Environmental and Social Impact Assessment

and

Environmental and Social Management Plan

6 January 2023

CEPF Grant 113643

Restoring the flooded forest in Cambodia's Tonle Sap Lake

Tonle Sap Lake and Inundation Zone

Grant Summary

1. Grantee organization: Conservation International
2. Grant title: Restoring the flooded forest in Cambodia's Tonle Sap Lake
3. Grant number: 113643
4. Grant amount (US dollars): 157 000
5. Proposed dates of grant: 1 March 2023 - 30 June 2025
6. Countries or territories where project will be undertaken: Cambodia
7. Summary of the project:

Project Rationale:

The Tonle Sap Lake's vast floodplain is integral to the Tonle Sap Lake and Inundation Zone Indo-Burma Hotspot priority corridor. The floodplain's vegetation communities comprise gallery forest, shrubland, grassland, invasive weeds, wetlands, and rice fields – all of which are flooded during the monsoon season. Most important is the gallery forest, now dominated by three tree species: Reang (*Baringtonia acutagula*), which is the most abundant, followed by sparser cover of Ptoul (*Diospyros cambodiana*), and Kanseng (*Xanthophyllum lanceatum*). The gallery forest provides habitat for threatened species such as the endangered hairy nosed otter (*Lutra sumatrana*), whilst also protecting villager's floating houses from storm driven wind and waves. The gallery forest is much reduced in area due to widespread deforestation and degradation which began with French colonial exploitation for fuelwood and charcoal in the 1930's. Large areas of flooded forest and shrubland have also been cleared, often illegally, for growing rice. Dry season forest fire, particularly during the hot El Niño years of 2015 and 2016, destroyed an estimated one third of the remaining gallery forest and shrubland. These increasingly frequent fires degrade the ecosystem's capacity to regenerate by reducing biomass and nutrient levels, flowering and seed production, and seedling survival and recruitment. Much of the burnt areas have been colonized by the invasive weeds *Mimosa pigra* and *Mimosa diplotricha* which form dense spiny thickets, providing a hostile habitat for the Tonle Sap's fish.

One hundred years of exploitation is believed to have dramatically altered the gallery forest's vegetation composition. Ta Ou (*Terminalia cambodiana*), S'dey Toek (*Crudia chrysantha*) and Roteang (*Homalium brevidens*), were believed to be the naturally dominant tree species prior to French exploitation. Now Ta Ou is rare, occurring within or adjacent to the gallery forest across the Lake. Whilst S'dey Toek and Roteang are very rare, and only isolated individuals or small groups of trees remain.

Conservation International supports nine Community Fisheries organizations in restoring their flooded forests on the Tonle Sap Lake. Since 2010 we have helped them to restore 370 ha of floodplain with 197,427 seedlings and 27,900 seeds, with 8 ha under assisted natural regeneration. We have focused our revegetation on restoring the current gallery forest vegetation community structure, replanting predominantly Reang (50% of all trees replanted), Ptoul (20% of replanted trees), Kanseng (10% of trees) and Ta Uo (5% of trees), but no S'dey Toek or Roteang. This is largely due to the phenomenon of moving baselines– we have attempted to replicate what is currently seen as the most pristine gallery forest community, one dominated by Reang. The current forest structure also influences the availability of seeds for replanting. As Reang is the most abundant species it is easiest to source seeds for, whilst it is difficult to obtain seeds for the rarer for S'dey Toek, Roteang and Ta Uo. Furthermore Reang, Ptoul and Kanseng have a high survival rate as nursery grown seedlings transplanted to open cleared land, and thus have been favored for nursery grown transplantation into cleared or previously burnt sites.

Whilst our focus has been on supporting communities to grow seedlings in a nursery and transplanting them into the field, we have been implementing and refining direct seeding and assisted natural regeneration (ANR) as additional restoration techniques. Direct seeding is a more cost-effective technique than growing seedlings in the nursery, but it requires more seed. ANR relies on accelerating, rather than replacing, natural successional processes

by removing or reducing barriers to natural forest regeneration such as disturbance caused by fire, grazing, invasive species, and wood harvesting. ANR offers significant advantages over conventional methods because it reduces or eliminates the costs associated with propagating, raising, and planting seedlings. This approach can achieve restoration gains on a significantly larger scale than direct planting.
Replanting is only the start of the restoration process, as the growing and finally restored forest must be protected. We train our partner communities in delivering community education, patrolling, and rapid response fire suppressing to ensure that each restoration site is protected.
This funding call presents a unique opportunity to capitalize on increased interest in restoring the Tonle Sap's flooded forest. In response to an increase in illegal forest and shrubland clearance for rice fields the Royal Cambodian Government has taken large areas of illegally cleared land back under State control, and decreed that floodplains cleared after 2010 are to be restored. The Government is funding local communities to revegetate areas of cleared floodplain. Outside resources are also being directed to fund communities restore their flooded forests, for example Conservation International has funding either secured from three international donors to work with Community Fishery organizations to begin restoring 967 ha of floodplain over the next three years.
Project success will see the creation of several demonstration sites showing the outcomes of successful restoration using a variety of techniques. The demonstration sites will be supported by the development of an updated best practice guide to restoring the flooded forest, improving on CI's Guide to flooded forest restoration. This guide will build on CI's extensive experience in working with communities in flooded forest restoration and management and include outcomes from this project's experimental components. We will develop techniques to restore the two very rare species S'dey Toek and Roteang which over time will increase their abundance and begin to return to the Tonle Sap vegetation community to what it once was. We will conduct an outreach program to provide others with detailed information of these current methods so they can be used elsewhere across the floodplain.
If this project were not implemented restoration efforts across the Tonle Sap Lake may be implemented using suboptimal methods – leading to an increased chance of failure and poor outcomes. Unless further effort is expended on restoring the now rare but once common tree species the ecological character of the floodplain will remain in a degraded state as the rarity of these trees means they are regenerating slowly, if at all. These species potentially play an important, but now almost lost role in the Tonle Sap's ecology. For example, Ta Ou is a favored location for both hairy nosed and smooth coated otters to place their spraints in the wet season. Thus, the restoration of these previously dominant species is important in restoring the lake's ecology and building its resilience to future climate and hydrological change.
Overall, our project will develop and demonstrate best practice in flooded forest restoration. We will do this by synthesizing CI's considerable and evolving knowledge in floodplain restoration and developing new methods for restoring now rare, but previously dominant tree species. We will present our approach, supported by permanent demonstration sites, to local communities, NGO's, and government agencies with the aim of scaling up across the Tonle Sap Lake and Inundation Zone Indo-Burma Hotspot priority corridor.

Project Approach:
We will determine the best propagation and replanting methods for the three rare species, Ta Ou, S'dey Toek and Roteang, using an experimental community knowledge approach. We will collate local knowledge about the reproductive ecology of these species and use this to conduct experiments to determine the most suitable propagation methods. We will work with partner Community Fishery organizations to locate mature trees from which to collect seeds and cuttings for propagation. Based on local knowledge we will determine when best

to collect seeds, if any seed pre-treatment is required, and conduct experiments to examine how best to restore these species using direct seeding, nursery propagation and site suitability (e.g. replanting/direct seeding in open or vegetated areas). We will also examine seedling density and growth rates around identified mature trees. This will inform the success of direct seeding and nursery replanting and the potential for assisted natural regeneration to help recover these species. Whilst we have been successful in propagating Ta Ou, this species has only provided 5% of the restored trees at our partner community restoration sites. As with the other two species we will work to optimize the successful restoration of these three species thus making the best use of their limited seed resource.
We plan to engage six CFi's, three each in Pursat and Kampong Thom Provinces to participate in the experimental restoration component. Each will trial various propagation and restoration methods over 9 ha, resulting in 54 ha being subject to a restoration treatment. We will use and refine our site selection and monitoring protocols at these sites to determine the success of these experimental methods.
By partnering with six Community Fishery Organizations and transferring the knowledge gained through this project to a further eight CFi's and two women's saving groups, we will develop local civil society capacity to undertake restoration and take advantage of the new opportunities in restoring the Tonle Sap's flooded forest. Establishing and promoting the demonstration sites and best practice guidelines will also help to increase local capacity for restoration.
Our project employs a gender mainstreaming approach, which as a part of our Families and Fisheries Resilience Building Model, aims to increase women's involvement in managing their natural resources and providing them with the benefits of CI's engagement with local communities. The Community Fishery organizations with whom we work tend to be dominated by men. As a part of our community engagement, we will work with our community partners, both men and women, to determine how women's involvement in restoration can be enhanced through the development of a women's engagement plan. Initial discussions suggest that a minimum target of 30% of the seedlings grown for restoration are provided by local women, who then receive commensurate payment for their efforts, is achievable. We will also work with the CFi's to ensure that at least 45% of the local people involved in replanting and project monitoring are women and are compensated accordingly. This project also presents an opportunity to survey local women's experiences in restoration, identifying positive outcomes and barriers to greater involvement. This information will be used to make recommendations for future restoration programmes.
We will provide a scholarship for a Royal University of Phnom Penh Masters student in Biodiversity Conservation to gather important ecological information about the three rare tree species. Investigations will potentially include comparisons of the growth rates of naturally germinated, replanted and direct seeded seedlings; determining the density and abundance of naturally regenerating seedlings and the vegetation associations within which they are found.
We will select the most successful of these experimental sites as demonstration sites for the most suitable method for restoring these rare species. We will also establish a comprehensive demonstration site in Pursat Province, making use of the replanting efforts undertaken by Kampong Prak and Ou Ta Prok CFis who began restoring their flooded forests in 2010 and 2011 respectively. Both CFis have restoration sites of varying longevity, and they have used all three methods (nursery seedlings, direct seeding and assisted natural regeneration). Thus, these two relatively accessible CFis can show the progress expected by successful restoration programs.
We will combine the outcomes of our investigations into the three rare species with the knowledge accumulated in restoring 370 ha, plus the 967 ha we will restore in partnership with communities under other funding to produce a comprehensive written guide to restoring the flooded forest in both English and Khmer. We will use our 2019 CEPF funded 'Guide to Inundated Tree Planting: Practical Experience' as the basis for this document

including information on replanting using nursery grown seedlings, direct seeding and assisted natural regeneration. We will provide guidance on initial site assessment, contracting local communities, monitoring techniques, and site management, community relations and establishing Community Based Fire Management. We will also liaise with other NGOs and community groups who are restoring the flooded forest and incorporate their learning into our information resource.
Furthermore, in updating the 'Guide to Inundated Tree Planting' will go beyond the technical aspects of tree planting and detail social aspects that lead to success. This will include discussions of gender mainstreaming, strong CFi leadership, the importance of engaging government, how to manage threats posed by outsiders who may clear forest and light fires. At projects end we will launch and demonstrate our information resource at the demonstration sites with involvement from government, NGO's, and local community groups.

8. Date of preparation of this document. 5 January 2023

9. **Legal and regulatory framework**: This section will analyze the legal and institutional framework for the project, within which the environmental and social assessment is carried out, in compliance with Safeguard Policy 1 on Environmental and Social Assessment.

   This project will work directly with Community Fisheries (CFis) in partnership with the Cambodian Fisheries Administration (FiA). Under Cambodia's Law on Fisheries (2006), the FiA has the jurisdictional authority over CFis, legally recognized areas established for community management. Reforestation of degraded and cleared forest is a priority under FiAs Strategic Plan for Fisheries Conservation (2019-2028). The Ministry of Land Management as well as the Pursat and Kampong Thom Provincial governments have also issued legal proclamations ('prakas') mandating that illegally cleared forest within the Tonle Sap floodplain must be restored. Additionally, forest restoration is a key measure under the FiA's Fire Prevention Master Plan (2022), and the Inundated Forest Fire Prevention and Management Plan for Pursat Province 2022-2026.

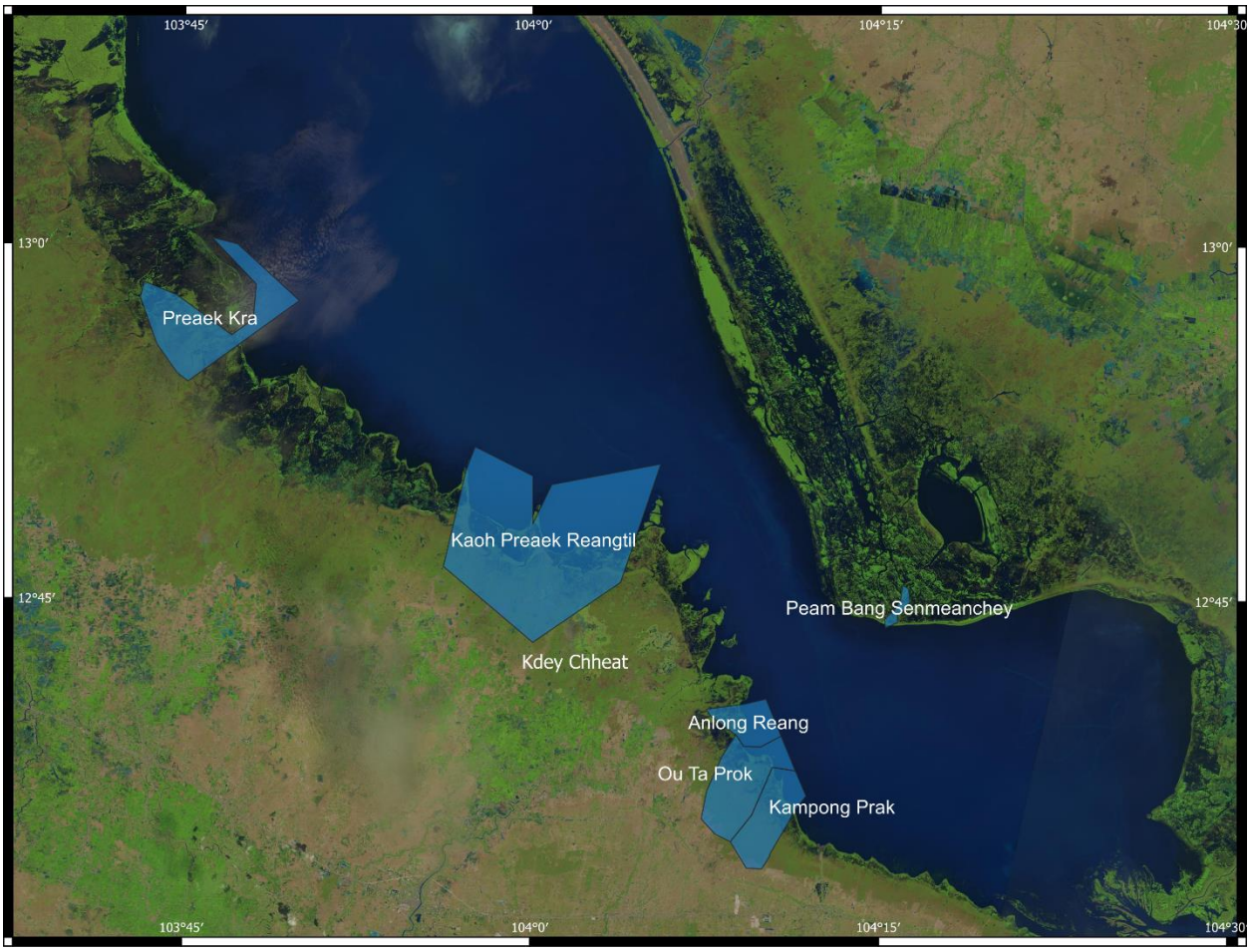
10. **Status of area to be impacted:** This section will describe the applicant's understanding of the project site, including a concise description of the proposed project's geographic, environmental, social, and temporal context. Where possible, it should include a map of sufficient detail, showing the project site and the area(s) that may be affected by the project's direct and indirect impacts.

    We will undertake the project in partnership with seven Community Fishery Organizations located in Pursat and Kampong Thom Provinces:

    - Kampong Prak (Pursat)
    - Anlong Reang (Pursat)
    - Ou Ta Prok (Pursat)
    - Peam Bang (Kampong Thom)
    - Preaek Kra (Pursat)
    - Kdey Chheat (Pursat)
    - Kaoh Preaek Reangtil (Pursat)

    The communities that comprise each of these CFi's depend on the Tonle Sap Lake's fishery for their livelihoods. They predominantly reside in floating villages which move

location during the year in response to the change in lake water level. We are concurrently implementing our Families and Fisheries Resilience Building Model in each of these communities – including flooded forest restoration which complements the aims of this project. Each community is responsible for managing an area of the lakes flooded forest which has been extensively destroyed and degraded over the last 100 years. Our communities are committed to restore the structure and function of their flooded forests which support the fishery upon which they depend. This aim also has significant government support.



11. **Baseline data**: This section will assess the dimensions of the study area and describe relevant physical, biological, and socioeconomic conditions, including any changes anticipated before the project commences. It will also take into account current and proposed development activities within the project area that are not directly connected to the project. Data should be relevant to decisions about project location, design, operation, or mitigation measures. The section will indicate the accuracy, reliability, and sources of the data.

    We have identified a range of baseline data that is relevant to this project. Spatially we have polygon outlines for each of the partner CFi's except Kdey Chheat which has been newly established and their boundary is yet to be defined. We hope that this will be

delineated during the project period. However, with any of our planting activities we are guided by local knowledge and discussions with local authorities as to the best locations. We have our own internal spatial datasets that delineate restoration site boundaries established since 2010. These will be used to select and establishing the demonstration sites and take advantage of historic restoration efforts

Our restoration activities concern restoring the complex flooded forest habitat which has become much reduced and degraded over the last 100 years. We concentrate our restoration on areas that were once forested and have been either burnt by wildfire or cleared for agriculture. As a part of the CEPF funded project "Community-Based Wild-Fire Management on Cambodia's Tonle Sap Lake" we are developing fire regime maps for each of the partner CFi's using the MODIS satellite data in Google Earth Engine (https://doi.org/10.5285/58f00d8814064b79a0c49662ad3af537). We will use this information in planning our restoration efforts.

We will avoid replanting in areas of remnant natural grassland, which according the recently released WCS Tonle Sap land cover map, are present in the vicinity of Kaoh Preaek Reangtil and Kdey Chheat CFi's. We will ensure that these areas are not subject to replanting with flooded forest tree species. The WCS map does not show grasslands near Preaek Kra CFi and they are not present in any of the other CFi's, of which we have extensive knowledge and experience.

All datasets are subject to some level of error and field surveys will precede any on ground restoration activities to check their accuracy and determine site suitability.

12. **Anticipated impacts and risks:** This section will describe the anticipated environmental and social impacts and risks, and explain how these have been determined. It should consider both positive and adverse impacts.

1. Remnant natural grassland: The absence of remnant natural grassland from the majority of four of the six experimental restoration sites and likely limited area in the remaining two reduces the risk of replanting flooded forest trees in this habitat. We will further reduce this risk through ensuring that extant areas of grassland – identified through both the WCS map and local knowledge - are not targeted for replanting. Prior to replanting all sites will be checked to ensure they are not remnant natural grasslands. Should this be the case replanting efforts will be moved elsewhere. As with all our restoration activities we respond to local partners directions and suggestions for areas to be restored – further guaranteeing that natural grasslands will not be impacted.
2. Nursery construction: There is a minor risk that nursery construction will have a negative impact on the environment should native vegetation be cleared to make way for the nursery. We will work with our local partners to ensure that nurseries are constructed on barren land to avoid this risk. Nurseries will be kept to a minimum size (20 x 20 m) and pre-existing nursery sites will be reused.
3. Waste disposal: Restoration activities will potentially use disposable plastic products such as bags or pots for growing seedlings. These could be inappropriately disposed of during replanting resulting in plastic pollution. We will ensure that this does not occur and plastics used for restoration are reused and if damaged, suitably disposed of offsite.
4. Grazing: Each community manages their restoration areas to avoid disturbance and thus encourage the regrowth of replanted and restored species. To this end they

discourage buffalo grazing through patrolling and signposting. This could have negative socio-economic consequences for people who herd buffalo depriving them of pre-existing pasture. However, the areas restored in each CFi under this project are small compared to entire area of floodplain able to be grazed.

13. **Mitigation measures**: This section will describe measures that will be taken to mitigate adverse impacts. For each anticipated adverse or risk identified in Section 12, it should describe, with technical detail, appropriate mitigation measure(s), including the conditions under which it is required (e.g., continuously or in the event of contingencies), together with designs, equipment descriptions, and operating procedures, as appropriate. It should also estimate any potential environmental and social impacts of these measures. Differentiated measures should be identified so that adverse impacts do not fall disproportionately on disadvantaged or vulnerable groups or individuals.

    All risks described above aside from 4) Grazing, can be avoided and thus mitigation is not required. To mitigate the impact of grazing we will help our community partners educate buffalo herders on the importance of floodplain restoration and direct them to alternative grazing areas.

14. **Actions to ensure health and safety**: This section will describe actions that will be taken to ensure the health and safety of workers.

    The restoration activities undertaken as a part of this project are all low risk having been conducted in partnership between CI and nine CFi's without incident since 2010. The risk of injury when collecting seeds is low as they can be collected by boat during the wet season from tree crowns – negating the need to climb trees or knock down. We will provide communities with personal protective equipment and first aid kits for nursery and tree replanting activities. Conservation International staff will operate according to institutional OH&WS policies and procedures.

15. **Monitoring and evaluation**: This section will outline the steps the applicant will take to monitor and evaluate the impact of the proposed project. It should identify the monitoring objectives and specify the type of monitoring, with linkages to the impacts assessed and the mitigation measures described. This is meant to provide (a) a specific description, and technical details, of monitoring measures, including the parameters to be measured, methods to be used, sampling locations, frequency of measurements, detection limits (where appropriate), and definition of thresholds that will signal the need for corrective actions; and (b) monitoring and reporting procedures to: (i) ensure early detection of conditions that necessitate particular mitigation measures; and (ii) furnish information on the progress and results of mitigation.

    As described above all but one of the projects anticipated impacts and risks can be avoided, thus negating the need for monitoring. The risk of replanting in grassland areas will be evaluated during planning through examining the WCS land cover and all sites will be checked on the ground to ensure site suitability. CFi's will monitor community access to restoration sites as a part of their routine activities and educate users accordingly.

16. **Timeline and resources:** For the mitigation and monitoring measures in Sections 14 and 15, this section will provide: (a) an implementation schedule for measures that must be carried out as part of the project, showing phasing and coordination with overall project implementation plans; and (b) cost estimates and sources of funding for implementing the ESMP.

    This ESMP plan will be incorporated into routine project activities throughout the project within the proposed budget. We have included 12 days our NCS and Safeguards Senior Technical Manager at a cost of $3205 to oversee our safeguards process.

17. **Permission of the landowner**: Please obtain permission of the landowner to undertake actions on the site, and verify that you have the required permits to undertake this work.

    We have obtained approval for this project's proposed activities from the Provincial Departments of Agriculture, Forestry and Fisheries who have government oversite of this state owned land. Relevant documentation has been provided with the full project proposal. Verbal approval to participate in the project has also been obtained by the local Community Fishery Committees who have a mandate to manage the areas which will be restored.

18. **Participatory preparation**: This section aims to outline the range of meaningful consultations that you have had both with experts to optimize the potential for success, and with stakeholders, particularly local communities, who are potentially affected by the proposed project. It should include dates of consultations.

    This project builds upon Conservation International's expertise in flooded forest restoration. We have designed this project based on ten years of experience in flooded forest restoration. In developing the project we have consulted extensively with Community Fishery partners, local authorities and national government agencies from 1 September 2022 to 2 January 2023. We have verbally consulted:

Position	Institution
Director of Freshwater Wetlands Conservation	Ministry of Environment
Director of Fish Conservation	Fisheries Administration
DoAFF director	Kampong Thom DoAFF
DoAFF director	Pursat DoAFF
FiAC director	Pursat FiAC
FiAC director	Kampong Thom FiAC
FiAC officer	Kampong Thom FiAC
Commune chief	Me Teuk commune
Commune chief	Srea Sdok commune
Commune council	ReangTil commune
Commune chief	Kampong Por commune

Commune council	Sna Ansa commune
CFi's leader	Kampong Prak CFi
CFi's leader	Anlong Reang CFi
CFi's secretary	Koh Preaek Reangtil CFi
CFi's leader	Kdey Chhveat CFi
CFi's leader	Preaek Kra CFi
CFi's leader	Peam Bang Senmeanchey

20. **Disclosure**: CEPF requires that environmental and social plans are disclosed to affected local communities and stakeholders prior to project implementation. Please describe efforts to disclose this impact assessment and environmental management plan and provide dates.

    Should this project be successful we will present it to partner Community Fishery Committees as a part of our project establishment meetings at the same time as we present the grievance mechanism. We will table this plan to meetings of relevant District and Provincial Fisheries Coordination Team meetings thus informing local authorities.