchasing the unit and running costs. It may be difficult to convince herders to cook with biogas as they are so accustomed to cooking on bukhari stoves which also provide heating. However some households use bottled natural gas for cooking, and most households use electric rice cookers.

Output 4. Community landcare training, savings groups and community education

4.1 Group organisation and management training was completed in the last reporting year.

4.2 Two savings groups were formed in August 2017 (see section 3.1). After only eight months, Gengu group now has 90 individual members (55 female) with savings of Nu.139,000 (1,522 GBP), and Merak has 44 families (60 women) with total savings of Nu.40,000 (438 GBP). So the target of 100 women participating in the savings scheme has been reached. The groups offer short term (one month), mid term (3 months) and long term (6 months) loans. Four Gengu households have taken out long term loans. One household has used the loan to increase burr bowl production whilst another family are expanding their fermented cheese business (see blog story). Two households took loans for house construction. Most Gengu members borrow small amounts (up to Nu5,000) for groceries and household items. Only one household has borrowed funds from the Merak savings group for purchasing a Dzomo (yak/cow cross) and calf to the value of Nu35,000. A woman member who has deposited Nu1,500 so far said she is saving to meet school costs which are Nu10,000 per primary school student per year, or Nu30,000 per secondary school student per year. She has not taken a loan yet but may do so in the future. When asked about the benefits or problems with the savings scheme to date, she replied'

"It is for safe keeping our money. If we keep at home we tend to just spend it! I haven't experienced any problems with the scheme to date."

One of the challenges facing the savings groups is how to increase membership without new members having an advantage over founding members (i.e taking loans when they have not deposited as much as original members). Members feel that newcomers should pay an upfront deposit of 1,500 to equal most deposits by current members. However, this may exclude some families from joining if they cannot afford the membership fee and start up deposit or think it is too much. The Merak group is meeting in coming months to work out an equitable solution for new members. The President, Dorji Wangdi, is confident that once impacts emerge from savings and loans, that more families will join the scheme. We will continue to monitor livelihood impacts over the next year via interviews. The group is applying to Helvetas for aromatic oil production.

Iron safe showing deposited funds   Member Passbook example

4.3 Study tour for 12 herders and 2 staff to Sikkim already described in section 3.1 with report attached separately. Video available on request.

4.4 Awareness of the importance of protecting red panda in SWS is slowly increasing as a result of project activities and school engagement. The study tour to Sikkim resulted in two herders deciding to fence off part of their rangeland for red panda habitat. They also want to start red panda ecotourism and increase visitors to their homestay in Gengu village. We anticipate that other families will want to follow if the benefits become evident over time. A CSU ecotourism/interpretation expert from Australia (Dr Rosemary Black) will visit Merak next October to provide guidance on how to develop a program. She will assist SWS to write an ecotourism and interpretation strategy for the whole park. An interpretation signboard will be erected in Merak village next month with information on red panda biology, habitat requirements and ways to minimise disturbance. The primary school teachers and students have been enthusiastically engaged in red panda education activities as evidenced by the drama performance (see section 3.1 and blog story). The final household survey in 2019 will measure changes in attitudes and knowledge stemming from all the education activities.

Output 5 Dissemination of project results

5.1 Merak herders attended the 2017 annual review and planning meeting. Other villages and local government officials will be invited to a site inspection later in 2018.

5.2 There has been regional and national media coverage of the project over the past year (see section 3.1). The project blog site is regularly visited by viewers in Bhutan. The national and transboundary red panda conservation workshop has been an excellent way to promote awareness of this endangered species and the need for coordinated research and protection (see annex 4.4 workshop resolutions).

5.3 Meetings with senior Ministry officials will be conducted in the coming year once project impacts emerge and policy recommendations are developed.

5.4 Journal papers are yet to be submitted

3.3 Progress towards the project Outcome

We have made considerable progress towards the project Outcome over the last year. We have revegetated 20 hectares of the largest gully within the project area despite setbacks last August with flash flooding. Given the high cost of fencing materials and checkdams we will not achieve the target of 7.5 sqkm of eroded gullies revegetated. A more realistic target is 2 sqkm. We should achieve at least 50% groundcover and 40% reduction in soil erosion by end of project next year. Fifty hectares of good quality red panda habitat have been fenced for bamboo regeneration with recent sightings of red panda by herders. Means of verification remain the same. Critical watershed declaration is now vital to attract ongoing funding to continue restoration work and reduce threats. Pasture improvement is underway now so we can expect 50% increase in winter fodder availability this year providing silage making is successful. An increase in milk/cheese production and reduction of livestock numbers are less certain and may not be achieved within the project timeframe. Means of verification remain the same except for weekly milk production records. We will capture changes in milk/cheese production in the final household survey. Although there has not been an increase in household income yet, the savings scheme will generate opportunities for improved household wellbeing. Savings group records, indepth interviews and the final household survey will assist us to track changes in income and wellbeing over the coming year. Reduced lopping of trees has not been achieved due to delay in pasture establishment but we anticipate Sheytemi households (30% of total households) will cease tree lopping by the end of project. Cheabuling households may continue to lop trees if they decide not to grow pasture, however we may be able to convince them to plant fodder trees next year. We are confident of 50%+ increase in bamboo regeneration in fenced red panda habitat areas which will be monitored by on ground assessments. Group capacity and motivation to manage projects has been enhanced as evidenced by the quick uptake of the savings schemes and grant applications for a wool processing centre (successful). The means of verification for measuring group capacity still hold.

3.4   Monitoring of assumptions

Outcome Assumptions

Assumption 1: Favourable climatic conditions and livestock not breaking into gullies.

Comments: Still holds. Monsoon rains caused loss of some plantings last year but check dams should slow run off this year. Good soil moisture for pasture establishment this year. Livestock not breaking into gullies but may occur once vegetation grows up. Will need regular monitoring.

Assumption 2: Good record keeping by group committee and DOL staff

Comments: Still holds Savings groups are keeping excellent records. Pasture and livestock data not yet collected.

Assumption 3: Yak/cattle herding continues to be main occupation of Brokpas

Comments: Still holds

Assumption 4: Able to distinguish income increases from cheese yields not price increases, and enterprises generated from savings scheme from other enterprises

Comments: Still holds. Will capture changes in cheese yields and discuss prices with herders once pasture is being utilised. Group records already showing changes in savings and interviews are capturing benefits from investing savings in enterprises vs other enterprises (see section 3.1).

Assumption 5: Pasture hay production enough to reduce tree lopping. Bamboo plantings and regeneration have high survival rates and not grazed by cattle, yaks or goats.

Comments: Still holds. Major uncertainty here as depends on weather and herder management. Regular field inspections and herder meetings to discuss management will be needed.

Assumption 6: Good leadership, minimal conflict and cooperative committee that works well with agency staff.

Comments: Still holds. Gengu group showing more co-operation and initiative than Merak group (see section 3.2).

Output Assumptions

Assumption 1: Herders do not breach fenced degraded areas for illegal grazing and lopping. No flash flooding or drought that eliminates plantings

Comments: Still holds. So far no breaches into gully area. However one household has erected fence in forest instead of open rangeland so they have been asked to remove the fence. Flash flooding destroyed some plantings in Drana Gully.

Assumption 2: Good research design, implementation and co-ordination between SWS rangers, UWICE and ILWS researchers, herders, WWF and Red Panda Network.

Comments: Still holds. Red panda camera trap monitoring in winter grazing area has not captured images of red panda to date. However there have been herder sightings so once the areas is rehabilitated there will be more scope for indepth research. Good coordination between SWS, WWF and RPN to host red panda workshop and collaborate on national action plan.

Assumption 3: Community willingness to establish and manage nursery with appropriate employees. Suitable site and available water. Funds received from Bhutan Trust Fund for Environment and Conservation.

Comments: Land Commission did not allow leasing of land for community nursery so a private operator has been engaged to set up the tree nursery. Funds provided by ALI so no need to apply to BTFEC.

Assumptions 4 and 5: Training courses held at suitable times with at least one household representative attending including women. Government support for leasing plots for establishment of improved pasture

Comments: Still holds. Women and households well represented at training courses (see section 3.1) and government has approved leasing for pasture development.

Assumptions 6, 7, 8: Environmental conditions and livestock management suitable. Herder willingness to sell unproductive animals. Adequate milk/cheese production and demand.

Comments: Still holds.

Assumptions 9 and 10: Biogas technology works for high altitude areas and is available at a reasonable cost. 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.

Comments: Biogas units are low cost but we don't know for sure if the proposed design will work at high altitudes so risk still holds.

Assumptions 11: Vegetables establish and grow well and people develop a taste for them.

Comments: Vegetables already grow well in Merak village and winter grazing areas with good consumption so low risk (see section 3.2). Whether vegetables grow well on top of the biogas units remains to be seen!

Assumptions 12, 13, 14: The group management committee has adequate gender balance and skills over time to manage landcare activities. Trained local extension agents and park rangers stay committed to group. Women have time and willingness to attend training sessions, invest savings and start new enterprises or build on existing ones.

Comments: Both savings groups have women on their committees. Women have attended training sessions and are investing in savings scheme and taking loans as a family household. Government staff are very committed to supporting the community.

Assumptions 15: Security situation in eastern Nepal is safe allowing travel to and from sites.

Comment: Still holds. No security issues so far.

Assumption 16, 17: 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. At least 70% of all households and government officials at village meetings.

Comments: Teachers, villagers and staff have been very enthusiastic with good attendance at the recent drama performance and film showings so this is a very low risk.

Assumptions 18, 19, 20: Assistance from Bhutan Foundation is forthcoming for video production. Government of Bhutan adopts policy recommendations. Papers accepted

Comments: We have decided not to apply to the Bhutan Foundation as they fund very small amounts. We will engage the Bhutan Broadcasting Service to film project impacts in the final year. We are confident that the GOB will adopt the red panda national action plan and declaration of critical watershed in the coming year.

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

The on-ground restoration works, community development program and red panda education activities are now well established. We should see impacts on biodiversity conservation and human wellbeing start to emerge in the final year of the project.

4. Contribution to the Global Goals for Sustainable Development (SDGs)

The project is addressing the following Global Goals for Sustainable Development:

1. *No poverty* through livestock income generation and red panda tourism(yet to be realised) and livelihood diversification into wool processing and textile production (grant received), value adding of primary products (savings scheme) and aromatic oil production (grant application).
3. *Good health and wellbeing* by introducing biogas and reducing fire smoke health impacts (next year).
4. *Quality education* through capacity building of local community members and students in rangeland/livestock management and red panda conservation (study tour, drama performance and films shown). Awareness raised of red panda habitat, breeding and diet and importance of protecting habitat (study tour, films, new interpretation board).

5. *Gender equality* by making sure women are involved in all training activities, savings schemes and enterprise development (see section 3.2 above).

7. *Affordable and clean energy* by introducing biogas production and reducing reliance on firewood (next year)

8. *Decent work and economic growth* through selling unproductive livestock, improving dairy production and diversifying products for barter or sale (next year).

15. *Life on Land* by reversing soil erosion, forest degradation and biodiversity loss (restoration of large gully and red panda habitat- see section 3.2).

5. Project support to the Conventions, Treaties or Agreements

The project is contributing 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 in the following ways;

CBD SG A: All partners will work with herders to jointly implement landcare activities that yield livelihood benefits so herders are able to engage in red panda conservation and adapt to climate change. (National Targets 1, 10, 11, 17, 19)

[Progress has been made to train and work with herders in land and habitat restoration as described in sections 3.1 and 3.2]

CBD SG B: The project aims to reduce grazing pressure and tree harvesting by providing fodder alternatives, rationalising livestock, forest regeneration and trialling biogas. (Targets 4, 7, 15)

[Progress has been made to providing fodder alternatives and forest regeneration as described in sections 3.1 and 3.2]

CBD SG C: On-ground works, management zoning, research and education on red pandas will help to conserve the species and protect habitat. (Targets 5, 12, 14)

[Progress has been made with on-ground works, pasture and red habitat zoning, red panda monitoring and community education as described in sections 3.1 and 3.2]

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

[Progress has been made on gully rehabilitation and forest regeneration as described in sections 3.1 and 3.2]

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

[Progress has been made to meeting this goal as described in section 3.1 and 3.2]

The host country CBD implementing agency is the National Biodiversity Centre. A meeting was held with Dr Tashi Yangzome, NBC Director in Bhutan. NBC coordinates the National Biodiversity Committee and is charged with developing and reviewing the National Biodiversity Strategy and Action Plan. Currently they are working on the 6th National Report on how Bhutan has met the Strategy Targets. The contribution of our project to meeting the national targets was shared with NBC and the Director, DOFPS.

6. Project support to poverty alleviation

In this project, 120 households (600 people) are the main beneficiaries including 200 women. The baseline household survey showed that 91% of these households own cattle and/or yaks and have the potential to benefit from increased livestock productivity by growing winter fodder, reducing calf mortality and focussing on productive milking animals. A quarter of these

households have sown pasture this year which will be used for making silage for winter feed. A direct impact will be less labour and risk required to lop trees. If the impacts are positive we anticipate that other households will follow. However it make take a few more years for poverty impacts in terms of increased income from cheese sales. In the meantime, the savings scheme is already having an impact on poverty alleviation by creating larger and faster returns than local lenders or banks. Group members are taking loans to build up enterprises as shown in section 3.2. The wool processing centre will provide opportunities for women from Gengu and Merak villages to process their wool and make more textiles for home use and sales. This will decrease labour input and increase income. The study tour has prompted several families to plan for red panda tourism, homestays, apiculture and rhododendron wine production. When we inquired about vulnerable families in Merak village, the group president explained that there are only a couple of families with disabilities. They receive government support and are not required to contribute to community contributions. Ideas for elder welfare have not been forthcoming from the community as of yet so further investigation is needed.

7.   Project support to gender equality issues

The project aims to encourage equal participation of men and women in group decision making, project implementation and management. In the last year, there has been active participation by women in the savings group training, committee establishment and member contributions (see sections 3.1 and 3.2). Women have also been involved in fencing, tree planting and pasture improvement. Several women representatives went on the study tour to Sikkim to learn about hosting visitors, managing waste and making eco-products to sell to tourists. We will be encouraging young women to become red panda guides for an ecotourism program in the coming year.

8.   Monitoring and evaluation

We have continued using the adaptive learning approach to monitoring and evaluation. Discussions and decisions are recorded at community-agency meetings (available in Dzongka language only) and project meetings as resolutions (see examples at Annex 4.1 and 4.4). This is important not only as a record of the meeting but also as an acknowledgment of participant input and ongoing commitment to future actions. Herder and staff learning activities such as the study tour to Sikkim are recorded including feedback on what was learnt (see Tour Report attached). The savings scheme is monitored using the group ledger records, meetings with the group president/secretary. Impacts are evaluated by interviewing members who are depositing savings and/or taking loans (see section 3.2). As more impacts emerge, we will develop case studies to showcase the livelihood outcomes. Photo-points are the main monitoring tool for the landslide restoration at this stage. Camera traps, scat detection and sightings remain the red panda monitoring method. As bamboo and forest regeneration starts to occur, we will measure changes in forest condition. Likewise pasture production will be measured using dry matter method, species composition and soil testing. Changes in livestock production, cheese sales, household income, family wellbeing and red panda awareness will be evaluated from the final household survey. The household survey will not be conducted this year as it is too early for livelihood changes to be apparent. We will conduct the final household survey in March 2019.

9.   Lessons learnt

Regarding administration, we have learnt that it is more efficient to transfer funds to Bhutan on a six monthly basis as the fund incorporation process takes at least two months in country. We underestimated the cost of materials in Bhutan which has impacted on the scale of restoration activities. However, tackling the worst area first will significantly reduce downstream damage and give communities and local officials confidence that the area can be stabilised with ongoing restoration and commitment. Two initiatives in the last year are proving successful in terms of social learning and potential livelihood improvement. The study tour to Sikkim created awareness of how conservation can benefit households, and revealed the power of peer learning. Participants came home inspired with subsequent plans to develop red panda ecotourism and make rhododendron wine, honey and crafts for sale. The savings groups have worked well to date with increasing membership, deposits and loans. Enabling households to invest in community run schemes is highly recommended, provided they are well run and transparent. The other important lesson from the past year has been 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.

10. Actions taken in response to previous reviews (if applicable)

Clarifications and actions taken in response to last year's report are attached separately.

11. Other comments on progress not covered elsewhere

12. Sustainability and legacy

The project has become more widely known within Bhutan as a result of national media coverage, social media and word of mouth (section 3.2 evidence). The project Blog site has been particularly effective in spreading stories emanating from the project to a national and international audience via professional and organisation links (eg ResearchGate, RPN, SWS, ALI, ILWS. RedPandaZine and personal FB sites). The national and transboundary Red Panda Workshop held in Tashigang has laid the foundation for increased commitment to red panda research and management across the country and with neighbouring states of Sikkim and Arunachal Pradesh. A working group has been formed to finalise the Action Plan and seek endorsement from GOB. The planned exit strategy is still valid and no changes are proposed. The actions above with ongoing support from SWS and the Ministry of Agriculture and Forests will ensure a sustained legacy.

13. Darwin identity

In all communications, the project has been recognised as a distinct project funded by the UK Darwin Initiative. The project has publicised the UK Darwin Initiative on the project Blog site https://redpandabhutan.wordpress.com/. In the last year, the project blog pages have been viewed by an average of 40 visitors per month from 41 countries. Most frequent visitors were from Australia, Bhutan, Japan, USA, India, UK, Nepal and Germany.

The Red Panda Network, Sakteng Wildlife Sanctuary, Redpandazine and Australian Landcare International continue to provide 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://alci.com.au/

The UK Darwin Initiative and project has also been promoted on the 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 Annual Meeting and Red Panda workshop banner (see blog stories), on road signage and in all reports and presentations. International and Bhutan partners at the national level are already familiar with the Darwin Initiative Fund due to previous projects in Bhutan and Nepal.

14. Project expenditure

Table 1: Project expenditure <u>during the reporting period</u> (1 April 2016 – 31 March 2017)

Project spend (indicative) since last annual report	2017/18 Grant (£)	2017/18 Total Darwin Costs (£)	Variance %	Comments (please explain significant variances)
Staff costs Dr Karma Tenzing			+16%	Annual increase in salary and on-costs slightly higher than budgeted.
Consultancy costs				
Overhead Costs			-18%	Remaining CSU Levy will be charged once Q4 payment is made.
Travel and subsistence			-15%	Joanne Millar did not travel to Bhutan in 2017 only Karma Tenzing.
Operating Costs (funds to partner organisation) (CSU operating)			-100%	Exchange rate difference. Journal paper not submitted yet. Promotion material being developed.
Capital items				
Monitoring and evaluation			-4.1%	Included in CSU travel budget and stores.
TOTAL			**-9.0%**	

Annex 1: Report of progress and achievements against Logical Framework for Financial Year 2016-2017

Project summary	Measurable Indicators	Progress and Achievements April 2016 - March 2017	Actions required/planned for next period
Impact 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.		Herders and agency staff have embraced the community landcare approach in the last year by participating in land restoration works, pasture establishment, group management and learning, savings schemes, red panda monitoring and education.	
Outcome Restoration and protection of 400ha of red panda habitat, watershed and grazing areas for 120 herding households and 10,000 downstream residents leading to improved rangeland management, biodiversity, and livelihoods.	0.1 7.5 sq.km of eroded gullies revegetated achieving 80% increase in groundcover, 60% reduction in soil erosion and 70% reduction in property damage for 10,000 downstream residents by 2019 from 2016 levels. 0.2 Sales of 500 unproductive livestock (20% of total herd), 15% increase in natural pasture productivity and 50% increase in winter fodder availability leading to 25% increase in milk production for 80% of households by 2019 from 2016 baseline survey. 0.3 Household income increases by 20% from cheese sales and/or women's enterprises for 60% of families leading to 30% increase in wellbeing satisfaction by 2019 from 2016 baseline survey. 0.4 70% of households reduce lopping of trees with an increase in fodder availability for red pandas of 50% by 2019 from 2016 baseline assessments. 0.5 Group capacity and motivation to manage landcare projects, welfare and conservation programs enhanced by 50% by 2019 from 2016 baseline survey.	Fencing, check dams and planting of the first major gully (20 ha). Pasture sown over 80 acres (32ha). Fertiliser trial established. Two savings schemes established with 134 members and 5 families taking loans for livestock, cheese making, house construction and burr bowl trade. Tree nursery established 50 ha of red panda habitat fenced with evidence of bamboo regrowth. Ten infrared camera traps installed and monitored. Red Panda Conservation and Pasture management study tour for herders results in plans for ecotourism, apiculture and dairy.	Planting of bamboo in red panda core areas. Pasture trials established over another 48 acres with training in pasture management. Setting up wool processing centre Discussion and agreement on selling unproductive animals Biogas unit and cattle stall construction Red panda conservation sessions at local schools and villages.

Output 1. Restoration of eroded gullies, regeneration and zoning of critical red panda habitat, and red panda research conducted.	1.1. Five gullies fenced off with 85 check dams and planted with 25,000 trees and bamboo seedlings with 80% survival rate by 2019.	1.1 One gully fenced with 55 check dams built and 22,000 seedlings and cuttings planted
	1.2. 400 ha of red panda habitat surveyed annually for condition, forage availability, presence/absence, and roosting/feeding sites, with zones established for conservation management by 2018.	1.2 Ten camera traps installed across the project area but no photos of red panda. However, scats have been sighted by SWS staff and herders report two sightings of animals in a 50ha core zone area which has now been fenced off.
	1.3. One community tree nursery established by end of 2017 employing at least 3 people from disadvantaged families.	1.3 Private tree nursery established

Activity 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 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 1.3 Conduct three surveys on Red Panda population and habitat condition (400 Ha) using camera traps, scat detection, sightings and roosting sites in strategic locations and at strategic times. 1.4 Establish one community nursery with a capacity to grow 10,000 seedlings and saplings/year and employ 3 disadvantaged people as a social enterprise in 2017 1.5 Conduct policy dialogue with DOFPS, MOA to explore the potential to declare the project site as a critical watershed.		1.1 Land management training conducted on the job for 130 herders in fencing, planting and building checkdams. 1.2 The largest landslide area at Drana has been fenced and planted with 22,000 seedlings. 55 checkdams of different designs installed. 1.3 Another survey conducted in different area using scat detection and camera traps. 1.4 Private nursery established 1.5 Discussions on declaring the area as a critical watershed have been held with the Director of Sakteng Wildlife Sanctuary and Director of DOFPS. The community needs to be consulted and talks held with the Watershed Management Division.

Output 2. Sustainable rangeland management and pasture hay production achieved, with improved livestock management and household income.	2.1 Four training events for 120 households and one study tour for 25 people held in 2016 (at least 50% women) in sustainable rangeland management, perennial pasture development, fodder conservation and livestock management.	2.1 On the job training in pasture establishment provided for 32 households at Sheytemi. Study tour with 12 participants (4 women) visited dairy farm at Bumthang to learn about pasture management and fodder conservation.
	2.2 Five (1ha) pasture trials established in 2016 producing average of 1000kg/ha of hay annually, scaling out to 120 plots by 2019.	2.2. 80 acres of pasture established involving 32 households.
	2.3 Voluntary sale of 500 unproductive cattle and yaks to India by 2019.	2.3 To be revisited (see section 3.2).
	2.4 Milk production increased by 25% and 20% increase in herder income from cheese sales by 2019 from 2016 survey	2.4 To be assessed in final year

Activity	
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.	2.1 The baseline household survey was conducted in 2016
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.	2.2 Completed in March 2018
2.3 Arrange 4x3 day training program for 120 herders (50% women) on sustainable rangeland management, improved pasture development, fodder conservation and livestock management.	2.3 Pasture establishment training completed in April-May 2018. Pasture management and fodder conservation training will occur in this final year.
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.	2.4 32ha completed this year
2.5 Reduce unproductive animal population by selling 500 head across the border to Arunachal Pradesh, India by end of project.	2.5 To be revisited this year

Output 3. Alternative energy technology and vegetable production piloted to reduce firewood consumption and improve family nutrition.	3.1. Two biogas units fully operating in two pilot households with 40% reduction in firewood consumption and 80% increase in vegetable consumption by 2019 from baseline survey in 2016.	3.1 Delays in biogas trial due to considerations of portability and design. To be trialled in this coming year.
	3.2. Biogas units create interest from 60% of households and inspire an increase vegetable growing and consumption by 80% by 2019 from 2016 baseline survey.	3.2 To be assessed

Activity	
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.	3.1 Not completed yet. Construction planned for June.
	3.2 Not completed yet. Construction planned for June.
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 No need for this activity as most households have greenhouses
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.	3.4 Not needed as already completed by other projects
3.4 Organise training in vegetable production and supply of vegetable seeds.	

Output 4. Competent community-based landcare group established with two women's savings groups enabling	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.	4.1 Completed. See 2017 Annual Report and website.

investment in small enterprises and community education.	4.2 Two women's groups formed involving 200 women, with least 50% (100 women) participating in savings scheme by end of 2017 and 70% (140 women) engaging in diversified enterprises by 2019.	4.2 Completed in August 2017 with 134 members (60% women) and five families taking out loans to build up 3 enterprises.
	4.3 One study tour for 10 people to eastern Nepal in 2017 to learn about red panda conservation from village communities.	4.3 Completed in March 2018 with 14 participants visiting Sikkim (see section 3.2)
	4.4 100% increase in awareness of red panda conservation by all Merak village households including schoolchildren from by 2019.	4.4 To be assessed.
Activity 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.		4.1 Training program completed and group constitution and by-laws established in 2016 4.2 Two savings groups established in 2017. 4.3 Wool processing equipment supplied in 2017 and 2018. 4.4 Study tour completed to Sikkim in 2018. 4.5 Drama performance held at Merak primary school in April 2018. Films shown.
Output 5. Project results and lessons learned from the landcare approach and red panda conservation disseminated.	5.1. Project results and lessons presented annually to Merak and Sakteng villages, and downstream Radhi and Phongmey villages with local government officials.	5.1 Planning meetings held with Merak village only to date.
	5.2. Information on red pandas and landcare outcomes distributed regionally and nationally every year via websites, posters, brochures, radio and TV.	5.2 Project Blog site maintained. Good media coverage on project events (see section 3.1 and 3.2 and Annexes.)
	5.3. One workshop to inform senior government officials of project findings and outcomes and make policy recommendations.	5.3 Workshop to be held in 2019.

	5.4. Two journal papers published in open access journals and red panda data shared with conservation organisations.	5.4 Draft journal paper in progress based on household survey results.
Activity 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		5.1 Planning meetings held with Merak herders in August 2017 and January 2018. 5.2 Film and cartoon on red panda, and wildlife DVDs given to Merak primary school. 5.3 Annual Project meeting and Red Panda Workshop publicised on national radio, TV and newspaper, and DOFP website. Stories from the project blog have been shared on SWS FB, Red Panda Network website, and ILWS website and FB. 5.4 To be held in Year 3. 5.5 Meetings were held in August 2017 and April 2018 to plan activities and budget. The next meeting will be held in November 2018 review achievements and plan activities for the remainder of Year 3. 5.6 Draft journal paper in progress based on household survey results.

Annex 2: Project's full current logframe as presented in the application form (unless changes have been agreed)

Project summary	Measurable Indicators	Means of verification	Important Assumptions
Impact: 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. .			
Outcome: Restoration and protection of 400ha of red panda habitat, watershed and grazing areas for 120 herding households and 10,000 downstream residents leading to improved rangeland management, biodiversity, and livelihoods.	0.6 7.5 sq.km of eroded gullies revegetated achieving 80% increase in groundcover, 60% reduction in soil erosion and 70% reduction in property damage for 10,000 downstream residents by 2019 from 2016 levels. 0.7 Sales of 500 unproductive livestock (20% of total herd), 15% increase in natural pasture productivity and 50% increase in winter fodder availability leading to 25% increase in milk production for 80% of households by 2019 from 2016 baseline survey. 0.8 Household income increases by 20% from cheese sales and/or women's enterprises for 60% of families leading to 30% increase in wellbeing satisfaction by 2019 from 2016 baseline survey. 0.9 70% of households reduce lopping of trees with an increase in fodder availability for red pandas of 50% by 2019 from 2016 baseline assessments. 0.10 Group capacity and motivation to manage landcare projects, welfare and conservation programs enhanced by 50% by 2019 from 2016 baseline survey.	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. 0.2 Records of livestock sales by group committee. Pasture measurements of dry matter yield in winter grazing areas and fodder plots taken every two months. Milk production recorded weekly in dairy books by herders and collated monthly by DOL staff. 0.3 Monthly records of cheese and enterprise sales kept by group committee. Income and wellbeing data recorded in annual household surveys including welfare of elders and disadvantaged families. 0.4 Annual household surveys and on-ground habitat condition assessments. 0.5 Annual household survey, interviews with group committee and agency staff, observations, committee records, feedback from group training workshops.	Favourable climatic conditions for re-vegetation and pasture establishment. Cattle and yaks do not break through fences into gully areas. Committee able to keep records. DOL take accurate pasture measurements and collate milk production data. Yak/cattle herding continues to be the main source of livelihood and occupation for semi-nomadic yak herders in the area Income increases from cheese yields not price increases. Can distinguish between enterprises generated from savings scheme from other enterprises. Pasture hay production is enough to enable reduction in tree lopping. Bamboo plantings and regeneration has high survival rates and is not grazed by cattle, yaks or goats. Good leadership, minimal conflict and cooperative committee that works well with agency staff.

Output 1			
Restoration of eroded gullies, regeneration and zoning of critical red panda habitat, and red panda research conducted.	1.4. Five gullies fenced off with 85 check dams and planted with 25,000 trees and bamboo seedlings with 80% survival rate by 2019.	1.1. Records of plantings and survival rates included in annual project reports with photos.	Herders do not breach fenced degraded areas for illegal grazing and lopping. No flash flooding or drought that eliminates plantings.
	1.5. 400 ha of red panda habitat surveyed annually for condition, forage availability, presence/absence, and roosting/feeding sites, with zones established for conservation management by 2018.	1.2. Annual research reports on red panda habitat condition, sightings, scat presence, feeding and roosting sites. Video and photos presented.	Good research design, implementation and co-ordination between SWS rangers, UWICE and ILWS researchers, herders, WWF and Red Panda Network.
	1.6. One community tree nursery established by end of 2017 employing at least 3 people from disadvantaged families.	1.3. Record of materials used and employment scheme documented in annual project reports with photos.	Community willingness to establish and manage nursery with appropriate employees. Suitable site and available water. Funds received from Bhutan Trust Fund for Environment and Conservation.
Output 2			
Sustainable rangeland management and pasture hay production achieved, with improved livestock management and household income.	3.5 Four training events for 120 households and one study tour for 25 people held in 2016 (at least 50% women) in sustainable rangeland management, perennial pasture development, fodder conservation and livestock management.	1.4. 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.	Training courses held at suitable times with at least one household representative attending including women.
	3.6 Five (1ha) pasture trials established in 2016 producing average of 1000kg/ha of hay annually, scaling out to 120 plots by 2019.	1.5. Cadastral survey of leased plots. Results of plant survival rates, dry matter yields, pasture composition, and soil tests included in annual project reports.	Government support for leasing plots for establishment of improved pasture. Environmental conditions suitable for pasture sowing with adequate weed control. Livestock do not break into pasture plots.
	3.7 Voluntary sale of 500 unproductive cattle and yaks to India by 2019.	1.6. Records of livestock sales in annual project reports.	Herder willingness to sell unproductive animals. Religious institutions do not hinder sales of unproductive animals.
	3.8 Milk production increased by 25% and 20% increase in herder income from cheese sales by 2019 from 2016 survey.	1.7. Records of monthly milk production and cheese sales by DOL, and change in household income from annual surveys and case studies.	Cows are healthy and there is enough labour for milking and cheese making. Continued strong demand and price for cheese.
Output 3			
Alternative energy technology and vegetable production piloted to reduce firewood consumption and improve family nutrition.	3.3. Two biogas units fully operating in two pilot households with 40% reduction in firewood consumption and 80% increase in vegetable consumption by 2019 from baseline survey in 2016.	3.1 Pilot household interview report and technical operating information in annual project reports. Demonstration video produced.	Biogas technology works for high altitude areas and is available at a reasonable cost.
	3.4. Biogas units create interest from 60% of households and inspire an increase vegetable growing and consumption by	3.2 Number of expressions of interest to purchase a biogas unit, number of vegetable gardens and daily vegetable consumption	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.

	80% by 2019 from 2016 baseline survey.	recorded in annual household surveys, and case studies.	Vegetables establish and grow well and people develop a taste for them.
Output 4 Competent community-based landcare group established with two women's savings groups enabling investment in small enterprises and community education.	5.7 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. 5.8 Two women's groups formed involving 200 women, with least 50% (100 women) participating in savings scheme by end of 2017 and 70% (140 women) engaging in diversified enterprises by 2019. 5.9 One study tour for 10 people to eastern Nepal in 2017 to learn about red panda conservation from village communities. 100% increase in awareness of red panda conservation by all Merak village households including schoolchildren from by 2019.	4.1 Group training reports for each workshop with participant evaluation of what they learnt and level of confidence to implement group activities. 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 and documented case studies on their experiences. 4.3 Study tour report included in annual project report. Short video produced. 4.4 Annual household surveys and school participant evaluation of conservation activities.	The selected group management committee has adequate gender balance and skills over time to manage landcare activities. Trained local extension agents and park rangers stay committed to group. Women have time and willingness to attend training sessions, invest savings and start new enterprises or build on existing ones. Security situation in eastern Nepal is safe allowing travel to and from sites. 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.
Output 5 Project results and lessons learned from the landcare approach and red panda conservation disseminated.	5.5. Project results and lessons presented annually to Merak and Sakteng villages, and downstream Radhi and Phongmey villages with local government officials. 5.6. Information on red pandas and landcare outcomes distributed regionally and nationally every year via websites, posters, brochures, radio and TV. 5.7. One workshop to inform senior government officials of project findings and outcomes and make policy recommendations. 5.8. Two journal papers published in open access journals and red panda data shared with conservation organisations.	5.1. Information and photos in project annual reports. 5.2 Information and photos in project annual reports. 5.3 National workshop proceedings on sustainable rangeland management and Red Panda habitat conservation policy recommendations. 5.4 Journal papers and datasets published by open access.	At least 70% of all households and government officials at village meetings. Assistance from Bhutan Foundation is forthcoming. Government of Bhutan adopts policy recommendations. Papers accepted

Activities (each activity is numbered according to the output that it will contribute towards, for example 1.1, 1.2 and 1.3 are contributing to Output 1)
1. Restoration of eroded gullies, regeneration and zoning of critical red panda habitat, and red panda research conducted

1.2. Conduct on-the-job training for herders (120 herders, 50% women) in sustainable land management methods and techniques based on the Landcare approach

1.3 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

1.7. Conduct three surveys on Red Panda population and habitat condition (400 Ha) using camera traps, scat detection, sightings and roosting sites in strategic locations and at strategic times.

1.5 Establish one community nursery with a capacity to grow 10,000 seedlings and saplings/year and employ 3 disadvantaged people as a social enterprise in 2017

1.6 Conduct policy dialogue with DOFPS, MOA to explore the potential to declare the project site as a critical watershed.

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.

2.5. Reduce unproductive animal population by selling 500 head across the border to Arunachal Pradesh, India by end of project.

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.

3.4. Organise training in vegetable production and supply of vegetable seeds.

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 3: Standard Measures

Table 1 **Project Standard Output Measures**

Code No.	Description	Gender of people (if relevant)	Nationality of people (if relevant)	Year 1 Total	Year 2 Total	Year 3 Total	Total to date	Total planned during the project
6A	Training savings scheme	Female and Male	Bhutan	98 herders 3 district staff				
6B	Training in savings scheme	Female and Male	Bhutan	2 days				
11B	Number of papers to be submitted to peer reviewed journals							2
12A	Household survey and red panda databases to be **established** and handed over to the host country			1				2
13A	Red panda reference collections to be **established** and handed over to the host country(ies)			1				1
14A	Number of conferences/seminars/ workshops to be **organised** to present/disseminate findings			1				2
20	Estimated value (£'s) of binoculars, camera traps, iron safe, wool processing equipment, biogas units, tree nursery equipment to be handed over to host country(ies			5200				6,700
22	Number of pasture field plots and land restoration sites to be established during the project and continued after Darwin funding has ceased			1 large gully				15
23	Value of resources raised from other sources (tree nursery, wool processing equipment)			1,000				29,000 euros

Table 2   **Publications**

Title	Type (e.g. journals, manual, CDs)	Detail (authors, year)	Gender of Lead Author	Nationality of Lead Author	Publishers (name, city)	Available from (e.g. weblink or publisher if not available online)

Checklist for submission

	Check
Is the report less than 10MB? If so, please email to Darwin-Projects@ltsi.co.uk putting the project number in the Subject line.	Yes
Is your report more than 10MB? If so, please discuss with Darwin-Projects@ltsi.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.	