



Darwin Initiative Main Project Annual Report

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

Submission Deadline: 30th April 2018

Darwin Project Information

Project reference	23-031
Project title	Science-based interventions reversing negative impacts of invasive plants in Nepal
Host country/ies	Nepal
Contract holder institution	Royal Botanic Garden Edinburgh, UK
Partner institution(s)	NAST, Department of Plant Resources, MoFSC, Central Department of Botany, Tribhuvan University, HELVETAS Swiss Interco-operation, Nepal§
Darwin grant value	£ 293,585
Start/end dates of project	June 2016-May 2019
Reporting period (e.g., Apr 2017 – Mar 2018) and number (e.g., Annual Report 1, 2, 3)	April 2017-March 2018 (Annual Report 2)
Project Leader name	Dr Mark Watson
Project website/blog/Twitter	www.invasiveplantsnepal.org ; https://twitter.com/Darwin_Nepal
Report author(s) and date	Mark Watson, Bhaskar Adhikari, Birendra Karna, Lila Nath Sharma, Ekananda Poudel

1. Project rationale

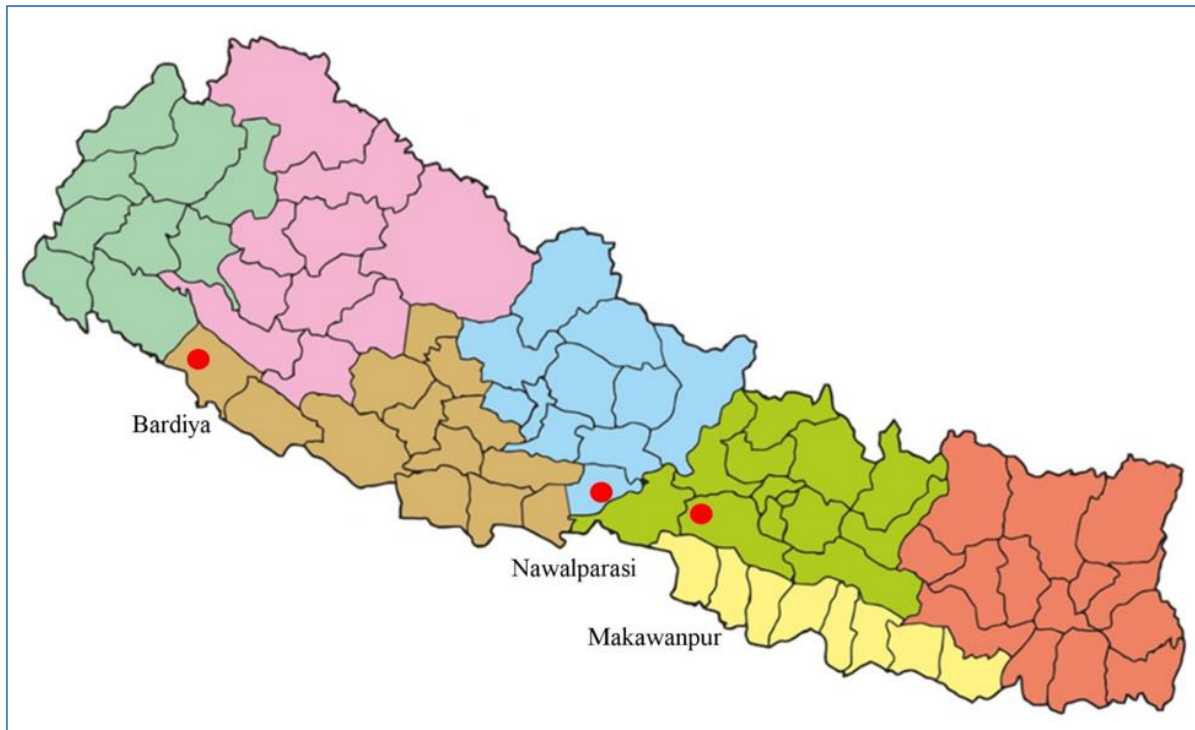
The project is designed to develop the in-country capacity to tackle the increasing challenges from alien invasive plants species (AIPS) in Nepal, and to develop the methods to best utilize them to improve the livelihood of local people.

69% of people in Nepal are rural poor living in remote regions relying directly on plant resources to sustain livelihoods, and 1.9 m are climate vulnerable. Community-based Forest User Groups (CFUGS) strive to manage plants and habitats so that they continue to meet daily needs for food, fodder, shelter, fuel, medicine, etc. Project partner engagement with rural communities has shown that invasive plants threaten livelihoods and wellbeing as farmland and forests have become unproductive, and medicinal plants and NTFPs have been lost. Natural resource dependent people in the many districts in Nepal have requested help to control invasive, restore degraded lands and acquire technologies to convert waste biomass into bioenergy.

Government of Nepal (GoN) recognises the spread of invasive plants as a ‘Key Challenge’, damaging habitats, forests and farmland, and causing biodiversity loss. Nepal’s *National Biodiversity Strategy and Action Plan* emphasises the increasing emergence and fast spread of invasive plants as a major threat to forest biodiversity and an emerging issue in understanding impacts of climate change. In alignment with Aichi Targets 9 & 15, Bonn Challenge, and Sustainable Development Goal 15, GoN considers it a ‘Strategic Priority’ to control infestation and spread of invasives and restore degraded lands.

Following site field visits in year 1, three districts (Makawanpur, Nawalparasi, Bardiya) were selected for the implementation of the project (Site report: <http://www.invasiveplantsnepal.org/about/project-reports/>; Map below), and the priority actions include:

- Enhancing national capacity for detailed surveying and early detection,
- Building the knowledge base - filling gaps in botanical identification, appearance and characterisation,
- Producing multi-lingual manuals on recognition and control,
- Informing and filling policy gaps for better management of forest resources,
- Raising awareness of local people on identification of invasives and impacts,
- Providing technical assistance and involving local people in controlling/managing invasives,
- Making char, biochar and other low-emission bioenergy from invasives.



2. Project partnerships

The partners

The project is led by the Royal Botanic Garden Edinburgh, and the team is comprised of Project Leader, Dr Mark Watson, Project Deputy-Leader Dr Colin Pendry, Project Officer- Dr Bhaskar Adhikari and Dr Martin Pullan (Informatics). The host country partners are:

1. Nepal Academy of Science and Technology (NAST) (<http://nast.gov.np/new/>): NAST is the national organisation for the promotion of science and technology. It is the lead in-country partner for Flora of Nepal and has an active programme of primary and applied research on plants and plant products, including bioenergy and other development-related bio-resources. NAST is the in-country lead organisation with responsibility for in-country co-ordination, reporting and general finance (including audited accounts). NAST hosts the Project Office in Nepal, oversee contracted staff, and provide leadership in bioenergy research and development, especially biochar technologies. NAST is responsible for liaison with the relevant Government Ministries and with the Nepal Steering Committee of the Flora of Nepal. The Chief of faculty of science also co-leads the project. Dr Kalpana Devkota was initially recruited as project officer but left towards the end of year 1. Dr Ekananda Poudel was recruited to fulfil the post (CV-attached: Doc.1). NAST senior scientists' Dr Shandesh Bhattarai (Botanist) and Dr Rabindra Dhakal (Bioenergy expert) are also working as a part of team.

2. Department of Plant Resources (DPR), Ministry of Forests and Soil Conservation (MoFSC) (www.dpr.gov.np): DPR is the National authority for plants and CITES. Established in 1964, DPR has an active programme of taxonomic and applied research, manages the National Herbarium (KATH) and the National Botanical Garden, and is a main partner on Flora of Nepal.

Leadership in biodiversity research and documentation (DPR is the in-country botanical authority for plant biodata), and restoration of degraded lands, especially relating to invasive plants and NTFPs. Liaison with Government of Nepal (Department of Forests and Department of National Parks and Wildlife Conservation, and other staff in MoFSC (especially CITES and CBD focal points). DPR will provide hot-desk facilities at KATH, and facilitate use of the herbarium, library and living collections. The Director General at DPR also co-leads the project. Subhas Khatri is working as a focal person at DPR.

3. Tribhuvan University, Central Department of Botany (CDB-TU) Nepal. (www.cdbtu.edu.np): TU-CDB is part of Tribhuvan University where botany has been taught since 1947. CDB is responsible for all academic programs of Botany within TU, it runs a postgraduate programme (MSc and PhD) and maintains an active research programme. TU-CDB has trained over 2000 M.Sc. (Botany) students since 1965. TU-CDB is a partner for Flora of Nepal and maintains the herbarium (TUCH). It is a centre of excellence for research on invasive plants, and involved in sustainable development programmes, especially relating to NTFPs. Three MSc students are working on flora of three target district. The Head of Department also co-leads the project. Assistant Professor Dr Bharat Babu Shrestha (expert in Invasion Biology in Nepal) (<https://www.cdbtu.edu.np/faculty/16/dr-bharat-babu-shrestha>) is leading the CDB-TU component of the project.

4. HELVETAS Swiss Intercooperation, Nepal. (nepal.helvetas.org).

HELVETAS came to Nepal in 1956 and cooperates with many technical and social organizations in all 75 districts. HELVETAS aims to create an environment where people have new choices and become equipped with new skills and abilities to improve their livelihoods. It promotes the principles of decentralization and subsidiarity in decision-making, implementation and accountability for development. Environment and Climate is one of the organisation's working areas, and HELVETAS runs the EU-funded bioenergy project (<http://bioenergy.org.np>), up-scaling the production and consumption of bioenergy to reduce carbon emissions and enhance local employment in Nepal. Country Director Dr Bharat Pokharel co-leads the project, Dr Dharam Uprety is working key personnel for the project activities.

5. ForestAction (<http://www.forestaction.org/>) is working as implementing partner for all field activities. ForestAction (Forest Resource Studies and Action Team), established in 2000, is a Nepal-based non-governmental organization focused on research, policy dialogue and stakeholder engagement to achieve productive, sustainable and equitable forest management. Dr Birendra Karna (Co-ordinator) and Dr Lila Nath Sharma (Project officer) are working in this project at ForestAction.

6. University of Tasmania (UTAS): The UTAS is supporting the project for Remote Sensing (RS) of invasive species and to develop the RS algorithm to monitor the distribution/invasion of some invasive species in Nepal. Senior lecturer in Geography and Spatial Sciences, Dr Jagannath Aryal (<http://www.utas.edu.au/profiles/staff/geography-environmental/jagannath-aryal>) is involved on the RS part of the project.

Communication among partners: As in year one, the team members are in regular contact via Skype, email and Facebook messengers. Mobile and landline phone calls are the only means of communication at field sites. The Project Officer at RBGE is in regular contact with Project Officers at NAST and Forest Actions, and regular skype meeting were held with Project Officers and key personnel in Y2 (for example, see attached meeting minutes, Doc. 2). Key project persons in Nepal communicate by phone and face-to-face meetings. We appreciate the reviewer's advice in the Y1 report to establish project management committee in Kathmandu. This committee has now been formed including 10 members from all partner institutions (see meeting minutes on formation of committee (in Nepali), Doc. 3), and seen to be effective. All partners and key persons met during the midterm review in January to discuss about progress against the logframe and gantt chart, issues that have arisen, and lessons learned. The effective partnership developed during the Y1 resulted in a successful grant application to GBIF's Biodiversity Information Fund for Asia (BIFA), led by CDB-TU, to mobilize data of the Invasive Alien Species (IAS) of Nepal (award letter attached, Doc. 4). CDB-TU in collaboration with DPR and RBGE will be working on data basing and mobilizing distribution data of IAS of Nepal, this extending the scope of the Darwin Project.

The RBGE Project Officer visited Nepal in early April 2018 to work with in-country partners to prepare this annual report. All our partners have been involved in the writing of the supporting documents and this report.

3. Project progress

The progress of the project against deliverables has been good, continuing the strong start made in the previous year. Some activities were delayed due to Nepal's protracted national elections in November/December 2017, but this did not have long term negative impact on the project. Additional activities, such as installation of improved cooking stoves in Bardiya district and compost plant in Nawalparasi, were also started during Y2. As in Y1, we have faced financial challenges due to the low exchange rate of pound, particularly in the first half of Y2. The log frame remains the same in Y2. NAST

is applying for some additional funds to install pelletizer, once the funding is confirmed log frame will be adjusted accordingly (with a change request).

3.1 Progress in carrying out project Activities

Most of the planned activities of year two have been achieved, however some activities were delayed due to the elections in Nepal, particularly those which need to be undertaken during certain months of the year (for example plantation of useful plants and removal of invasive species). Details of these are given in the following paragraphs.

Output 1: Capacity for managing and controlling invasive plants built, practical control methods employed, and restoration of land degraded by invasive plants into economically and environmentally beneficial habitats initiated in 15 CFUGS.

Activities:

- 1.1 Hold planning and stakeholder workshops, taking a participatory approach to provide training, enhancing the knowledge of local communities and raising awareness on the identification, impact, control and management of invasive plants.

Task: 1.1.1 Project initiation, task review and revision, finalisation of District and CFUGs participation. **Comments:** Completed in Y1.

Task: 1.1.2 Annual District Workshops (3 x 3-5 people from each of 5 CFUG/district, 25 people per district): including training on awareness, CFUG management, adaptation methods and control of invasive plants. **Comments:** Completed for Y2. Second annual district workshops on biochar production, identification techniques and management of AIPS completed (workshop report attached, doc 12-14). The identification manual has been designed and tested with local people (template attached, doc. 5).

- 1.2 Work with CFUGs to undertake effective practical action for the removal and on-going control of invasive plants, with training and support, and assess the impact of this work.

Task: 1.2.1 Land surveys (what invasive species present, areas covered, etc.) and interviews to assess base lines and identify target areas for removal of invasive plants. **Comments:** Rapid land surveys were completed to record the most problematic species in each target district in Y1, detailed surveys completed in Y2 (see report, doc. 6). Data are being entered into the data base for analysis and preparing a journal article.

Task 1.2.2 Removal and management of invasive species on 15 community forests/private lands, including CFUG support field visits and write reports on progress. **Comments:** Removal of AIPS is ongoing in all three districts and will be continued in the future as removal of AIPS is now incorporated in forest management plans. Approximately 156 ha of infested area has been cleared in Y2, 236 ha cleared so far (see doc. 7_ForestAction Progress Report) – this is more than 50% towards the final target, and so we are on track to achieve this.

- 1.3 Hold meetings with experts to agree on target species for replanting and work with government and local plant nurseries, and CFUGs, to undertake replanting of reclaimed lands with native, economically useful plants.

Task 1.3.1 Selection of 15 native economically and medicinally important plant species suitable for replanting in each district. **Comments:** Consultation with CFUGs, forest experts, forest officers from district forest offices have been undertaken, and eight species have been selected and planted (see ForestAction activity report, Doc. 7). Consultation with CFUGs are on-going for selecting other species which are suitable for planting. One of the lessons learned from this is not to rely only on expert consultation for the selection of species. It is much more effective to include CFUGs, forest officers from local forest offices in the selection of species for replanting.

Task 1.3.2 Nursery cultivation for each district/community and/or link to nearby DPR regional garden, for 15 native agro-economically and medicinally important plant species ca. 15 X 1000= average 15,000 per district, ca. 45,000 plants in total. **Comments:** Nurseries at district forest offices have been linked with CFUGs in the target districts. Major plantation will be done during June/July 2018.

Task 1.3.3 Supply and plantation of 15 native and economically important plant species on reclaimed land at 15 CFUGs. **Comments:** Nurseries at district forest offices are linked with CFUGs and they are supplying sufficient seedlings to the target areas for replanting.

- 1.4 Research, build and disseminate a science-based knowledge resource for invasive plants, and take a participatory approach to incorporating into CFUG Management Plans the lessons learned in best practice in restoration of lands degraded by invasive plants.

Task 1.4.1 Production of guidelines on the management of invasive plants and replanting with native plants. **Comments:** Management and clearing of invasive plants, and production of char and biochar from AIPS biomass has now been incorporated into forest management plans in one CF and others are underway (Attached scan copy of the page attached, doc. 8 & details in doc. 7).

Task 1.4.2 Bilingual photographic manual for identification and knowledge of economically important plant species published (print and electronic format). **Comments:** Planned for Y3 Q1, however collation of photographs and literature sources is well underway.

Task 1.4.3 CFUG Management Plans include control and management of invasive species. **Comments:** Planned for Y3, however the work was started in Y1, one CF plan has been approved which include control and management of invasive species, and two are now close to approval.

Output 2: Weed species researched and evaluated and local community understanding of invasive plants enhanced. A national list of priority invasive plants established, supported by a bilingual identification manual and the raising of public awareness.

Activities:

2.1 Research, evaluate and publish inventories of the district-level weed flora in the study areas with fieldwork, sample collection and identification, enhancing reference collections, and training and capacity building of MSc students.

Task 2.1.1 Selection of 3 (or more) MSc students (Taxonomy/Forestry) as Research Assistants for the inventory of weed flora in 3 districts. **Comments:** Completed in Y1

Task 2.2.2 Two field trips to each district by each MSc Research Assistant with field assistants (other MSc and local person) to collect and record the weed flora, undertake interviews to assess living memory changes of increase/decrease of invasive plants and NTFPs in the area, prepare fieldwork reports. **Comments:** The 3 MSc students have completed their field research in the 3 districts and are working on finalizing their theses (doc. 9, CDB-TU Progress Report). A total of 1504 herbarium specimens with full field data were collected (see doc. 9).

Task 2.2.2 Research visits by MSc Research Assistants to Indian herbaria for sample identification. **Comments:** Completed in Y2 (see doc. 15, page 8, CDB-TU newsletter & doc. 9).

2.2 Research and evaluate a national list of priority invasive species and submit a report through Government partners to inform Government of Nepal policy. **Comments:** All partners realised the need of proper assessment of AIPS in Nepal based on the IUCN guidelines recently published in 2017 (<https://www.iucn.org/theme/species/our-work/invasive-species/eicat>). Initially planned for November 2017 but due to the elections in Nepal, the dates for workshop has been finalised for 17 & 18th of May 2018. On reflection this delay has benefitted the evaluation process as this has given more time to fully understand the new IUCN guidelines.

2.3 Research, develop and publish a photographic identification manual (and other educational materials on a project website), tested by communities, to inform and raise awareness of invasive plants both at a local level with communities and nationally with the general public.

Task 2.3.1 Preparation of detailed bilingual photographic identification manual covering the national list of 30-40 priority species. **Comments:** The manual has been designed and tested with the communities for feedback (sample page attached, doc.5).

Task 2.3.2 Y2 and Y 3 Annual Workshops with CFUGs incorporate new materials on invasive plants, and training undertaken on identification and used for the bilingual manual. CFUG Operational Plans updated. **Comments:** On going.

Task 2.3.3 Establish a project website within Flora of Nepal to publish reports and other project documentation. **Comments:** Completed in Y1 (see: www.invasiveplantsnepal.org).

Task 2.3.4 20 awareness-raising articles published by popular newspapers (e.g. Kantipur), and picture articles on popular online news sites (e.g. BBC nepali sewa) and the project website. **Comments:** Awareness-raising articles focussing our activities have been published in the mainstream popular newspapers in Nepal and online Nepalese media (see doc. 10). More articles focussed on individual AIPS will be published in Y3. Awareness rising article on AIPS of Nepal has been accepted for publication on next issue of popular Nepali journal in forestry sector "Hamro Ban Sampada" vol. 15 (1) (manuscript attached, doc. 17).

2.4 Use the improved species distribution mapping to investigate the likely unrestricted spread of 10 current or potentially invasive plants using GIS niche modelling techniques and undertake a Remote Sensing pilot study on one high-priority problem species, submitting papers for publication. **Comments:** On-going: Dr Jagannath Aryal from University of Tasmania visited RBGE for a month (Feb, 2018) to work on the application of remote sensing to AIPS of Nepal. RBGE

secured £7500 extra funding to purchase high resolution satellite image data for this study. All images have been purchased and are being analysed by Dr Aryal.

Output 3. Charcoal densification technologies (e.g. beehive bio-briquettes and pellets) successfully introduced and densified charcoal products made from invasive plants and other waste biomass. DCPs used as an alternative to fossil fuels and firewood as a domestic fuel source, and small-scale women-run co-operatives derive alternative incomes from bio-briquettes/pellets.

- 3.1** Hold workshops and meetings with community stakeholders to inform and train people in the use of invasive plant biomass, and other waste plant material (e.g. dead leaves, newspaper) to produce bio-briquettes/pellets.

Task 3.1.1 Introduction to charcoal densification technologies, methodologies and their application to produce alternative fuels during the first main Workshop. Engagement with communities to assess levels of interest to direct future, in-depth capacity building. **Comments:** Initial training completed in Y1, follow-up meetings and support on going. Local people have already started selling char and generating financial income of NPR 120000 (ca.£900). The cost of making bio-briquettes in terms of return is higher than initial estimates, and the dynamics of supply and demand has changed since the formulation of the project. A cost-benefit analysis based on users (see report, doc.7) shows that the production of bio-briquettes at small scale is not cost effective. Locals are earning cash directly from selling char and this is more lucrative to them than producing briquettes, which involves greater manufacturing costs and labour. NAST has applied for extra funding to support communities by providing a pelletizer which will help CFUGs undertake densification of char to produce pellets, which have higher market value and wider use.

Task 3.1.2 15 CFUGs and 7 women's groups provided with detailed information, equipment and practical training on species selection and use of invasive plants for producing bio-briquettes/pellets. **Comments:** 15 CFUGs were selected in Y1. 3 women's group have been trained and linked with local markets to sell char (see comments above: Task 3.1.1). Once the funding is confirmed, a pelletizer will be installed at Makawanpur district.

- 3.2** Provide capacity building to local stakeholder groups in the formation of cooperatives for bio-briquette/pellet production, which have the necessary equipment, technological knowledge and practical experience. **Comments:** We are working with women-led CFUGs. Women groups are producing char and equipment has been distributed during the annual workshops. See comments above on pelletizer.
- 3.3** Support local cooperatives in the production, distribution, marketing and use of bio-briquettes/pellets as an alternative source of fuel for cooking and heating. **Comments:** cooperatives have been linked to market, local people are selling char and have earned NPR 120000 (£900) in Y2. See comments above on pelletizer.
- 3.4** Undertake base line and monitoring socio-economic surveys to assess impact and benefits of introducing bio-briquette/pellet production on livelihoods and well-being and incorporating best practice into CFUG Management Plans. **Comments:** Baseline survey completed, and a repeat survey will be conducted towards the end of project. Following advice from the review of the Y1 report, we have provided training on the production and use of Improved Cooking Stoves (ICS) in Bardiya district. ICS reduce the firewood consumption and produce very little smoke, which helps to prevent common diseases due to smoke in rural communities (doc. 11, ICS workshop report). 14 local women from five CFUGs were trained in to build and use ICS. These women will be able to make extra income by installing these stoves in neighbouring villages.

Output 4. Biochar technologies successfully introduced, biochar manufactured locally and used to improve soil fertility of degraded land and to sequester carbon.

Activities:

- 4.1** Hold workshops and meetings with community stakeholders to inform and train people in the use of invasive plant biomass, and other waste plant material, to produce biochar.

Task 4.1.1 15 CFUGs (740 rural households) introduced to biochar technologies, methodologies and their application to improve soil fertility during the main Workshops. Engagement with communities to assess levels of interest, directing more in-depth capacity building. **Comments:** The level of interest in Biochar is very high among local people, and there was enthusiastic participation during Y2 at the main workshops on production and application of Biochar (see workshop report, doc.12-14; media coverage doc.10).

- 4.2** Provide capacity building and support the establishment of low-tech pyrolysis methods for biochar production and the use of biochar to improve the soil fertility of land reclaimed from invasive weed infestations. **Comments:** Practical training for capacity building completed, equipment handed

over to the communities (see workshop report, Doc 12-14, photos in flickr: <https://www.flickr.com/photos/152233654@N02/albums/72157681937585290>).

- 4.3** Undertake base line and monitoring surveys to assess the impact and benefits of biochar production and its use in improving soil fertility, restoration of lands cleared of infestations and crop yields, incorporating best practice into CFUG Management Plans. **Comments:** Baseline survey completed, the progress has been discussed during the review meeting in January. A repeat survey will be conducted towards the end of the project to assess the impact. One MSc student Pratibha Poudel has started an MSc thesis on carbon sequestration under NAST senior scientist Dr Rabindra Dhakal (see doc. 16)

3.2 Progress towards project Outputs

Most of the activities were achieved which were aimed for Y2, some of the activities are ongoing such as clearing AIPS, plantations of useful plants, production of char and biochar. All indicators remain appropriate for year two.

Output 1. Capacity for managing and controlling invasive plants built, practical control methods employed, and restoration of land degraded by invasive plants into economically and environmentally beneficial habitats initiated in 15 CFUGS. Y2 workshops were completed in all three districts (workshop reports attached, doc. 12-14). Local people were very engaged and enthusiastic on learning about the impact of AIPS on their livelihood and the environment. CFUGs are now managing invasive plants by producing char and biochar, and these best practices are now being incorporated into their forest management plans (doc. 7 & 8). Approximately 156 ha of forest has been cleared in Y2 (doc. 7_FA progress report). The identification manual (sample page, doc.5) received very good feedback from local people. Nurseries at district forest offices are linked with CFUGs and they are supplying seedling to the target areas for replanting. Eight different species of native and economically useful plant has been planted on reclaimed land (doc. 7_FA progress report). The clearing of AIPS and plantation of economically useful plants will continue during Y3.

Output 2. Weed species researched and evaluated and local community understanding of invasive plants enhanced. A national list of priority invasive plants established, supported by a bilingual identification manual and the raising of public awareness. As in Y1, excellent progress has been made towards output 2 in Y2. Three MSc students completed their field work and collected total of 1504 herbarium specimens. Distribution mapping of AIPS was done in mid-western Nepal at 76 locations in eight districts (doc. 9, CDB-TU Progress Report). The designing of bilingual identification manuals and testing the manuals with local people completed (doc. 5, sample pages). Draft version of five species are also available in web (www.invasiveplantsnepal.org) and more will be completed in Y3. We are organising a two-day workshop for the assessment of AIPS of Nepal in May to finalize the national list of priority invasive species. This was delayed due to elections in Nepal in November 2018. Articles on invasive species focussing our activities have been published in popular mainstream media in Nepal (Kanitpur, Annapurna and Nagrik) and also in online news portals (doc. 10). Remote sensing studies on AIPS of Nepal focussing on Lantana have started in February 2018 and continue in Y3. Awareness rising article on AIPS of Nepal has been accepted for publication on next issue "Hamro Ban Sampada" vol. 15 (1) (manuscript attached, doc. 17).

Output 3. Charcoal densification technologies (e.g. beehive bio-briquettes and pellets) successfully introduced and densified charcoal products made from invasive plants and other waste biomass. DCPs used as an alternative to fossil fuels and firewood as a domestic fuel source, and small-scale women-run co-operatives derive alternative incomes from bio-briquettes/pellets.

Production of char and their use as an alternative source of income was higher than expected in Y2. Local disadvantaged groups made additional income of NRS 120000 (ca. £900) in Y2. A cost-benefit analysis of bio-briquettes shows the production of briquettes is not cost effective (see report, doc.7) and selling char to companies which produce bio-briquettes on an industrial scale is more beneficial for local people, rather than making bio-briquettes themselves. However, installation of pelletizer would help communities to densify char to make pellets, and that would significantly increase the extra income as pellets have better market value. NAST has applied for extra funding to support communities to install a pelletizer, if successful the communities will be highly benefited by this activity. We have provided training on production of Improved Cooking Stoves (ICS) in Bardiya district (as advised by the Y1 review). These stoves are not only energy efficient but also produce no smoke and thereby help to prevent the diseases cause by smoke. This also enables woody biomass from invasive plants to be burnt as a fuel source. 14 local women from five CFUGs were trained in Y2 (doc.11_ICS workshop report).

Output 4. Biochar technologies successfully introduced, biochar manufactured locally and used to improve soil fertility of degraded land and to sequester carbon.

All 15 CFUGs in 3 districts participated on the practical training for biochar production (doc. 12-14, workshop reports). Demonstration cultivation plots were established in all three districts. The outcome from the first two demonstration plots were not as satisfactory but the lesson learned from these helps to improve the methods of biochar application on soil fertility in third plot - which has some excellent results so far. More biochar will be produced in Y3 and applied to crops and in reclaimed land for plantation of economically useful plants. Our activities on biochar production from invasive species also attracted media attention and is well covered by three popular newspapers (doc. 10). One MSc student Pratibha Poudel has started her MSc thesis on carbon sequestration under the supervision of NAST's senior scientist Dr Rabindra Dhakal (proposal attached, doc. 16)

3.3 Progress towards the project Outcome

The project Outcome is " Increased knowledge, awareness and effective management of invasive plants in Nepal. Safeguarding and restoring biodiversity, creating climate smart alternative sources of bioenergy and soil improvement, and enhancing livelihoods and wellbeing." Annex 1 includes the Measurable Indicators for this and progress made towards all seven of these in Y2. The project team considers that the measurable indicators are adequate for measuring the Outcome and we are on track to achieve them all by the end of the project.

3.4 Monitoring of assumptions

Assumptions 1: The political situation in Nepal remains stable to permit work, and that earthquakes, landslides and other natural disasters present no more than short-term obstacles. **Comments:** The stability of the political situation is good at the moment, and instability does not have major effects on any project activities. However, the holding of national elections was a major event and impacted on a workshop which we had to postpone workshop from November 2017 to May 2018.

Assumptions 2: Local communities actively engage with the activities of the project. **Comments:** The high level interest showed by local communities clearly indicates that they will be fully engaged through the project. The MoU signed with local CFUGs in Y1 endorses this.

Assumption 3. Local communities recognise the economic, health and environmental benefits from management practices and technologies and decide to adopt them. **Comments:** The assumptions still hold true, and local people have started to see the benefits from activities.

Assumption 4. Household members (particularly women) recognise the benefits to themselves and the environment, and are self-motivated to adopt bioenergy and change from traditional fuel sources (wood) to bioenergy alternatives, and using biochar. **Comments:** To make them self-motivated, demonstration cultivation plots were established for biochar application to show the increase in crop growth/yield (doc.12-14). Producing bio- briquettes is not cost effective, but local women have already started making extra income by selling char (see above section 3.2, output 3).

Assumptions 5. Partners involved remain committed to the project. **Comments:** Partners are fully committed to the project and this is seen as priority work within their organisations. The assumption is expected to be hold true throughout the project.

Assumptions 6. The recent fuel crisis in Nepal caused severe transport problems and critical shortages of gas for cooking and heating. A benefit has been the raised awareness for alternative bioenergy sources, demand for bio-briquettes and pellets has far outstripped demand. Furthermore, wood was imported into Kathmandu (under rationing) putting forests under pressure. **Comments:** Demand of bio-briquettes is limited to certain regions and the cost of making bio-briquettes is rising. Instead, selling char directly to companies would be more beneficial to the poor communities. Partners are seeking extra funding for installation of pelletizers.

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

Although it is too early to measure the full impact, the project has already shown some direct positive impact on biodiversity and poverty alleviation. 236 hectare forest is now cleared from invasive species, and more than 800 seedling of economically useful plant species were planted on the reclaimed land. Disadvantage and marginalised poor people made extra income of NRS 120000 by selling char in Y2 (doc. 7). Women spend more time in the kitchen in rural Nepal and usually suffer from respiratory diseases due to smoke produced from traditional stoves. Training on installation of Improved Cooking Stoves to women not only prevents smoke-related disease but also saves firewood consumption (doc.11). Participation by women has been very encouraging, with the gender balance being at least 50:50. Local women groups have been encouraged to participate in the project, and have become confident to be involved in project activities.

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

SDG 1 No poverty: Rural poor groups are already deriving extra income from producing and selling char. In Y2 they made additional income of NRS 120000. future year's poverty will be alleviated through improved productivity of land infested by invasive plants.

SDG 3 Good Health and Well-Being for people: Installation of Improved Cooked Stoves (ICS). 26 ICS were installed in Y2, and more in the future to replace traditional stoves in rural areas.

SDG 5 Gender Equality: Involvement of women in the project – women's groups and individuals have participated actively in the project, with at least 50:50 gender balance.

SDG10 Reduced inequalities: Involvement of disadvantage and marginalised groups. We are working in some of the poorest areas of Nepal, and marginalised groups are already participating (e.g. Dalits)

SDG15 Life on land: Management of Invasive species. Lands infested by invasive species are being cleared, in total 236 hectare of land was cleared from invasive plants, and 800 seedlings of economically useful native plants were planted.

SDG17 Partnership: Partnership between local and both government- nongovernmental organizations is strong, bringing together diverse expert groups to tackle the problem of Invasive alien plants and the negative effect these have on biodiversity and local people.

5. Project support to the Conventions, Treaties or Agreements

This project primarily supports the CBD. In Year 1 and 2 the following are relevant and will be strengthened and extended in the following years. The Nepalese CBD focal point is within our Government project partner and so included in internal discussions.

Art 7 – capacity to identify and monitor species has been highlighted during workshops, and the University staff and students have been actively engaged in fieldwork collecting, recording and identifying invasive plant species in the project areas. This will also inform conservation measures needed and sustainable use. [Aichi Target 9]

Art 8 – local community groups now understand the importance of biodiversity, and threats from invasive plants, and have agreed to incorporate biodiversity (including invasive plants and restoring degraded lands) in their management plans. [Aichi Target 5 & 7]

Art 10 - government and private sector project partners working together to raise awareness and empower local people (through workshops and follow on activities) to conserve biodiversity and use it sustainably. [Aichi Target 1]

Art 12 - capacity has been built both within project partners and with participants on the project, through working together and sharing experiences in workshops and other project activities. This has included international collaborations to address real issues with invasive plants in Nepal [Aichi Target 19].

6. Project support to poverty alleviation

A major part of the project is aimed at supporting poverty alleviation, and the local communities we are working with are from poor areas of Nepal. Local and disadvantaged (Dalit) women have already made an extra income of NRS 120,000 (see above output 3). Partners applied for additional funding to install pelletizer so that communities can make more income from pellets in future years. Local people in all 15 CFUGs are trained on making biochar and provided with equipment's (doc. 12-14, workshop reports). Using biochar on cultivated lands reduces the use of chemical fertilizer which have both health and economic benefits. For the first time, local women in Bardiya enjoying smoke free environment in their kitchen which not only prevent respiratory diseases due to smoke but also reduces firewood consumption. 26 Improved Cooking Stoves were installed in Y2, and more in the future to replace traditional stoves in rural areas (doc. 11, ICS workshop report). Trained women could make additional income through cash or reciprocal provision of labour by installing these stoves to their neighbours.

7. Project support to gender equality issues

The lead partner organisations and implementing partners all have gender equality as a core value, and we actively encourage women to be involved in the project. This mirrors the Government of Nepal's focus on addressing gender inequality. Many women have commitments to their families and so, wherever possible, we timetable activities to minimise conflicts with these commitments and facilitate their participation. Two of the community forest user groups selected for project interventions are led by a women-only team, and similar to Y1 the participation of women in the second workshops was also high (Nawalparasi 69%, Bardiya 40%, and Makwanpur 61%, see workshop reports, doc.12-14). 14 women participated in Improved Cooking Stove training. In addition, we are paying local women groups to help

with the logistical arrangements (e.g. providing catering), which is promoting inclusion in project activities and increasing the income of these groups and not just individuals.

8. Monitoring and evaluation

The overall progress is monitored and evaluated regularly by Team Leader Dr Mark Watson and RBGE project officer (Bhaskar Adhikari). Within Nepal, CDB-TU formed their own project management committee to monitor the progress. NAST also have project management committee which meets every 3 months, sometimes more frequently if needed. Following Y1 review comment, a Project Management Committee has now been formed including 10 members from all partner institutions-see meeting minutes on formation of committee (doc. 3). Part-time M & E consultant Dr Bhima Dhungana assessed project activities and advised accordingly. Financial monitoring in RBGE is provided by RBGE finance officer. Base line survey has been completed, we are monitoring the progress through meetings and community facilitators, the repeat survey will be conducted towards the end of the project. A Midterm Review was undertaken in January and lessons learned used to shape the rest of the project. Bhaskar Adhikari spent a week in Nepal in April working with partners to discuss monitoring and evaluation, particularly with respect to Annual Reporting as required by the Darwin Initiative. This cemented the requirement for regular reports on activities to provide evidence of achievements and monitor progress. No changes have been made on M & E plan over this reporting period.

9. Lessons learnt

Similar to Year 1, at the beginning of Y2 budget difficulties continued, caused by the loss of value of pound, although this improved somewhat towards the end of Y2. All project partners were aware of this at the start of Y2, and continued to adjust their budgets as they had seen in Y1. A cost benefit analysis of bio-briquettes shows the production of briquettes at local scale is not cost effective. However, after discussion with communities and partners, it has been decided to seek for extra external funding to install pelletizer (see comments above). The results from two of the demonstration plots was not as good as was expected in Nawalparasi and Makwanpur, and the lessons learnt from those plots were very helpful to improve the methodology on application of biochar in Bardiya. During Y2 the opportunity to install Improved Cooking Stoves was capitalised, and these were incorporated into the project activities in Bardiya. This has proved highly successful and, when the outcome of our bid to include pelletiser technology is known, these will be included in the log frame with a change request. The Project Management Committee provides a forum to discuss lessons learnt and rapidly incorporate them into ongoing works. The Mid Term Review enabled a wider look at the project and deeper assessment of the major lessons learnt.

Actions taken in response to previous reviews (if applicable)

Project Management Committee was established (see above, sec. 8). Reviewers advised to draft a business plan together with community group which will facilitate charcoal production in sufficient quantities and to guarantee continuity of supply. This has been discussed and we are waiting for the confirmation of funding for the installation of pelletizer. Eight species were confirmed for replanting; however, other species are yet to be finalized for replanting. We realized it is difficult to finalize the list of species well in advance because it depends on seasonality, local people's interest and availability and condition of seedlings. Following reviewer's comments, the improved cooking stoves were installed in Bardiya district and this was very popular among the locals. We are producing vinyl posters for awareness as per reviewer's recommendation, and will be posted in schools, village offices and homes of community leaders.

10. Other comments on progress not covered elsewhere

Our partner ForesAction helped communities in Nawalparasi to construct an organic compost plant where they will use invasive species to make compost (doc. 7)

11. Sustainability and legacy

We have seen growing interest in the project at the local and national level, with excellent engagement in project activities as shown in the reports. Project partners have developed good links with media in Nepal, resulting in well-written articles in major newspapers in Nepal. The Mid Term Review included a session with presentations on the activities of the project, attended by institute leaders and journalists, which raised awareness and interest in the project beyond those in the project team. The project has a website and social media channels where we promote the project and make images, data and reports freely available. The planned exit strategy is still valid. We have already made strides to sustain a legacy through additional activities with build on or extend those funded by the DI. CDB-TU has successfully applied for funding to digitise legacy distribution data of invasive plants held in herbaria, ForestAction has funded the installation of composting facilities and training in response to requests from local communities in the project area, and NAST has applied for funding to supply a pelletizer to improve the

value of char produced in one of the village communities with whom we are working. These are examples where in-country partners are continuing and developing the work undertaken in the project, thereby sustaining the legacy.

12. Darwin identity

This is a stand-alone project with clear identity, with major funding from the DI. This is recognised in all aspects of the project, and the role of the UK Government in supporting the DI is clearly made. The Darwin Initiative (DI) logo is used in all workshops banners, and printed materials (see attached supporting documents). A logo sticker has been produced to label all the equipment bought through DI funds. The Government of Nepal and other organizations are very familiar with Darwin Initiative from several high-profile DI funded projects in Nepal, and the support of the UK Government, through the Darwin Initiative, is widely understood. The Team Leader Dr Mark Watson also gave a presentation on during Midterm review in January 2018 to highlight Darwin Initiative funding, and also co-organised and spoke at a Darwin Initiative session at the 6th Global Botanic Gardens Conference in Geneva.

Twitter, Facebook and Flickr accounts have been set up, and now linked with the project website. Because of Internet problems in some places in Nepal, mainly at project sites, the in-country use of these is continuing at a modest level but we are working together with partners to improve this.

13. Project expenditure

Table 1: Project expenditure during the reporting period (1 April 2017 – 31 March 2018)

Project spend (indicative) since last annual report	2017/18 Grant (£)	2017/18 Total Darwin Costs (£)	Variance %	Comments (please explain significant variances)
Staff costs (see below)			0.5	
Consultancy costs				
Overhead Costs			1	
Travel and subsistence			-5	
Operating Costs			0	
Capital items (see below)			7	
Monitoring & Evaluation (M&E)			-3	
Others (see below)			-4	
TOTAL				

These are indicative figures detail expenditure report will be submitted by the finance officer.

Annex 1: Report of progress and achievements against Logical Framework for Financial Year 2017-2018

Project summary	Measurable Indicators	Progress and Achievements April 2017 - March 2018	Actions required/planned for next period
<p>Impact</p> <p>Reduction and ultimate eradication of invasive plants in forests, farmland and wild habitats in Nepal: improving biosecurity, safeguarding globally significant biodiversity, and improving livelihoods and wellbeing of natural resource-dependent people.</p>		<p>The project has already shown some direct positive impact in Y2. Following are the highlights: 236 hectare forest is now cleared from invasive species, and more than 800 seedling of economically useful plant species were planted on the reclaimed land; disadvantage and marginalised people made extra income of NRS 120000 by selling char in Y2; 14 local women from five CFUGs were trained in to build and use improved cooking stoves (ICS), and 26 ICS has been installed.</p>	
<p>Outcome Increased knowledge, awareness and effective management of invasive plants in Nepal. Safeguarding and restoring biodiversity, creating climate smart alternative sources of bioenergy and soil improvement, and enhancing livelihoods and wellbeing.</p>	<p>0.1 15 CFUGS (representing 750 households/3750 people - of which 2000 are women) in 3 VDCs in 3 districts in Western, Mid-Western and Far Western Development Regions of Nepal engaged in capacity building activities and provided with a clear understanding of invasive plants and climate reliance/adaptation methodologies by Year 1, actively implementing invasive plant management guidelines by Year 2.</p> <p>0.2 30% of invasive species-dominated forest areas (both natural and managed, total area of infested forests in 3 VDCs established in Year 1 baseline survey) restored, with the management of regrowth of native species undertaken, and nursery areas for replanting established or linked with 15</p>	<p>0.1 More intensive practical training and workshops in 3 districts involving all 15 CFUGs completed (see workshop reports, doc. 12-14): 87 (50 female, 37 male) involved on direct training, 1500 households involved on bush clearing; 300 households in plantation (see doc.7). Best practices on management of invasive species being incorporated in CFUGs forest management plans.</p> <p>0.2 Total area of forest identified as 2325 ha in baseline, and about 50% of the total area dominated by invasive species. Around 80 hectare of forest was cleared towards the end of Y1. In Y2, 156 hectare was cleared (see doc. 7). All CFUGs linked with district forest offices for seedlings for replanting. Eight different species of</p>	<p>0.1 Follow up practical training and workshops planned for Y3 involving more households.</p> <p>0.2 More AIPS dominated area will be cleared in Y2, and plantation will be done on those areas.</p>

	<p>Community Forests and private lands by Year 3.</p> <p>0.3 Establishment of a comprehensive science-based knowledge-base for weed species in Community Forests and agricultural ecosystems in 3 districts of Nepal, including horizon scanning for potential future invasive plants, by Year 2.</p> <p>0.4 Public awareness raised of the 20 nationally most problematic invasive plants in Nepal; 15 CFUGS capable of identifying all local invasive plants and reporting new plant invaders in their local area; and 750 rural households (disaggregated by gender) empowered with knowledge on uses of invasive plants to improve livelihoods by Year 3.</p> <p>0.5 With reference to Government of Nepal 2011 Census data and Year 1 baseline socio-economic survey data, a 30% increase in the use of alternative bioenergy sources in 750 rural households (disaggregated by gender), and 30% reduction reported in the use of wood as the primary fuel by end of Year 3, and contributing to enhanced wellbeing of household members.</p> <p>0.6 3 local women's groups (including people from ca. 30 households) with enhanced livelihoods by producing and deriving incomes from charcoal densified products (e.g. bio-briquettes, pellets) by end of Year 3.</p>	<p>economically important useful plants were planted in three CFs.</p> <p>0.3 Three MSc students completed their fieldwork, collected 1504 herbarium specimens, analysis on-going. Distribution mapping of AIPS was completed at 76 locations in eight districts (doc. 9, CDB-TU progress report).</p> <p>0.4 Discussed and agreed with the editor of Kantipur daily for the publication of articles on AIPS. Articles on AIPS and focussing on our activities has been published by three popular media in Nepal (doc. 10). Awareness raising article on AIPS of Nepal (in Nepali) has been accepted for publication on the next issue of "Hamro Ban Sampada" vol. 15 (1) (doc. 17, manuscript). Design and content of manuals were confirmed and tested with communities (see sample pages, doc.5).</p> <p>0.5 Baseline data collected in Y1, end line data will be collected towards the end of the project.</p> <p>0.6 3 women group comprising 20 households producing char; total of 9.2 tons of char was produced in Y2 and local people made an income of NRS 120,000 (doc. 7)</p>	<p>0.3 MSc students finishing analysis in Y3 Q1. Additional field work funded by RBGE is planned in October for data collection for distribution mapping of AIPS.</p> <p>0.4 Awareness raising articles on individual AIPS will be published by Y3</p> <p>0.5. End line survey planned towards the end of Y3.</p> <p>0.6 More char will be produced in Y3. If funding available from NAST, a pelletizer will be installed in Y3 (see above comments in output 3)</p>
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	<p>0.7 Low-tech, local biochar manufacture facilities established in 3 VDCs, 15 CFUGS using biochar to increase soil fertility and sequester carbon in restored lands by Year 3.</p>	<p>0.7 Bio-char technology has been introduced in 15 CFUGs (see workshop reports, doc. 12-14). MSc student started research on carbon sequestration from invasives in Nawalparasi district (doc. 16)</p>	<p>0.7. More biochar will be produced in Y3.</p>
<p>Output 1. Capacity for managing and controlling invasive plants built, practical control methods employed, and restoration of land degraded by invasive plants into economically and environmentally beneficial habitats initiated in 15 CFUGS.</p>	<p>1.1 15 CFUGS in 3 districts of Nepal are engaged in training and provided with management guidelines, training and supervision, and practical guidance in managing and controlling invasive plants by Year 1. Best practices incorporated into CFUGS management plans</p> <p>1.2 15 CFUGS engaged in practical control measures for invasive plants undertaken in 15 Community Forests and private lands by Year 2, and effective management of regrowth/seedlings of invasive plants undertaken by Year 3.</p> <p>1.3 Selection and documentation of 15 native, economically and/or environmentally important plants which are suitable for use in restoring degraded habitats (e.g. cleared of invasive plants) by Year 1. Nursery areas established in or existing nurseries linked with 15 CFUGS by Year 3.</p> <p>1.4 15 CFUGS engaged in initiating forest restoration plans, including replanting of native species in 15 areas cleared of invasive plants by Year 3.</p>	<p>1.1 Workshops for Y2 completed in three districts (see workshop report doc.12-14). Project officers at ForestAction and NAST, and local facilitators are actively involved with communities for support and guidance. Best practices on management of AIPS are being incorporated in CFUGs forest management plans (doc. 7 & 8)</p> <p>1.2 15 CFUGS actively involved in AIPS cleaning, and char production and cleared 236 (80 Y1 + 156 Y2) hectare of infested forest by the end of Y2 (doc. 7)</p> <p>1.3 Eight species were selected and planted in reclaimed land (doc. 7). CFUGs are linked with district forest nurseries.</p> <p>1.4 Plantation started in 3 CFUGs, planation in 12 CFUGs starting in Y3 in June/July. 3 CFUGs planted around 1550 seedlings of 8 species (see doc. 7)</p>	

<p>Activity 1.1 Hold planning and stakeholder workshops, taking a participatory approach to providing training, enhancing the knowledge of local communities and raising awareness on the identification, impact, control and management of invasive plants.</p>	<p>Workshops in three districts completed for Y2 (doc. 12-14). Yearly removal and management of Invasive species is being incorporated in CFUG operational plans in 3 CFs (doc. 8), and ongoing for other CFs.</p>
<p>Activity 1.2 Work with CFUGs to undertake effective practical action for the removal and on-going control of invasive plants, with training and support, and assess the impact of this work.</p>	<p>Removal of species is ongoing in all 15 CFUGs, 236 hectare of infested forest area cleared by the end of Y2 (doc. 7).</p>
<p>Activity 1.3 Hold meetings with experts to agree on target species for replanting and work with government and local plant nurseries, and CFUGs, to undertake replanting of reclaimed lands with native, economically useful plants.</p>	<p>Based on local interest and expert advice, eight species were selected for planting in 3 CFs, and total of 1550 seedling were planted (doc. 7)</p>
<p>Activity 1.4 Research, build and disseminate a science-based knowledge resource for invasive plants, and take a participatory approach to incorporating into CFUG Management Plans the lessons learned in best practice in restoration of lands degraded by invasive plants.</p>	<p>Science based knowledge products are being produced after consultations with local communities. Few are uploaded in the web (http://www.invasiveplantsnepal.org/). Awareness raising article in Nepali is accepted for publication in next issue of "Hamro Ban Sampada" vol. 15 (doc. 17, manuscript). CFUGs management plans will be updated towards the end of the project to incorporate best practices on restoration of land degraded by invasive species.</p>
<p>Output 2. Weed species researched and evaluated and local community understanding of invasive plants enhanced. A national list of priority invasive plants established, supported by a bilingual identification manual and the raising of public awareness.</p>	<p>2.1 Science-based inventory of weed species in 3 districts of Nepal completed in Year 2, highlighting known invasive plants and spotlighting potential future problematic species. At least 20 MSc students trained in fieldwork techniques.</p> <p>2.2 15 CFUGS with enhanced understanding of local invasive plants and skills in identifying new invasive and potentially problematic plants, and CFUG Management Plans updated by Year 3.</p> <p>2.3 Evidence based national list of 30-40 priority invasive species compiled and documented, and submitted to Government of Nepal to underpin policy decisions by Year 2.</p> <p>2.1 Three MSc students collected total of 1504 specimens, analysis on going. Distribution mapping of AIPS was done in mid-western Nepal at 76 locations in eight districts (see CDB-TU report, doc. 9) Field work technique training is postponed to Y3 to accommodate semester time and exams.</p> <p>2.2 Identification manual designed and tested with local CFUGs (see sample pages, doc. 5).</p> <p>2.3 Postponed to Y3 due to elections in Nepal, see comments in section 3.1, activities 2.2.</p>

	<p>2.4 GIS niche modelling of 10 potentially invasive species undertaken, and horizon scanning reported to Government of Nepal by Year 3. Pilot study applying Remote Sensing methodologies to detect <i>Lantana camara</i> and two other invasive species completed by Year 3.</p> <p>2.5 Bilingual identification manual covering the national priority invasive plant species published and 20 monthly newspaper and online popular articles featuring invasive plants published by Year 3.</p> <p>2.6 Project website established in Year 1 and used to give free and open access to project reports and other outputs during the project.</p>	<p>2.4 Remote sensing analysis on mapping and assessment of <i>Chromolaena odorata</i> and <i>Lantana camara</i> has been started in Y2. The working is ongoing.</p> <p>2.5 Bilingual manual has been designed and tested with local CFUGs (see finalized template, doc. 5). Newspaper articles on Individuals species will be published in Y3. Newspaper articles featuring our work and invasive species has been published in 3 popular newspaper in Nepal and in online media (doc. 10).</p> <p>2.6 Project website was established in Y1 (http://www.invasiveplantsnepal.org/)</p>
<p>Activity 2.1. Research, evaluate and publish inventories of the district-level weed flora in the study areas with fieldwork, sample collection and identification, enhancing reference collections, and training and capacity building of MSc students.</p>		<p>3 MSc students have completed their field work and working on finalizing their thesis work (see CDB-TU report, doc. 9). Altogether 1504 herbarium specimens were collected (see doc. 9). MSc students visited CAL herbaria for training and identification of plant species (see CDB-TU newsletter, page 8, doc. 15 & CDB-TU report, doc.9).</p>
<p>Activity 2.2. Research and evaluate a national list of priority invasive species and submit a report through Government partners to inform Government of Nepal policy.</p>		<p>Work started in Y2, workshop postponed to Y3 (see comments in section 3.1, activities 2.2.)</p>
<p>Activity 2.3 Research, develop and publish a photographic identification manual (and other educational materials on a project website), tested by communities, to inform and raise awareness of invasive plants both at a local level with communities and nationally with the general public.</p>		<p>Bilingual manual has been designed and tested with local CFUGs (see finalized template, doc. 5). Few identification manuals uploaded in the website under tab plants (www.invasiveplantsnepal.org). Awareness raising article in Nepali is accepted for publication in Hamro Ban Sampada vol 15. (manuscript, doc. 17)</p>
<p>Activity 2.4 Use the improved species distribution mapping to investigate the likely unrestricted spread of 10 current or potentially invasive plants using GIS niche modelling techniques and undertake a Remote Sensing pilot study on one high-priority problem species, submitting papers for publication.</p>		<p>Remote Sensing (RS) study on <i>Chromolaena odorata</i> and <i>Lantana camara</i> has been started in Feb 2018. Dr J Aryal from UTAS visited RBGE for a month to work on RS. RBGE secured £7500 extra funding, and RS data purchased in Y2. GIS niche modelling studies will be started in Y3.</p>
<p>Output 3. Charcoal densification technologies (e.g. beehive bio-briquettes and pellets) successfully introduced and densified charcoal</p>	<p>3.1 15 CFUGS and 7 Women's Groups, representing ca. 4000 individuals (at least half of which are women or girls), provided with</p>	<p>3.1 Practical training provided on selection of species and production of char in Y2 (see workshop report, doc 12-14):</p>

<p>products made from invasive plants and other waste biomass. DCPs used as an alternative to fossil fuels and firewood as a domestic fuel source, and small-scale women-run co-operatives derive alternative incomes from bio-briquettes/pellets.</p>	<p>information resources and engaged in practical training on the species selection and use of invasive plants and other waste biomass (e.g. fallen leaves, newspaper) for producing bio-briquettes/pellets by Year 1</p> <p>3.2 30 women from local women's groups recruited for training in bio-briquette/pellet manufacture, at least 3 co-operatives/enterprises set up with employment to 21 people (women/target community), which produce and market ca. 120,000 bio-briquettes/pellets using 45 metric tons of charcoal by Year 3. This represents ca. 45 metric tons generating extra income and enhancing livelihoods of poor communities.</p> <p>3.3 250 rural households (30% increase from 2011 census baseline) adopting bio-briquettes/pellets as at least a partial alternative to fossil fuels and firewood, improving wellbeing by reducing time spent collecting firewood by Year 3.</p>	<p>3.2 Char production continuing in Nawalparasi and Makwanpur. In Bardiya local people are interested in biochar only due to lack of availability of char market. Altogether 9.2 tons of char sold making an extra income of NRS 120000 for poor and disadvantaged people in Nawalparasi and Makwanpur (doc. 7). Project partners are working with the government and local people to secure funds to install Pelletizer, and if successful local women groups will be involved on producing Pellet and generating more income from Y3. Once the pelletizer installed, business model will be developed at local scale.</p> <p>3.3 Production and sale of bio-briquettes is not cost effective (see comments above). As per reviewers advise on Y1 report, 14 women trained on making ICS stoves (doc. 11, ICS workshop report). In Y2, ICS were installed at 26 households benefitting 208 people. More ICS will be installed throughout year 3. Trained women can be benefited by extra income by installing these ICS to neighbours.</p>
<p>Activity 3.1 Hold workshops and meetings with community stakeholders to inform and train people in the use of invasive plant biomass, and other waste plant material (e.g. dead leaves, newspaper) to produce bio-briquettes/pellets.</p>		<p>Y2 workshop completed, local women's in Nawalparasi and Makwanpur are trained on making char to sell to the market (see comments above on bio-briquettes and pellet).</p>
<p>Activity 3.2 Provide capacity building to local stakeholder groups in the formation of cooperatives for bio-briquette/pellet production, which have the necessary equipment, technological knowledge and practical experience.</p>		<p>Capacity building of char production completed, equipment supplied. The installation of pelletizer (if funds available, see comments above), and the business model to run community own enterprise to produce and sell pellet is underway.</p>

<p>Activity 3.3 Support local cooperatives in the production, distribution, marketing and use of bio-briquettes/pellets as an alternative source of fuel for cooking and heating.</p>	<p>See comments above on bio-briquettes and pelletizer. Market is linked for selling char, a total of 9.2 metric ton char produced by the community making an extra income of NRS 120,000 (see doc.7).</p>
<p>Activity 3.4 Undertake base line and monitoring socio-economic surveys to assess impact and benefits of introducing bio-briquette/pellet production on livelihoods and well-being, and incorporating best practice into CFUG Management Plans.</p>	<p>Base line data collected, and database has been established. The end line survey will be done in Y3 to assess the impact.</p>
<p>Output 4. Biochar technologies successfully introduced, biochar manufactured locally and used to improve soil fertility of degraded land and to sequester carbon.</p>	<p>4.1 15 CFUG, representing 750 rural households, provided with information resources and practical training on the species selection and use of invasive plants for producing biochar by Year 1.</p> <p>4.2 Local biochar production facilities, using appropriate low-tech technologies, established and manufacturing biochar in 3 VDCs by Year 2, and making 90 metric tons of biochar by end of Year 3</p> <p>4.3 15 CFUGS using biochar to increase soil fertility and sequester carbon, and 20% of households using biochar for soil improvement, with estimated increase in crop yields of 20% by end of Year 3 improving livelihoods and income generation potential.</p> <p>4.1 Practical training completed in all 15 CFUGs in 3 districts (see workshop report doc. 12-14), and provided with information resources developed by NAST.</p> <p>4.2 Local biochar production facilities established in all 3 sites and provided with equipment's and resources (see workshop report doc 12-14). Field demonstration plot has been established in 3 districts.</p> <p>4.3 Baseline data completed, end line data will be collected towards the end of the project. One MSc student Pratibha Poudel started MSc research on carbon sequestration from AIPS (doc.16).</p>
<p>Activity 4.1 Hold workshops and meetings with community stakeholders to inform and train people in the use of invasive plant biomass, and other waste plant material, to produce biochar</p>	<p>Y2 practical training on producing biochar completed. All 15 CFUGs are producing biochar from AIPS and other waste biomass (see workshop report doc. 12-14).</p>
<p>Activity 4.2 Provide capacity building and support the establishment of low-tech pyrolysis methods for biochar production and the use of biochar to improve the soil fertility of land reclaimed from invasive weed infestations.</p>	<p>Low tech pyrolysis methods for biochar production has been established on 3 sites representing all 15 CFUGs. Equipment were distributed to the community in all 3 sites. Field demonstration plots were also established on all sites (see workshop report doc.12-14, comments above section 3.2, output 4).</p>
<p>Activity 4.3 Undertake base line and monitoring surveys to assess the impact and benefits of biochar production and its use in improving soil fertility, restoration of lands cleared of infestations and crop yields, incorporating best practice into CFUG Management Plans.</p>	<p>Baseline data completed and entered into the excel sheet. Endline data will be collected towards the end of Y3 to assess the impact and benefit of biochar production.</p>

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

Project summary	Measurable Indicators	Means of verification	Important Assumptions
<p>Impact: Reduction and ultimate eradication of invasive plants in forests, farmland and wild habitats in Nepal: improving biosecurity, safeguarding globally significant biodiversity, and improving livelihoods and wellbeing of natural resource-dependent people.</p>			
<p>Outcome: Increased knowledge, awareness and effective management of invasive plants in Nepal. Safeguarding and restoring biodiversity, creating climate smart alternative sources of bioenergy and soil improvement, and enhancing livelihoods and wellbeing.</p> <p>CFUGS = Community-based Forest User Groups</p> <p>VDC = Village Development Committee</p>	<p>0.1 15 CFUGS (representing 750 households/3750 people - of which 2000 are women) in 3 VDCs in 3 districts in Western, Mid-Western and Far Western Development Regions of Nepal (Nawalparasi, Dailekh and Bhajura) engaged in capacity building activities and provided with a clear understanding of invasive plants and climate reliance/adaptation methodologies by Year 1, actively implementing invasive plant management guidelines by Year 2.</p> <p>0.2 30% of invasive species-dominated forest areas (both natural and managed, total area of infested forests in 3 VDCs established in Year 1 baseline survey) restored, with the management of regrowth of native species undertaken, and nursery areas for replanting established or linked with 15 Community Forests and private lands by Year 3.</p> <p>0.3 Establishment of a comprehensive science-based knowledge-base for weed species in Community Forests and agricultural ecosystems in 3 districts of Nepal, including horizon scanning for potential future invasive plants, by Year 2.</p> <p>0.4 Public awareness raised of the 20</p>	<p>0.1 VDC annual reports, interviews with CFUGS, project reports on workshops, training and invasive plant management guidelines.</p> <p>0.2 VDC annual reports, interviews with CFUGS, photographs, land-use survey project reports.</p> <p>0.3. Fieldwork and weed survey project report, project publications.</p> <p>0.4. Media articles, invasive plant manual, interviews with CFUGS, household socio-economic survey reports.</p> <p>0.5. Household socio-economic survey project reports, interviews with women’s groups, women’s group records/annual reports.</p> <p>0.6 VDC annual reports, bioenergy project reports.</p> <p>0.7 District Forest Officer annual report verifies progress of change of CFUG members livelihoods.</p>	<p>1. The political situation in Nepal remains stable to permit work, and that earthquakes, landslides and other natural disasters present no more than short-term obstacles.</p> <p>Mitigation: Partners are not politically aligned and have been able to work effectively under past regimes. Similarly, partners are experienced in coping with extreme environmental conditions and can schedule work to minimise impact.</p> <p>2. Local communities actively engage with the activities of the project.</p> <p>Mitigation: We will work with local communities within the established MSFP network as trust and effective, two-way communication are already set up and proven successful.</p> <p>3. Local communities recognise the economic, health and environmental benefits from management practices and technologies and decide to adopt them.</p> <p>Mitigation: Local communities will be deeply involved in training and information sharing events, promoting engagement and understanding.</p>

	<p>nationally most problematic invasive plants in Nepal; 15 CFUGS capable of identifying all local invasive plants and reporting new plant invaders in their local area; and 750 rural households (disaggregated by gender) empowered with knowledge on uses of invasive plants to improve livelihoods by Year 3.</p> <p>0.5 With reference to Government of Nepal 2011 Census data and Year 1 baseline socio-economic survey data, a 30% increase in the use of alternative bioenergy sources in 750 rural households (disaggregated by gender), and 30% reduction reported in the use of wood as the primary fuel by end of Year 3, and contributing to enhanced wellbeing of household members.</p> <p>0.6 3 local women's groups (including people from ca. 30 households) with enhanced livelihoods by producing and deriving incomes from charcoal densified products (e.g. bio-briquettes, pellets) by end of Year 3.</p> <p>0.7 Low-tech, local biochar manufacture facilities established in 3 VDCs, 15 CFUGS using biochar to increase soil fertility and sequester carbon in restored lands by Year 3.</p>		<p>4. Household members (particularly women) recognise the benefits to themselves and the environment, and are self-motivated to adopt bioenergy and change from traditional fuel sources (wood) to bioenergy alternatives, and using biochar.</p> <p>Mitigation: Heads of households will be engaged and informed on the personal livelihood and wellbeing benefits of switching fuel, in addition to the wider environmental benefits. Partners provide information with engaging audio-visual aids and technology with good coordination.</p> <p>5. Partners involved remain committed to the project.</p> <p>Mitigation: Partners have an excellent track record in collaborative projects, and this will be maintained through regular communication and involvement in monitoring and evaluation.</p> <p>6. The recent fuel crisis in Nepal caused severe transport problems and critical shortages of gas for cooking and heating. A benefit has been the raised awareness for alternative bioenergy sources, demand for bio-briquettes and pellets has far outstripped demand. Furthermore, wood was imported into Kathmandu (under rationing) putting forests under pressure.</p> <p>Mitigation: partners are experienced in working during periods of fuel shortages and adapt workplans to cater for restrictions.</p>
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<p>Output 1</p> <p>Capacity for managing and controlling invasive plants built, practical control methods employed, and restoration of land degraded by invasive plants into economically and environmentally beneficial habitats initiated in 15 CFUGS.</p>	<p>1.1 15 CFUGS in 3 districts of Nepal are engaged in training and provided with management guidelines, training and supervision, and practical guidance in managing and controlling invasive plants by Year 1. Best practices incorporated into CFUGS management plans</p> <p>1.2 15 CFUGS engaged in practical control measures for invasive plants undertaken in 15 Community Forests and private lands by Year 2, and effective management of regrowth/seedlings of invasive plants undertaken by Year 3. Checks on active cultivation of alien species as a bioenergy source undertaken in Years 2 and 3.</p> <p>1.3 Selection and documentation of 15 native, economically and/or environmentally important plants which are suitable for use in restoring degraded habitats (e.g. cleared of invasive plants) by Year 1. Nursery areas established in or existing nurseries linked with 15 CFUGS by Year 3.</p> <p>1.4 15 CFUGS engaged in initiating forest restoration plans, including replanting of native species in 15 areas cleared of invasive plants by Year 3.</p>	<p>1.1 Project workshop reports, guideline documents, CFUGS interviews and management plans.</p> <p>1.2 CFUGS interviews, fieldwork surveys, project reports.</p> <p>1.3 Replanting guidelines project report, Government policy brief.</p> <p>1.4 Interviews with CFUGS and households, photographs, fieldwork surveys, project reports.</p>	<p>Assumptions as above, especially 2 & 3.</p>
<p>Output 2</p> <p>Weed species researched and evaluated, and local community understanding of invasive plants enhanced. A national list of priority invasive plants established, supported</p>	<p>2.1 Science-based inventory of weed species in 3 districts of Nepal completed in Year 2, highlighting known invasive plants and spotlighting potential future problematic species. At least 20 MSc students trained in fieldwork techniques.</p>	<p>2.1 Annotated inventory of weed species project report, fieldwork reports.</p> <p>2.2 Interviews with CFUGS, project workshop reports.</p> <p>2.3 National priority invasive plant report submitted to Government of</p>	<p>Assumptions as above, especially 2 & 3.</p>

<p>by a bilingual identification manual and the raising of public awareness.</p>	<p>2.2 15 CFUGS with enhanced understanding of local invasive plants and skills in identifying new invasive and potentially problematic plants, and CFUG Management Plans updated by Year 3.</p> <p>2.3 Evidence-based national list of 30-40 priority invasive species compiled and documented, and submitted to Government of Nepal to underpin policy decisions by Year 2.</p> <p>2.4 GIS niche modelling of 10 potentially invasive species undertaken, and horizon scanning reported to Government of Nepal by Year 3. Pilot study applying Remote Sensing methodologies to detect <i>Lantana camara</i> and two other invasive species completed by Year 3.</p> <p>2.5. Bilingual identification manual covering the national priority invasive plant species published and 20 monthly newspaper and online popular articles featuring invasive plants published by Year 3.</p> <p>2.6 Project website established in Year 1 and used to give free and open access to project reports and other outputs during the project.</p>	<p>Nepal.</p> <p>2.4 Invasive plant species horizon scanning project report, research paper submitted to international peer-reviewed journal.</p> <p>2.5 Published identification manual, articles in national newspapers and online (e.g. project website).</p> <p>2.6 Project website.</p>	
<p>Output 3</p> <p>Charcoal densification technologies (e.g. beehive bio-briquettes and pellets) successfully introduced and densified charcoal products made from invasive plants and other waste biomass. DCPs used as an alternative to fossil fuels and firewood as a domestic fuel source, and</p>	<p>3.1 15 CFUGS and 7 Women's Groups, representing ca. 4000 individuals (at least half of which are women or girls), provided with information resources and engaged in practical training on the species selection and use of invasive plants and other waste biomass (e.g. fallen leaves, newspaper) for producing bio-briquettes/pellets by Year 1</p>	<p>3.1 Interviews with CFUGS and Women's Groups, workshop reports, bioenergy project report.</p> <p>3.2 Interviews with Women's Groups, Women's Group records, photographs, project reports and socio-economic survey.</p>	<p>Assumptions as above, especially 2, 3 & 4.</p>

<p>small-scale women-run co-operatives derive alternative incomes from bio-</p>	<p>3.2 30 women from local women's groups recruited for training in bio-briquette/pellet manufacture, at least 3 co-operatives/enterprises set up with employment to 21 people (women/target community), which produce and market ca. 120,000 bio-briquettes/pellets using 45 metric tons of charcoal by Year 3. This represents ca. 45 metric tons generating extra income and enhancing livelihoods of poor communities.</p> <p>3.3 250 rural households (30% increase from 2011 census baseline) adopting bio-briquettes/pellets as at least a partial alternative to fossil fuels and firewood, improving wellbeing by reducing time spent collecting firewood by Year 3.</p>	<p>3.3 Household socio-economic survey, photographs, project report.</p> <p>3.4 District Forest Officer annual report verifies progress of change of CFUG member's livelihoods.</p>	
<p>Output 4 Biochar technologies successfully introduced, biochar manufactured locally and used to improve soil fertility of degraded land and to sequester carbon</p>	<p>4.1 15 CFUG, representing 750 rural households, provided with information resources and practical training on the species selection and use of invasive plants for producing biochar by Year 1.</p> <p>4.2 Local biochar production facilities, using appropriate low-tech technologies, established and manufacturing biochar in 3 VDCs by Year 2, and making 90 metric tons of biochar by end of Year 3.</p> <p>4.3 15 CFUGS using biochar to increase soil fertility and sequester carbon, and 20% of households using biochar for soil improvement, with estimated increase in crop yields of 20% by end of Year 3 improving livelihoods and income generation potential.</p>	<p>4.1 Interviews with CFUGS, workshop reports, project reports.</p> <p>4.2 VDC annual report, workshop reports, photographs, bioenergy project report.</p> <p>4.3 VDC annual report, photographs, project report.</p>	<p>Assumptions as above, especially 2, 3 & 4.</p>

Activities

Output 1. Invasive plants controlled and degraded lands restored

- 1.1 Hold planning and stakeholder workshops, taking a participatory approach to providing training, enhancing the knowledge of local communities and raising awareness on the identification, impact, control and management of invasive plants.
- 1.2 Work with CFUGs to undertake effective practical action for the removal and on-going control of invasive plants, with training and support, and assess the impact of this work.
- 1.3 Hold meetings with experts to agree on target species for replanting and work with government and local plant nurseries, and CFUGs, to undertake replanting of reclaimed lands with native, economically useful plants.
- 1.4 Research, build and disseminate a science-based knowledge resource for invasive plants, and take a participatory approach to incorporating into CFUG Management Plans the lessons learned in best practice in restoration of lands degraded by invasive plants.

Output 2, Weed species evaluated and communicated

- 2.1 Research, evaluate and publish inventories of the district-level weed flora in the study areas with fieldwork, sample collection and identification, enhancing reference collections, and training and capacity building of MSc students.
- 2.2 Research and evaluate a national list of priority invasive species, and submit a report through Government partners to inform Government of Nepal policy.
- 2.3 Research, develop and publish a photographic identification manual (and other educational materials on a project website), tested by communities, to inform and raise awareness of invasive plants both at a local level with communities and nationally with the general public.
- 2.4 Use the improved species distribution mapping to investigate the likely unrestricted spread of 10 current or potentially invasive plants using GIS niche modelling techniques, and undertake a Remote Sensing pilot study on one high-priority problem species, submitting papers for publication.

Output 3. Bio-briquette technologies successfully implemented

- 3.1 Hold workshops and meetings with community stakeholders to inform and train people in the use of invasive plant biomass, and other waste plant material (e.g. dead leaves, newspaper) to produce bio-briquettes/pellets.
- 3.2 Provide capacity building to local stakeholder groups in the formation of cooperatives for bio-briquette/pellet production, which have the necessary equipment, technological knowledge and practical experience.
- 3.3 Support local cooperatives in the production, distribution, marketing and use of bio-briquettes/pellets as an alternative source of fuel for cooking and heating.
- 3.4 Undertake base line and monitoring socio-economic surveys to assess impact and benefits of introducing bio-briquette/pellet production on livelihoods and well-being, and incorporating best practice into CFUG Management Plans

Output 4. Biochar technologies successfully implemented

- 4.1 Hold workshops and meetings with community stakeholders to inform and train people in the use of invasive plant biomass, and other waste plant material, to produce biochar.
- 4.2 Provide capacity building and support the establishment of low-tech pyrolysis methods for biochar production and the use of biochar to improve the soil fertility of land reclaimed from invasive weed infestations.
- 4.3 Undertake base line and monitoring surveys to assess the impact and benefits of biochar production and its use in improving soil fertility, restoration of lands cleared of infestations and crop yields, incorporating best practice into CFUG Management Plans

Annex 3: Standard Measures

Table 1 Project Standard Output Measures

Code No.	Description	Gender of people (if relevant)	Nationality of people (if relevant)	Year 1 Total	Year 2 Total	Year 3 Total	Total to date	Total planned during the project
Established codes								
2	MSc Thesis	1M, 3 F				4		3
7	Awareness leaflet			1				1
10	Identification manuals for AIPS (20 species)				5	15	5	1 manual for 20 species
10	Manuals for economically useful species (20 species)					20		1 manual for 20 species
11A	Niche modelling and Remote sensing paper					2		2
11B	Management of AIPS in Nepal (in Nepal)				1			
14A	District level workshops			3	3	3	6	9
14B	Seminar RBGE				1	1	1	2
14B	4 th Graduate Conference				2		2	2
14B	Seminar-Kolkata				1		1	1
14B	6GBGC-Geneva				1		1	1
20	Computers, scanners, cameras			£9200				
20	Digitization unit at DPR				£2850			
23	Other sources including contribution in kind			£66922	£83451			

Table 2 Publications

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

Checklist for submission

	Check
Is the report less than 10MB? If so, please email to Darwin-Projects@ltsi.co.uk putting the project number in the Subject line.	
Is your report more than 10MB? If so, please discuss with Darwin-Projects@ltsi.co.uk about the best way to deliver the report, putting the project number in the Subject line.	
Have you included means of verification? You need not submit every project document, but the main outputs and a selection of the others would strengthen the report.	
Do you have hard copies of material you want to submit with the report? If so, please make this clear in the covering email and ensure all material is marked with the project number.	
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.	