



Darwin Initiative: Final Report

To be completed with reference to the “Writing a Darwin/IWT Report” Information Note:
(<https://www.darwininitiative.org.uk/resources-for-projects/reporting-forms-change-request-forms-and-terms-and-conditions/>).

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

Darwin Project Information

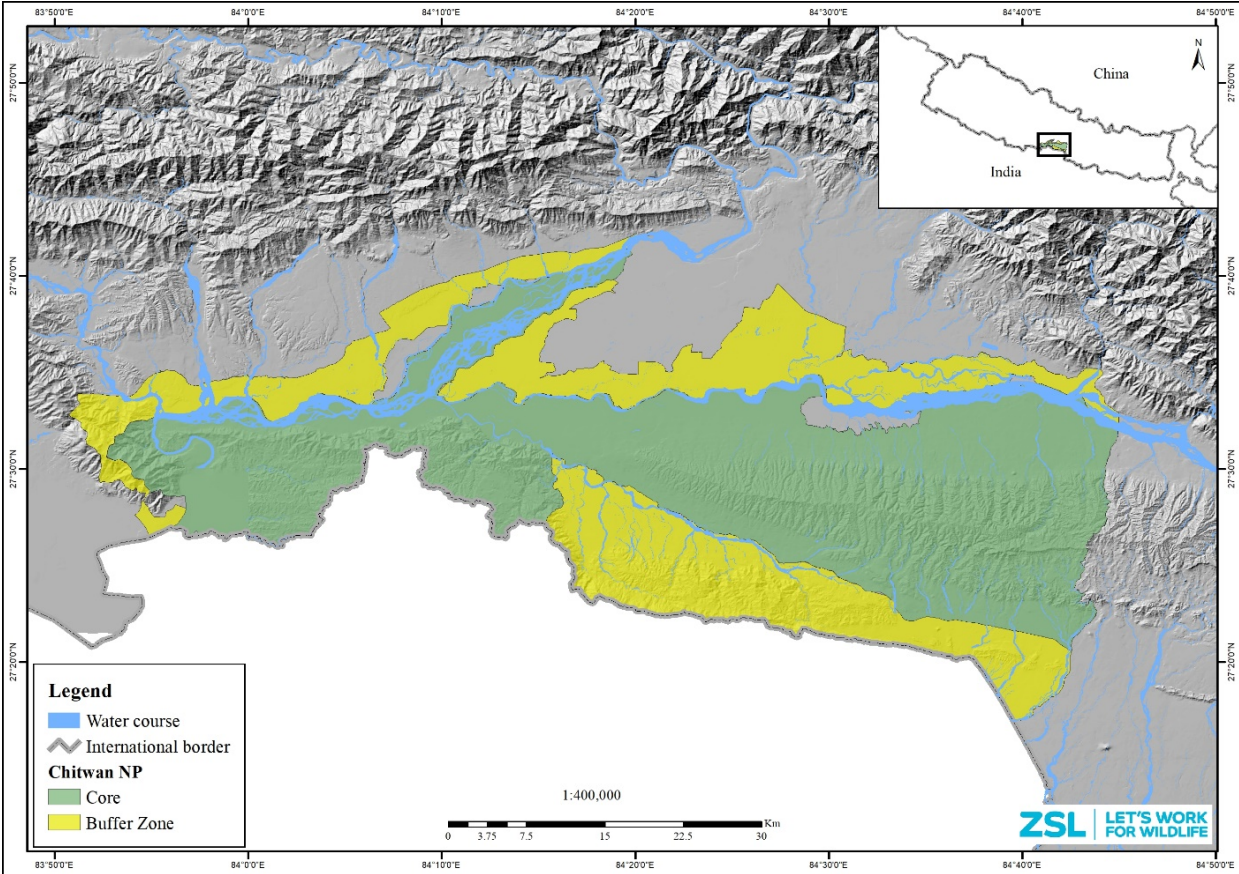
Project reference	24-015
Project title	Community conservation of Chitwan National Park's freshwater ecosystem
Country(ies)	Nepal
Lead organisation	Zoological Society of London
Partner institution(s)	Department of National Parks and Wildlife Conservation (DNPWC), National Trust for Nature Conservation (NTNC), Himalayan Nature (HN)
Darwin grant value	£ 397,692
Start/end dates of project	15 June 2017 – 31 March 2021
Project leader's name	Hem Baral
Project website/blog/social media	https://www.zsl.org/community-conservation-of-chitwan-national-park%E2%80%99s-freshwater-ecosystems-and-gharials https://www.zsl.org/blogs/asia-conservation-programme/community-crocodilian-coexistence https://www.himalayannature.org/project/freshwater-ecosystems-and-gharials https://ntnc.org.np/node/187 https://ntnc.org.np/newsletter/crocodile-monitoring-chitwan-and-bardia https://www.zsl.org/conservation/regions/asia/endangered-crocodilians-and-wetlands-in-nepal https://www.darwininitiative.org.uk/assets/uploads/Darwin-Newsletter-June-2021-A-Global-Restoration-FINAL.pdf
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1 Project Summary

Globally, freshwater ecosystems are undergoing declines in biodiversity much greater than in the most-affected terrestrial ecosystems, mainly due to over exploitation, water pollution, flow modification, destruction or degradation of habitat and invasion by exotic species. Freshwater biodiversity protection and conservation is challenging as it is susceptible to pollution in the upstream drainage network, the surrounding land, the riparian zone and in downstream reaches

in the case of migrating aquatic fauna. Although freshwater biodiversity is vital for human health, it receives limited attention and funding for conservation and management. In Nepal, the loss of freshwater species has been almost double the loss of terrestrial species in the last 50 years (Living Planet Report 2016).

This project worked in the stretch of the Narayani and Rapti rivers within Chitwan National Park (CNP), a world heritage site established in 1973. The Narayani, Rapti, and Reu rivers flowing through CNP are its major water sources. Besides these, there are several other streams and streamlets fulfilling the needs of wildlife species in the park. These rivers are home to several aquatic animals, including critically endangered Gharial and Gangetic Dolphin. CNP is located in south central lowland Nepal, and these two rivers border CNP and its northern buffer zone (Figure 1). Both of these rivers are critical to the socioeconomic wellbeing of indigenous Bote, Musahar and Tharu communities around CNP, who rely heavily upon the rivers for their food and income. The Narayani and Rapti rivers within CNP are protected, but they are still affected by land use change, riverbank disturbance, and harmful and unsustainable fishing practices. This has caused dramatic declines in water quality and fish stocks, affecting the health, income, and food security of local river-dependent communities as well as the Critically Endangered gharials. Gharials are extinct from most of their historic range, with their current distribution confined to only a few river systems in Nepal and India. In Nepal, they are confined to the Narayani, Rapti, Karnali and Babai rivers. The gharial population within the project site is the largest subpopulation in Nepal, which makes its conservation of paramount importance. The conservation needs of gharials have been highlighted by the Department of National Parks and Wildlife Conservation (DNPWC) in its ‘Gharial Conservation Action Plan 2018-2022’ and also by national experts. Gharials play the ecological role of top predators in the river ecosystem and are a key indicator of a healthy freshwater ecosystem upon which the socio-economic wellbeing of local communities depends.



This project was designed to reverse the current rate of decline in the gharial population through robust monitoring of the river ecosystem and gharial population; provide knowledge for the formulation of a river ecosystem management plan; increase river protection through forming community-based protection units; and enhance the effectiveness of the Gharial Conservation Breeding Centre (GCBC). By restoring the ecosystem health of Narayani and Rapti rivers, the project aimed to deliver positive benefits to local communities dependent upon these river ecosystems for food (fish) and water. The project also supported indigenous fish-dependent

communities to enhance their food security as well as to raise their income through developing capacity in sustainable aquaculture livelihoods.

2 Project Partnerships

Over the years, ZSL has fostered a strong partnership with Nepal's major stakeholders in biodiversity conservation and protection, which has been instrumental in delivering a suite of successful conservation projects. This project was designed based on the partnership with the Department of National Parks and Wildlife Conservation (DNPWC), the National Trust for Nature Conservation (NTNC), and Himalayan Nature (HN).

Prior to project development, a project concept was circulated among all partners and their recommendations were received. The project proposal was finalised based on their recommendations and shared with the Project Coordination Committee (PCC) for approval to carry out the project activities. The PCC is a central-level unit, chaired by the Deputy Director General of DNPWC and with section heads of DNPWC and the Country Representative (CR)/Deputy CR from ZSL as members, which was formed to provide guidance and supervise project implementation. Similarly, the project proposal was shared with the PCC for approval to carry out the project activities.

A Project Management Unit (PMU) was formed in CNP for project implementation at the field level. The PMU is chaired by the Chief Conservation Officer of CNP with representatives from NTNC, HN and ZSL as members. Representation of communities and protection units is ensured by inviting the chairman or a representative of the Buffer Zone Management Committee, and the head or a representative of the respective protection unit, to each meeting. The PMUs are responsible for coordination among partners, Buffer Zone Management Committees, and local communities; facilitating project activities; monitoring progress; and reporting to the PCC.

A project agreement was signed between ZSL and the other project partners, namely HN and NTNC, specifying activities and responsibilities for each. HN was primarily responsible for executing activities related to Output 4 while NTNC was responsible for executing activities related to Outputs 1, 2 and 3. ZSL provided technical assistance to partners as well as facilitated coordination among them to ensure effective project implementation and monitored project progress periodically. Involvement of all partners and relevant stakeholders has been ensured throughout the implementation, monitoring and evaluation of the project. During the project, the implementing partners provided reports (annual/quarterly) based on which ZSL has produced this final report.

ZSL, along with all the project partners, has established good relationships with the local communities in the project sites. Local communities are direct project beneficiaries and have a key role in ensuring the sustainability of the project activities. Communities have been well informed about the project, and their participation has been ensured during the implementation of project activities.

An inception workshop was organized at CNP among all project partners (Annex 7.1) to implement the project effectively. During the project period, several PMU meetings and community meetings/workshops were conducted among all the project partners, stakeholders, local government and CBOs to strengthen working relationships.

3 Project Achievements

3.1 Outputs

The application established four outputs: (1) habitat utilisation by gharial; (2) improved patrolling to secure sensitive riverine zones; (3) increased post-release survival of gharials; and (4) community engagement in sustainable aquaculture livelihoods. These outputs were designed to tackle prevailing challenges within the Narayani and Rapti river ecosystems in CNP to protect the Critically Endangered gharial and reduce river dependency of the indigenous fishing communities. Achievements towards the project outputs and indicators as laid out in the logical framework are described under the respective outputs below.

Output 1: Improved River ecosystem management delivered through improved management plans and environmental policy based on a robust Gharial and riverine ecosystem monitoring programme.

Prior to the start of the project, there were 166 gharials in Chitwan National Park (CNP), concentrated in the lower stretches of the Narayani and Rapti rivers below Sauraha. Ecological baselines for prey fish stocks/biodiversity and gharial distribution were established (**Ind 1.1**) through a survey at the end of the first year. The survey was carried out covering larger stretches of the Rapti and Narayani rivers to find out their status. A total of 219 gharials (118 from the Rapti and 101 from the Narayani river), 32 fish species (20 in the Rapti and 12 in the Narayani river), and fish densities of 61 per 100 m² in the Rapti and 19 per 100 m² in the Narayani river (Annex 7.2a) were recorded. As a part of CNP's regular release program to maintain the viable population of gharial in the wild, as many as 48 gharials were released at the junction of segment 2 (Sauraha–Kasara) and 3 (Kasara–Golaghat) a week before the survey. This may have caused an inflated population of juveniles, especially on these survey segments (*Supplementary Document 1*). In Year 2, a gharial and river ecosystem monitoring guideline (*Supplementary Document 2*) was finalised (**Ind 1.2**) based on successful monitoring in Year 1 as well as with consultations with park authorities, experts, and local communities (Annex 7.3). Ecological monitoring in the project site in Years 2-4 was conducted based on the guidelines. The increased gharial number has remained almost constant since the 2018 survey, as 214 gharials (117 from the Rapti and 97 in the Narayani) were recorded in December 2020 (Annex 7.2a). Compared to the 2016 survey and equal area coverage, the gharial population has increased by 28% in the last four years. This indicates a significant increase in the gharial population in these rivers. Likewise, 28 different species of fish (18 in Rapti and 10 in Narayani) were recorded which is near identical to the baseline and fish densities of 73 per 100 m² in the Rapti and 47 per 100 m² in the Narayani show improved prey fish in the rivers. (Annex 7.2a).

A PhD student project on “Building an evidence base for Gharial conservation in Nepal”, with an objective to understand the dispersal behaviour of wild and released gharials as well as their post-release survival, is near completion. COVID-19 impacted this project's schedule. Altogether, four MSc projects were completed in support of this project (**Ind 1.3**). Two EDGE fellows (working on Evolutionarily Distinct and Globally Endangered, or EDGE, species) were recruited in 2019 and supported through this project (**Ind 1.4**) to carry out research on gharials in Chitwan and Bardia. One of the two EDGE fellows collaborated with the PhD student at Chitwan to carry out a study on “Understanding reproductive ecology and social mapping for the conservation of Critically Endangered gharial in Chitwan National Park”. Their findings were incorporated to support CNP in gharial and river ecosystem monitoring, eventually feeding into the development of a robust park management plan. Similarly, ZSL has supported DNPWC to prepare a five-year gharial conservation action plan in 2018.

Likewise, threats and impacts on gharial population and fish biodiversity were mapped (**Ind 1.5**) across the Narayani and Rapti ecosystems (Annex 7.4). Anthropogenic activities like illegal fishing, sand and gravel extraction and aquatic weed collection are some direct threats to gharial population and fish biodiversity. CNP authorities were informed to prepare and implement a river management plan, and park staff and buffer zone members were later trained in sustainable conservation of river ecosystems and the importance of upstream and downstream linkages. This has helped in securing the functional river ecosystems and ensured the protection of flora and fauna dependent on these river systems. Also, the management plan of CNP is in the process of endorsement, with all project-produced plans already incorporated by CNP (**Ind 1.6**). COVID-19 impacted the completion of this indicator.

Output 2: Threats to fish stocks and gharials are reduced through protection provided by 10 Community Based Anti-Poaching Units (CBAPUs) patrolling sensitive riverine zones in the Narayani and Rapti watersheds to protect the area from unsustainable fishing, poaching and other damaging and unsustainable uses of the river.

Altogether, 11 Community Based Anti-Poaching Units (CBAPUs), also called Gharial Guard Groups (3Gs), were established (Annex 7.5) in the project sites, with a total of 66 members in Year 1 and 2 (**Ind 2.1**) and trained annually in river patrolling (Annex 7.6). They were equipped with necessary devices and logistics to carry out monitoring activities, regular patrols, and anti-poaching operations throughout the year to protect the Rapti and Narayani river ecosystems. In Year 2, the CBAPUs conducted a total of 132 patrols, covering a distance of 792 km, (**Ind 2.2**)

and leading to the recording of 14 illegal incidents, through which 27 people were arrested for illegal fishing and 13 people were arrested for illegal collection of river materials from inside CNP (Annex 7.7). Throughout the project duration, regular sharing meetings were arranged between CBAPU members and CNP officials to plan and strengthen patrol operations (**Ind 2.3**) in sensitive riverine zones. In Year 3, the CBAPUs conducted a total of 284 patrols, covering a distance of 1420 km, (**Ind 2.4**) leading to the arrest of 34 people: 25 involved in illegal fishing and nine involved in illegal resource extraction from rivers (Annex 7.7). In Year 4, 330 patrols were conducted leading to the recording of 23 illegal incidents and arrest of 118 people; 107 involved in illegal fishing and 11 involved in illegal resource extraction from rivers (Annex 7.7). At the project design stage, the patrol targets were set considering a coverage of a three km river stretch per patrol in the first year; however, each CBAPU covered an average six km river stretch per patrol during the project period.

Through the combined effort of its officials and CBAPU's support, CNP was able to arrest 159 illegal fishermen (Annex 7.7) from 36 incidents, helping improve reporting of illegal incidents, leading to increased arrest of intruders during the project period (**Ind 2.5**). COVID-19 has impacted this activity, as economic impacts from the pandemic towards Year 4 of the project saw an increase in the number of illegal entrants in protected areas across Nepal. However, project-formed CBAPUs became a vital source of information for park officials to promptly apprehend the culprits. No gharial poaching incidents (**Ind 2.6**) have been recorded in any of the project years. Additionally, during the project period, a total of 16 crocodiles (eight gharials and eight muggers), entangled in gill nets, were rescued from community fishponds and paddy fields (Annex 7.8) through the combined effort of CBAPUs, NTNC and CNP officials.

Output 3: Increased post-release survival of Gharials from the Chitwan Gharial Conservation Breeding Centre (GCBC) delivered through implementing improved husbandry and release protocols, and post-release monitoring.

The project assessed the infrastructure and equipment requirements of GCBC (**Ind 3.1**) and supported the construction of a visual platform to install display screens as a means of awareness raising for visitors, and of artificial sand banks within the centre that have increased the opportunities for gharials to lay eggs. Chip readers, laptops and camera provided were used for record keeping and management, and educational and awareness-raising materials including information boards and posters were provided. Likewise, during the project period, 5,178 sq. feet of ground area in the GCBC were paved with concrete paver blocks, helping enhance visitors' experience, as they had previously had to walk on muddy surfaces in the compound area (Annex 7.9).

A gharial husbandry and release guideline was prepared (*Supplementary Document 3*) and is being implemented by GCBC (**Ind 3.2**) to manage gharial population, both in the breeding centre and in the wild. Likewise, 18 GCBC staff including one staff member each from HN and NTNC in Year 2, and 19 GCBC/CNP staff, 7 NTNC staff and 2 Nepali Army in Year 4, have been trained by experts in gharial husbandry and release (**Ind 3.3**), building in-country capacity to support GCBC in the future (Annex 7.10). They were trained in egg collection from the wild, handling gharial and releasing the juveniles in the wild. Combined, the husbandry guidelines and trainings have strengthened the GCBC, improving onsite protection of eggs and collection protocol while enhancing its capacity in rearing gharials within the centre and their subsequent release into the wild. Altogether, 45 gharials (20 wild and 25 captive) were tagged with GPS/VHF radio tags (5 in 2018, 35 in 2019 and 5 in 2020) and released in the Rapti river and were monitored in the rest of the project year (**Ind 3.4**; Annex 7.11). Out of the 45 tagged with GPS-GSM/VHF transmitters, 33 gharials were successfully tracked until Year 3 and 28 gharials until Year 4. For head-started gharials released from GCBC, there was a 20-35% mortality in Year 3 (considering that the undetected gharial in India were very likely dead), and a near-identical 21-29% mortality rate in Year 4. This suggests gharial annual mortality remains high after release from captivity, with entanglement in fishing gear and intentional killing by people remaining the major causes of mortality (**Ind 3.5**). However, for the wild-caught gharial, survival rate was much higher. We cannot compare across years because the sample sizes and age structure of the animals tagged in 2018 and 2019 are so different. Overall, survival rate of wild-caught gharial is currently estimated to be 90%, which suggests that larger gharial are surviving much better. The findings obtained from the post-release monitoring of gharials with regards to their movement,

reproduction and survival have been shared with the conservation officials of CNP for improved gharial conservation efforts.

Output 4: Food security of local communities improved through implementing sustainable fishing and reducing the dependence of local communities on fishing through generating sustainable aquaculture livelihoods.

In Year 1, this project identified the most vulnerable indigenous fish-dependent communities living alongside the Rapti and Narayani rivers as potential project beneficiaries through key informant and social surveys. Altogether, eight community-managed fishponds were established in 2017 and 2018, and eight women-led sub-committees were formed under the respective Buffer Zone User Committee (BZUC) to sustainably manage these ponds (**Ind 4.1**), which are currently benefitting 161 households (*Annex 7.12, Supplementary Document 4*). These fishpond groups have earned NRS so far, and the average income of the households engaged in sustainable aquaculture has increased compared to the baseline. (*Annex 7.13*) in Year 1 (**Ind 4.2**), with an 18.7% increase in income of 60 households reported in Year 2 and a 25.9% increase in income of 120 households reported in Year 3 (**Ind 4.4**). All community-managed fishponds have become self-sustaining and the BZUCs are committed to providing support in future if needed. These groups are also being supported by the Fishery Development Centre, CNP and local government.

Similarly, the project established five drop-in centres in upstream communities in Year 2 (*Annex 7.14, Supplementary Document 5*), hosting 25 visitors per day on average (**Ind 4.3**) prior to the government lockdowns. These centres are effectively spreading awareness on the conservation of gharial and river ecosystems in the upstream communities and are completely owned by their respective BZUCs. In a total of 240 households (87.9% of 273 households), all the fishers with valid licences are practicing sustainable fishing methods (**Ind 4.5**), using appropriate net sizes, timing and locations as allowed by CNP authorities. A total of ten workshops were held to sensitize fisher households, including fishers with valid fishing licenses, on sustainable fishing and gharial conservation.

3.2 Outcome

This project has made considerable progress towards achieving the intended outcome: the health of the Narayani and Rapti river ecosystems restored, with improved water quality, increased fish stocks, and stabilised Gharial population, supported by local communities benefitting from sustainable livelihoods.

Gharials have been recorded in 12 out of the 13 monitoring sections (8 sections in the Narayani and 5 sections in the Rapti river) during the surveys. Based on the monitoring data, a detailed gharial habitat utilization map has been prepared (**Ind 0.1**). The monitoring of gharials in the Rapti and Narayani rivers has shown the increased range of gharial habitats: a 17 % increase in Year 2 compared to Year 1 and a 24% increase in Year 4 compared to Year 1 (*Annex 7.15*).

This project facilitated 100% of eligible local fishers to obtain valid licenses; they are engaged in reporting their average catch per effort (**Ind 0.2**). Average catch for both rivers was 0.7 kg per effort (*Annex 7.2a*). Compared to the baseline average catch per effort (0.5885 kg per effort for the Narayani and Rapti rivers), a 18.94% increase has been reported in Year 4 (**Ind 0.3**), which indicates gradual recovery of fish stock in these rivers.

Likewise, the gharial populations of the Narayani and Rapti rivers were annually monitored during the duration of the project. There has been an encouraging increase in the population status of gharial compared to the baseline (**Ind 0.4**). During the setting of the baseline in Year 1, we failed to consider the impact of the 48 juvenile gharials that were released one week prior to the annual monitoring, which may have caused an inflation in the gharial population (*Supplementary Document 1*). However, if we consider the National Gharial Survey 2016 as the baseline, we can see a 28% increase in gharial population at the current stage, just 2% short of the target (*Annex 7.2a*).

During the project period, we coordinated well with the DNPWC, CNP, NTNC, HN and wider stakeholders to integrate the plans and protocols prepared by the project (**Ind 0.5**) into CNP's management plan. Three such adaptive plans, including the Gharial and River Monitoring Guideline, Egg Collection Protocol and Gharial Husbandry and Release Guideline, and River Ecosystem Management Plan (*Supplementary document 2, 3 and 6*) were prepared and shared

with CNP, and have been incorporated into their management plan (*Supplementary document 7*). The impact of the pandemic has slightly delayed the finalisation of CNP's management plan, which will be shared as soon as it becomes available.

Similarly, we have successfully engaged 161 households from indigenous fish-dependent communities to sustainably manage fishponds and receive a regular income from the farmed fish (**Ind 0.6**). They are sustainably managing these fishponds on their own at the current stage, earning which translates to NRS per household, up from a baseline of NRS. This is a 51% increase in the average household income from fishing (Annex 7.13).

3.3 Monitoring of assumptions

The risks and assumptions were critically monitored throughout the project period and no changes were made in the assumptions. Below is the table showing the monitoring of assumptions.

	Outcome Assumptions	Comments
Assumption 1	A positive trend in these key indicators indicates an overall increase in the biodiversity value of these river ecosystems. This method has been used successfully in the Chambal River.	This assumption remains reasonable.
Assumption 2	Positive results in all ecological indicators indicates that successful ecosystem restoration has taken place.	This assumption remains reasonable.
Assumption 3	Relevant authorities show continued commitment to implement robust management plans and monitoring programmes.	DNPWC and CNP authorities are highly committed, and gharial conservation remains a top priority. During this project, ZSL facilitated CNP to prepare and implement different guidelines/plans (<i>Supplementary documents 2, 3, 6</i>).

	Output 1 Assumptions	Comments
Assumption 1	Monitoring programme sustainably institutionalised by DNPWC in the long term.	This assumption remains reasonable. DNPWC has prepared the Gharial Conservation Action Plan (<i>Supplementary document 8</i>). DNPWC played a crucial role in the preparation of the gharial and river monitoring guidelines. DNPWC has ownership of the documents prepared by the project.
Assumption 2	DNPWC continues to have adequate resources to implement the required changes in all the relevant areas affecting the riverine ecosystem in the Narayani and Rapti watersheds.	This assumption remains reasonable.
Assumption 3	Improved plans and policy are effectively translated into improved management.	This assumption remains reasonable.
Assumption 4	Management plan is effectively implemented by DNPWC.	This assumption remains reasonable.

		However, due to the impact of the pandemic, the preparation of the management plan is ongoing (<i>Supplementary document 7</i>) and will be implemented once finalised.
	Output 2 Assumptions	Comments
Assumption 1	There will be an adequate number of suitable CBAPU applicants	There were an adequate number of suitable applicants (Annex 7.5).
Assumption 2	Sufficient number and diversity of community members are willing to participate in CBAPUs; the community workshops explaining and demonstrating the benefits of the CBAPU concept will support this.	This assumption remains reasonable.
Assumption 3	That CBAPUs will use the existing towers and that they will be effective in increasing chances of spotting poacher activity.	This assumption remains reasonable.

	Output 3 Assumptions	Comments
Assumption 1	Factors unrelated to the release procedures are not the primary cause of released gharial mortality.	This assumption remains reasonable. A document on Gharial husbandry and release guideline (<i>Supplementary document 3</i>) has been owned and is being implemented by the GCBC.
Assumption 2	Factors relating to post-release mortality are identified and adequately addressed through other project Outputs, specifically monitoring.	This assumption remains reasonable. A total of 45 gharials (25 from GCBC, 20 from wild) have been tagged with satellite GPS collars (Annex 7.11). Post-release mortality monitoring is ongoing.

	Output 4 Assumptions	Comments
Assumption 1	Aquaculture combined with increased awareness and strengthened protected area management disincentives illegal and harmful fishing practices.	This assumption remains reasonable. Increase in reporting of illegal and harmful fishing practices has been recorded during 2017-2021.
Assumption 2	Sustainable fishing increases the food security of local communities.	This assumption remains reasonable. Community fishponds have earned a total of NRS (Annex 7.13).
Assumption 3	Communities have the will to manage their resources sustainably long-term.	This assumption remains reasonable. All eight fishponds are owned by the BZUCs and have become sustainable. Two fishpond committees have invested the surplus to operate lunch shops, banana plantations and pig farming.

Assumption 4	Unequal benefit sharing, corruption and theft do not fundamentally undermine community aquaculture.	This assumption remains reasonable. All eight fishponds have guidelines/bylaws (<i>Supplementary document 4</i>) to address these threats.
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3.4 Impact: achievement of positive impact on biodiversity and poverty alleviation

Target Impact: Narayani and Rapti river ecosystems are protected and restored, with the recovered gharial populations safeguarded and viable long-term, and providing ecosystem services to local fishing communities practicing sustainable livelihoods, reducing poverty.

The project has contributed to the recovery of gharial populations in Narayani and Rapti river ecosystems of Chitwan. Compared to the 2016 survey there has been a 28% increase in the wild gharial population (**Ind 0.4**, Annex 7.2a), which is a result of the project's support in enhancing protection through regular community patrolling (**Ind 2.1, 2.2, 2.3 and 2.6**) and increasing community awareness of gharial conservation (**Ind 4.3, 4.5**), as well as through reducing river dependency by supporting fish-dependent indigenous communities' livelihoods through the establishment of eight community-managed fishponds (**Ind 4.1 and 4.4**).

The project has contributed to improve wellbeing of the 161 river-dependent indigenous households through improving their income, as shown by the estimated 51% increase (Annex 7.13) in average income (**Ind 4.2**) through sustainably managing eight community-owned fishponds (Annex 7.12). Increased income contributes to reducing multidimensional poverty through increased food security and improved access to health services and better education.

4 Contribution to Darwin Initiative Programme Objectives

4.1 Contribution to Global Goals for Sustainable Development (SDGs)

The following SDGs are relevant to the project.

Goal 1: No poverty: The project has supported the formation of women-led committees to operate eight community-managed fishponds, resulting in a 51% increase in income for 161 households belonging to river-dependent indigenous communities. During the project period, we helped develop the capacities of all eight fishpond committees and ensured steps to sustainability were clearly defined. As a result, these have now become sustainable and will contribute to achieving the goal.

Goal 3: Good health and wellbeing: Strengthened ecosystem services through conservation (**Ind 0.5, 1.6**) and improved access to health services through increased income (**Ind 0.7, 4.2, 4.4**) are contributing to maintaining the good health and wellbeing of the communities.

Goal 5: Gender equality: All eight community fishponds established under this project, are women-led, consisting of 68% females from indigenous communities. We have ensured equal participation, wherever possible, in all our activities to promote gender equality (Annex 7.12).

Goal 6: Clean water and sanitation: Increased income has contributed to improved access to clean drinking water and better sanitation. Over the long term, the implementation of the river management plan will contribute to restoring river quality and ecosystem, ensuring communities have continued access to clean drinking water.

Goal 11: Sustainable cities and communities: The project activities have contributed towards sustainable communities through the development of a sustainable community governance mechanism for all community-managed fishponds.

Goal 12: Responsible consumption and production: Communities have reported that their frequency of fishing in rivers has decreased as they have started to harvest the fish from community-managed fishponds.

Goal 15: Life on Land: Gharial and fish monitoring surveys show an increase in gharial population, while the upgrades to the GCBC have provided long-term infrastructure for gharial conservation and population recovery.

Goal 17: Partnership for the goals: Close partnerships have been built among the communities, conservation stakeholders and government agencies to carry out the activities that contribute to the goals.

4.2 Project support to the Conventions or Treaties (e.g., CBD, Nagoya Protocol, ITPGRFA, CITES, Ramsar, CMS, UNFCCC)

SN	Convention, treaty, agreement	Project contribution to meet national obligations
1	Convention of Biological Diversity	<p>The project contributes to the following Aichi Biodiversity Targets:</p> <p>Target 5: This project worked to reduce habitat loss, and improve habitat quality through working with upstream communities, construction of sandbanks at GCBC, and working with partners to produce a River Ecosystem Management Plan (Ind 0.1).</p> <p>Target 6 and 7: This project worked to train local people in sustainable aquaculture to help them manage fish stocks in the community fishponds, while also taking pressure off the river to avoid overfishing to promote ecosystem health (Ind 4.2 and 4.4)</p> <p>Target 8: This project worked to increase/maintain the water quality of the rivers and is helping CNP draft a comprehensive River Ecosystem Management Plan to ensure river health is sustained (Ind 0.1, 0.3 and 0.4).</p> <p>Target 12: The Critically Endangered gharial is at clear risk of extinction, which is why the project has worked to increase Nepal’s largest subpopulation by 28% compared to 2016 baseline, which is a significant result (Ind 0.1, 0.3 and 0.4).</p> <p>Target 14: The contribution to Target 8 also contributes to ecosystem health; the project was designed to be of particular benefit to women, indigenous and poor local communities (Ind 0.7, 4.2. 4.4).</p> <p>Target 18: The number of indigenous people that have taken part in the Gharial Guard Groups demonstrates the relevance of the project to the knowledge and practice of these indigenous communities. We worked with local institutions, such as the Buffer Zone User Committees (Ind 0.2, 0.3, and 0.6).</p> <p>Target 19: The project’s support to the GCBC, post-graduate students, and local conservation awareness have all supported to build the knowledge base of conservation in Nepal (Out 1).</p>

2	CITES	This project worked to conserve the gharial, which is listed on Appendix I of CITES. However, the illegal wildlife trade does not pose a major threat to this population in Nepal.
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4.3 Project support to poverty alleviation

Support for poverty alleviation has been provided through activities conducted under output four. A total of 161 households (110 female and 51 male members) from indigenous fish-dependent communities were supported through eight community-managed fishpond committees (**Ind 4.1**). ZSL facilitated the formation of these committees, including *Samudayama Aadharit Ghaaila Maachapalan Samuha (A and B)*, *Majhi Utthan Samuha*, *Santi Srijana Krisak Samuhain*, *Shreee Gyan Jyoti Krisak samuha*, *Srijansheel Mahila Machhapalan Samuha*, *Bote Mahila Machhapalan Samuha*, *Darai Mahila Machhapalan Samuha* located in the buffer zone of CNP (**Ind 4.1**). These community fishpond groups started harvesting fish from Year 2 and have reported an increase of NRS 5,077 per household in the income from fishing (**Ind 4.2, 4.4**), as compared to the baseline NRS 8,343 (NRS 4,000 from traditional fishing and 4,343 from fishpond income). During the project period, 143 people were trained in sustainable aquaculture techniques, helping them build their capacity. Two of the fishpond groups have also invested income from the fishponds to initiate new ventures (pig farming, banana plantation and lunch shop). The project has improved park-people communication, helping local communities seek advice from park management on different issues (e.g., human wildlife conflict or livelihood activities). This has helped communities to improve their wellbeing. Poor people have also been involved in drafting river monitoring guidelines by ensuring that their requirements/needs have been incorporated into the guideline.

4.4 Gender equality

The project has addressed the issues of poor representation of women in decision-making processes and limited access to resources, which were evident through our preliminary socio-economic studies. To ensure women's participation, we included them in all project planning meetings, and they have been heavily involved in the implementation of all project activities. To support women's active participation, CNP, the buffer zone user committees of CNP, project partners and ZSL frequently sensitized indigenous communities and women's groups on long term conservation benefits and livelihood enhancement.

The project has also focused on providing better access to income-generating activities for women. Women's leadership was prioritized in the formation of all eight committees to manage community fishponds, with 68% of the members of these committees being women (Annex 7.12). One committee (named Srijansheel Women Fish Farming Group at Kathar) in the buffer zone of CNP is run by women only. Additionally, women were prioritised for inclusion in training programmes on aquaculture (68.5% women participation) as a process of capacity building (Annex 7.19).

4.5 Programme indicators

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

Yes, the project led to greater representation of local poor people in the project-formed management structures of biodiversity (cooperatives and CBAPUs).

- **Were any management plans for biodiversity developed and were these formally accepted?**

Yes, three management plans for biodiversity were developed, namely, (1) Gharial and River Monitoring Guideline, (2) Egg Collection Protocol and Gharial Husbandry and Release Guideline, and (3) River Ecosystem Management Plan. All these were formally accepted by CNP.

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

Yes, they were participatory in nature. Inputs from a range of stakeholders were collected and incorporated in Gharial and River Monitoring Guidelines and River Ecosystem Management Plan, while the remaining two plans were technical and explicitly drafted for GCBC.

- **How did the project positively influence household (HH) income and how many HHs saw an increase?**

During its lifetime, the project involved 161 households in sustainable management of eight community fishponds, giving them the means and tools through trainings, guidance, financial support, and exposure visits to help improve their income. The profit received from the community fishponds were equally distributed to all 161 households who are the members of these fishponds group, so all households saw an increase.

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

Per household income from fishing increased on average from NRS 8,343 (baseline in Year 1) to NRS 13,420 at the end of the project, an increase of approximately 51%. This was measured through a socio-economic survey conducted at the end of the project.

4.6 Transfer of knowledge

The project supported two master’s-level students’ (one male and one female) thesis research (See Section 3.1), helping them earn their formal qualifications. Both came from a developing country (Nepal). Similarly, one PhD-level research project on gharial is underway (Annex 7.16), which is being conducted by a female student from a developed country (UK). The project also supported two EDGE fellows, one male and one female (*Supplementary Document 12*). Aside from these, the project facilitated DNPWC to formulate the Gharial Conservation Action Plan 2018-2022 and supported CNP to finalise its management plan (near completion) by incorporating three project-produced management plans.

4.7 Capacity building

A staff member each from DNPWC, NTNC and HN (all male) were facilitated by the project to secure membership in the IUCN Crocodile Specialist Group.

5 Sustainability and Legacy

The key achievements towards the sustainability of the project activities are:

- DNPWC and CNP own all the project-produced documents, including the river and gharial monitoring guidelines, egg collection protocol and gharial husbandry and release guideline, and river ecosystem management plan. These have been incorporated in the management plan for CNP, which is being finalised.
- The eight fishpond management committees have been formed within the existing institutional framework of BZMC. Therefore, the BZMC fully owns the operation and management of these committees. Guideline documents for their management and operation are in place.
- Five community engagement centres (drop-in centres) have been institutionalized under the buffer zone user committees and other community-based organisations (Jatayu Restaurant, Community Library, etc.) that are already functioning well.
- In-country capacity within GCBC for gharial husbandry and release has been strengthened. This is expected to promote the survival of gharial post-release.
- Our partners NTNC and HN have a strong presence in the project site, and they will take over mobilising the project-formed CBAPUs.

The involvement of wider stakeholders, such as the local government, Fishery Development Centre, buffer zone committees, and local community organisations, throughout the project implementation period has helped the project cement its legacy. Collectively, the close

involvement of all responsible local agencies and the phased hand-over of all project achievements to them remains a sound exit strategy to ensure a sustained legacy. In addition, gharial is a priority EDGE species and ZSL will continue to work for its conservation.

6 Lessons learned

The involvement of existing and institutionalised community organisations such as Buffer Zone Management Committees and Buffer Zone User Committees was vital for successful implementation of the project and to bring about positive changes.

New targeted institutions, working in coordination with the existing institutions mentioned above, have proven to be an effective means of establishing and embedding new livelihood activities such as aquaculture under this project. Forming these under the umbrella of Buffer Zone User Committees also supported the sustainability of these new institutions by helping them to access existing support and resources for the long term. Similarly, regular meetings among partners and project beneficiaries are vital for successful implementation of the project activities.

Communities should be an integral component of any conservation programmes and providing them with an alternative to the direct use of natural resources will benefit conservation in the long run as communities with alternative livelihood options work as guardians of the nature – as is the case with the project-supported fishing communities, which are guarding the gharials and the river ecosystem, becoming the Guardians of Gharials.

The river CBAPUs (Gharial Guard Groups) faced some challenges in patrolling during the monsoon season, which reduced the motivation of community members during this period. However, they picked up their pace in the remaining months and covered a significant distance (3862 km) during the project period.

6.1 Monitoring and evaluation

The two key monitoring units established for the monitoring and evaluation of project implementation, progress and results are the Project Coordination Committee (PCC) at central level and the Project Management Unit (PMU) at the field level. Additionally, CNP, in coordination with project partners, conducted regular monitoring of the project's progress at the site. Regular visits and additional visits organised for specific purposes have been conducted by the project manager to monitor and evaluate project implementation. Regular monitoring visits have been made by senior ZSL staff, joined by CNP senior staff, partners, representatives of buffer zone user committees and local government. The chair of the PCC also conducted a monitoring visit to the project sites, observing the project's interventions in communities as well as in GCBC. He provided his feedback and gave the project management team several suggestions to improve the implementation.

The project used a performance appraisal framework (PAF), tied to the logframe, for ZSL staff to conduct M&E. The PAF uses ZSL's web-based systems to track progress and promote interaction between project partners. Monthly highlights reports are generated from the PAF with input from all the relevant project components. These feed into the regular project reports both for the Darwin Initiative and ZSL's internal M&E procedures.

The PAF is supplemented with rapid appraisals anonymously completed at the end of training sessions, forums, workshops and seminars, with data disaggregated by gender. In order to promote adaptiveness, project reporting also fed into an internal review process.

6.2 Actions taken in response to annual report reviews

1. *Indicator 0.1 was amended in response to comments to 'Recommendations from Proposal Review Team' – from 'By Year 4 the UNEP Water Quality Indicator for Biodiversity score in each river will show a steady increase, particularly in pollution hotspots; to 'Habitat utilisation by gharials increases by 10% by the end of Year 2 and 15% by the end of Year 4 - (This will be measured by GIS mapping of the habitat and the baseline will be set in Year 1).' The logframe presented at Annex 2 does not incorporate this change (although Annex 1 has). This should be updated.*

Response: This has been updated.

2. *Please provide training materials and/or training evaluation reports as Annexes.*

Response: These have been provided.

3. *Describe the roles played by the NGO partners – Himalayan Nature and the National Trust for Nature Conservation in project implementation (Partnership Section).*

Response: This has been described.

4. *Clarify postgraduate work supported by the Project – in light of Change Request (LTS462), which switched funding for a PhD to support two additional MSc students.*

Response: We found that the PhD student was able to generate most of her funding on her own. This meant we could free up this resource to support additional people conducting research on subjects related to our project. However, we continued to support the PhD student in getting permits, coordination with relevant authorities and providing technical backup embedded in this project. The two additional postgraduate students conducted their research on (1) *Covariates affecting the occupancy of Gharial (*Gavialis gangeticus*) in the Rapti River of Chitwan National Park, Nepal* and (2) *The ecosystem services of watershed area that feeds water into the Rapti River*. The researchers worked with communities and park officials to understand the threats and opportunities for ecosystem services of the watershed area as well as the status and habitat of wild gharials in the Rapti River, with recommendations.

5. *Comment on support / work of the EDGE Fellow supported by the project.*

Response: One of the EDGE Fellows working in CNP aimed to undertake research to support science-driven, in-situ conservation by providing detailed, evidence-based information on the gharial, with the following objectives:

- Study the reproductive ecology of wild gharial.
- Study the change in available suitable habitat for gharial in Chitwan National Park.
- Study acoustic communication in gharial and determine sex ratios.
- Determine the historical existence of gharial and its habitat in Chitwan National Park.

The other EDGE Fellow's work on gharial was based in Bardia National Park (BNP) and aimed to collect previously non-existent, baseline scientific information on various ecological attributes of gharial populations in BNP to assess their conservation status. Objectives were:

- Assess the population dynamics of gharials in BNP.
- Assess habitat availability vs utilisation by gharials in BNP.
- Determine major threats to gharials in the rivers of the BNP.
- Model the impact of climate change on gharials and their habitat.
- Engage households and students from indigenous riverine communities to encourage gharial and freshwater conservation.

7 Darwin identity

This project supported by the Darwin Initiative (DI) is a distinct project. However, the project aligns with the government programmes of gharial conservation outlined in the Gharial Conservation Action Plan 2018-2022. The DI has been mentioned in each agreement signed with the partners. The DI logo and a description of the project has been published in ZSL's Quarterly Newsletter. The DI logo along with the partner logo has been placed on the rubber boats that were handed over to CNP and NTNC for gharial monitoring and river patrolling. DI's contribution has been mentioned in all drop-in centres as well as in GCBC. DNPWC, partner organizations, other conservation organizations working at national and site levels, the BZMC officers, and local communities know about the DI support for this project through inception workshops, meetings, and interaction programmes.

The project webpage, hosted on ZSL's as well as HN's websites, and the first in a series of blogs (details above) have highlighted the critical support provided to the project by the Darwin Initiative.

8 Impact of COVID-19 on project delivery

COVID-19 has had a moderate impact on this project, with the progress of Act 1.7, 1.11, 2.4, 3.6 and 4.8 slightly delayed. We responded by altering our workplan to help maintain delivery. The health and safety of all project staff and beneficiaries was assured through following government-mandated regulations. All project staff were provided with face masks and sanitisers and advised to follow social distancing. In this instance, we don't expect any of the project outcomes to assist with the response to COVID-19 or reduce the risk of future pandemics. Greater use of virtual meetings to reduce the need to travel is feasible for coordination with government and in-country partners, but these will not be feasible for communicating with local communities.

9 Finance and administration

9.1 Project expenditure

Project spend (indicative) since last annual report	2020/21 Grant (£)	2020/21 Total actual 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				

Staff employed (Name and position)	Cost (£)
Bhogendra Rayamajhi, Senior Programme Officer	
Dr. Bhagawan Raj Dahal, Dy. Country Representative	
Shashanka Sharma, Programme Officer	
Reshma Shrestha, Finance Associate	
Kamal Prasad Dahal, Office Assistant	
Anita Magar, Office Helper	
Prabin Shrestha, Field biologist	
Chandra Shekhar Sharma, Field assistant	
Roshan Ghimire	
Binay Kumar Jha	
Ramesh Kumar Yadav	
Binod Darai, Field assistant	
Deep Prasad Chaudhary, Field assistant	
Kapil Pokheral, Field assistant	
Ramesh Darai, Field assistant	
Rishi Ram Subedi, Field assistant	
TOTAL	

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

Other items – description	Other items – cost (£)
Publications	
Monitoring & Evaluation	
Fieldwork Equipment	
TOTAL	

9.2 Additional funds or in-kind contributions secured

Source of funding for project lifetime	Total (£)
ZSL	
DNPWC	
Himalayan Nature	
NTNC	
TOTAL	

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

9.3 Value for Money

ZSL has 25 years' experience in working with DNPWC, the government of Nepal and local communities, improving ZSL's access to information, tools, permits, and local expertise to enable cost-effective impact. The project utilised methods, data, infrastructure and learning from our existing ZSL Nepal programmes and wider portfolio of community conservation and species recovery work.

Economy

The construction of infrastructure and equipment supplied to GCBC was accomplished through NTNC to reduce cost and ensure quality, given NTNC's experience of working closely with the

GCBC and their knowledge of what was required. Similarly, through the initiative of CNP and the BZMC, eight fishponds were established within the framework of BZMC. For the operation of these fishponds, community cooperatives were formed, which have run efficiently with very low administrative cost during the project period, ensuring both value and sustainability as it will be possible for these costs to continue to be met locally post-project. Five drop-in centres were established within local libraries, which now serve to educate local communities. As far as possible, all procurement for the project was done locally. All trainings delivered by the project were conducted locally, with experienced local trainers to minimise training costs.

Efficiency/Effectiveness

All fishponds are being run effectively and are providing an additional source of income for the members involved. They have over-delivered on the target indicators, as beneficiaries are investing income from fishponds into other business ventures. Similarly, the five drop-in centres are now owned by the local communities and raising awareness among all visitors with regards to gharial and freshwater conservation.

Equity

All eight fishpond committees were formed in a way that benefitted households belonging to indigenous, marginalised and vulnerable groups, especially women as 68% of the cooperative members are women. In the same way, the project also provided soft loans for the fishponds at very low interest rates, coordinated by the cooperatives with their inclusive governance structures to ensure equitable distribution of benefits.

Legacy

The ownership of project-supported management plans by the GCBC, including gharial husbandry and release guidelines, egg collection protocol, and gharial monitoring guidelines will provide value for money beyond the life of the project. Similarly, the project's capacity- and knowledge-building around gharial ecology will provide CNP with the resources and the know-how to secure the future of this critically endangered species. Additionally, capacity development of communities (esp. vulnerable groups) in securing alternative livelihoods will continue to bear fruit both in terms of generating income and in promoting freshwater conservation.

10 OPTIONAL: Outstanding achievements of your project during the (300-400 words maximum). This section may be used for publicity purposes

The Rapti and Narayani river systems in CNP are home to the largest sub-population of the Critically Endangered gharial in Nepal. Owing to the rapid deterioration in gharial population, the government of Nepal established the Gharial Conservation and Breeding Centre (GCBC) in 1978 to aid their recovery. Since then, the GCBC has released 1,184 gharials in river stretches within CNP. Despite this, the recovery of the species has not been as significant as anticipated. Of the 214 gharials that currently reside within CNP, there are only three males. The problem of skewed sex ratio has been a prevalent one in CNP and has been considered one of the primary reasons for their slow recovery.

Gharials are known to display temperature-dependent sex determination, where the ambient temperature of the developing eggs determine the individual's sex. To increase the male numbers being released into the wild, an incubator was handed over to the GCBC towards the end of May 2021, co-funded by the British Herpetological Society. The design of the incubator was developed with the Reptile and Amphibian team at ZSL London Zoo.

After the installation of the incubator, 10 eggs were kept, of which two turned out to be infertile. Of the eight fertile eggs, seven have hatched into healthy babies. Generally, the sex of the gharials is hard to determine within 1-2 year after hatching, which is why the tails of the hatchlings were clipped to facilitate monitoring. They will be recaptured once they're mature enough to identify the sex as well as to insert micro-chips for long-term monitoring.

This is the first time gharial eggs have been hatched in an incubator in Nepal. They also hatched nearly two weeks earlier than the eggs from the same nest that were buried in the standard way outside of the incubator, with an 87.5% success rate. The temperature of the incubator was kept at 32°C, which is shown to produce male gharials. This is based on a study in 1990-1991 at the Madras Crocodile Centre, where a clutch of eggs was kept at different temperatures; with 31.5°C (n=3) producing 0% male, 32°C (n=9) producing 89% male, 33°C (n=5) producing 20% male and

33.5⁰C (n=13) producing 15% male. The incubator will assist the GCBC to maintain optimum temperature to produce males, thereby helping decrease the skewed sex ratio and ensure that gharial population recovers in the wild in the long run.

(399 words)

Annex 1 Project's original (or most recently approved) logframe, including indicators, means of verification and assumptions.

Project summary	Measurable Indicators	Means of verification	Important Assumptions
<p>Impact: Naranyi and Rapti river ecosystems are protected and restored, with the recovered gharial populations safeguarded and viable long-term, and providing ecosystem services to local fishing communities practicing sustainable livelihoods, reducing poverty.</p>			
<p>Outcome: Health of the Narayani and Rapti river ecosystems restored, with improved water quality, increased fish stocks, and stabilised Gharial population, supported by local communities benefiting from sustainable livelihoods</p>	<p>1. Habitat utilisation by gharials increases by 10% by the end of Year 2 and 15% by the end of Year 4 (baseline that will be set in Year 1)</p>	<p>1. GIS mapping of the habitat</p>	<p>Positive trend in these key indicators indicate an overall increase in the biodiversity value of these river ecosystems. This method has been used successfully in the Chambal river.</p>
	<p>2. By Year 4 100% of the fishermen in the Narayani and Rapti river system will have a valid Fishing licenses, will be recording and reporting the weight of each catch (Baseline to be set in Year 1)</p>	<p>2. Social survey results and Socioeconomic survey on livelihood composition, DNPWC records</p>	<p>• Positive results in all 3 ecological indicators (Gharial populations; fish populations; and water quality) indicate successful ecosystem restoration has taken place.</p>
	<p>3. By Year 4 Fisherman's catches will show a 20% increase in weight per unit effort and with key high value fish species showing a population recovery (baseline to be set in Year 1)</p>	<p>3. Fisherman landing records</p>	<p>• Relevant authorities show continued commitment to implement robust management plans and monitoring programmes</p>
	<p>4. By the end of Year 4 there will be a 30% increase in the Gharial populations in the wild within Chitwan National Park (Baseline to be set in Year 1)</p>	<p>4. Gharial population monitoring records</p>	
	<p>5. By the end of Year 4 adaptive management plans and participatory approaches have been adopted and are being implemented in the management of the wild and released Gharial population in Chitwan NP</p>	<p>5. DNPWC records showing iterative updates to Gharial management plans, and management plans</p>	

	6. By the end of Year 4 there will be a 30% increase in the Gharial populations within Chitwan National Park (Baseline to be set in Year 1)	6. Gharial population monitoring records	
	7. By Year 4 120 fish-dependent Household are sustainably managing fish-ponds, and receiving a regular income from farmed fish	7. Fish pond records, socioeconomic survey results	
Output 1: Improved river ecosystem management delivered through improved management plans and environmental policy based on a robust Gharial and riverine ecosystem monitoring programme	1. Ecological baselines established for prey fish stocks/biodiversity, and gharial distribution in Year 1, and repeating every year following that.	1. Partner reports, Scientific Papers, survey reports, senior DNPWC briefing	• Monitoring programme sustainably institutionalised by DNPWC in the long term
	2. Gharial and river ecosystem monitoring guidelines finalised, on the basis of successful monitoring in Year 1, by end of Year 2	2. Guideline documents	• DNPWC continues to have adequate resources to implement the required changes in all the relevant areas affecting the riverine ecosystem in the Narayani and Rapti watersheds
	3. PhD student project underway and 2 Masters students projects completed on Gharials and the river ecosystem by Year 3 to feed into management plans	3. PhD and MSc researcher producing at least 2 briefings written to inform decision makers. 1 technical workshop host each year for PA and partner staff. Data from field research is incorporated into M&E system.	• Improved plans and policy are effectively translated into improved management
	4. EDGE Fellow recruited with project focussed on gharial conservation to feed into management plans	4. Scientific Papers, survey reports, policy briefing	Management plan is effectively implemented by DNPWC
	5. Threats and impacts to Gharial population and fish biodiversity mapped across Narayani and Rapti ecosystems, including illegal fishing by Year 2	5. Scientific Papers, survey reports, policy briefing	
	6. Management plan for CNP updated, including strengthened policies on sustainable use of riverine biodiversity and reducing industrial and domestic waste by Year 4	6. Management plan, DNPWC strategic documents, CNP reports, workshop with senior DNPWC leaders	

<p>Output 2: Threats to fish stocks and gharials are reduced through protection provided by 10 Community-Based Anti-Poaching Units (CBAPUs) patrolling sensitive riverine zones in the Narayani and Rapti watersheds to protect the area from unsustainable fishing, poaching and other damaging and unsustainable uses of the river.</p>	1. 6-person CBAPUs established in 10 local communities with a total of 60 members trained in river patrolling, with support and enabling roles targeted at women by Year 1	1. Training attendance records, results of post-training assessment	<ul style="list-style-type: none"> • CBAPUs continue to be respected and influential within the community
	2. Each CBAPU conducting 2 patrols of the river system per month in Year 2	2. CBAPU reports, SMART reports showing prioritisation of sensitive riverine zones	<ul style="list-style-type: none"> • Sufficient number and diversity of community members are willing to participate in CBAPUs
	3. Protected area authorities actively collaborating with CBAPUs and utilising intelligence gathered by Year 2 to inform patrol planning	3. Monthly coordination meetings are being held between PA authorities and CBAPU leads, and intelligence-led patrols by DNPWC using intelligence gathered from CBAPU patrols taking place	<ul style="list-style-type: none"> • Fishing of prey fish and the killing of gharials, both unintentionally via fishing and through poaching, are the key threats for the Gharial population.
	4. Each CBAPU conducting 3 patrols of the river systems per month in Year 3 with 100% of identified sensitive riverine zones being protected	4. CBAPU reports, SMART reports showing that 100% of identified sensitive riverine zones have been patrolled	
	5. Illegal fishing incidents down 50% from baseline in Year 1 to year 4	5. DNPWC Records, CBAPU reports, SMART reports	
	6. Zero gharial poaching incidents in Year 4	6. DNPWC Records, CBAPU reports, SMART reports	
<p>Output 3: Increased post-release survival of Gharial's from the Chitwan Gharial Conservation Breeding Centre (GCBC) delivered through implementing improved husbandry and release protocols, and post-release monitoring.</p>	1. GCBC infrastructure improved and identified required equipment supplied by Year 1	1. Equipment records, installation records and GCBC reports	<ul style="list-style-type: none"> • Factors unrelated to the release procedures are not the primary cause of released gharial mortality
	2. Gharial husbandry and release guidelines developed and implemented at GCBC by Year 3	2. Training attendance records, results of post-training assessment	Factors relating to post-release mortality are identified and adequately addressed through other project Outputs, specifically monitoring.
	3. All 12 GCBC staff trained in herpetology husbandry and release by Year 2	3. Gharial tagging and monitoring reports	
	4. 40 gharial tagged on release in Year 2 as a pilot, and monitored from then on	4. Guideline document approved by GCBC, GCBC records	
	5. Released gharial annual mortality reduced 20% by Year 4 from Year 1 baseline	5. Release reports, reports from post release monitoring	

Output 4: Food security of local communities improved through implementing sustainable fishing, and reducing the dependence of local communities on fishing through generating sustainable aquaculture livelihoods.	1. 8 fish ponds, run by indigenous fish-dependent communities established of sufficient size to support at least 20 households each in the buffer zones of CNP, with a focus on management by women's groups by the end of Year 1.	1. Fish pond management, environmental safeguarding guidelines on fishpond construction and management, and lease records	• Aquaculture combined with increased awareness and strengthened protected area management disincentives illegal, and harmful fishing practices
	2. 40% (60) of those households with a member trained in aquaculture are receiving aquaculture income higher than baseline fishing income recorded in Year 1 by Year 2	2. Partner reports, alternative livelihood records, social surveys	• Sustainable fishing increases the food security of local communities
	3. 20 people per day visiting each of 5 community conservation engagement centres in upstream communities by Year 2	3. Partner reports of drop in centres	• Communities have the will to manage their resources sustainably long-term
	4. 80% (120) of those households with a member trained in aquaculture livelihoods receiving aquaculture income by Year 3	4. Partner reports, alternative livelihood records, social surveys	• Unequal benefit sharing, corruption and theft do not fundamentally undermine community aquaculture
	5. 90% of practicing fishermen with valid licenses are using sustainable fishing methods by Year 4	5. Fishing techniques survey at start of project and in Year 4, and a reduction in the number of accidental deaths of gharials	
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)			
1.1	Collect and collate relevant literature available for Gharial and riverine ecosystem research and conservation		
1.2	Recruit 1 PhD candidate, 2 MSc students and on EDGE Fellows		
1.3	Organise 2 inception meetings with conservation stakeholders (including DNPWC, NTNC, HN and BZCs) and experts		
1.4	2 workshops with wider stakeholders, consultation meetings with experts and community members for developing guidelines		
1.5	Produce gharial/river monitoring guidelines		
1.6	Conduct field training courses to train participants for the use of monitoring guidelines for PA staff, CBAPUs, conservation stakeholders, and university students.		
1.7	Conduct baseline surveys for fish stock, amphibian stock, and water quality in major rivers of Chitwan National Park, these to repeat in Year 4. Annual monitoring of Gharial's will start in Year 2.		
1.8	Revise gharial/river monitoring guidelines as necessary according to survey findings.		
1.9	Share findings to park managers and stakeholders in a wider forum and agree on an annual monitoring plan		
1.10	Publish at least 2 peer reviewed papers		
1.11	Organise preliminary meeting with conservation stakeholders (including DNPWC, NTNC, HN and BZCs) and experts to support DNPWC in development of river ecosystem management plan for Chitwan National Park		
1.12	2 workshops with wider stakeholders, consultation meetings with experts and community members to input into ecosystem management plan		
1.13	Conduct training workshop for the park staff and buffer zone community for river ecosystem management		
2.1	Assessment of status in the key locations for Gharial conservation for the establishment of CBAPUs		
2.2	Identify 10 existing CBAPUs and establish additional CBAPUs if needed		
2.3	Train and equip CBAPUs in river patrolling		

2.4	Support the CBAPU for yearly monitoring programmes, linked with park authority to control illegal activities in the rivers
3.1	Conduct assessment of the GCBC infrastructure and prioritise for improvement
3.2	Renovate GCBC infrastructure aiming to increase the egg laying, visitor experience, etc.
3.3	Review GCBC's current egg collection practice from the wild and revise guidelines as appropriate
3.4	Prepare husbandry and release guidelines for gharials of Nepal
3.5	Conduct training for GCBC staff on gharial handling and release
3.6	Post-release monitoring of gharials with state of the art methods e.g. satellite tagging, data loggers, etc. Include research on some existing wild populations for comparison
3.7	Make recommendations to park managers and stakeholders in a wider forum based on findings
4.1	Meetings with park managers and buffer zone committees to identify indigenous fish dependent communities and households
4.2	Conduct socioeconomic and livelihoods survey in fish-dependent communities in years 1 and 4
4.3	Prioritise households based on the wealth ranking from the socioeconomic survey
4.4	Identify areas suitable for the establishment of community managed ponds
4.5	Set up 5 women-led committees of 10 households to manage and operate community fish ponds
4.6	Organise 2 aquaculture training workshops for 150 households and 2 exposure visits for community leaders of identified communities
4.7	5 community conservation engagement centres will be established in upstream communities for awareness raising of the project and the benefits of gharial and freshwater conservation.
4.8	Hold 10 community workshops on sustainable fishing and gharial conservation reaching 200 households

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

Project summary	Measurable Indicators	Progress and Achievements
<p>Impact</p> <p>Narayani and Rapti river ecosystems are protected and restored, with the recovered gharial populations safeguarded and viable long-term, and providing ecosystem services to local fishing communities practicing sustainable livelihoods, reducing poverty.</p>		<p>By the end of the project, we have reached some milestones towards achieving the impact. A 28% increase in wild gharial population has been recorded since 2016. Likewise, the project intervention has resulted in a 51% increase in average income from fishing for 161 households ably practicing sustainable fish farming in community ponds.</p>
<p>Outcome <i>Health of the Narayani and Rapti river ecosystems improved, with increased fish stocks, and stabilised Gharial population, supported by local communities benefiting from sustainable livelihoods</i></p>	<ol style="list-style-type: none"> 1. Habitat utilisation by gharials increases by 10% by the end of Year 2 and 15% by the end of Year 4 (baseline that will be set in Year 1) 2. By Year 4 100% of the fishermen in the Narayani and Rapti river system will have a valid Fishing licenses, will be recording and reporting the weight of each catch (Baseline to be set in Year 1) 3. By Year 4 Fisherman's catches will show a 20% increase in weight per unit effort and with key high value fish species showing a population recovery (baseline to be set in Year 1) 4. By the end of Year 4 there will be a 30% increase in the Gharial populations in the wild within Chitwan National Park (Baseline to be set in Year 1) 5. By the end of Year 4 adaptive management plans and participatory approaches have been adopted and are being implemented in the 	<ol style="list-style-type: none"> 1. Based on the monitoring data, a detailed gharial habitat utilization map was prepared. The monitoring of gharials in Rapti and Narayani rivers has shown the increased range of gharial habitats: 17% increase in year 2 compared to Year 1 and 24% increase in Year 4 compared to Year 1 (Annex 7.15), exceeding the target increase. 2. 100% (baseline 43% in Year 1) of fishermen now have a valid fishing license. Average weight of catch per effort for both rivers is 0.7 kg (Annex 7.2a). 3. The average catch per effort increased by 18.94% from the baseline of 0.5885 kg per effort for both rivers to 0.7 kg (Annex 7.2a). 4. The population of gharials has increased by 28% (Annex 7.2a) from the 2016 national gharial survey baseline (i.e., 167 to 214 individuals). For Year 1, the gharial population was 219 (possibly inflated due to the release of 48 juveniles one week prior to the count). 5. Three adaptive plans, Gharial and River Monitoring Guidelines; Gharial Husbandry, Release and Egg Collection Guideline; and River Ecosystem Management Plan, have been prepared and are being implemented in CNP (<i>Supplementary Document 2, 3 and 6</i>). These plans have also been incorporated into CNP's management plan. 6. A total of 161 households are engaged in sustainably managing eight community fishponds through women-led cooperatives, earning a total of NRS 5,820,779 (£ 35,219.80) during the course of the project (Annex 7.13). Three such cooperatives have now expanded their business and invested in pig farming, banana plantation and lunch shop to diversify their income streams.

Project summary	Measurable Indicators	Progress and Achievements
	<p>management of the wild and released Gharial population in Chitwan NP</p> <p>6. By Year 4 120 fish-dependent Household are sustainably managing fishponds, and receiving a regular income from farmed fish</p>	
<p>Output 1.</p> <p>Improved river ecosystem management delivered through improved management plans and environmental policy based on a robust Gharial and riverine ecosystem monitoring programme</p>	<ol style="list-style-type: none"> 1. Ecological baselines established for prey fish stocks/biodiversity, and gharial distribution in Year 1, and repeating every year following that. 2. Gharial and river ecosystem monitoring guidelines finalised, on the basis of successful monitoring in Year 1, by end of Year 2 3. PhD student project underway and 2 Masters students projects completed on Gharials and the river ecosystem by Year 3 to feed into management plans 4. EDGE Fellow recruited with project focussed on gharial conservation to feed into management plans 5. Threats and impacts to Gharial population and fish biodiversity mapped across Narayani and Rapti ecosystems, including illegal fishing by Year 2 6. Management plan for CNP updated, including strengthened policies on sustainable use of riverine biodiversity and reducing industrial and domestic waste by Year 4 	<ol style="list-style-type: none"> 1. Altogether, 219 gharials (118 from Rapti and 101 from Narayani river) and 32 fish species (20 in Rapti and 12 in Narayani river) were recorded in the first year, and fish density was found to be 61 per 100 m² in Rapti and 19 per 100 m² in Narayani river. In Year 4, 214 gharials (See Sec 3.1 for details) and 28 fish species (18 in Rapti and 10 in Narayani) were recorded, with fish density at 73 per 100 m² in Rapti and 47 per 100 m² in Narayani river (Annex 7.2a). 2. The Gharial and River Ecosystem Monitoring Guideline was prepared and shared with CNP in 2018 (<i>Supplementary Document 2</i>). 3. PhD research project is near completion; two master students' projects and a River Ecosystem Management Plan were completed in 2019. The findings and results have been shared with CNP authorities. In light of Change Request (LTS462), two additional Masters students' projects were supported later. 4. Two EDGE Fellows were recruited by the project in 2019. Their results have been shared with CNP to be fed into the management plan (<i>Supplementary Document 7</i>). 5. Mapping of threats and impacts on the gharial population and fish biodiversity across Narayani and Rapti rivers was completed in 2019 (Annex 7.4). 6. This project coordinated with CNP and facilitated the incorporation of four project-produced adaptive plans to update CNP's management plan, including policies strengthened on sustainable use of riverine biodiversity and reducing industrial and domestic waste. The management plan is being finalised.

Project summary	Measurable Indicators	Progress and Achievements
Activity 1.1 Collect and collate relevant literature available for Gharial and riverine ecosystem research and conservation		Prior to the implementation of the project, literature such as research articles, books, manuals, and guidelines were collected.
Activity 1.2 Recruit 1 PhD candidate, 2 MSc student and one EDGE Fellow		Two EDGE fellows have completed their research on gharial conservation and four MSc students (including an additional two added after the approval of Change Request (LTS462)) have completed their research under this project. The PhD research project is ongoing and near completion. The student is conducting research on gharial movement and survival. As part of the PhD research, post-release gharial monitoring and regular tracking of the tagged gharial is ongoing.
Activity 1.3 Conduct large scale Local Ecological Knowledge survey		A survey was conducted to document the knowledge of local communities on gharial, its habitat and conservation (<i>Supplementary document 9</i>).
Activity 1.4 Organise 2 inception meetings with conservation stakeholders (including DNPWC, NTNC, HN and BZCs) and experts		Two inception meetings among conservation stakeholders were conducted at CNP during the Year 1 (<i>Annex 1</i>).
Activity 1.5 Two workshops with wider stakeholders, consultation meetings with experts and community members for developing guidelines		Two workshops among conservation stakeholders were conducted in Year 1 and 2 to prepare a gharial monitoring guideline. Participants represented DNPWC, CNP, BZMC, BZUCs, NTNC, HN and ZSL.
Activity 1.6 Produce gharial/river monitoring guidelines		A gharial monitoring guideline was prepared and shared with CNP (<i>Supplementary document 2</i>).
Activity 1.7 Conduct field training courses to train participants for the use of monitoring guidelines for PA staff, CBAPUs, conservation stakeholders, and university students		In total, 216 participants from CNP, CBAPUs, student volunteers and NTNC were trained in using the gharial monitoring guideline over three years. The trainings covered gharial and other aquatic animal monitoring and conservation in the Rapti and Narayani rivers and their tributaries in CNP, its buffer zone, and the surrounding area (<i>Annex 7.6</i>).
Activity 1.8 Conduct baseline surveys for fish stock, amphibian stock, and water quality in major rivers of Chitwan National Park, these to repeat in Year 4. Annual monitoring of Gharial's will start in Year 2		In total, 219 gharials (118 from Rapti and 101 from Narayani river) and 32 fish species (20 in Rapti and 12 in Narayani river) were recorded in the first year and fish density was found to be 61 per 100 m ² in Rapti and 19 per 100 m ² in Narayani river. In Year 4, 214 gharials (See sec 3.1 for detail) and 28 fish species (18 in Rapti and 10 in Narayani) were recorded during the survey. The fish densities were found to be 73 per 100 m ² in Rapti and 47 per 100 m ² in Narayani (<i>Annex 7.2a</i>). The water quality was assessed, and results show most measured physical and chemical parameters within the recommended range for most of the tropical fish species, indicating good water quality in Rapti and Narayani rivers (<i>Annex 7.2b</i>).
Activity 1.9 Revise gharial/river monitoring guidelines as necessary according to survey findings.		Gharial and river monitoring guidelines was revised and finalised (<i>Supplementary Document 2</i>).

Project summary	Measurable Indicators	Progress and Achievements
Activity 1.10 Share findings to park managers and stakeholders in a wider forum and agree on an annual monitoring plan		Results from the survey were shared with CNP at the site level and with DNPWC officials at the central level. An annual monitoring plan, as incorporated in the gharial monitoring guidelines, was agreed with the relevant stakeholders.
Activity 1.11 Publish at least 2 peer reviewed papers.		Two articles have been submitted for publication in peer-reviewed journals (Act. 1.11) during this reporting period. The articles are: (i) "Population Status of Gharial Crocodiles in Chitwan National Park, Nepal" submitted to <i>Oryx</i> on 22 June 2020 (article reference: Oryx-20-A-0191) and (ii) "Evaluating local fishers' livelihood needs, impacts and support for gharial conservation in Chitwan Nepal" submitted to <i>Our Nature</i> on 19 May 2020. Both articles are under editorial review.
Activity 1.12 Organise a preliminary meeting with conservation stakeholders (including DNPWC, NTNC, HN and BZCs) and experts to support DNPWC in development of river ecosystem management plan for Chitwan National Park		In Year 2, a meeting was organised in Sauraha Chitwan among conservation stakeholders to support CNP in the development of the river ecosystem management plan. These meetings were attended by the representatives of DNPWC, NTNC, HN, BZs, CBAPUs and the protection unit of CNP.
Activity 1.13 Two workshops with wider stakeholders, consultation meetings with experts and community members to input into ecosystem management plan.		For collective input from all concerned stakeholders, a total of four workshops were conducted to gather inputs for the river ecosystem management plan in Year 2. A total of 186 people attended the consultation workshops, representing relevant stakeholders including community members from river-dependent communities, buffer zone user committee/user groups and forest user groups, park authorities, experts from NTNC, and representatives from HN (Annex 7.17)
Activity 1.14 Conduct training workshop for the park staff and buffer zone community for river ecosystem management		A training workshop was completed for 45 participants from the park, buffer zone committees, local communities and relevant stakeholders. The training workshop primarily focused on various measures recommended by the River Ecosystem Management Plan prepared by the project in Year 2 (Annex 7.18)
<p>Output 2.</p> <p>Threats to fish stocks and gharials are reduced through protection provided by 10 Community-Based Anti-Poaching Units (CBAPUs) patrolling sensitive riverine zones in the Narayani and Rapti watersheds to protect the area from unsustainable fishing, poaching and other damaging and unsustainable uses of the river.</p>	<ol style="list-style-type: none"> 1. 6-person CBAPUs established in 10 local communities with a total of 60 members trained in river patrolling, with support and enabling roles targeted at women by Year 1 2. Each CBAPU conducting 2 patrols of the river system per month in Year 2 3. Protected area authorities actively collaborating with CBAPUs and utilising intelligence gathered by Year 2 to inform patrol planning 4. Each CBAPU conducting 3 patrols of the river systems per 	<ol style="list-style-type: none"> 1. A total of 66, including women members, were recruited under 11 CBAPUs. These members were annually trained on patrolling river stretches to monitor gharial population and deter illegal wildlife activities (Annex 7.6). 2. In Year 2, a total of 132 patrols were conducted in the Narayani and Rapti rivers (an average of 2 per CBAPU per month), covering a 6km river stretch per patrol on average. This resulted in the arrest of 27 people for illegal fishing and 9 involved in illegal resource extraction from rivers (Annex 7.7). 3. CBAPUs remain one of the vital sources of information for CNP authorities to control illegal activities in the Narayani and Rapti rivers. CNP authorities actively collaborated with project-formed CBAPUs to obtain information and plan the patrols accordingly to curb illegal activities, rescue gharials and monitor gharial nests. There is a strong mechanism for coordination established between CBAPUs and park authorities.

Project summary	Measurable Indicators	Progress and Achievements
	<p>month in Year 3 with 100% of identified sensitive riverine zones being protected</p> <p>5. Illegal fishing incidents down 50% from baseline in Year 1 to Year 4</p> <p>6. Zero gharial poaching incidents in year 4</p>	<p>4. In Year 3, a total of 284 river patrols were conducted, covering all identified sensitive riverine zones. This resulted in the arrest of 25 people for illegal fishing and nine for illegal river resource extraction (Annex 7.7). In Year 4, a total of 330 river patrols were conducted, resulting in the arrest of 107 people for illegal entry with unsustainable fishing gear and 11 for illegal river resource extraction (Annex 7.7).</p> <p>5. Through the combined effort of its officials and the support of the CBAPUs, CNP was able to arrest 159 illegal fishermen (Annex 7.7) from 36 incidents, with improved reporting of illegal incidents leading to increased arrests of intruders during the project period. Illegal fishing incidents dropped in Year 3, but in the last year, restrictions on economic activities due to COVID-19 meant that livelihoods were lost, and Nepal's protected areas saw a general increase in the number of illegal entrants for resource collection, resulting in a 70% increase (from 10 to 17 incidents) in illegal fishing compared to Year 2. All this information on illegal incidents was provided by the members of project-formed 3Gs (Annex 7.7).</p> <p>6. According to CNP annual reports, no gharials were poached throughout the project period. Additionally, the project-supported CBAPU groups promptly reported to the PA authorities six incidents of gharials and 10 cases of mugger crocodiles entangled in nets in community fishponds and paddy fields, subsequently helping in their rescue (Annex 7.8).</p>
Activity 2.1 Assessment of status in the key locations for Gharial conservation for the establishment of CBAPUs		A total of 11 priority locations based on threats were identified in the Narayani and Rapti rivers for the establishment CBAPU groups, also known as the Gharial Guard Groups (3Gs) (Annex 7.5).
Activity 2.2. Identify 10 existing CBAPUs and establish additional CBAPUs if needed		A total of 11 six-member 3Gs/CBAPUs became functional from Year 1. These groups consisted of both existing and newly formed CBAPUs. All groups were supported to conduct regular river patrols in 11 different monitoring sections of the Rapti and Narayani rivers and provide information to CNP officials regarding illegal human activities.
Activity 2.3 Train and equip CBAPUs in river patrolling		All CBAPU members were trained annually on river patrolling and monitoring of river ecosystem and gharials. A total of 27 people were trained in Year 1, 59 in each of Years 2 and 3 and 66 in Year 4. This activity has been conducted together with Activity 1.7 (Annex 7.6).
Activity 2.4 Support the CBAPU for yearly monitoring programmes, linked with park authority to control illegal activities in the rivers		During the project period, all CBAPUs were supported to conduct yearly monitoring programmes, involving the monitoring of river ecosystem and gharial and their nests to report illegal activities and protect gharials. As part of their annual programmes,

Project summary	Measurable Indicators	Progress and Achievements
		<p>CBAPUs supported CNP officials to monitor 24 gharial nests in total (16 from Rapti and eight from Narayani). Information about the nest dynamics as reported by the CBAPUs prompted CNP officials to transfer eggs from 10 nests to GCBC as part of the Nepal government's ex-situ gharial conservation programme. Eggs from the nests that were in the lower banks and susceptible to be washed out by floods during the pre-monsoon period were transferred. The rest of the nests were guarded and monitored for protection from human interference to aid the in-situ breeding programme (Annex 7.19).</p> <p>Similarly, during the project period, the CBAPUs promptly reported to PA authorities six incidents of gharials and 10 cases of mugger crocodiles entangled in nets in community fishponds and paddy fields, subsequently helping PA authorities in their rescue (Annex 7.8).</p>
<p>Output 3.</p> <p>Increased post-release survival of Gharial's from the Chitwan Gharial Conservation Breeding Centre (GCBC) delivered through implementing improved husbandry and release protocols, and post-release monitoring.</p>	<ol style="list-style-type: none"> 1. GCBC infrastructure improved and identified required equipment supplied by Year 1 2. Gharial husbandry and release guidelines developed and implemented at GCBC by Year 3 3. All 12 GCBC staff trained in herpetology husbandry and release by Year 2 4. 40 gharials tagged on release in Year 2 as a pilot, and monitored from then on 5. Released gharial annual mortality reduced 20% by Year 4 from Year 1 baseline 	<ol style="list-style-type: none"> 1. In Year 1, the infrastructure and equipment needs of GCBC were assessed. Chip readers, laptops and cameras were provided in Year 1, artificial sand banks were created in Year 2 within the centre, educational and awareness-raising materials including information boards and posters were provided, a visual platform was constructed to install display screens in the information centre and approx. 5,178 square feet of the ground area of GCBC were paved with concrete paver blocks (Annex 7.9). These have helped improve management efficiency within GCBC and strengthen positive visitor experience. 2. Gharial husbandry and release guidelines were prepared and submitted to CNP. Recommendations provided by the guidelines are already being adopted (<i>Supplementary Document 3</i>). 3. A total of 46 people (18 in Y2 and 28 in Y4) were trained in gharial husbandry and release: 16 GCBC staff (target 12 plus additional four) and two staff from NTNC and HN in Y1 (Annex 7.10), 19 GCBC/CNP staff, 7 NTNC staff and 2 Nepali Army in Y4 (Annex 7.10). They were trained in egg collection from the wild, handling gharial and releasing the juveniles in the wild. 4. A total of 150 gharials were released throughout the project period and of these, 25 gharials were fitted with GPS/VHF devices before release from GCBC and an additional 20 wild-caught gharials were tagged for regular monitoring of their movement (Annex 7.11). Of these, 28 (11 headstart and 17 wild-caught) have survived till Y4 and are being monitored currently. 5. The monitoring of the released gharials is ongoing. Out of 45 tagged gharials, 33 gharials have survived to Year 3 and 28 gharials have survived to Year 4. For headstarted gharials released from GCBC, there was a 20-35% mortality rate in Year 3 (considering that the undetected gharials in India were very likely dead), and a 21-29% mortality rate in Year 4, which indicates a fairly constant mortality rate. This suggests annual gharial mortality remains high after release from captivity, with entanglement in fishing gear

Project summary	Measurable Indicators	Progress and Achievements
		and intentional killing by people remaining the major causes of mortality. However, for the wild-caught gharial, the survival rate was much higher. Overall, the survival rate of wild-caught gharial is currently estimated to be 90%, which suggests that larger gharials are surviving much better. (Annex 7.11).
Activity 3.1. Conduct assessment of the GCBC infrastructure and prioritise for improvement		GCBC infrastructure was assessed and later improvement was supported.
Activity 3.2. Renovate GCBC infrastructure aiming to increase the egg laying, visitor experience, etc.		Chip readers, laptops and cameras were provided in Year 1, artificial sand banks were created in Year 2 within the centre, educational and awareness-raising materials including information boards and posters were provided, a visual platform was constructed to install display screens in the information centre and approx. 5,178 square feet of ground area within GCBC were paved with concrete paver blocks (Annex 7.9). These have helped improve management efficiency within GCBC and strengthen positive visitor experience.
Activity 3.3. Review GCBC's current egg collection practice from the wild and revise guidelines as appropriate		National and international experts, in collaboration with project and national park staff, reviewed the current egg collection practice of GCBC and have revised the guidelines based on the review results (<i>Supplementary Document 3</i>).
Activity 3.4. Prepare husbandry and release guidelines for gharials of Nepal		Gharial husbandry and release guidelines have been prepared and submitted to CNP (<i>Supplementary Document 3</i>).
Activity 3.5. Conduct training for GCBC staff on gharial handling and release		A total of 46 participants (38 GCBC staff, 1 HN and 7 NTNC staff) were trained in gharial handling and release techniques. (Annex 7.10)
Activity 3.6. Post-release monitoring of gharials with state-of-the-art methods e.g. satellite tagging, data loggers, etc. Include research on some existing wild populations for comparison		A total of 25 juvenile gharials of GCBC were tagged in 2019 (n = 20) and 2020 (n = 5) and released in the wild. In addition to these 25 individuals, 20 wild ones were also tagged in 2018 (n = 5) and 2019 (n = 15) (Annex 7.11). Of the tagged gharials, nearly 90% wild gharials survived to Year 4, while 44% headstarted gharials released from GCBC survived to Year 4 (Annex 7.11).
Activity 3.7. Make recommendations to park managers and stakeholders in a wider forum based on the findings.		Reports on the findings of gharial monitoring were shared periodically with DNPWC and CNP authorities.
Output 4. Food security of local communities improved through implementing sustainable fishing and reducing the dependence of local communities on	1. 8 fishponds, run by indigenous fish-dependent communities established of sufficient size to support at least 20 households each in the buffer zones of	1. 8 fishponds, sustainably managed by women-led cooperatives, were established in the buffer zone areas of CNP. The majority of the members belong to indigenous fish-dependent communities. Altogether, 161 households are involved in managing the fishponds (Annex 7.12).

Project summary	Measurable Indicators	Progress and Achievements
fishing through generating sustainable aquaculture livelihoods.	<p>CNP, with a focus on management by women's groups by the end of Year 1.</p> <ol style="list-style-type: none"> 2. 60 households with a member trained in aquaculture are receiving 20% higher aquaculture income than baseline fishing income recorded in Year 1, by Year 2 3. 20 people per day visiting each of 5 community conservation engagement centres in upstream communities by year 2 4. 120 households with a member trained in aquaculture livelihoods are receiving 20% higher aquaculture income than baseline fishing income recorded in Year 1, by Year 3 5. 90% (180 households) of practicing fishermen with valid licenses are using sustainable fishing methods by Year 4 	<ol style="list-style-type: none"> 2. There was an 18.7% increase in the income of 60 HHs from fishing as reported in Y2 (Annex 7.13). 3. 5 drop-in centres established in the upstream communities saw nearly 25 people visiting on average per day prior to the government-imposed lockdown (Annex 7.14); currently, 13 people visit per day. These drop-in centres have been owned by the communities and have remained effective in spreading conservation awareness. 4. There was a 25.9% increase in the income of 120 households from fishing reported in Y3 and a 51% increase reported in Y4, compared to Y1 (Annex 7.13). 5. Of the 273 households with valid licences, almost 240 households (87.91%) are practicing sustainable fishing methods. They are using appropriate net size, timing and locations that are allowed by CNP authorities.
Activity 4.1. Meetings with park managers and buffer zone committees to identify indigenous fish dependent communities and households		11 consultation meetings were conducted with CNP authorities and buffer zone communities to identify indigenous fish-dependent communities and households (Annex 7.23).
Activity 4.2. Conduct socioeconomic and livelihoods survey in fish-dependent communities in Years 1 and 4		Socioeconomic and livelihood surveys were done at the beginning and end of the project period. A total of 319 households were surveyed in Year 1 and 422 households were surveyed in Year 4 (<i>Supplementary Document 10 and 11</i>).
Activity 4.3. Prioritise households based on the wealth ranking from the socioeconomic survey		A total of 59 households were prioritised based on wealth ranking obtained from the survey for inclusion in income generation through sustainable aquaculture practices (Annex 7.12a). Later, in consultations with the buffer zone user groups and local communities, a further 105 households were included in income generation through sustainable aquaculture. All participating households are members of eight women-led cooperatives (Annex 7.12b).
Activity 4.4. Identify areas suitable for the establishment of community managed ponds		Eight locations were identified in the buffer zone area of CNP for the establishment of community-managed fishponds. The identification was based on socio-economic

Project summary	Measurable Indicators	Progress and Achievements
		survey and wider consultations with CNP authorities and buffer zone user committees (Annex 7.12).
Activity 4.5. Set up 5 women-led committees of 10 households to manage and operate community fishponds		Eight women-led cooperatives were established to manage and operate the community-managed fishponds. The project provided NRS 4,396,525 as seed money to strengthen the operation of these ponds and for their regular management. Furthermore, these community-managed fishponds have been linked with existing markets. These fishpond groups have earned NRS 5,820,779 (£35,219.80) so far and the average income of the households engaged in sustainable aquaculture has increased to NRS 13,420, compared to the baseline of NRS 8,343 (4000 from traditional fishing and 4343 from fishpond income) in Year 1 (Annex 7.13).
Activity 4.6. Organise 2 aquaculture training workshops for 150 households and 2 exposure visits for community leaders of identified communities		A total of 143 members (98 female and 45 male) were trained in two aquaculture training workshops to enable members of the community-managed fishpond cooperatives to better manage and sustainably operate the fishponds (Annex 7.20a & 7.20b). The training covered various topics including fish farming concept, fish seed, care and management during fish rearing and fingerling production (Annex 7.20c). Similarly, two exposure visits were conducted for the members of community-based fishponds to Koshi and Chitwan (outside the project location) to exchange learnings with successful fish farmers and adopt best practices on account keeping, fishpond management, market linkages and benefit-sharing mechanisms; and two workshops on identifying the existing market links for fish products (Annex 7.21) were conducted to increase opportunities of selling products easily at a good rate.
Activity 4.7. 5 community conservation engagement centres will be established in upstream communities for awareness raising of the project and the benefits of gharial and freshwater conservation.		Five community conservation engagement centres (drop-in centres) were established through the project's support. Altogether, 11,000 brochures and 3,500 posters were provided to the drop-in centres as education materials. These centres hosted an average of nearly 25 visitors per day prior to the government-imposed lockdown; currently, 13 people on average visit per day. These drop-in centres have been owned by the communities and have remained effective in spreading conservation awareness. Likewise, 120 mounted posters were distributed to national park offices, buffer zone offices, schools, local community-based organisations and crossroads tea shops, and 2 large hoarding boards were installed in the buffer zone of CNP (Annex 7.22).
Activity 4.8. Hold 10 community workshops on sustainable fishing and gharial conservation reaching 200 households		10 community workshops have been conducted on sustainable fishing and gharial conservation. Altogether, these community workshops have reached nearly 400 households (Annex 7.23).

Annex 3 Standard Measures

Code	Description	Total	Nationality	Gender	Title or Focus	Language	Comments
Training Measures							
1a	Number of people to submit PhD thesis	1	British	F	Research to understand the dispersal behaviour of wild and released gharials and survival rate of released gharials	English	Near completion
1b	Number of PhD qualifications obtained						
2	Number of Masters qualifications obtained	4	Nepali	2 M, 2 F	1. Behaviour of captive Gharial (<i>Gavialis gangeticus</i>) in monsoon season. 2. River water quality and aquatic biodiversity in the lower stretches of Rapti and Narayani rivers 3. Identification, Prioritization and Valuation of Ecosystem Services in Buffer Zone Community Forest of Parsa National Park, Nepal 4. Covariates affecting the occupancy of Gharial (<i>Gavialis gangeticus</i>) in the Rapti River of Chitwan National	English	Submitted to School of Environment Science and Management, Pokhara University, Nepal Central Department of Environmental Science, Tribhuvan University, Nepal Nepal Engineering College Changunarayan, Bhaktapur Pokhara University Nepal

					Park, Nepal		Tribhuvan University Institute of Forestry, Hetauda Campus, Hetauda
3	Number of other qualifications obtained	2	Nepali	1 M, 1 F	“Understanding ecology of gharial (<i>Gavialis gangeticus</i>) to support in-situ conservation” in Chitwan and “Assessment of conservation status of critically endangered Gharials (<i>Gavialis gangeticus</i>)” in Bardia National Park, Nepal		EDGE Fellow
4a	Number of undergraduate students receiving training						
4b	Number of training weeks provided to undergraduate students						
4c	Number of postgraduate students receiving training (not 1-3 above)						
4d	Number of training weeks for postgraduate students						
5	Number of people receiving other forms of long-term (>1yr) training not leading to formal qualification (e.g., not categories 1-4 above)						
6a	Number of people receiving other forms of short-term education/training (e.g., not categories 1-5 above)	143	Nepali	98 F, 45 M	Trainings on aquaculture		3trainings
6a	Number of people receiving other forms of short-term education/training (e.g., not categories 1-5 above)	70	Nepali	46 F, 24 M	Market linkages training		2 training workshops
6a	Number of people receiving other forms of short-term education/training (e.g., not categories 1-5 above)	185	Nepali		Orientation training for CBAPUs on gharial and other		4 trainings

					aquatic animal monitoring		
6a	Number of people receiving other forms of short-term education/training (e.g., not categories 1-5 above)	185	Nepali		Training on river patrolling to CBAPU members		4 trainings
6a	Number of people receiving other forms of short-term education/training (e.g., not categories 1-5 above)	46	Nepali	2 F, 44 M	Training on gharial handling and release		2 trainings
6b	Number of training weeks not leading to formal qualification						
7	Number of types of training materials produced for use by host country(s) (describe training materials)	2			Gharial Monitoring Guideline, Egg Collection Protocol		
Research Measures		Total	Nationality	Gender	Title	Language	Comments/ Weblink if available
9	Number of species/habitat management plans (or action plans) produced for Governments, public authorities or other implementing agencies in the host country (ies)	1	Nepali		Gharial Conservation Action Plan	English	ZSL has supported DNPWC in the preparation of this plan
10	Number of formal documents produced to assist work related to species identification, classification and recording.						
11a	Number of papers published or accepted for publication in peer reviewed journals	2			(i) "Population Status of Gharial Crocodiles in Chitwan National Park, Nepal" submitted to <i>Oryx</i> on 22 June 2020 (article reference: Oryx-20-A-0191) and (ii) "Evaluating local fishers' livelihood needs, impacts and		Both articles are under editorial review

					support for gharial conservation in Chitwan, Nepal” submitted to <i>Our Nature</i>		
11b	Number of papers published or accepted for publication elsewhere						
12a	Number of computer-based databases established (containing species/generic information) and handed over to host country						
12b	Number of computer-based databases enhanced (containing species/genetic information) and handed over to host country						
13a	Number of species reference collections established and handed over to host country(s)						
13b	Number of species reference collections enhanced and handed over to host country(s)						

Dissemination Measures		Total	Nationality	Gender	Theme	Language	Comments
14a	Number of conferences/seminars/workshops organised to present/disseminate findings from Darwin project work	19	Nepali		<p>Inception workshop (2),</p> <p>Revise and share findings to park managers and stakeholders in a wider forum and agree on an annual monitoring plan (4)</p> <p>To collect inputs for the development of ecosystem management plan and its sharing (3)</p> <p>Sustainable fishing and gharial conservation, reaching 200 households (10)</p>	Nepali	<p>To share project rationale and kick off the project</p> <p>Workshops organized with wider stakeholders, consultation meetings with experts and community members</p>

Dissemination Measures		Total	Nationality	Gender	Theme	Language	Comments
14b	Number of conferences/seminars/workshops attended at which findings from Darwin project work will be presented/ disseminated.	1	Nepali		Gharial & River Ecosystem Conservation	English & Nepali	Shared among citizen scientists and local municipal authorities during Asian Bird Census, Third National Workshop of Nepal Site Coordinators

Physical Measures		Total	Comments
20	Estimated value (£s) of physical assets handed over to host country(s)		
21	Number of permanent educational, training, research facilities or organisation established	5	5 drop-in centres established to raise awareness on gharial and river ecosystem conservation
22	Number of permanent field plots established	9	One GCBC maintained, with 5178 square feet of ground area paved in the GCBC with concrete paver blocks to enhance visitors' experience. 8 community-managed fishponds established.

Financial Measures		Total	Nationality	Gender	Theme	Language	Comments
23	Value of additional resources raised from other sources (e.g., in addition to Darwin funding) for project work (<i>please note that the figure provided here should align with financial information provided in section 9.2</i>)						

Annex 4 Aichi Targets

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

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

Annex 5 Publications

Type * (e.g. journals, manual, CDs)	Detail (title, author, year)	Nationality of lead author	Nationality of institution of lead author	Gender of lead author	Publishers (name, city)	Available from (e.g. web link, contact address etc)
Newsletter	Protecting gharials to conserve freshwater ecosystem, June 2021	Nepali	Nepali	M	Darwin Initiative	https://www.darwininitiative.org.uk/assets/uploads/Darwin-Newsletter-June-2021-A-Global-Restoration-FINAL.pdf
Blog	Endangered crocodilians and wetland in Nepal, 2019	Nepali	Nepali	M	ZSL	https://www.zsl.org/conservation/regions/asia/endangered-crocodilians-and-wetlands-in-nepal
Online News	Gharial monitoring begins in Chitwan Park, 2018	Nepali	Nepali	M	Ekantipur	http://kathmandupost.ekantipur.com/news/2018-02-25/gharial-monitoring-begins-in-chitwan-park.html
Blog	Community-Crocodilian Coexistence, February 2018	Nepali	Nepali		ZSL	https://www.zsl.org/blogs/asia-conservation-programme/community-crocodilian-coexistence
Newsletter	Gharial conservation and poaching control workshop organised (Published in Nepali Language), July 2017	Nepali	Nepali	NA	ZSL Nepal	ZSL Nepal Office
Newsletter	Gharial conservation information centre to be constructed (Published in Nepali	Nepali	Nepali	NA	ZSL Nepal	ZSL Nepal Office

	Language), October 2017					
Brochure	Gharial Conservation brochure				ZSL Nepal/HN	ZSL Nepal Office
Poster	Gharial Conservation poster				ZSL Nepal/HN	ZSL Nepal Office

Annex 6 Darwin Contacts

Ref No	24-015
Project Title	Community conservation of Chitwan National Park's freshwater ecosystem and gharials.
Project Leader Details	
Name	Hem Baral
Role within Darwin Project	Project Leader
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Phone	
Fax/Skype	
Email	
Partner 1	
Name	Karan Shah
Organisation	Himalayan Nature
Role within Darwin Project	Partner project manager
Address	
Fax/Skype	
Email	
Partner 2 etc.	
Name	Chiranjivi Prasad Pokheral
Organisation	National Trust for Nature Conservation
Role within Darwin Project	Partner project manager
Address	
Fax/Skype	
Email	

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.	√
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.	x
If you are submitting photos for publicity purposes, do these meet the outlined requirements (see section 10)?	√
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.	√
Do you have hard copies of material you need 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. However, we would expect that most material will now be electronic.	x
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.	