



Darwin Initiative Main: Annual Report

To be completed with reference to the “Project Reporting Information Note”:
(<https://www.darwininitiative.org.uk/resources/information-notes/>)

It is expected that this report will be a **maximum of 20 pages** in length, excluding annexes)

Submission Deadline: 30th April 2024

Submit to: BCF-Reports@niras.com including your project ref in the subject line

Darwin Initiative Project Information

Project reference	30-022
Project title	Ecosystem restoration of watering holes in Cambodia’s Northern Plains
Country/ies	Cambodia
Lead Partner	Wildlife Conservation Society
Project partner(s)	<ol style="list-style-type: none"> 1. Laos Buffalo Dairy (LBD), 2. Centre for Biodiversity Conservation of the Royal University of Phnom Penh (CBC-RUPP) 3. Provincial Department of Agriculture, Forestry and Fisheries (PDAFF) 4. Ministry of Environment (MOE)
Darwin Initiative grant value	£300,000
Start/end dates of project	01 April 2023 to 31 March 2025
Reporting period (e.g. Apr 2023 – Mar 2024) and number (e.g. Annual Report 1, 2, 3)	April 2023 to March 2024
Project Leader name	Nev Broadis
Project website/blog/social media	NA
Report author(s) and date	Nev Broadis, April 2024

1. Project summary

Cambodia supports the largest remaining Indochinese Dry Forests on earth. This habitat is in the protected areas of the Northern Plains Landscape (NPL) and managed by the Ministry of Environment (MOE) (Figure 1). The NPL supports some of the rarest species in the world, such as Giant Ibis, White-shouldered Ibis and Banteng, as well as a large human population reliant on subsistence use of natural resources and small-scale farming. Despite conservation actions, the NPL has lost significant populations of large herbivores - elephant, rhinoceros and four species of wild cattle would have grazed and browsed grasslands and forests extensively. These natural processes would have opened the forest and maintained large areas of grassland by preventing succession while also dispersing and deepening seasonal forest pools through bathing and wallowing. This in turn provides vital habitat for all species; in particular, globally threatened bird species such as the White-shouldered and Giant Ibis, White-winged Duck and the Eastern Sarus Crane that rely on the tropeangs as feeding grounds. These seasonal ponds are also a resource for the local communities who rely on them as a food and water source, and in some cases for the medicinal properties of the species found in them. The

demise of the seasonal pond network creates challenges for both biodiversity and local communities.

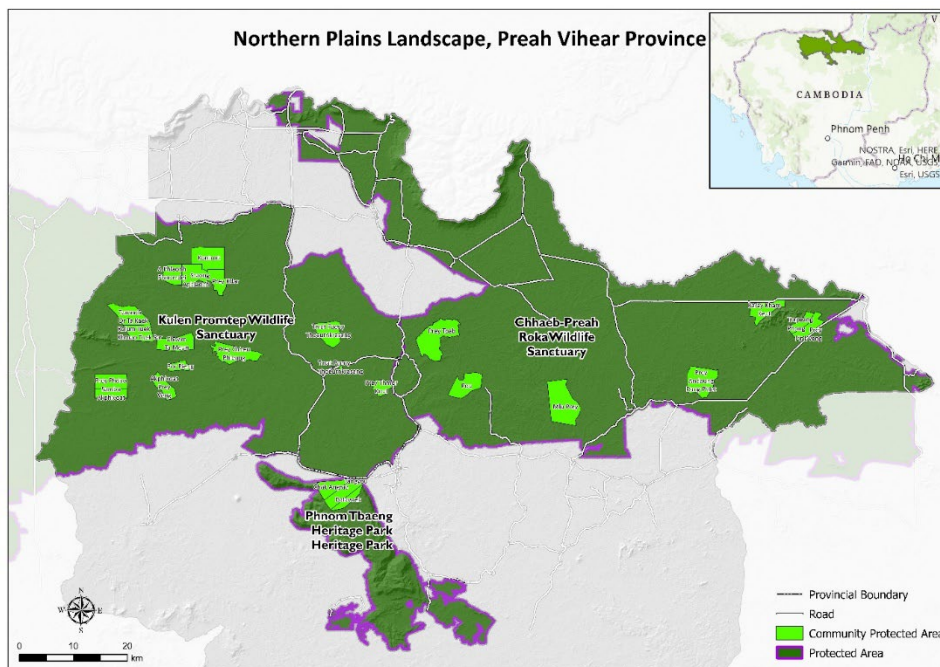


Figure 1: Map of the Northern Plains Landscape

The NPL is home to a predominantly rural population, shown to correlate with lower literacy rates than urban populations, and with a majority of the workforce involved in labour for agriculture (78.9%). Within the PA network, access to healthcare, education and employment are further restricted. Capacity and capability of the communities where WCS focuses our activities is inherently low.

2. Project stakeholders/ partners

Laos Buffalo Dairy

The partnership with LBD has been strong from before project inception to the present day. In addition to the four exchange trips, the project initiated a Telegram chat group to allow for constant project involvement by LBD on the day-to-day activities and to provide a valuable resource for husbandry, veterinary or food production queries. The project lead from WCS and the lead from LBD have regular calls and, when possible, in-person meetings to follow-up on project evolution. Challenges from the long distance between Luang Prabang and the project site are overcome through these regular calls and real-time communication channels such as Telegram. It can often be challenging linking businesses with communities, however in the case of the LBD, with their clear track record of working with local communities, these challenges were foreseen and mitigated in advance.

Centre for Biodiversity Conservation (CBC) of the Royal University of Phnom Penh (RUPP), Cambodia

The project successfully enlisted a Master of Science student from the CBC-RUPP early in the project and have collaborated with the student on the design of his thesis throughout his course. Through attending the defence of his thesis with his supervisors, the project staff were able to assist in the necessary changes to the thesis and subsequently the Biodiversity Survey Protocols. The CBC-RUPP provides input on the survey techniques through the Master's student.

Provincial Department of Agriculture, Forestry and Fisheries (PDAFF), Cambodia

PDAFF have participated in vaccination trainings across the four CPAs of the project over the last year and have supplied certain vaccinations free of charge as per government provisions. PDAFF have village veterinarians in each of the target villages who are the initial responders for veterinary interventions.

Ministry of Environment (MOE)

Through the delegation of duty to the Provincial Department of Environment, the MOE have been involved in the project through the inclusion of its staff in aspects of community work. WCS supports a staff member from the Livelihoods department who is involved in all community projects supported by WCS – including the buffalo project. In addition, law enforcement rangers have supported project activities where appropriate – such as overnight biodiversity surveys at project ponds. The MOE established a Technical Working Group for restoration of ponds using buffalo. Unfortunately, this became inactive during the Covid-19 pandemic and reinitiating regular meetings has not yet happened. This would be an effective way to involve the partner more in the project, and it is planned to include an MOE staff member on a future exchange trip to Laos Buffalo Dairy.

[Informal Partners – not for publication

Whilst investigating market linkages for buffalo products, staff and partners have discussed opportunities with the Koh Ker Temple World Heritage Site (located ~12km from one project dairy) to investigate options for the sale of buffalo yoghurt to tourists visiting this new World Heritage Site. This is seen as a key angle for the market of buffalo products and has led to discussions around marketing and sales of first yoghurt, with the potential to expand to ice cream. Additionally, project staff have met with an independent consultant who has successfully created community dairies in Africa, producing high quality cheese. A sample of project buffalo milk (2.5 litres) was provided to the consultant for testing, and production of various cheese products. This is another potential market linkage with high-end restaurants in the capital, Phnom Penh. For reasons of market advantage, it is requested not to publish the section “Informal Partners” on the Darwin Initiative website.

Several meetings were organized between WCS and School for Field Studies (SFS) to discuss about the different taxa that could be targeted during biodiversity surveys in ponds, as well as hydrological data on water quality that could be collected at the same time. The involvement of students from the SFS program for both field and laboratory work were also considered. Due to the high temperatures and lack of water in most ponds during the dry season, it was decided that the students would focus on the camera trap project as part of their research project in April 2024. A second session will be held during the fall semester in November 2024 and several students could be chosen to participate in biodiversity surveys such as invertebrates or amphibians, as well as water quality index and soil survey. This will be discussed further at the start of the fall semester and depending on student interest. As part of their research project, three SFS students led the classification and data analysis of the camera trap survey carried out from January to March 2024. They were trained by WCS staff on camera trap data management, classification, and straightforward data analysis. At the end of their research project, they produced a final report outlining the initial results of this two-month camera trap survey, the various problems encountered in the field and recommendations for overcoming these challenges.]

3. Project progress

3.1 Progress in carrying out project Activities.

Output 1: Livelihoods are developed and diversified through CPA-led buffalo banking schemes linking producers to markets.

Activity 1.1 CPA assessment across the landscape to select suitable locations for buffalo bank restoration project.

The activity has been completed in Year 1 and the assessment drew on biodiversity data, institutional knowledge, and field visits to 6 CPAs. The report on the assessment (Annex 1) culminated in a clear pathway to CPA selection. Criteria were established, upon which assessments were made of the 20 CPAs available. Criteria were: (1) presence of seasonal ponds that are within close proximity to the CPA, (2) accessibility and distance of seasonal ponds around the CPA and the villages where the CPA members reside, (3) Areas of high populations of domestic water buffalo and cows considered as a negative, (4) knowledge and experience of community members in buffalo husbandry, or presence of experienced buffalo herdsman in the CPA – a willingness to learn and participate, (5) CPAs currently active in other

projects with WCS – bird nest protection, IBIS Rice production, etc – should not be considered. On the contrary, CPAs with little interaction on conservation actions should be considered, (6) Areas of high importance for bird nests, (7) Areas of high biodiversity importance for threatened species, (8) CPAs that have experience of ecotourism, (9) Presence of schools close to CPAs or dairy locations, (10) CPA proximity to one another to maximise production of buffalo products. Following in-depth discussion based on extensive desk-based research, field visits to selected CPAs resulted in the decision to work with Akphivoat Prey Veng, Mlu Prey Keub, Sambour Akphivoat and Prey Phdao – 4 CPAs, 1 in Chhaeb Preah Roka Wildlife Sanctuary and 3 in Kulen Promtep Wildlife Sanctuary. Of these, only 1 – Sambour Akphivoat was an existing CPA Buffalo Project member. With the selection of the CPAs, this activity is considered as complete.

Activity 1.2 Using existing buffalo herds a starter stock, purchase new buffalo locally to create adequate herds for restoration projects.

Sambour Akphivoat Community Protected Area had a population of 23 Buffalo at the start of the Darwin Initiative Project (taken as 1st April 2023), these were made up of 15 females and 8 males. Of these 23 Buffalo, 13 were purchased under the previous Critical Ecosystem Partnership Fund (CEPF) project *“Pragmatic protocols for restoration of ecosystem processes in Cambodia’s wild”*, completed in June 2022, and 8 were born in the CPA. Under this activity, the herds were to be scaled up to increase the scope of the project. In Sambour, no new buffalo were purchased, however, due to the quality of care provided in this CPA, through participation in husbandry training workshops a total of 6 buffalo were born to females in this herd and zero deaths, this is a remarkable growth for this CPA, and given that 5 were female, the potential for increased dairy production is great. For the single male, he will be used either for breeding or meat sales once he reaches a suitable size. This in turn means that at the end of Year 1, the total population of Sambour Akphivoat herd was 28 individuals, of which 20 are female (see Annex 2).

Mlu Prey Keub Community Protected Area inherited their starter stock of buffalo from a CPA that had been part of the previous project but due to staffing issues were no longer being cared for sufficiently. In that CPA (Kham Keut) a total herd size of 18 animals (9 female) existed at the start of the Darwin Initiative project in April 2023. This sex ratio is not ideal for dairy purposes and so herd management was required once the herd was able to be moved to Mlu Prey Keub. Before moving to Mlu Prey Keub, one female died, meaning the total starter stock for Mlu Prey Keub was 17 animals (8 female). Due to CPA assessment, weather conditions and discussions with Kham Keut CPA Committee, the herd was moved on 30 September 2023. Since that time, herd management has been taking place meaning that 6 males have been sold to the Biodiversity Monitoring Team of WCS to be used as supplementary food for critically endangered vultures. The proceeds of sale went to the CPA bank account to be spent on their core activities. In addition to selling off excess males, breeding was very successful (given the high number of males in this herd) producing 6 (3 female) offspring in Year 1. At the close of year 1, the total population for Mlu Prey Keub CPA was 17 animals (11 female) (see Annex 3).

Akphivoat Prey Veng Community Protected Area was a new CPA for this project, part of the scaling up aspect of this important work. In December 2023, in collaboration with the implementing partners from Laos Buffalo Dairy, a buffalo purchasing trip was organised to secure the starter herd for this CPA (Annex 4). A herd of 13 animals (9 female) were purchased with the entire herd being delivered to the herdsman’s house for temporary housing whilst herd management took place. With the construction of the buffalo corral in Prey Phdao still ongoing, the buffalo were kept in Prey Veng village for several months, which also allowed for a deeper understanding of the herd dynamics. During this time, 3 buffalo were born to the herd, 2 males and 1 female. One of the older females unfortunately had complications during birth, leading to a late-stage abortion, which sadly also resulted in her death. On the 6th of February, 3 buffalo (2 females) were then transferred to Prey Phdao CPA. With 13 initial animals purchased, 1 death, 3 transfers and 3 births, the final number of buffalo in Prey Veng CPA at the close of year 1 was 12 animals (7 female) (see Annex 5).

Prey Phdao Community Protected Area was the last CPA to come online with the project, due in part to community engagement challenges. However, at the close of the year, 3 animals (2

females) were on site. This brings the total number of project buffalo to 60 animals (40 female) (Annex 6).

Activity 1.3 Collaborating with project partners, conduct training workshops both in-situ and at Laos Buffalo Dairy on animal husbandry, breeding, herd management, and milking techniques.

Over the course of Year 1, 4 separate training workshops were held, 3 in Cambodia and 1 in Lao PDR. Project partners, Laos Buffalo Dairy provided the training and schedules for all training events based on the needs of the community and in consultation with the Community Liaison Officers at WCS. The first workshop involved two specialists from the Laos Buffalo Dairy traveling to Cambodia and focused on the existing herds, conducting a full inventory, and creating a management plan for maximizing dairy production. Ear-tagging, pregnancy checks, vaccination and deworming were all conducted. An initial training on milking was also conducted, after building a simple milking stall. Milk products were then used in preparation of 2 dishes and warmed milk for consumption by local schoolchildren. During this trip, the CPAs were also assessed for their ability to conduct buffalo project activities (Annex 7). The second workshop was held at the Laos Buffalo Dairy in Luang Prabang, Lao PDR. A total of 6 community members who had been assessed for their skills during the first exchange trip were accompanied by WCS Community Technical Advisor on a 6-day trip to the fully functioning buffalo dairy managed by our partners. The community members were exposed to all the aspects of buffalo husbandry, dairy production, cheese-making and many more aspects of the working dairy over the course of the trip. Receiving hands-on practical experience in an environment such as this was invaluable for both the participants but also the trainers who were able to assess which community members could progress faster when returning to their respective communities in Cambodia (Annex 8). Exchange trip three focused mainly on herd management, purchasing the required buffalo to expand the project in the two new CPAs of Akphivoat Prey Veng and Prey Pdhao. A total of 13 buffalo were purchased, dewormed, vaccinated and general health check including pregnancy check provided. This allowed for further training of community members in these techniques. Time was also spent with Mlu Prey Keub CPA who were experiencing issues with a newborn calf (Annex 9). The last exchange trip of the year took place between 24th and 27th March with our partners at LBD sending two experts – 1 in animal husbandry and 1 chef, specializing in producing products from buffalo milk such as cheese, yoghurt and ice cream. The objectives of the visit were to conduct health checks and training, vaccination as per the annual calendar, milk production, and yogurt making and business discussions. The trip was well received and involved many community members in each target village. For those villages not yet producing milk, or not producing in a great enough quantity, travel support was provided to allow for lessons learned exchange trips to visit more advanced dairies (Annex 10).

Activity 1.4 Create 4 community buffalo dairies using simple structures and locally-sourced equipment and associated protocols for keeping buffalo in suitable environment.

Over the course of Year 1 of the project, buffalo dairies were successfully built in all 4 target CPAs. Technical advice was provided by LBD, with all labour provided by the membership of the CPA in each location. Locally available materials, including timber that had been confiscated from illegal timber trade, were used to construct the dairy, the adjacent milking stall, a simple crush for vaccination and pregnancy checks and separate stalls for newborn calves and their mothers.



Figure 2: Construction of buffalo dairy in Sambour Akphivoat CPA

In addition to the housing for the buffalo, the project invested in a biodigester producing methane gas for cooking for each of the four CPAs. These were installed by the company ATEC with support provided for training and follow up as necessary.



Figure 3: A biodigester producing gas from buffalo manure, used to heat-pasteurize milk

Activity 1.5 Assessment of community needs, and development of either school meals programme or community nutrition groups

During the fourth exchange trip, nutrition featured heavily in the training, with local community members encouraged to look at the types of food and drink available to them from a nutritional perspective. The first year of this project was geared towards initiating the groundwork to produce milk and milk products. As part of this process, a local taste for milk was essential. By inviting schoolchildren to sample milk and foods made with milk, we have successfully created a taste for what previously did not exist in the villages.

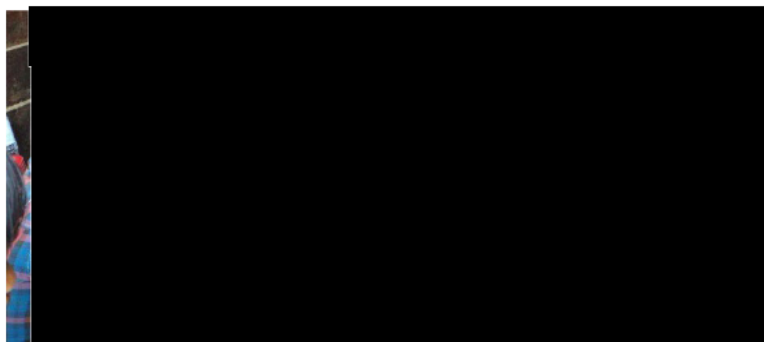


Figure 4: Schoolchildren visit the buffalo dairy on their way to school for a nutritious meal cooked with buffalo milk

The families of the herdsmen in 2 of the CPAs are now producing pasteurised milk, yogurt and rice soup made with buffalo milk and providing this to children before school starts to change the diet preference away from unhealthy snacks. Once the production of milk is more stable, this model will change to working with local food producers (particularly close to schools) to incorporate buffalo products into their meals.

Output 2: Restoration of the ecological functionality of tropeangs through community-led and managed buffalo herds.

Activity 2.1 Train community members on tropeang rotation for buffalo herds and create herding schedule based on tropeang area and herd size.

The key part of this activity was to assess ponds located near to the communities based on predefined criteria to decide on which ponds to include in the project either as a control or an experiment. This was conducted through a series of desk-based exercises (Annex 11) and field visits with the community (Annex 11). One of the CPAs (Sambour) is an extension of a previous CEPF project and so the ponds were simply carried through to this project. A total of 8 ponds are studied here, with 3 of them as experimental ponds – the ponds that are restored by buffalo. For Prey Pdhao, 6 ponds were selected, with 2 of those being experiment ponds for restoration. In Prey Veng CPA, 6 ponds were selected, with 2 of those being designated as experiment ponds. Finally, in Mlu Prey Keub CPA a further 6 ponds were selected, with 2 of those being designated as experiment ponds. This brings the total number of restoration ponds that buffalo must be rotated through to 9 (Annex 12 - 16). For the herding of buffalo, since Sambour was our previous pilot project for this activity, the herds were already rotating through the ponds there, with the herdsman moving on with the herd when they chose to move on. Through the training workshops, as part of husbandry, the new herdsman at each of the 3 CPAs were trained how to herd the buffalo by the herdsman from Sambour, including tying the halter using non-cruel methods (ropes were removed from the nasal passage of buffalo that were purchased with them attached). Experiences and lessons learned by the skilled herdsman from Sambour were used to inform the new herdsman from other CPAs.

Activity 2.2 Collaborating with project partners, create a tropeang survey protocol as a means to assess biodiversity value and complete surveys in project tropeangs.

Over the course of the year, many discussions were had with informal partners and key WCS staff on the methodology for conducting biodiversity assessments of the project ponds. Since this forms the main work of the MSc student's thesis, discussions were also had between the student and his university supervisors on various methodologies. Field tests were carried out on the methodologies (Annex 17) in close collaboration with the masters' student. The result was two separate protocols, one based on hydrological factors to consider (Annex 18) and a second protocol focusing on fish and amphibians (Annex 19).

Activity 2.3 Conduct both community workshops including field training, and extended support for tropeang monitoring using previously-developed pragmatic tropeang monitoring protocols & 2.4 Conduct community monitoring of tropeangs on a monthly basis and adaptively update the herding schedule based on results.

In the first part of the year, the Monitoring of Seasonal Forest Ponds Protocol for Community Researchers was translated into Khmer language (Annex 20) and tested extensively with Biodiversity Staff. Following this a Kobocollect form was produced and, using these tools as a teaching aid, the WCS Biodiversity Team began teaching community members and recruiting suitable candidates in each of the 4 target CPAs. Candidates had to be able to dedicate time each month to monitor the ponds, follow a Kobocollect form for data gathering, learn and become adept at sketch-mapping, and be compliant under protected area management rules through the WCS Compliance Monitoring Unit. The Biodiversity Team began conducting monitoring with community members observing initially, then gradually taking over each part of the monitoring process until they felt comfortable conducting these sessions with oversight only. Up to the end of Year 1, the community members still required oversight from the Biodiversity Team and capacity-building will continue into Year 2.

Activity 2.5 Conduct camera trapping surveys during the dry season to assess use of tropeangs by mammal and bird species.

During the dry season of Year 1, the biodiversity team conducted a camera trap survey from January 10 to March 20, 2024. In total, 9 camera traps were deployed, but it was only possible

to extract data from 8 of these cameras. Of the 8 cameras that remained functioning, 3 were positioned at experimental ponds and 5 were positioned at control ponds. The camera trap data was analyzed by informal partners at the SFS and used as a training tool for the undergraduate thesis of a group of visiting SFS students. The full report for this first camera trap survey can be found in Annex 21.

Output 3: Globally threatened wetland biodiversity is protected through community conservation activities.

Activity 3.1 Train and build capacity of CPA patrol teams on the use of SMART and patrol techniques used in trapeang protection, with a focus on poisoning and snaring.

The Conservation Technology Team of WCS conducted 4 trainings on SMART Patrolling with communities within the 4 target CPAs over the course of Year 1 (Annex 22-25). The training sessions are predominantly on-the-job training with classroom sessions on the background and technical aspects of SMART.

Activity 3.2 Conduct monthly community patrols in the project area, in collaboration with MOE to ensure forest crimes are adequately addressed.

Community Patrolling, with the good cooperation between the communities and the Ministry of Environment rangers, successfully operated throughout the target CPAs in Year 1. Law enforcement activities are based on the by-laws of the CPA, and under the jurisdiction of the Provincial Department of Environment mandate. Deterrence remains one of the strongest tools for these patrols with illegal actors opting to move out of areas that are frequently patrolled. Over the course of the year, the communities improved their patrolling skills and were able to work closely with the park authorities to deter illegal activities in their community areas (Annex 26-29).

Activity 3.3 Community members conduct bird nest monitoring and protection based on species requirements.

Bird nest protection occurred in 3 out of the 4 target CPAs in Year 1, focusing on target species such as Lesser Adjutant (*Leptoptilos javanicus*), Sarus Crane (*Grus antigone*), and Giant Ibis (*Pseudibis gigantea*). Of the 40 nests protected by community members, 10 (25%) were in the vicinity of the pond restoration project. All nests hatched and fledged successfully (Annex 30).

Activity 3.4 Enlist an MSc Student from a national university to conduct research on habitat biodiversity of restored tropeangs.

In June of 2023 we formally welcomed Mr. LY Kunthy as our intern at WCS (Figure 5), conducting his Masters' research on the habitat of restored ponds in the Northern Plains Landscape with the Royal University of Phnom Penh (RUPP). Kunthy worked closely with our team to create the methodologies for his study based on the needs of our project. Successfully defending his thesis proposal in February 2024, Kunthy immediately began fieldwork with our team collecting data for his thesis and in support of the buffalo project activities (Annex 31).



Figure 5: MSc Student, LY Kunthy at the Royal University of Phnom Penh, Cambodia

3.2 Progress towards project Outputs

Output 1: Livelihoods are developed and diversified through CPA-led buffalo banking schemes linking producers to markets.

1.1 By the end of Y1, buffalo herds across 4 CPAs will increase through purchasing 25 buffalo and breeding from a baseline of 30 animals up to 60 animals with herd dynamics at optimum levels for milk and meat production.

Output achieved, refer back to section 3.1, Activity 1.2.

1.2 By end of Q1, Y2, at least 20 community members (at least 60% women) will be managing buffalo banks and trained in animal husbandry techniques that maximize production to provide income generation to the CPA Committee of at least \$2,400 per year per CPA.

Output ongoing, preliminary income generation is based on buffalo sales (see Section 3.1, Outcome 0.2). Within Year 2, income generation will include sales of yoghurt and potentially cheese.

1.3 By end of Q2, Y2, buffalo herds will be producing a combined daily average of 10 litres of milk to support 100 children (50 girls/50 boys) across 4 communities.

The project is on target to achieve this output. Over a 7-month period, Sambour CPA dairy produced a total of 437 litres of buffalo milk, consumed by students from the local primary school 2,938 times (each serving approximately 150ml). On average this equates to 20 children (9 girls) per day consuming milk, yogurt, or cooked food with buffalo milk. The other active dairy in Year 1, Prey Veng Akphivoat, produced a total of 25 litres of milk over the 11-day period, equivalent to 167 servings, which were consumed 130 times. On average this equates to 12 children (7 girls) per day consuming milk, yogurt, or cooked food with buffalo milk. From two CPA dairies, this represents a daily average of yield of 4.7 litres, but at a time when calving is at a low. With the introduction of two further dairies, and increased calves, the daily average is on target for 10 litres/day (Annex 34 & 35).

Output 2: Restoration of the ecological functionality of tropeangs through community-led and managed buffalo herds.

2.1 By end of Y1, 4 buffalo herds of at least 10 individuals per herd frequent at least 8 tropeangs on a rotational basis, increasing water depth by an average of least 30cm when compared against 16 control tropeangs without buffalo.

By the end of Y1, 4 herds of buffalo were established at 4 target CPAs (Annex 2, 3, 5 & 6). Due to the extent of the dry season, buffalo restoration was not possible in all target CPAs due to the complete absence of water and hence vegetation. A total of 9 ponds are visited by buffalo at the end of Y1 (Annex 32), however buffalo were not able to affect the water depth in experiment ponds prior to their drying out in 3 CPAs. For the hydrological studies of control and experiment ponds in the dry season months of November to March, experiment ponds consistently maintained higher levels of water than control ponds (Figure 6).

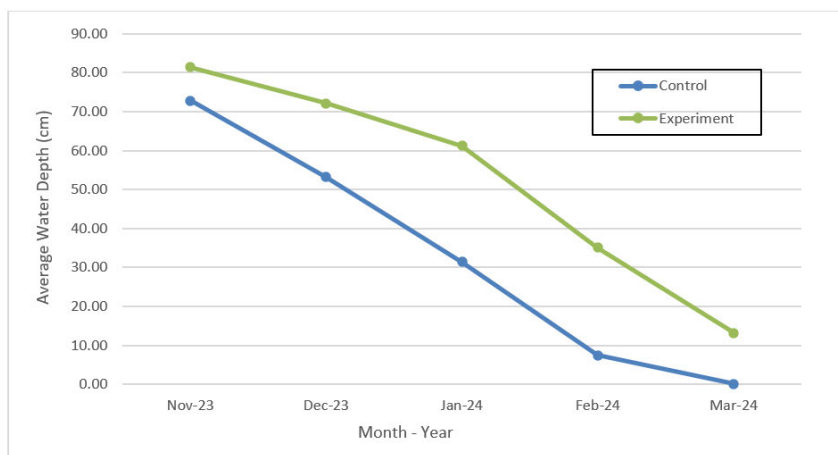


Figure 6: Water depth average each month for control ponds and experiment ponds

Depth measurements revealed that in January 2024, experiment ponds on average were approximately 30cm deeper when compared to control ponds, however, this is expected to improve once all ponds are restored on a regular basis (Annex 32).

2.2 By end of Y1, a biodiversity survey protocol, used to assess restoration of tropeangs, will be developed with project partners and will have been conducted in at least 8 tropeangs within the project area.

By the end of Year 1, the biodiversity survey protocol (Annex 18 & 19) was produced, however due to the early onset of the wet season, it was not possible to conduct the initial surveys in the dry season. However, the survey protocols were used to assess 6 project ponds in February 2024, at the end of Year 1. The data analysis for these surveys was not available in time for the end of year report, however this will be included in the next project report.

2.3 By end of Y1, 16 community members from 4 CPA (8 women/8 men) trained in habitat survey methods for biodiversity monitoring and tropeang monitoring protocols for physical characteristics and using these skills on a monthly basis to monitor and adapt use of tropeangs by buffalo herds.

A total of 24 community members participated in pond monitoring activities from September 2023 to March 2024. In the end, only four community members per CPA were selected to carry out this activity monthly (Table 1, Annex 32).

Table 1: Community members trained in pond monitoring

Name	Khmer Name	Sex	CPA
Vann Dan	វ៉ាន់ ដាន	Male	Sambour Akphivoat
In Tann	អ៊ិន តាន់	Female	Sambour Akphivoat
Loeun Dyna	លឿន ឌីណា	Male	Sambour Akphivoat
It Srey Oun	អ៊ិត ស្រីអូន	Female	Sambour Akphivoat
Chan Chav	ចាន់ ចាវ	Male	Prey Pdao
Heak Hann	ហ៊ាក់ ហាន់	Male	Prey Pdao
Sie Theary	ស៊ី ថារី	Female	Prey Pdao
Vanna Prom	វណ្ណា ប្រូម	Female	Prey Pdao
Voeun Srey Mit	វឿន ស្រីមិត	Female	Prey Veng
Mao Kim	ម៉ៅ គឹម	Female	Prey Veng
Chhann Monychhat	ឆាន់ មុន្នីឆាត	Male	Prey Veng
Loeung Ya	លឿង យ៉ា	Male	Prey Veng
Jork Vath	ចក វ៉ាត	Male	Mlu Prey Keub
Khath Sopheak	ខាត់ សុភោក	Male	Mlu Prey Keub
Phol I'm	ផល អ៊ឹម	Male	Mlu Prey Keub
Poy Ros	ប៉ោយ រស់	Male	Mlu Prey Keub

They were selected based on their ability to draw accurate sketch maps, their understanding of the Kobocollect form, and their availability to participate in pond monitoring during the project period. The data collection started at different times in the CPAs. For Sambour Akphivoat CPA,

three ponds from the previous phase of the project were removed due to the presence of uncontrolled herds of buffalo in two of them and the construction of a dam in one of them. It was then possible to start pond monitoring in September 2023 in this CPA as the CPA members and biodiversity teams were already familiar with the location of the ponds and the methodology. However, due to heavy flooding of the NPL during the rainy season, three ponds were not accessible in September 2023, and one was still hard to access in October 2023. For the other three CPAs, a more thorough assessment of the ponds was needed as well as selecting and training community members. For these three CPAs, pond monitoring therefore started later in November 2023. Between September 2023 and March 2024, a total of 144 pond monitoring events occurred in Year 1 with communities and biodiversity team collaborating to gather accurate data.

Output 3: Globally threatened wetland biodiversity is protected through community conservation activities.

3.1 By project end, at least 240 patrol days by community patrol teams comprising at least 8 members (6 women) monitor and protect 24 tropeangs and surrounding habitat. In Mlu Prey Keub CPA, 45 community members (3 women) patrolled the CPA and surrounding habitat for a total of 943 patrol days in Year 1 (Annex 26). In Prey Veng Akphivoat CPA, 106 community members (15 women) patrolled the CPA and surrounding habitat for a total of 462 patrol days in Year 1 (Annex 28). In Prey Pdhao CPA, 92 community members (15 women) patrolled the CPA and surrounding habitat for a total of 507 patrol days in Year 1 (Annex 27). Lastly, in Sambour Akphivoat CPA, 123 community members (21 women) patrolled the CPA and surrounding habitat for a total of 776 patrol days in Year 1 (Annex 29). Table 2 summarizes the total number of patrol days across the target area in Year 1.

Table 2: Summary of patrol days and members - Year 1

CPA Name	Patrol Days	#Community Members (of which #women)
Mlu Prey Keub	943	45 (3)
Prey Veng Akphivoat	462	106 (15)
Prey Pdhao	507	92 (15)
Sambour Akphivoat	776	123 (21)
TOTAL	2,688 days	366 (54)

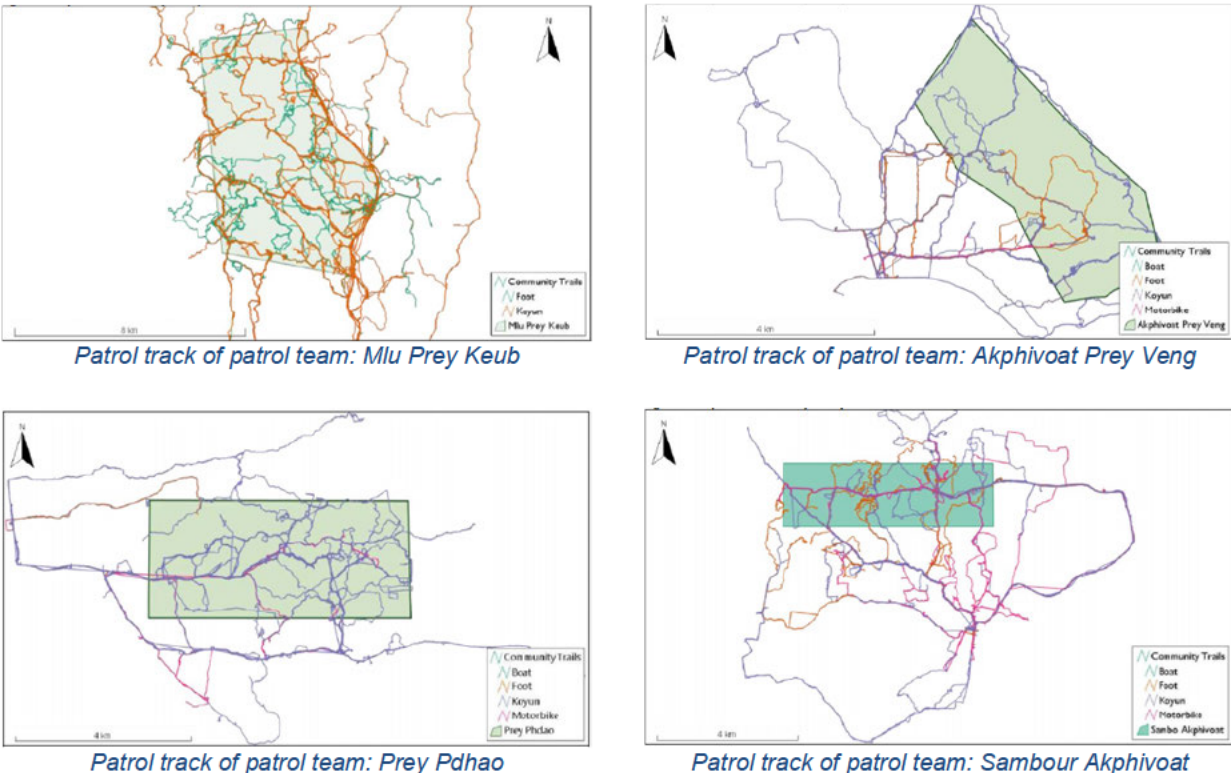


Figure 7: Patrol maps of 4 target CPAs

3.2 By end of Q1, Y2 at least 68 bird nests of globally threatened species in habitats containing project tropeangs monitored or protected by community members of which 20% are women.

During Year 1, within the target CPAs and surrounding habitat, a total of 34 nests were protected, representing 60 chicks successfully fledging. This is an ongoing output; project should achieve this during Year 2 (Annex 30).

3.3 By project end, at least 4 tropeangs show an improvement in biodiversity value based on surveys conducted by the close of Q2, Y1. Note that the project will create a protocol to assign a biodiversity value as part of Output 2.

Ongoing output, project should achieve this during Year 2.

3.3 Progress towards the project Outcome

Outcome: Globally threatened wetland biodiversity is restored through community-owned buffalos performing important ecosystem processes and protected through sustainable income, community-led monitoring, and patrolling.

0.1 At least 16 tropeangs will be monitored and at least 8 will be restored by buffalo herds by project end.

Progress toward this indicator is considered to be successful, over 35 ponds have been monitored over the course of Year 1. Of these 26 have become the project ponds to be used as both control and experiment with regular monthly monitoring by the Biodiversity Team. Of these 26, 7 have begun or are continuing restoration by buffalo (Annex 32). The means of verification have proved to be adequate, a combination of completed Kobocollect forms from the community and the deeper understanding of biodiversity value by the Masters' student's work.

0.2 4 CPA that are managing buffalo will have at least 2 community patrols (total 8) with participation from at least 25% women supported by income from buffalo products by the end of Year 1.

Progress toward this outcome has been hampered by capacity of the CPA committees to control the finance/bookkeeping for the various projects and grants that they hold. Support from the project partners has been consistent, with frequent training on accounting and administration tasks, however the foundation blocks for this type of work are weak in the communities where the project is focused. Despite this ongoing challenge, income from the buffalo project was used to support CPA activities. Since Year 1 was focusing on creating herds, sales of buffalo were restricted to those males that were surplus, a total of 7 buffalo were sold by the CPA committees during Year 1 (Sambour CPA, 1 male (Annex 2), Mlu Prey Keub, 6 males (Annex 3)), bringing an income of \$3,150 to the CPA bank account for spending on project activities such as patrolling. Despite efforts to include women further in patrolling activities, these are still dominated by male participants, due in part to cultural norms (Annex 26 and 29). With the sale of yogurt and milk products and expected increases in sales of male buffalo in the first part of Year 2, the project is certain to reach the outcome by project end.

0.3 By project end, bird nests of globally threatened species within the project area (vicinity of tropeangs) will be stable compared to the baseline at project start, based on multi-year biodiversity surveys results already conducted.

By the end of Year 1, the bird nests that are located in the vicinity of the project ponds, were all deemed to have fledged successfully based on nest protection reports. It is expected that this 100% success rate will mean that the bird nests of the target species are at least stable by project end (Annex 30).

3.4 Monitoring of assumptions

Assumption 0.1 Extreme weather events do not impact seasonal tropeangs to the extent that project interventions are negated.

This assumption holds true, with extreme weather continuing to risk the project success. In May 2023, when the project began, the wet season began early, filling seasonal ponds quickly, making baseline studies difficult. Severe flooding was experienced throughout the project area. Conversely the wet season finished early and prolonged hot and dry weather into March 2024 severely impacted water availability at all ponds across the Northern Plains Landscape. The restoration of ponds by buffalo has been shown to buffer the effects dry weather, but when this weather is extreme as in the case this year, the results can be harder to interpret.

Nevertheless, throughout the dry season months of November to March, control ponds maintained water for 3.29 months, whereas restored ponds retained water for 4.11 months on average (Annex 32).

Assumption 0.2 Mortality rates and disease can be mitigated to create healthy and productive herds.

Disease and mortality rates remain a risk to the project, although rigorous vaccination campaigns have been successful in preventing any threat to the project in Year 1. Improved husbandry techniques through in-depth training workshops have helped reduce mortality rates, with only 3 deaths from the 60-strong population of buffalo in the project during Year 1 (Annex 2,3 & 5).

Assumption 0.3 Poisoning events do not cause crashes in populations of globally threatened species.

Poisoning remains a threat to biodiversity in the Northern Plains Landscape. In Year 1, chemicals were used as a means to harvest fish, amphibians, and other wildlife within a seasonal pond being monitored in Kulen Promtep Wildlife Sanctuary (Figure 8). The community monitoring team were quick to respond, and together with key WCS staff were able to implement the pond cleaning protocol, rescue fish and other wildlife and thus minimize the effect to biodiversity. In response to poisoning events, community and government patrolling is stepped up around seasonal ponds in the dry season.



Figure 8: At the height of the dry season, ponds become scarce and deliberate poisoning increases, here WCS and the community join forces to clean a poisoned pond

Assumption 1.1 Emerging disease does not affect herds in terms of reducing productivity or increased infant mortality.

Testing of herds for diseases such as brucellosis has taken place and remains part of the monitoring process. Additionally, new or emerging disease is closely monitored by project staff. These remain a risk, as shown by the report towards the end of Year 1 on the outbreak of Anthrax in neighboring Lao PDR (Annex 33). The project team is considering the benefit of adding anthrax vaccination to the schedule.

Assumption 1.2 Travel restrictions (such as Covid-19) do not restrict training workshops being conducted at the Laos Buffalo Dairy.

This represents a risk of low likelihood but high impact. The risk did not present itself during Year 1 and is unlikely to impact the remainder of the project.

Assumption 1.3 Community nutrition groups or local schools are engaged and willing to diversify their nutrition sources.

Buffalo milk or milk products had not been used by local communities in any of the 4 target CPAs and so this risk was assumed. To mitigate this risk, the buffalo dairy in Sambour CPA and Prey Veng CPA have distributed milk and yogurt products free of charge to local community members who are interested in sampling the products. This has created a local demand for products and helped reduce the risk of non-uptake. The primary school director in Sambour CPA was invited to visit the buffalo dairy with one or two classes and also sample the products (Figure 9).

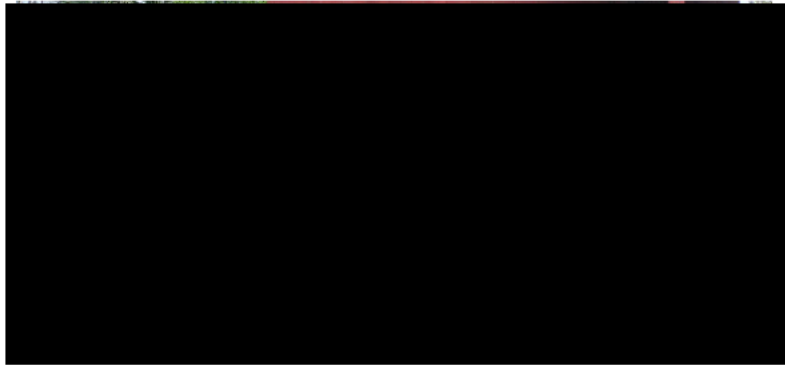


Figure 9: Students from Sambour Primary School pay a visit to the Sambour Akphivoat CPA buffalo dairy

Assumption 2.1 Buffalo numbers can be increased through purchase of appropriate animals and successful breeding.

Breeding success is not guaranteed and remains a risk. For successful dairy activities, female buffalo are required, it is not always possible to buy female buffalo. We are mitigating this risk through mixing of herds between the 4 CPAs.

Assumption 2.2 Project collaborators are able to refine techniques used to survey tropeangs, and survey techniques are possible in a local setting.

This remains a high risk, given the lack of basic understanding in the village population. One of the challenges for the biodiversity team was finding community members who were literate. Often, the community members who did possess this skill, were not able to allocate time to the project. There remains a challenge related to gender equality, with the survey work predominantly favored by men. This assumption holds true.

Assumption 2.3 Protected area land under the management of the MoE can be protected adequately, including preserving locations of project trapeangs.

Land conversion remains a threat with both high likelihood and high impact. Market prices of crops such as cashew and cassava drive land conversion and remain a threat, this assumption still holds true.

Assumption 3.1 Community patrol teams are permitted to operate in the project areas, either with or without support from MOE.

This remains a risk, with some ponds being outside of Community Protected Areas, patrolling relies on the joint patrol model, which in turn relies on local agreements with the Provincial Department of Environment to conduct these patrols.

Assumption 3.2 Nesting birds return to the project area in significant numbers and their populations are not affected by factors outside of the project area such as hunting or poisoning.

Whilst the project has some level of control over the project area, when working with species that spend part of their time outside of the protected area, or outside of the project location, there are factors which are outwith the control of the project, hence this assumption still holds true.

Assumption 3.3 A suitable candidate to conduct freshwater surveys can be enlisted.

This assumption held true for Year 1 of the project, but now that an intern has been enlisted, the only risk remains that he does not complete the project. To mitigate this risk, project staff work very closely with him to increase the likelihood of success for this masters' thesis.

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

Impact: Tropeangs within the Northern Plains Landscape are restored by buffalos that are owned by communities with sustainable livelihoods, safeguarding threatened biodiversity and creating a scalable model for other protected areas.

The multi-faceted approach of this project means that biodiversity conservation is impacted on different levels. By supporting communities to monitor the seasonal forest ponds, they are

gaining a deeper understanding of their importance. This lends itself to direct protection of these habitats, which is further bolstered by community/government patrols and direct protection of bird nests. The restoration project itself is safeguarding the vital sources of water in the dry season that local biodiversity depends on. By incorporating university students in the process, biodiversity of this critical ecosystem is kept on the agenda at a national level.

The project takes place in villages that suffer from high levels of poverty. Livelihoods are dependent on forest resources and agriculture. Through diversification of livelihoods, poverty reduction is mitigated, and resilience is introduced. The project provides direct income to a range of positions, from those caring for buffalo (herding and husbandry), those involved in milk production through dairy activities, and producers of milk products such as yoghurt. In addition, community members involved in pond monitoring, guiding, bird nest protection and patrolling all receive direct benefits from the project. In Year 1, milk products were supplied to those at risk of nutrient deficiency free of charge, directly benefitting the well-being at risk children.

4. Project support to the Conventions, Treaties or Agreements

Not applicable

5. Project support for multidimensional poverty reduction

Cambodia is designated as a Least Developed Country (LDC) according to the United Nations. The project is centered on the rural communities of 4 villages located within the protected area network of the Northern Plains Landscape. These represent some of the poorest communities in the country, communities that are heavily reliant on subsistence agriculture and natural resources – both climate vulnerable sources of income. Seasonal forest ponds are disappearing due to the extirpation of large ungulates in the landscape. By bringing buffalo back to the habitat, this trend is being influenced. Ponds that have been restored by buffalo are deeper, retain water for longer periods during the dry season and have an increased value for biodiversity (Annex 20). Ponds are vitally important for poverty reduction of these remote communities, and restored ponds offer a lifeline both in terms of water but also a myriad other resource for local communities who depend on a healthy forest environment for their survival. Direct income in terms of buffalo sales, and other project activities also improves the local economy in these small villages leading to poverty reduction for other households not directly involved with the project. For example, income from the buffalo project directly pays for patrolling, bird nest protection and monitoring of ponds. In Year 1, herds were established, now complete, the revenue will be considerably amplified in Year 2 with sales of buffalo and milk products. By directly linking with important ecotourism sites such as the Prey Veng Ecodge and the Koh Ker World Heritage Site, expansion of sales opportunities will lead to further benefits from sales of products.

6. Gender Equality and Social Inclusion (GESI)

Please quantify the proportion of women on the Project Board ¹ .	N/A
Please quantify the proportion of project partners that are led by women, or which have a senior leadership team consisting of at least 50% women ² .	50%

GESI Scale	Description	Put X where you think your project is on the scale
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¹ A Project Board has overall authority for the project, is accountable for its success or failure, and supports the senior project manager to successfully deliver the project.

² Partners that have formal governance role in the project, and a formal relationship with the project that may involve staff costs and/or budget management responsibilities.

Not yet sensitive	The GESI context may have been considered but the project isn't quite meeting the requirements of a 'sensitive' approach	
Sensitive	The GESI context has been considered and project activities take this into account in their design and implementation. The project addresses basic needs and vulnerabilities of women and marginalised groups and the project will not contribute to or create further inequalities.	
Empowering	The project has all the characteristics of a 'sensitive' approach whilst also increasing equal access to assets, resources and capabilities for women and marginalised groups	X
Transformative	The project has all the characteristics of an 'empowering' approach whilst also addressing unequal power relationships and seeking institutional and societal change	

Working with CPA Committees, the project sought to include vulnerable groups as is standard for our community activities. This is written into both the contract with the CPA for the buffalo project (Annex 36) and existing bird nest protection guidelines (Annex 37) where stipulations such as “disadvantaged groups, youth or women should be encouraged and given priority to participate” are clearly written as guidance for project staff. Some of the project activities are predominantly male led (such as patrolling) so the project staff actively promote the involvement of women in these activities. Despite these measures, the project faced early difficulties in recruiting community members for roles on the project. Women required more encouragement than anticipated, and the first exchange trip was dominated by males. However, once these initial hurdles had been overcome a pathway to greater inclusion had been made and the second Exchange trip saw an equal 50/50 ration on gender for participants from the community traveling to Lao PDR (Annex 8). Some roles are still favoured by women, for example yogurt making, where 100% of workshop participants were women (Annex 10), however this does have its advantages as this activity will be the source of income in Year 2.

7. Monitoring and evaluation

The core project activities are managed by WCS and the main partner Laos Buffalo Dairy. A telegram group has been established allowing for direct communication between partners and field staff ensuring clear messaging for the communities and instant support for buffalo husbandry and veterinary needs. The project also utilizes AirTable for project management and our in-house M&E Officer tracks all project activities through this. WCS has been employing long term biodiversity monitoring in the Northern Plains Landscape for more than two decades. This gives us a good understanding of the baseline situation on the species that we are monitoring and allows us to assess contributions towards the project outcome from the activities conducted. Project indicators such as pond characteristics, hydrological and biodiversity changes will allow us to compare experiment ponds with control ponds that have not experienced restoration from buffalo activity. Nest protection success will allow us to gauge the benefit to bird population from increasing productivity. Monitoring of CPA bookkeeping allows the project team to assess income generation that leads to support of further community conservation projects. Whilst the M&E work is the sole responsibility of WCS, this information is shared through regular reporting with Ministry of Environment and other project partners.

8. Lessons learnt

Lesson 1: Literacy is extremely low in project villages, this has caused various challenges, but in particular - data collection and forms of communication. Conversely, practical skills of community members are high. To overcome this barrier, data collection methods have been adapted to fit the capabilities of community members, including use of Kobocollect forms incorporating voice messages as well as written form. The use of these types of technologies has worked well and community members quickly become empowered to develop skills that

improve their capabilities in these and other areas. We believe that this will have knock-on effects for individuals in other areas of development.

Lesson 2: The community has a wealth of knowledge on the local habitat, and biodiversity and is an extremely important resource. By connecting the community with the researcher from the national university, a collaborative research project has been realized. This has fostered a deeper interest in biodiversity research among our community members.

Lesson 3: The project originally planned to provide nutritional benefits (in the form of buffalo milk products) free of charge to vulnerable members of the community. Following extensive conversations with project partners, both formal and informal, it was deemed important to assign value to buffalo milk products such that they become sought after by the community, thus leading to sustainability. For Year 1, the products in the form of fresh milk and yogurt were provided at no cost, for the purpose of highlighting their benefits. After close consultation with the community and the CPA committee, it is likely that we will agree on a price structure for these products and investigate ways to incorporate them into the diet.

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

Not applicable

10. Risk Management

See section 3.4, project risks remain the same.

11. Sustainability and legacy

During Year 1, the buffalo project has gained interest from local media outlets (including Kiripost – an online news outlet, and Khmer Times, the national newspaper). There has additionally been interest in the project from other organisations working with local communities, both in Preah Vihear and further afield. The interest has been on both aspects of the project, the biodiversity benefits and the community benefits. In particular, there has been interest from producers of milk and cheese products who are looking to expand their range and incorporate the better-quality buffalo milk into their products. This will increase the sustainability of the project by widening market linkages beyond what the project initially imagined. At the community level, members of other CPAs in the landscape have lodged their interest in bringing this project to their members, something which is realistic now that the starter stock of buffalo exists.

12. Darwin Initiative identity

The project was highlighted in the Darwin Newsletter: [REDACTED] with the article “Grabbing poverty by the horns”. This was further boosted by through WCS social media, including the Telegram channel of the Northern Plains Landscape REDD Project. There were cross links to the Darwin Biodiversity Challenge Funds and the Ministry of Environment. This story was later picked up by news outlets in the country and these relationships will be fostered in Year 2 to create a story around the success of the project. Darwin Initiative logo has been used on materials for publication – including the Community Research Protocol on Monitoring Seasonal Ponds that will be shared with government and non-government institutions alike and proposed to be adopted by the Technical Working Group on Buffalo Restoration of the Department of Wetlands at the Ministry of Environment.

13. Safeguarding

Has your Safeguarding Policy been updated in the past 12 months?	Yes/No
Have any concerns been reported in the past 12 months	Yes/No
Does your project have a Safeguarding focal point?	Yes/No
Has the focal point attended any formal training in the last 12 months?	Yes/No
What proportion (and number) of project staff have received formal training on Safeguarding?	Past: 54% (12) Planned: 82% (18)
Has there been any lessons learnt or challenges on Safeguarding in the past 12 months? Please ensure no sensitive data is included within responses. None to date	
Does the project have any developments or activities planned around Safeguarding in the coming 12 months? If so please specify. No	
Please describe any community sensitisation that has taken place over the past 12 months; include topics covered and number of participants. In CPA assessment for participation in the project, Community Liaison Officers (CLOs) conducted meetings with CPA Committee members to announce the project, the details of activities, the benefits and risks to the communities and seek consent on any collaboration. Committee members were then free to discuss with the CPA Membership and advise on interest to join the project. The result was a signed contract on buffalo project participation at the committee level of each of the target CPAs.	
Have there been any concerns around Health, Safety and Security of your project over the past year? If yes, please outline how this was resolved. While there have not been any concerns, the project partners are ensuring that health and safety are paramount topics in each of the workshops conducted. Given the nature of food production, measures will be taken in Year 2 to step up hygiene practices prior to market linkages being established.	

14. Project expenditure

Table 3: Project expenditure during the reporting period (1 April 2023 – 31 March 2024)

Project spend (indicative) since last Annual Report	2023/24 Grant (£)	2023/24 Total Darwin Costs (£)	Variance %	Comments (please explain significant variances)
Staff costs (see below)				
Consultancy costs				
Overhead Costs				
Travel and subsistence				
Operating Costs				
Capital items (see below)				
Others (see below)				
TOTAL	£152,521.00	£152,521.00		

Table 4: Project mobilised or matched funding during the reporting period (1 April 2023 – 31 March 2024)

	Secured to date	Expected by end of project	Sources
Matched funding leveraged by the partners to deliver the project (£)			Northern Plains Landscape REDD + Project
Total additional finance mobilised for new activities occurring outside of the project, building on evidence, best practices and the project (£)			

15. Other comments on progress not covered elsewhere

As the report is already close to the page count, this is not applicable.

16. OPTIONAL: Outstanding achievements or progress of your project so far (300-400 words maximum). This section may be used for publicity purposes.

For community conservation projects to be successful there are a few key aspects; ownership is one of these. The collaboration with Darwin Initiative has allowed four focal communities to kickstart their own projects based on buffalo dairy activities. From the herdsmen to the milkers, and the habitat monitors, the community is behind this project because it is weaved into their very existence in the landscape. These are community members who, for generations, have relied on subsistence farming and collection of non-wood forest products in an ecosystem that is increasingly facing threats from both climate and land-use change. Protecting these lands means giving them value, it requires direct investment, but this can bring its own threats. By engaging with WCS and the Darwin Initiative, control over this investment is held by the community members who actively take part in the project activities. The benefits are directly linked to successfully producing high quality buffalo milk and products from animals that are actively restoring a degraded ecosystem. This translates to monetary injections for the Community Protected Area committee to sustain protection of the resources that their whole community relies on. One of the greatest achievements of this year has been this realization within the community. In the early part of the project, six community members (some of whom had never left their home province) embarked on a training workshop in Northern Laos. The skills they learned on this international exchange trip allowed them to return home and begin herding buffalo and, by working with the biodiversity team of WCS, begin monitoring the effects that buffalo and people have on the very seasonal ponds on which they rely. Milk and milk products are not unheard of in these remote villages, however they are usually consumed in the form of sweetened drinks with little or no net nutritional benefit to the consumer. Dairy members began producing milk immediately after their initial training and the result was an

instant hit with young school goers. With further training, they honed their skills to produce yoghurt, and tried different combinations to perfect the flavour that suited them and their consumers. With year 2 of this collaboration focusing on market linkages to step up income from buffalo dairies, the incorporation of the local temple of Koh Ker as a World Heritage Site in September 2023, and the burgeoning tourism market that resulted, comes at an opportune time

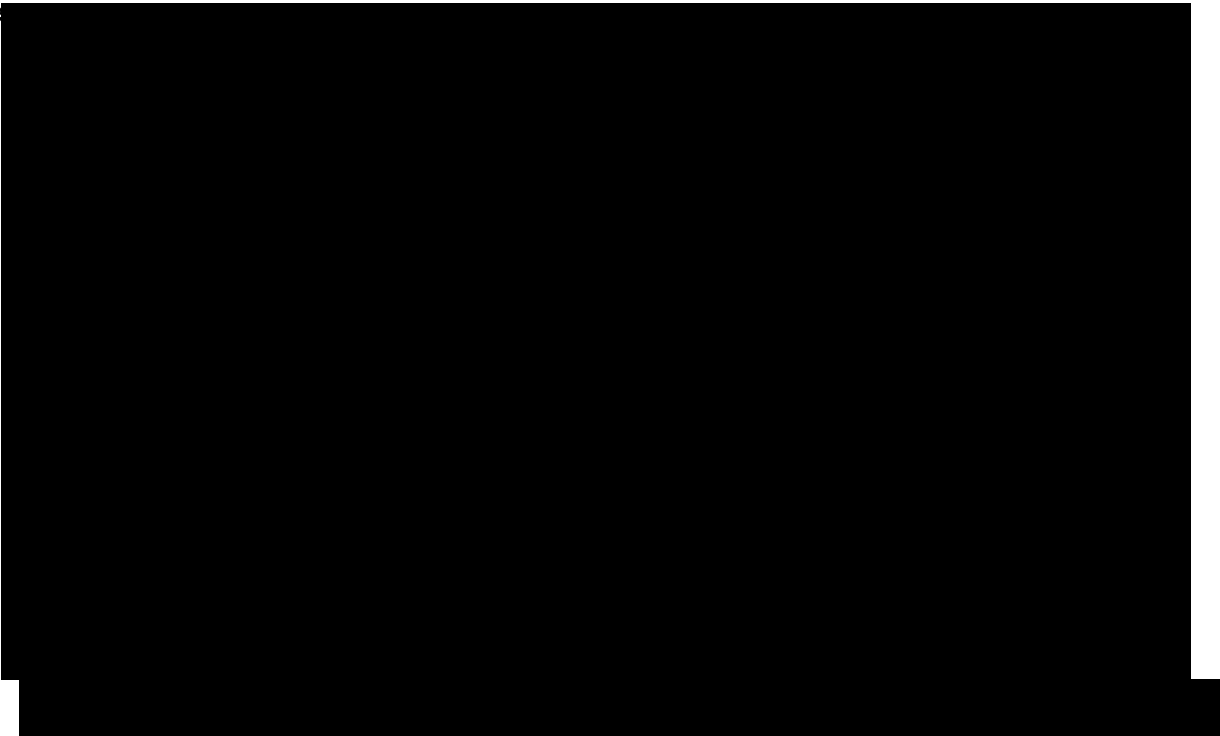


Figure 10: A young mother feeds her children yoghurt she has produced from community owned buffalo that are actively restoring seasonal ponds in the Northern Plains Landscape, Cambodia

Annex 1: Report of progress and achievements against logframe for Financial Year 2023-2024

Project summary	Progress and Achievements April 2023 - March 2024	Actions required/planned for next period
<p>Impact</p> <p>Tropeangs within the Northern Plains Landscape are restored by buffalos that are owned by communities with sustainable livelihoods, safeguarding threatened biodiversity and creating a scalable model for other protected areas.</p>	<p>Restoration efforts using buffalo continue to show promising results for biodiversity, with communities at the forefront of these efforts. Communities are increasingly aware of the threats to the seasonal pond network and can visibly see benefits from protecting and restoring this resource. Buffalo herds are providing added value in terms of nutritious supplementary diet and buffalo meat. Revenue from the sale of buffalo have supported communities to carry out patrols and monitoring, thus earning a living from the project activities.</p>	
<p>Outcome Globally threatened wetland biodiversity is restored through community-owned buffalos performing important ecosystem processes and protected through sustainable income, community-led monitoring, and patrolling.</p>		
<p>Outcome indicator 0.1</p> <p>At least 16 tropeangs will be monitored and at least 8 will be restored by buffalo herds by project end.</p>	<p>Ongoing outcome, currently monitoring 26 ponds on a regular basis, with 7 of these being restored by buffalo (Section 3.3 and Annex 32)</p>	<p>Continue to support communities to monitor these ponds independently</p>
<p>Outcome indicator 0.2</p> <p>4 CPA that are managing buffalo will have at least 2 community patrols (total 8) with participation from at least 25% women supported by income from buffalo products by the end of Year 1.</p>	<p>\$3,150 were raised through the sale of buffalo products during Year 1, which were used by CPA Committees to support their activities – including patrolling. Each 5-day patrol costs approximately \$250, the project can therefore support at least 12 patrols in Year 1 (Section 3.3 and Annex 26 & 29)</p>	<p>Work more closely with CPA committees on financial bookkeeping to better track expenditures</p>
<p>Outcome indicator 0.3</p> <p>By project end, bird nests of globally threatened species within the project area (vicinity of tropeangs) will be stable compared to the baseline at project start, based on multi-year biodiversity surveys results already conducted.</p>	<p>All nests protected by the project during Year 1 fledged successfully (34 nests), this bodes well for the end of project indicator of stable nest numbers (Section 3.3 and Annex 30)</p>	<p>Continue the bird nest protection scheme and process proximities to restored and control ponds, calculate % women participation.</p>
<p>Output 1 Livelihoods are developed and diversified through CPA-led buffalo banking schemes linking producers to markets.</p>		
<p>Output indicator 1.1 By the end of Y1, buffalo herds across 4 CPAs will increase through purchasing 25 buffalo and breeding from a baseline of 30 animals up to 60 animals with herd dynamics at optimum levels for milk and meat production.</p>	<p>Buffalo herds across the 4 CPAs had successfully reached the goal of a combined 60 animals (Section 3.1, Activity 1.2 and Annex 2, 3, 5 & 6).</p>	

Project summary	Progress and Achievements April 2023 - March 2024	Actions required/planned for next period
<p>Output indicator 1.2 By end of Q1, Y2, at least 20 community members (at least 60% women) will be managing buffalo banks and trained in animal husbandry techniques that maximize production to provide income generation to the CPA Committee of at least \$2,400 per year per CPA.</p>	<p>Preliminary income generation is promising but based on buffalo sales (Section 3.3 Outcome 0.2 and Annex 2, 3, 26 & 29). Year 1 focused on creating the skill base for successful production of yogurt and cheese in Year 2.</p>	<p>Create income generation through sales of milk products in addition to buffalo sales.</p>
<p>Output 1.3 By end of Q2, Y2, buffalo herds will be producing a combined daily average of 10 litres of milk to support 100 children (50 girls/50 boys) across 4 communities.</p>	<p>Achieved a daily average yield of 4.7L of milk from just two dairies, providing nutrient supplementation to 32 children (16 girls) per day by end of Year 1 (Section 3.2, Output 1.3 and Annex 34 & 35)</p>	<p>Bring two more dairies online and increase the proportion of pregnant females in the herd.</p>
<p>Output 2. Restoration of the ecological functionality of tropeangs through community-led and managed buffalo herds.</p>		
<p>Output indicator 2.1. By end of Y1, 4 buffalo herds of at least 10 individuals per herd frequent at least 8 tropeangs on a rotational basis, increasing water depth by an average of least 30cm when compared against 16 control tropeangs without buffalo.</p>	<p>4 buffalo herds established during Year 1, with a total of 9 ponds visited on a rotational basis, herd sizes not consistent due to carrying capacity of the habitat during extended drought in dry season. Average depths between control and experiment ponds show positive results (Section 3.2, Output 2.1 and Annex 2, 3, 5, 6, & 32).</p>	<p>Increase restoration from consistent herds and rotations, continue pond monitoring to better understand effects.</p>
<p>Output indicator 2.2. By end of Y1, a biodiversity survey protocol, used to assess restoration of tropeangs, will be developed with project partners and will have been conducted in at least 8 tropeangs within the project area.</p>	<p>Biodiversity protocol produced and tested in 6 ponds (Section 3.2, Output 2.2 and Annex 18 & 19)</p>	<p>Conduct further baseline and follow up surveys in ponds and conduct data analysis with student researcher from national university</p>
<p>Output indicator 2.3. By end of Y1, 16 community members from 4 CPA (8 women/8 men) trained in habitat survey methods for biodiversity monitoring and tropeang monitoring protocols for physical characteristics and using these skills on a monthly basis to monitor and adapt use of tropeangs by buffalo herds.</p>	<p>24 community members were trained and 16 (6 women) conducted habitat surveys in 26 ponds in Year 1 (Section 3.2, Output 2.3 and Annex 32)</p>	<p>Improve the gender balance through further training and continue to provide technical assistance for habitat surveys</p>
<p>Output 3. Globally threatened wetland biodiversity is protected through community conservation activities.</p>		
<p>Output indicator 3.1. By project end, at least 240 patrol days by community patrol teams comprising at least 8 members (6 women) monitor and protect 24 tropeangs and surrounding habitat.</p>	<p>366 community members (54 women) patrolled for the equivalent of 2,688 days across 4 CPAs in Year 1 (Section 3.2, Output 3.1 and Annex 26, 27, 28 & 29)</p>	<p>Provide training on SMART patrol techniques to focus efforts on pond and surrounding habitat.</p>

Project summary	Progress and Achievements April 2023 - March 2024	Actions required/planned for next period
<p>Output indicator 3.2. By end of Q1, Y2 at least 68 bird nests of globally threatened species in habitats containing project tropeangs monitored or protected by community members of which 20% are women.</p>	<p>Bird nest protection in Year 1 covered 34 nests representing 60 chicks, community members were recruited by CPA committees focusing on vulnerable groups, youth and women (Annex 30 & 37)</p>	<p>Continue bird nest protection and focus on gender equity</p>
<p>Output indicator 3.3. By project end, at least 4 tropeangs show an improvement in biodiversity value based on surveys conducted by the close of Q2, Y1. Note that the project will create a protocol to assign a biodiversity value as part of Output 2.</p>	<p>Due to difficulties with early onset of rains and extended drought during the dry season, the results of these surveys will not be available until Year 2. However, 6 surveys were conducted during Year 1 (Section 3.2 Output 2.2)</p>	<p>Biodiversity and Hydrological surveys will be conducted in the dry season of Year 2</p>

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

Project summary	SMART Indicators	Means of verification	Important Assumptions
<p>Impact: Tropeangs within the Northern Plains Landscape are restored by buffalos that are owned by communities with sustainable livelihoods, safeguarding threatened biodiversity and creating a scalable model for other protected areas.</p>			
<p>Outcome:</p> <p>Globally threatened wetland biodiversity is restored through community-owned buffalos performing important ecosystem processes and protected through sustainable income, community-led monitoring, and patrolling.</p>	<p>0.1 At least 16 tropeangs will be monitored and at least 8 will be restored by buffalo herds by project end.</p> <p>0.2 4 CPA that are managing buffalo will have at least 2 community patrols (total 8) with participation from at least 25% women supported by income from buffalo products by the end of Year 1.</p> <p>0.3 By project end, bird nests of globally threatened species within the project area (vicinity of tropeangs) will be stable compared to the baseline at project start, based on multi-year biodiversity surveys results already conducted.</p>	<p>0.1 Monthly community tropeang monitoring reports (including digital sketch map of physical characteristics). Habitat survey reports (focused on biodiversity) by project lead and partners.</p> <p>0.2 Financial Records of CPA Committees including bookkeeping and patrol financial clearance documents.</p> <p>0.3 Nest Survey and Protection Reports from biodiversity monitoring team and SMART Patrol Data from biodiversity monitoring, community, and Ministry of Environment patrols.</p>	<p>0.1 Extreme weather events do not impact seasonal tropeangs to the extent that project interventions are negated.</p> <p>0.2 Mortality rates and disease can be mitigated to create healthy and productive herds.</p> <p>0.3 Poisoning events do not cause crashes in populations of globally threatened species.</p>
<p>Output 1</p> <p>Livelihoods are developed and diversified through CPA-led buffalo banking schemes linking producers to markets.</p>	<p>1.1 By the end of Y1, buffalo herds across 4 CPAs will increase through purchasing 25 buffalo and breeding from a baseline of 30 animals up to 60 animals with herd dynamics at optimum levels for milk and meat production.</p> <p>1.2 By end of Q1, Y2, at least 20 community members (at least 60% women) will be managing buffalo banks and trained in animal husbandry techniques that maximize production to provide income generation to the CPA Committee of at least \$2,400 per year per CPA.</p> <p>1.3 By end of Q2, Y2, buffalo herds will be producing a combined daily average of 10 litres of milk to support 100 children (50 girls/50 boys) across 4 communities.</p>	<p>1.1.1 Community studbooks on herd dynamics.</p> <p>1.1.2 Purchase reports and pre-assessments of animals by partners.</p> <p>1.2.1 Workshop reports from both in-country and exchange trips, including assessments of CPA skills (where possible, disaggregated by gender) by partners</p> <p>1.2.2 Income generation tracked using the CPA bookkeeping/financial records process already in place for participating CPA.</p> <p>1.3.1 Daily farmer diaries expanded to incorporate milk production records.</p> <p>1.3.2 Nutrition group reports, with combined participant lists of</p>	<p>1.1 Emerging disease does not affect herds in terms of reducing productivity or increased infant mortality.</p> <p>1.2 Travel restrictions (such as Covid-19) do not restrict training workshops being conducted at the Laos Buffalo Dairy.</p> <p>1.3 Community nutrition groups or local schools are engaged and willing to diversify their nutrition sources.</p>

		participating families/children (disaggregated by gender).	
<p>Output 2</p> <p>Restoration of the ecological functionality of tropeangs through community-led and managed buffalo herds.</p>	<p>2.1 By end of Y1, 4 buffalo herds of at least 10 individuals per herd frequent at least 8 tropeangs on a rotational basis, increasing water depth by an average of least 30cm when compared against 16 control tropeangs without buffalo.</p> <p>2.2 By end of Y1, a biodiversity survey protocol, used to assess restoration of tropeangs, will be developed with project partners and will have been conducted in at least 8 tropeangs within the project area.</p> <p>2.3 By end of Y1, 16 community members from 4 CPA (8 women/8 men) trained in habitat survey methods for biodiversity monitoring and tropeang monitoring protocols for physical characteristics and using these skills on a monthly basis to monitor and adapt use of tropeangs by buffalo herds.</p>	<p>2.1.1 Buffalo herd diaries and studbooks used to compile and track herd data and schedule of tropeang restoration.</p> <p>2.1.2 Community tropeang monitoring reports (monthly) to track changes in physical characteristics or tropeangs.</p> <p>2.2.1 Report/publication on the development of the protocol, including contributors (disaggregated by gender).</p> <p>2.2.2 Assessment report on each of the tropeangs assessed using the protocol outlining results.</p> <p>2.3.1 Participant lists (disaggregated by sex) from training sessions for community members.</p> <p>2.3.2 Monthly tropeang monitoring surveys and field training conducted in conjunction with the project lead</p>	<p>2.1 Buffalo numbers can be increased through purchase of appropriate animals and successful breeding.</p> <p>2.2 Project collaborators are able to refine techniques used to survey tropeangs, and survey techniques are possible in a local setting.</p> <p>2.3 Protected area land under the management of the MoE can be protected adequately, including preserving locations of project tropeangs.</p>
<p>Output 3</p> <p>Globally threatened wetland biodiversity is protected through community conservation activities.</p>	<p>3.1 By project end, at least 240 patrol days by community patrol teams comprising at least 8 members (6 women) monitor and protect 24 tropeangs and surrounding habitat.</p> <p>3.2 By end of Q1, Y2 at least 68 bird nests of globally threatened species in habitats containing project tropeangs monitored or protected by community members of which 20% are women.</p> <p>3.3 By project end, at least 4 tropeangs show an improvement in biodiversity value based on surveys conducted by the close of Q2, Y1. Note that the project will create a protocol to assign a biodiversity value as part of Output 2.</p>	<p>3.1.1 SMART reports from CPA Patrol teams, number of patrols, locations of tropeangs, tropeang specific crimes (such as poisoning) targeted, participants (disaggregated by sex).</p> <p>3.1.2 Financial records from CPA Committees highlighting beneficiaries of patrols.</p> <p>3.2.1 Nest protection reports from biodiversity team</p> <p>3.2.2 Participant lists (disaggregated by sex) from community members actively monitoring bird nests.</p>	<p>3.1 Community patrol teams are permitted to operate in the project areas, either with or without support from MOE.</p> <p>3.2 Nesting birds return to the project area in significant numbers and their populations are not affected by factors outside of the project area such as hunting or poisoning.</p> <p>3.3 A suitable candidate to conduct freshwater surveys can be enlisted.</p>

		<p>3.3.1 Reports of biodiversity surveys conducted in collaboration with partner institutions.</p> <p>3.3.2 Results of MSc Student thesis.</p>	
<p>Activities</p> <p>Output 1: Livelihoods are developed and diversified through CPA-led buffalo banking schemes linking producers to markets.</p> <p>1.1 CPA assessment across the landscape to select suitable locations for buffalo-bank restoration project based on pre-defined criteria such as importance for threatened species</p> <p>1.2 Using existing buffalo herds as starter stock, purchase new buffalo locally to create adequate herds for restoration projects</p> <p>1.3 Collaborating with project partners, conduct training workshops both in-situ and at Laos Buffalo Dairy on animal husbandry, breeding, herd management, and milking techniques</p> <p>1.4 Create 4 community buffalo dairies using simple structures and locally-sourced equipment and associated protocols for keeping buffalo in suitable environment</p> <p>1.5 Assessment of community needs, and development of either school meals programme or community nutrition groups</p> <p>Output 2: Restoration of the ecological functionality of tropeangs through community-led and managed buffalo herds.</p> <p>2.1 Train community members on tropeang rotation for buffalo herds and create herding schedule based on tropeang area and herd size</p> <p>2.2 Collaborating with project partners, create a tropeang survey protocol as a means to assess biodiversity value and complete surveys in project tropeangs</p> <p>2.3 Conduct both community workshops including field training, and extended support for tropeang monitoring using previously-developed pragmatic tropeang monitoring protocols</p> <p>2.4 Conduct community monitoring of tropeangs on a monthly basis and adaptively update the herding schedule based on results</p> <p>2.5 Conduct camera trapping surveys during the dry season to assess use of tropeangs by mammal and bird species</p> <p>Output 3: Globally threatened wetland biodiversity is protected through community conservation activities.</p> <p>3.1 Train and build capacity of CPA patrol teams on the use of SMART and patrol techniques used in tropeang protection, with a focus on poisoning and snaring</p> <p>3.2 Conduct monthly community patrols in the project area, in collaboration with MOE to ensure forest crimes are adequately addressed</p> <p>3.3 Community members conduct bird nest monitoring and protection based on species requirements</p> <p>3.4 Enlist an MSc Student from a national university to conduct research on habitat biodiversity of restored tropeangs</p> <p>Project Title: Ecosystem restoration of watering holes in Cambodia's Northern Plains</p>			

Annex 3: Standard Indicators

Table 1 Project Standard Indicators

DI Indicator number	Name of indicator	Units	Disaggregation	Year 1 Total	Year 2 Total	Year 3 Total	Total to date	Total planned during the project
DI-A01	Number of people from key national and local stakeholders completing structured and relevant training.	People	Men	71			71	80
DI-A01	Number of people from key national and local stakeholders completing structured and relevant training.	People	Women	48			48	50
DI-B07	Number of people participating in Payment for Ecosystem Services (Nest Protection)	People	Men	249			249	400
DI-B07	Number of people participating in Payment for Ecosystem Services (Nest Protection)	People	Women	24			24	100
DI-C01	Number of best practice guides and knowledge products published and endorsed	Numer	Product typology	3			3	4
DI-D12	Area of degraded or converted ecosystems that are under active restoration	Area (ha)	Ecosystem	3.43 ha			3.43 ha	3.43 ha

Checklist for submission

	Check
Different reporting templates have different questions, and it is important you use the correct one. Have you checked you have used the correct template (checking fund, type of report (i.e. Annual or Final), and year) and deleted the blue guidance text before submission?	
Is the report less than 10MB? If so, please email to BCF-Reports@niras.com putting the project number in the Subject line.	
Is your report more than 10MB? If so, please discuss with BCF-Reports@niras.com about the best way to deliver the report, putting the project number in the Subject line.	
Have you included means of verification? You should not submit every project document, but the main outputs and a selection of the others would strengthen the report.	
If you are submitting photos for publicity purposes, do these meet the outlined requirements (see Section 16)?	
Have you involved your partners in preparation of the report and named the main contributors	
Have you completed the Project Expenditure table fully?	
Do not include claim forms or other communications with this report.	