

RESTORING LANDSCAPES IN
STEUNG SIEM REAP WATERSHED AREA

SIEM REAP PROVINCE, CAMBODIA

OCTOBER, 2012

COUNTRY
LANDSCAPES

PROGRAM
STRATEGY



COUNTRY LANDSCAPES PROGRAM STRATEGY

RESTORING LANDSCAPES IN STEUNG SIEM REAP WATERSHED AREA

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LIST OF ACRONYM

CBO	Community Based Organization
CF	Community Forestry
CFi	Community Fishery
COMDEKS	Community Development and Knowledge Management of the Satoyama Initiative
CPA	Community Protected Area
GEF	Global Environmental Facility
NC	National Coordinator
NSC	National Steering Committee
SEPL	Socio-Ecological Production Landscape
SGP	Small Grant Program
UNDP	United National Development Program

EXECUTIVE SUMMARY

This document, the CODMEKS Country programme Landscape Strategy for Cambodia is intended as a strategic paper for the implementation of COMDEKS activities in Cambodia. The socio-ecological landscape selected for the implementation of COMDEKS is the Steung Siem Reap watershed area. This landscape is located in Northwestern Cambodia in the province of Siem Reap, home to the world-famous historic temple of Angkor Wat. It covers an area of 3,619 square kilometers and extends from the mountain range of Phnum Kulen to the Tonle Sap Lake. The area is selected its severity of natural resource degradation but still restorable as well as the alignment of proposed activities to prioritized themes in the Cambodian GEF-SGP country programme strategy.


The landscape of the Steung Siem Reap watershed is very diverse. A socio-ecological zoning is applied - taking into account topography, rainfall pattern, soil types, land use, forest cover change, and statutory land tenure systems variables - using a Geographic Information System (GIS) to capture heterogeneity of the target area. The six zones identified include (1) Tonle Sap flood plain, (2) Rice plain, (3) Agro-archeological complex, (4) Agro-forest mosaic, (5) Upland agriculture and (6) Phnom Kulen National Park.

An assessment was conducted to explore problems and potential opportunities as well as measure the level resilience indicators in the Socio-ecological Production landscape and Seascapes (SEPLS) at the target site. The most important problem for **zone 1** is the decline in fish catch that can be attributed to illegal fishing, destruction of flooded forest, and increase fishers. Although **zone 2 and 3** face the same problem of low rice yield, this problem is playing out in different contexts. In **zone 2** the problem is attributed to low fertility and lack of water storage system while in zone three the problem is further reinforced by restriction of access to agricultural land (the Apsara zone). In zone 4 and 5, the problem is forest decline and low agricultural productivity. There is a community forestry scheme in zone 4 while there is none in zone five to cope with the problem. The problem of low agricultural productivity is found in zone 6 due to the fact that restriction on farming land expansion is imposed by the protected area authority.

The landscapes management strategy proposed for this area is guided by a vision to “maintain and restore functional socio-ecological production landscapes to preserve biodiversity, improve local livelihood, and enhance ecological and institutional landscape connectivity.” There are four outcomes to support this vision 1) Degraded biodiversity and ecosystem services are restored through multi-functional land use systems, 2) Livelihoods of people in the landscapes are improved through development of ecologically sound and community owned income generating activities, 3) Ecologically sound agricultural production system in the target landscape is strengthened for sustainable increase of crop yield and productivity, and 4) Robust governance systems are established and strengthened for effective participatory decision making at the landscape level. This report identifies potential projects under each program outcome and indicate specific zones for implementation.

Given the large extent of the area, as well as the variety of functions of the watershed system, interventions should be prioritized into two phases. The first phase will focus on **zones 4, 5 and 6** and the second phase on zones 1, 2 and 3. This being said, if financial resources are available, intervention could happen concomitantly in all the area.

It is recommended that monitoring and evaluation is performed on two levels, at the program/landscape level and individual project level. Resilience indicators (SEPL) will be used to guide monitoring and evaluation exercises. Project monitoring would include Ex-ante Visits, Field monitoring visits, Progress reports, and Final project evaluation report.



It is expected that documentation of best practices for the various thematic issues of landscape management will be disseminated. The documentation process will take place at the project level since specific lessons can be generated at the implementation level. Different multimedia tools will be used such as newsletter or e-newsletters will be produced periodically and shared with key stakeholders. Analytical case studies written at the end of each project implementation, policy briefs, as well as video documentation will also be produced.

INTRODUCTION

The Satoyama Initiative aims to conserve human-influenced natural environments (Socio-Ecological Production Landscapes and Seascapes; SEPLS) through the broader recognition of their value (www.Satoyama-Initiatives.org). It aims to maintain, rebuild and revitalize Socio-Ecological Production Landscape and Seascapes (SEPLS) and conserve biodiversity while meeting the socio economic needs of communities residing in these areas by ensuring sustainable uses of natural resources and preserving the cultural values communities place on the environment. The Community Development and Knowledge Management for the Satoyama Initiative Project (COMDEKS) is a unique global project implemented by UNDP, and delivered through the GEF-Small Grants Programme. This document, the CODMEKS Country programme Landscape Strategy for Cambodia is intended as a strategic paper for the implementation of COMDEKS activities in Cambodia. It was designed by the action-research team of the Learning Institute (www.learninginstitute.org), and financed through a specific COMDEKS grant aimed at conducting a baseline assessment of the target landscape.

1. Priority Area

1.1 The context of development in Siem Reap province

Siem Reap province is home to the world-famous historic temple of Angkor Wat. The province has one of the highest poverty rates in Cambodia whereas it attracts by far the largest number of the country's international tourists, as well as a growing number of domestic tourists. Many people in the area around Siem Reap town benefit from the economic impact of the rapid growth in the tourism industry. The distribution of such benefits is, however, somewhat uneven. It appears that people benefit more from employment in the construction, services and handicraft sectors than in the agricultural sector, though more than 80% of families are primarily involved in cropping, livestock, fishing or forestry¹. Those with better education and/or financial resources are able to acquire better paying jobs, while those from poorer households tend to end up working in lower income jobs. In either case, it appears that people are increasingly abandoning farming in favour of waged employment in the tourism sector. In areas further from the city, individual household members are migrating to the city to work in the construction and services sector. In areas closer to the city, some entire households are abandoning farming by selling land and moving into secondary and tertiary employment. Thus, we can observe a shift in the structure of employment away from the primary sector in the direction of the secondary and tertiary sectors, accompanied by a shift in the ownership of land resources in and around Siem Reap away from small scale farmers in the direction of developers in the tourism sector and other emerging industries².

1.2 Identification of the landscape(s)

The socio-ecological landscape selected for the implementation of COMDEKS is the Steung Siem Reap watershed area. This landscape is located in Northwestern Cambodia in the province of Siem Reap, home to the world-famous historic temple of Angkor Wat. It covers an area of **3,619 square kilometers** and extends from the mountain range of Phnum Kulen to the Tonle Sap Lake (figure 1). The elevations in the upstream area of Phnum Kulen reach 500 m above sea level, whereas the town of Siem Reap in the downstream area is located only at 15 m above sea level.

⁽¹⁾ Commune database: db.ncdd.gov.kh/cdbonline

⁽²⁾ Ballard, Brett. 2005. "Linking Tourism to Poverty Reduction: A Siem Reap Case Study." In *Annual Development Review 2004-2005*, 21. Cambodian Development Resource Institute.

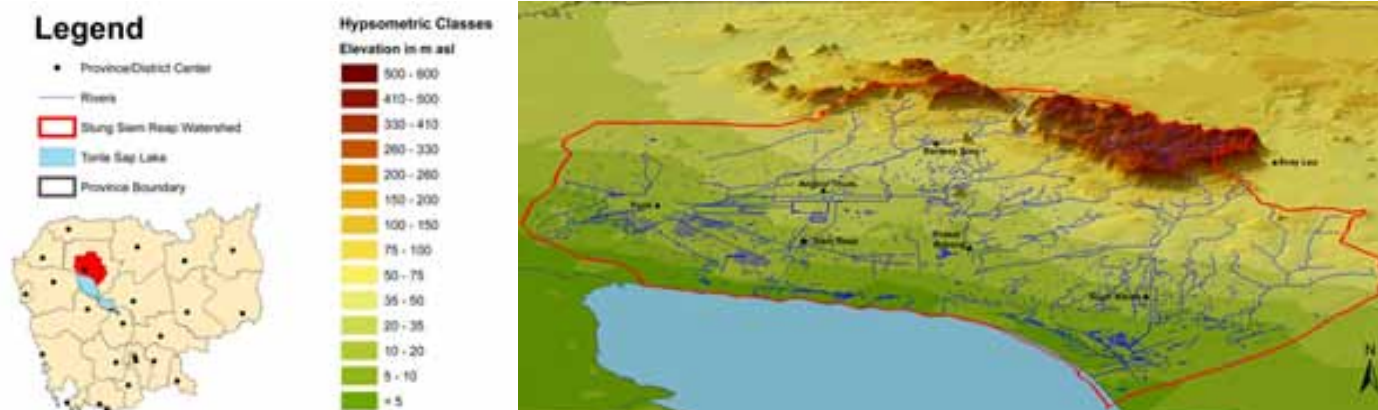


Figure 1. Location and topography of the Steung Siem Reap Watershed area (Kirsch 2008)³

The target landscape comprises 10 districts, 66 communes, 470 villages and a total population of 500,000 (growing at an average rate of 2.2%.year¹). The majority of the population lives in a 30 km wide strip between the foot slope of Phnum Kulen and the shoreline of the Tonle Sap Lake (Kirsch 2010)⁴.

1.3 Capturing natural resource diversity and livelihoods in the Steung Siem Reap Watershed area

The landscape of the Steung Siem Reap watershed is very diverse (see annexes). The overall watershed is subdivided into four topographical zones (see annex 1 for detail), where the downstream plain is seasonally flooded due to the reversal of Tonle Sap Lake water (annex 1). Annual rainfall ranges from 1093 to 1611 mm (annex 2). As a result of these topographical differences, the soils in the watershed system reflect the geological setup, the topography and the interaction of surface water and ground water. The three most important types of soil are *arenosols*, weathered *acrisols* in the non-flooded downstream and midstream areas and the *gleysols-fluvisols* in the flood plain (annex 3). The spatial distribution of the natural vegetation also reflects the diversity of the ecological systems, patterns of precipitation, which ranges from 1093 to 1611 mm per year (annex 2), groundwater and soil diversity. Evergreen, semi-evergreen and dry-deciduous vegetation are present in different parts of the catchment area (annex 4).

The use of land and natural resources by local communities has adapted to this diversity (annex 5). On the main agricultural land, household farming is dominant (mainly rice but also other annual and tree crops). On public land, tenure arrangements are diverse: there are three main protected areas in the target landscape: the Phnom Kulen National Park, the Angkor Protected Landscape and the Tonle Sap Biosphere reserve. Natural resource management is mostly conducted through co-management schemes between communities and relevant government administrations (community forestry on forest land, community-run fisheries on fishing grounds and community protected areas in the Kulen area (annex 6).

In order to capture the ecological and social heterogeneity of the target landscape (the entire watershed cannot be considered and treated as an ecologically or socially homogenous landscape), a socio-ecological zoning exercise was completed using geographic information systems (GIS) (figure 2). The zoning exercise aims to differentiate the whole catchment into (6) specific *socio-ecological* zones where relationships between land/natural resources, the local com-

⁽³⁾ Kirsch, H., 2008. Watershed Profile of the Steung Siem Reap Watershed 2008. In Management of Pilot Watershed Areas in Cambodia. Phnom Penh: Mekong River Commission - GTZ.

⁽⁴⁾ Kirsch, H., 2010. "Watershed Inventory Siem Reap, Cambodia: A Combination of Social and Natural Science Methods." Pacific News no. 34:6.

munities and their management practices are somewhat homogenous. The criteria and methodology used to develop the socio-ecological zones are detailed in annexes 7 and 8.

- Zone 1, the Tonle Sap Plain, entails a variety of land uses. The area is seasonally flooded by Tonle Sap river and includes grassland, shrub land, forests, ponds and lakes. The plain includes important fishing grounds, which are managed mainly through community fisheries schemes, and deep-water rice plots.
- Zone 2 is an agricultural plain, primarily used for rain-fed rice production. The level of agricultural intensification and crop diversification in these rice hinterlands are low and the area is mainly managed through household farming. However, a more intensive commercial form of agriculture is practiced where water storage infrastructures are available.
- Zone 3 is a very specific agricultural and forest area surrounding the archeological park of Angkor Wat. Though family farming is predominant, this section is under the overall management of APSARA authorities (Authority for the Protection and Management of Angkor and the region of Siem Reap).
- Zone 4 is an “agriculture–forest” mosaic area. The forest is highly fragmented due to recent deforestation. The remaining forest is managed through community forestry schemes.

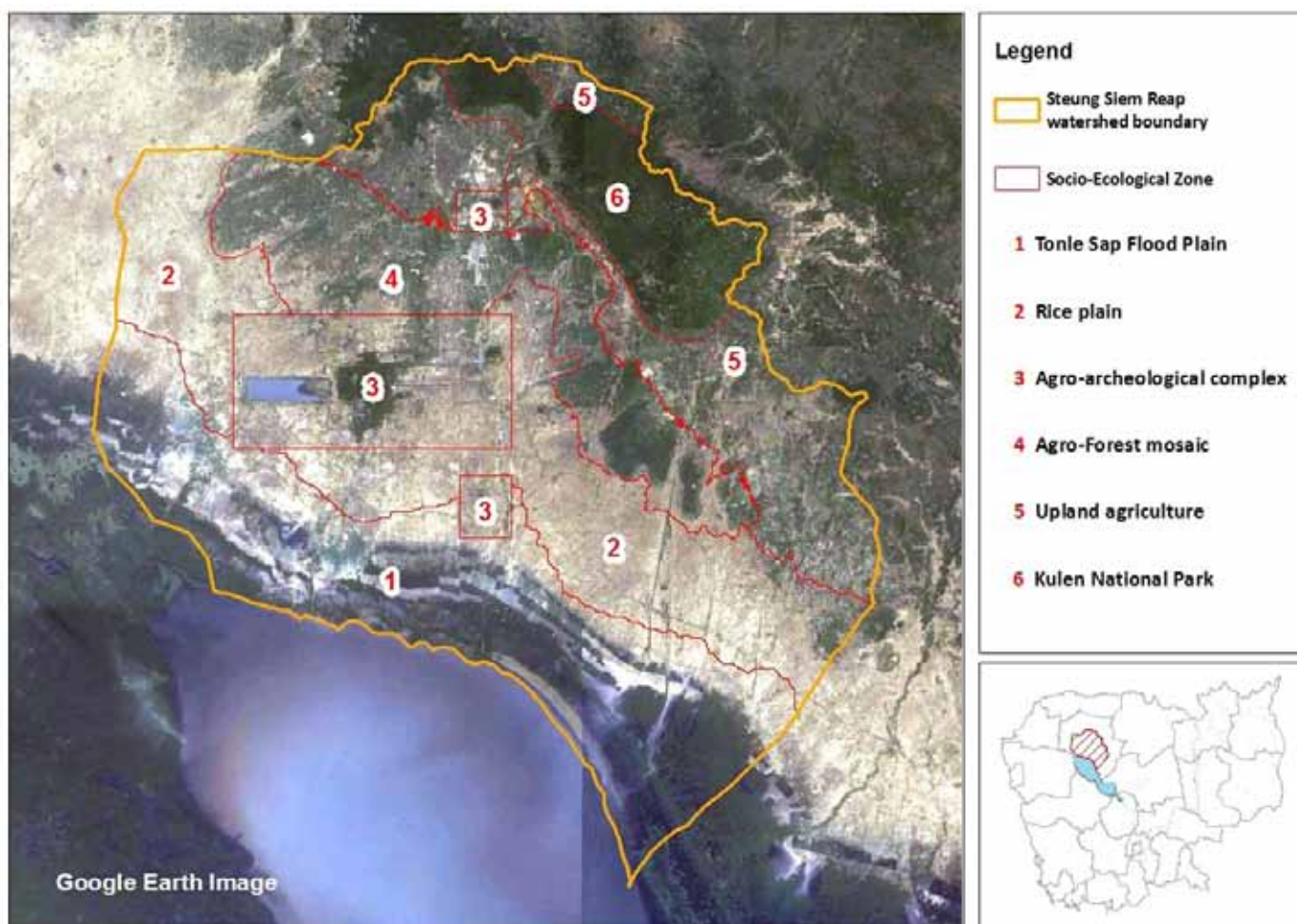


Figure 2. Socio-ecological zoning of the Steung Siem Reap Watershed area

- Zone 5, is an upland agricultural area, over the last 10 years forest cover has been entirely cleared and substituted for upland cropping systems (rice and other annual and perennial crops).
- Zone 6 is the Phnom Kulen protected area under the management of the Ministry of the Environment and partly in co-management with local communities (Community Protected Area -CPA).

1.4 Rationales for the selection of Steung Siem Reap watershed area

Steung Siem Reap watershed was selected as the target landscape for the COMDEKS project in Cambodia for two reasons:

- In order to address the issues of natural resource degradation (deforestation, river sand excavation, disturbance of hydrological regimes, water pollution), the provincial authorities have established in 2004 a pilot watershed management program, under the auspices of the Cambodian National Working Group on Watershed Management supported by the Mekong River Commission and the GTZ. Additionally, a number of surveys were conducted to design a sustainable watershed management plan with functioning institutions, but clear guidance and incentives are missing to implement concrete actions. The COMDEKS Cambodia clearly envisions providing effective support to this initiative through concrete community-based actions at the community level.
- Additionally, the selection Steung Siem Reap watershed as the target landscape area for COMDEKS activities is well aligned with the themes prioritized in the Cambodian GEF-Small Grant Programme (GEF-SGP) Country Programme Strategy. COMDEKS is in line with in the biodiversity component (one of the 5 themes highlighted in the Country Programme Strategy). Geographically, the Steung Siem Reap watershed is located in the northern plains, one of the “biodiversity hot spots” specified in the Cambodian GEF-SGP Country Programme Strategy.

2. Situation Analysis

An assessment of problems and potential opportunities of the target landscape was carried out in the field based on a variety of methods. Participatory rural appraisals were organized in 13 villages (two/three villages in each socio-ecological zone). Resource mapping exercises, seasonal calendars and problem/solution analysis were used to complement the set of resilience indicators in Socio-ecological Production landscape and Seascapes (SEPLS), developed by IPSI members Bioversity International and UNU-IAS. These indicators helped measure and understand the resilience of target landscapes, the data sets were consolidated for each socio-ecological zone. Finally a workshop took place in Siem Reap to present the findings and generate discussion with other stakeholders (local authorities and technical institutions) about strengths, weaknesses, opportunities and challenges of resource management in each socio-ecological zone. The data sets were complemented with secondary information available through statistical commune databases. The results from the baseline assessment of the target landscape are summarized below for each socio-ecological zone.

2.1 Zone 1

The large majority of households combine farming and fishing activities as their main source of income. According to the commune database statistics, the percentage per commune of household primarily involved in agriculture and natural resources management is above 90%. The percentage of household involved in any service sectors is more

⁽⁵⁾ Based on data computation from commune data base (<http://db.ncdd.gov.kh/cdbonline>)

important in communes closer to Siem Reap town⁵.

Cropping usually takes place before and after the high floods (August-October), in the dry season. More than 60% of the agricultural land is actually cultivated during dry season with yield between 2.5 to 3 T/ha. The yield of rainy season rice is slightly lower (2-2.5 T/ha). An important number of people living on agriculture (40-50%) actually own less than one hectare per family, which is an indication of complicated land access⁶. Fishing in receding ponds mostly takes place from October to May. The area Fisheries are managed by households through community fisheries administrations, which oversee the demarcation of specific fishing grounds and approve fishing regulations. There are 10 Community fisheries across the zone, covering a total area 600 square kilometers.

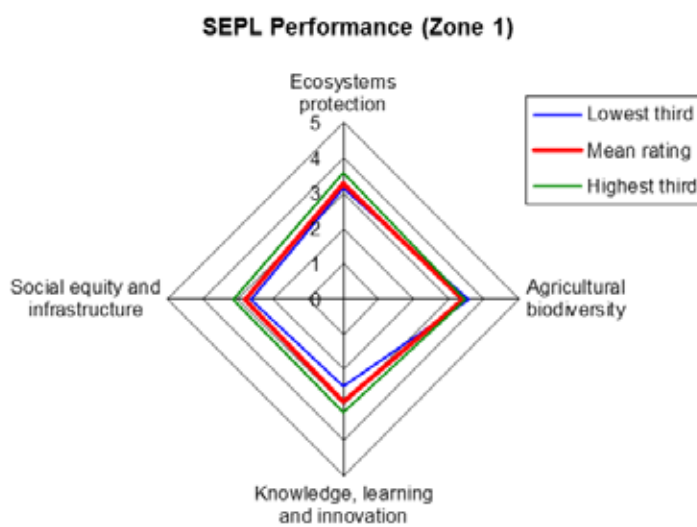
Access to school and health facilities is very problematic and poverty is widespread in the area.

The heterogeneity of the landscape is an important dimension of this zone and people are traditionally involved in a wide variety of resource management activities across the plain. For instance, at the edge of the agricultural zone, the flood plain is characterized by continually changing land-use patterns ranging from rice cultivation, cattle grazing on grasslands and non-timber forest products collected on shrub lands.

This land is managed through a variety of practices such as the use of fire control, ploughing, fallowing or grazing with the objective of maintaining the fertility of the agro-ecosystem and ensuring a flexible and diverse supply of natural products. Maintaining the multi-functional aspect of agro-ecosystems is therefore crucial for local livelihoods. For example, different rice cropping systems are adopted at each water depth while including aquatic biodiversity. The grass is used as fodder for the cattle, who generate a significant portion of the farming income portfolio and the shrubs are important for the energy supply of households.

However, the area is sensitive to natural and man-made disasters. Modern agricultural practices and the intensification of fishing practices coupled with the modernization of fishing gear have put pressures on the ecosystems. Also, local governance gaps and illegal fishing activities are a significant threat perceived by all stakeholders. People feel that the protection of the natural resources is limited.

The most important problem faced by the local populations is the decline of the fish catch. This is a human as well as an ecological issue attributed to the increased of inappropriate fishing gear coupled with the growing number of fishers, the destruction of flooded forests which are an important spawning ground for the fish, the use of illegal fishing gear, the use of fertilizers which pollute water run-off. Although community fisheries have managed to reduce the prevalence of illegal fishing activities, the problems still persists.



⁽⁶⁾ Ibid

2.2 Zones 2 and 3

Zones 2 and 3 are inhabited by farmers who are primarily involved in rain-fed rice production (usually more than 90% per commune but with lower percentage in commune connected to Siem Reap town). The area rice area cultivated during season represent less than 5% of the total rice cultivated area, while rainy season rice yield are not significantly different from the dry season cultivation (2 T/ha on average). Landlessness is significant amongst farmers (7% on population involved in agriculture) and the access to land is problematic as 49% of households involved in cropping on average own less than one hectare. Water management infrastructure such as irrigation and drainage systems are rare, so double harvests per year are uncommon. Although agriculture keeps people busy during the rainy season, unemployment is widespread during the dry season. Poverty remains a serious concern, though access to health and education is easy thanks to the nearby city and better transportation infrastructure.

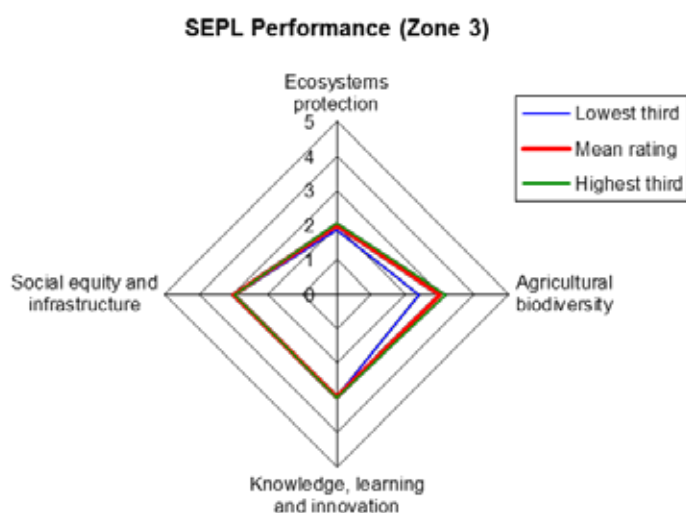
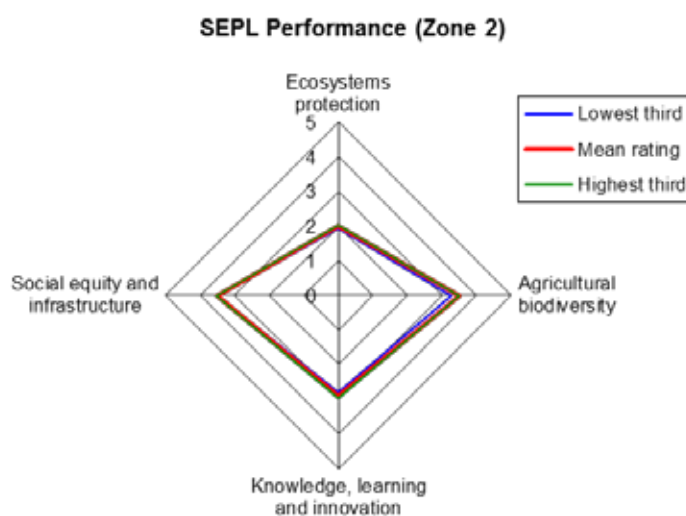
The key problem identified by local communities is the low rice yield, a problem attributed to low soil fertility and the lack of water storage systems. Also, agricultural diversification is limited. Despite the very high demand for vegetables from the tourism sector, most vegetables consumed in restaurants are imported from neighboring countries. The poor coordination between markets and production is paradoxically a key issue in this region which has recently undergone a touristic boom.

Integrated livestock cropping systems are rare, and crop production is mainly achieved using chemical fertilizers and pesticides. Generally, practices favoring agro-ecological principles are not followed.

Agriculture is important for food security but it is not sufficient to meet employment needs. People are obliged to look for off-farm or non-farm job opportunities. Though the conditions of labor markets do not offer long-term security, there is an increasing number of non-farming jobs and the opportunity cost of doing farming is high. For this reason, farmers usually opt for quick and expeditious agricultural practices that produce relatively high yields, but are harmful to the environment and endanger biodiversity.

If rainwater could be stored, stakeholders perceive there could be a greater potential for integrated farming systems on land located closer to village compounds.

In zone 3, livelihood problems are similar to those in zone 2 (see RADAR diagram). However, the context in which agriculture and livestock activities are undertaken is somewhat different because the area comprises the archeological park of Angkor Wat, under the overall management responsibility of the

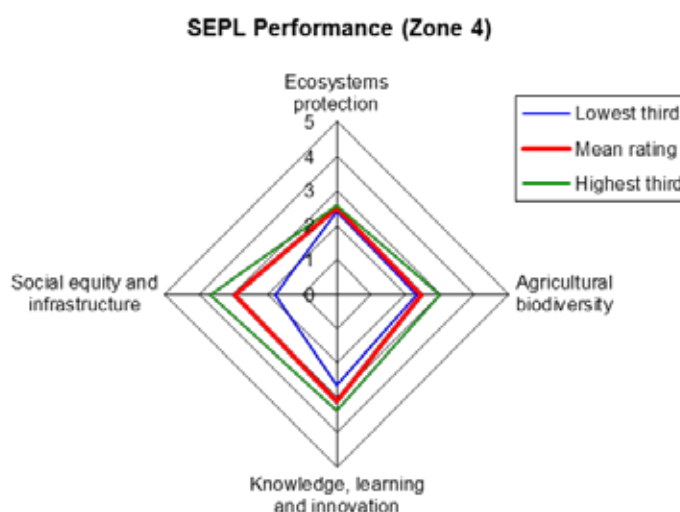


APPSARA authority. The clearing of forestland to expand agricultural land holding is forbidden by APPSARA, which creates tensions with local communities.

2.3 Zones 4 and 5

Zone 4 is a mosaic of cropping areas and forest patches. The inhabitants of this area are mainly involved in rainy season cropping activities (94% on average in zone 4, but with a higher number of household involved in chamcar rather than in rice farming) but also depend on the forest resources to meet their livelihood needs. Access to land is even more problematic than in zone 1-2-3 with higher prevalence of landlessness amongst farming population (28% on average). There are serious factors limiting agricultural production so off-farm wage and salary jobs are an important, secondary source, of occupation for most people.

In this region, agriculture suffers from lack of water because of a combination of limited rainfall, lack of water storage capacity and low water retention in soil. The soil fertility of the arenosols is low therefore the potential for agricultural development is also low. To make matters worse, biophysical resource degradation, driven by illegal logging and demographic increases, has worsened in recent years. Illegal logging is organized by powerful and influential people. Poor farmers are hired to clear the forests but are also engaged directly in illegal logging to expand their agricultural plot holding. Some of the depleted areas have been converted into orchards or annual crop plots, while others remain in fallow and will change into shrub or grassland. In a context where social and economic power greatly influences the management of forest resources, law enforcement has been very limited.



However, local communities have managed to protect some forest areas under a community forestry agreement. Local management groups have started to develop regulations and management plans for these community entitlements and there has been increasing cooperation between local communities, forestry administration and development partners. Community forestry areas are considered as multi-functional areas which are not necessarily restricted exclusively to production and silviculture activities but could potentially encompass other forms of landscape management. In this respect, people feel there is a high potential to reinforce and integrate community forestry management schemes with other income generating activities such as agro-forestry and ecotourism. There are 26 community forestry schemes recognized by prakas since 2007; covering a total land area size of 69 km².

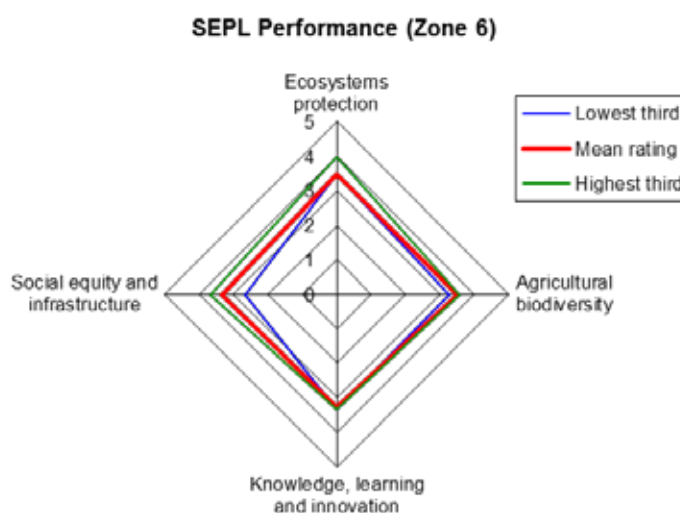
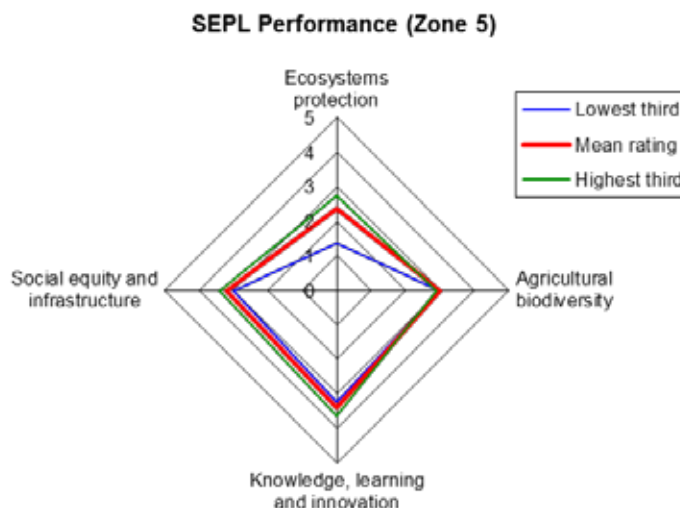
In zone 5, the household socio-economic situation is not essentially different than in zone 4. A very large majority of household (91% on average) is primarily involved in cropping activities with forest resources being less significant in the income portfolio. Dry season agriculture is marginal while the yield of the rainy season rice averages 2.5 t/ha in the zone. The agricultural problems faced by local communities are quite similar to those in zone 4; lack of water and low soil fertility are the key issues. However, deforestation has been more extensive in this zone and the area is basically now a large upland crop plain. The establishment of community forestry did not catch up with the deforestation pace, so there is virtually no forest left.

2.4 Zone 6

People living within the boundary of the Kulen National park consider themselves as farmers (99% according to commune database). They are engaged in a rain-fed agriculture system involving both rice and non-rice (chamcar) production. Timber and non-timber forest resource collection are central to their livelihoods. Access to farmland does not seem to be as problematic as in zone 5 though it is limited to certain zones of the protected area.

The entire zone is a protected area under the overall management of the Ministry of Environment. Specific rules and regulations are defined for the area and are enforced by the governmental staff. The improved enforcement of protected area rules limits the possibilities for people to expand their agricultural land holding.

Within the protected area, four specific areas are assigned with community entitlement (Community Protected Area-CPA) and follow similar co-management principles as the community forestry schemes. Local management groups have been established and have started to develop regulations and management plans for these community entitlements. There are 5 CPA schemes recognized by the ministry of environment; covering a total land area size of 9 km². The CPA is considered a multi-functional area that is not restricted exclusively to protection with possibilities of integrating forest management with other income generating activities such as agro-forestry. The area is also an important tourism destination, which represents a potential for further development.



3. Landscapes Management/Restoration Strategy

3.1 The vision

The vision for Steung Siem Reap Watershed Landscapes Programme Strategy is to “maintain and restore functional socio-ecological production landscapes to preserve biodiversity, improve local livelihood, and enhance ecological and institutional landscape connectivity.” This vision will be met through community based activities at the landscape level based on the integration of local cultural knowledge and scientific technology in respect of adaptive, collaborative management principles.

3.2 The outcome, indicator and typology of community based projects

The landscapes program strategy for Steung Siem Reap watershed area seeks to produce four main outcomes in respect to biodiversity conservation, livelihood enhancement, agricultural production system and institutional structure. The following section presents four outcomes with descriptions of the potential community projects which could be implemented in the specific socio-ecological zones to achieve the outcomes.

Outcome 1) Degraded biodiversity and ecosystem services are restored through multi-functional land use systems:

The response will include efforts to protect natural resources within the socio-ecological zones, while increasing ecosystem services. The following projects are considered viable to be implemented:

- Reforestation and tree nursery development in areas under community forestry scheme and through private plantation (Zone 6)
- Promotion of multipurpose trees and plantations on private forest lands (zone 4, 5, 6)
- Supporting the integration of community forestry and grazing areas into Commune Land Use Plans (Zone 4, 5)
- Development of forest corridors to connect community forestry areas (Zone 4)
- Supporting management of flooded forest and shrub land and integrating these into commune land use plans (Zone 1, 2)
- Supporting the stabilization and consolidation of river bank by planting trees (Zone 1-6)
- Outcome 2) Livelihoods of people in the landscapes are improved through development of ecologically sound and community owned income generating activities: The response will include efforts to address the lack of farmer- to- market linkages, while enhancing income opportunities for local people, the following projects could be potentially supported:
 - Promotion of bee keeping activities and strengthening existing bee keeping associations (Zone 4, 5, 6)
 - Promotion of ecotourism activities (Zone 1, 3, 4, 5, 6)
 - Supporting the improvement of handicraft production (Zone 1, 4, 5, 6)
 - Promoting farmer associations (Zone 2, 3)

Outcome 2) Livelihoods of people in the landscapes are improved through development of ecologically sound and community owned income generating activities: The response will include efforts to address the lack of farmer- to-market linkages, while enhancing income opportunities for local people, the following projects could be potentially supported:

- Promotion of bee keeping activities and strengthening existing bee keeping associations (Zone 4, 5, 6)
- Promotion of ecotourism activities (Zone 1, 3, 4, 5, 6)
- Supporting the improvement of handicraft production (Zone 1, 4, 5, 6)
- Promoting farmer associations (Zone 2, 3)

Outcome 3) Ecologically sound agricultural production system in the target landscape is strengthened for sustainable increase of crop yield and productivity: The response will include efforts to reinforce eco-friendly farming and cropping methods to increase soil and crop productivity and maintain and enhance livestock production. The potential projects supporting this outcome could include:

- Promoting the production and use of compost, forest humus and liquid slurry (Zone 2, 3, 4)
- Use of green manure/cover crops (Zone 4, 5)
- Promoting the System of Rice Intensification, entailing change in transplantation technics combined with better weed and water control (Zone 3, 4, 5)
- Promotion of hedge rows with fast growing and N-fixing trees/shrub (Zone 2, 3, 4)
- Producing rain water storage systems (Zone 5, 6)
- Introducing Bio-digesters (Zone 4, 5, 6)

Outcome 4) Robust governance systems are established and strengthened for effective participatory decision making at the landscape level: Efforts to ensure efficient coordination of community conservation activities could include:

- Efforts to reinforce various community based organizations in the target landscape, including community forestry (CF) organizations, community fisheries (CFi) organizations, community protected area (CPA) organizations, and to strengthen their management plans (Zone 1-6)
- Supporting the integration of CFi, CF, CPA into commune land use plans (CLUP) and into commune development plans (CDP) (Zone 1-6). The integration of watershed management approach may be integrated in district and provincial development plans as well.
- Establishing a network or federation of CFi, CF, CPA (Zone 1-6)

Outcome	Indicator
Degraded biodiversity ecosystem and services are restored through multi-functional land use systems	Areas (size or %) degraded ecosystem are managed under sustainable multi-functional land use system.
Livelihoods of people in the landscapes are improved through the development of ecologically sound and community owned income generating activities	Number of new income generations activities/measures, that are biologically and culturally practical, being implemented Percentage increase in income from project activities.

Ecologically sound agricultural production system is strengthened for sustainable increased of crop yield and productivity	<p>Areas (size or %) of agricultural land is put into sound ecological production system</p> <p>Percentage increase in yield of major crops due to project activities</p>
Robust governance system are established and strengthened	<p>Number of community based organizations established and strengthened with a mandate in conservation and development in the target landscape</p> <p>Number of development plans being developed which integrate landscape management perspectives.</p>

3.3 Proposed Strategic Phasing of the Implementation of the Landscape Strategy

The target area for the COMDEKS country program landscape strategy is the Steung Siem Reap watershed. The area overlaps multiple districts ranging from upland areas of the Phnom Kulen mountain range to the flooded flat plain of Tonle Sap lake. To ensure the effective management of the target landscape the watershed has been divided into three sub-areas based on the waterway systems of the three rivers in the area . The sub-areas are characterized as upstream, midstream and downstream based on watershed management perspectives. During the landscape-wide baseline assessment the landscape was further subdivided into six socio-ecological zones to avoid a “one size fits all” landscape strategy and instead ensure that landscape management decisions adapt and respect the heterogeneity of the entire watershed system. Given the large extent of the area, as well as the variety of functions of the watershed system, interventions should be prioritized into two phases.

The first phase will focus on upstream and midstream areas to ensure that the negative impacts on downstream areas are immediately reduced while maximizing watershed ecosystem services that are beneficial to downstream users. Therefore, interventions in **zone 4, 5 and 6** where there is degraded forest and biodiversity will be prioritized. The protection of biodiversity in these three zones will also contribute to regulate water flow (eg. run-off control through reforestation) which will form the basis for other agricultural zones to develop.

The second phase of the intervention will focus on the flat downstream areas in zone 1, 2 and 3. This being said, if financial resources are available, intervention could happen concomitantly in all the area.

4. Monitoring and Evaluation Plan

It is recommended that monitoring and evaluation is performed on two levels, at the program/landscape level and individual project level.

At the program/landscape level, performance indicators will be used to guide monitoring and evaluation exercises while progress will be measured by evaluating the actual status of landscapes performance against the baseline assessment results.

Country Programme Landscape Level Indicators: SEPL Indicators measured during the baseline assessment will be monitored on an annual basis. A final assessment of SEPL indicators will take place at a workshop financed by a grant. This will serve as a final evaluation of the Country Programme Landscape Strategy.

The monitoring reporting conducted by the country GEF-SPG Secretariat, will be completed at each of the two strategic stages semi-annually. Outcomes and results of monitoring and evaluation need to be integrated in the second strategic stage planning process. Monitoring and evaluation of the strategic stage will also be carried out by the GEF-SGP secretariat who will be responsible for reporting and updating proposed revisions of the strategic program to NSC for their approval.


At the project level, outcomes and indicators will be developed specifically for the project and in the context of the approved Country Programme Landscape Strategy. The project indicators will be aligned and contribute to overall outcomes of the program strategy. In particular, each project will identify the specific landscape strategy outcome to which it is contributing and will monitor the corresponding indicators. Progress toward achieving project outcomes will be monitored regularly through small grant progress report. The following standard monitoring and evaluation for project should be applied.

- **Ex-ante Visits:** The project team should undertake ex-ante visits on a risk basis to grant-requesting organizations upon grant approval by the National Steering Committee and prior to the signature of the Memorandum of Agreement between UNDP and the grantee.
- **Field monitoring visits:** Every project should be visited at least twice in its lifetime, once upon receipt of the first progress report from beneficiary organizations and second during the following year. National Steering Committee members with relevant technical expertise in project-related areas may join the CPM during these visits, as appropriate.
- **Progress reports:** Beneficiary organizations should submit quarterly, progress reports to the NC along with a financial report. A forecast of resources needed in the following period should be submitted by the grantee to the NC as a requirement for disbursement of the next installments.
- **Final project evaluation report:** Beneficiary organizations should submit a final report summarizing landscape-level benefits and other results achieved, outputs produced, and lessons learned. The final report should also include a final financial statement.
- **Project Level Indicators:** Each project will identify the specific landscape strategy outcome to which it is contributing and will monitor the corresponding indicators. Progress towards the outcome will be updated using the grantees' progress reports. Additionally, the individual project will have an indicator system aligned with GEF SGP's OP5 system of indicators.

5. Knowledge Management Plan

In response to the learning and sharing aspects of the COMDEKS project, knowledge management is a main component of the program strategy. It is expected that documentation of best practices for the various thematic issues of landscape management will be disseminated. The documentation process will take place at the project level since specific lessons can be generated at the implementation level. Different multimedia tools will be used such as newsletter or e-newsletters, which are produced periodically and shared with key stakeholders. Analytical case studies written at the end of each project implementation, policy briefs, as well as video documentation will also be produced.

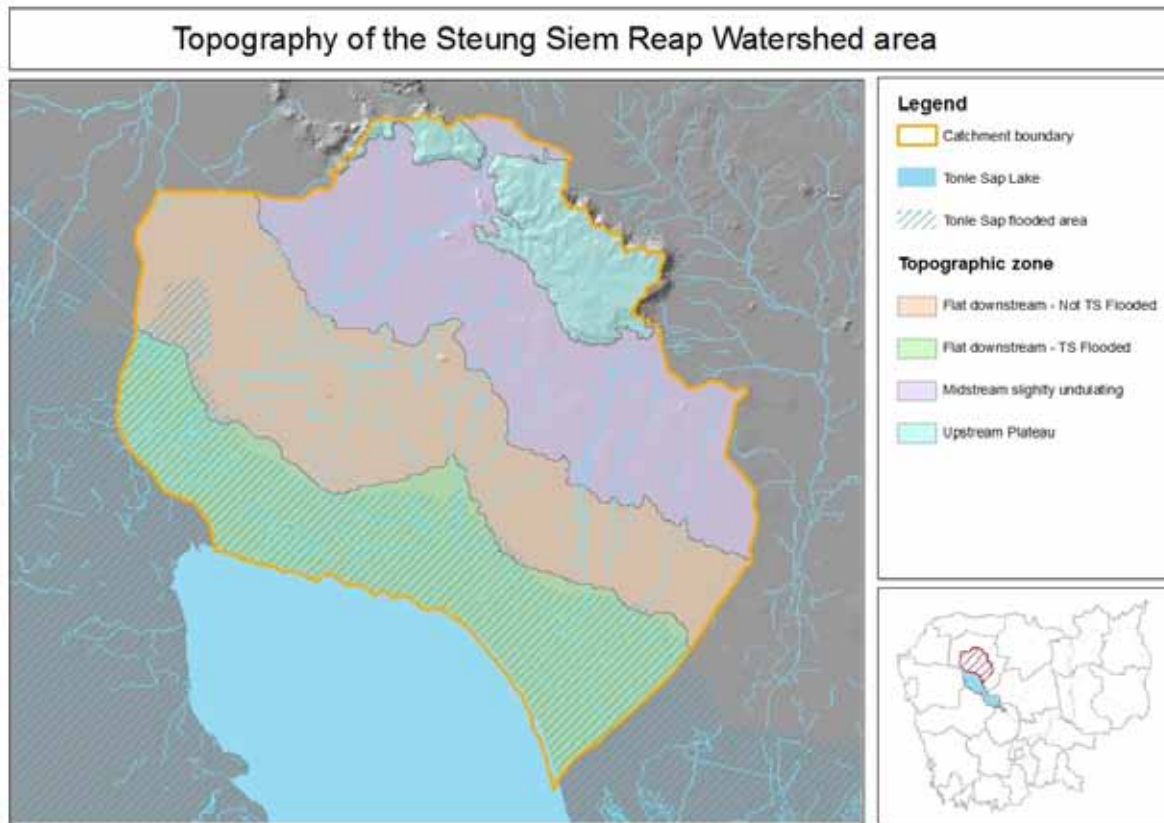
Each community based project should allocate an amount for KM activities, and clearly identify the type of knowledge management products that will be produced.



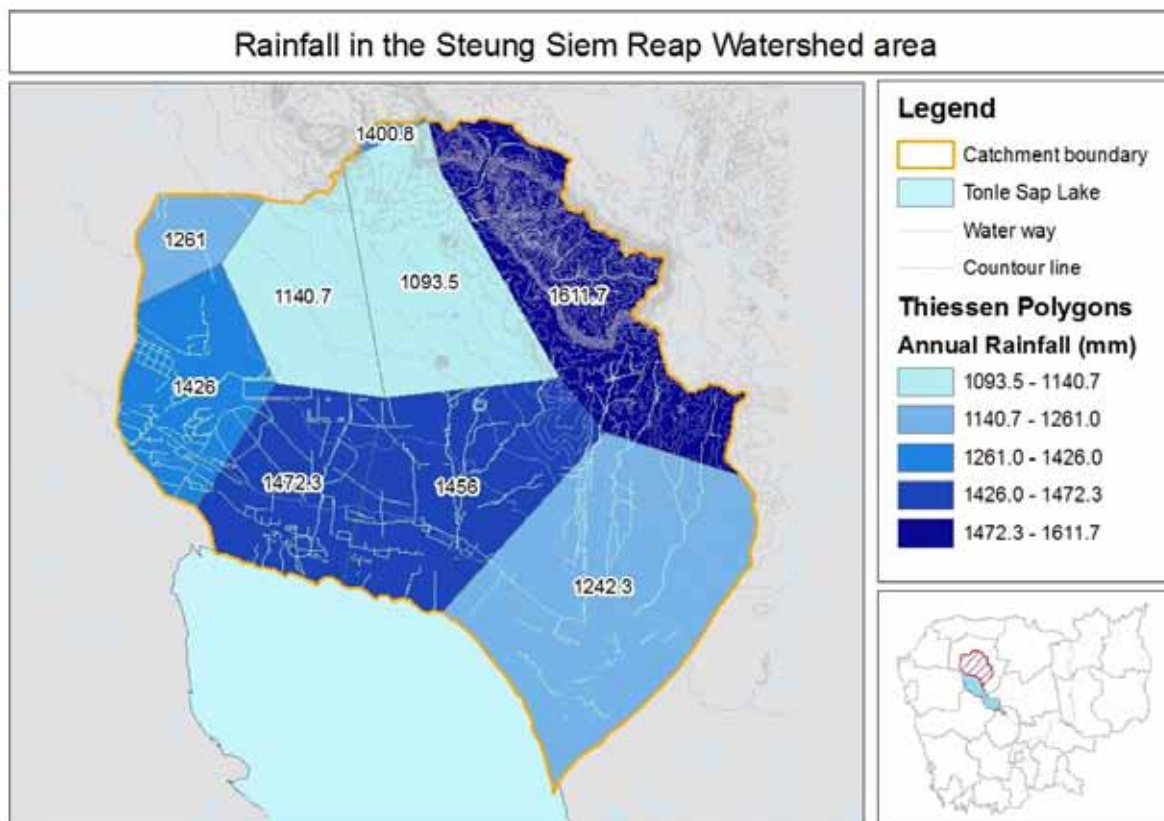
In addition to program reflection workshops (mid-term or final stakeholder workshop), the GEF Small Grant Program Secretariat in Cambodia will organize dissemination events to ensure lessons learnt are effectively communicated to a range of audiences including the National Steering Committee members, government and NGOs to promote upscale of best practices and influence on national and subnational policies and strategies. The UNDP SGP webpage will be used to post updates on issues or progress related to program implementation, as well as specific articles or case studies.

ANNEXES

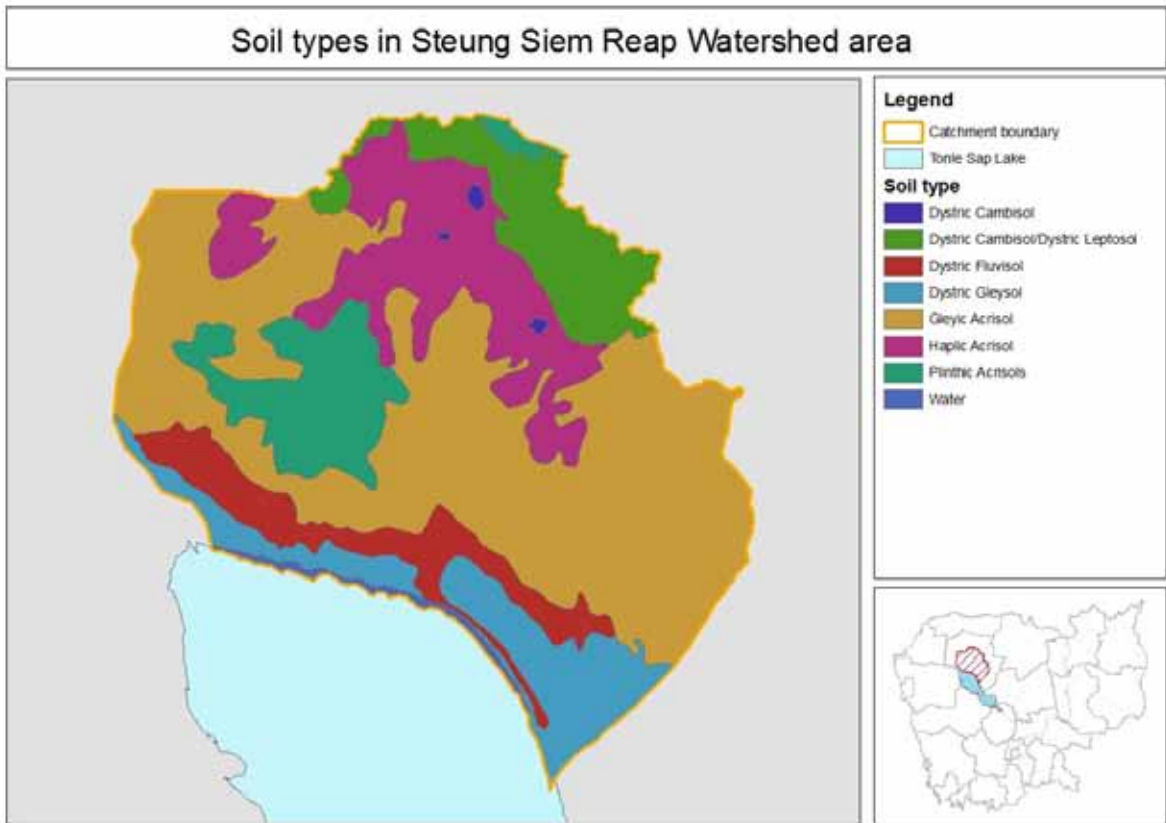
ANNEX 1



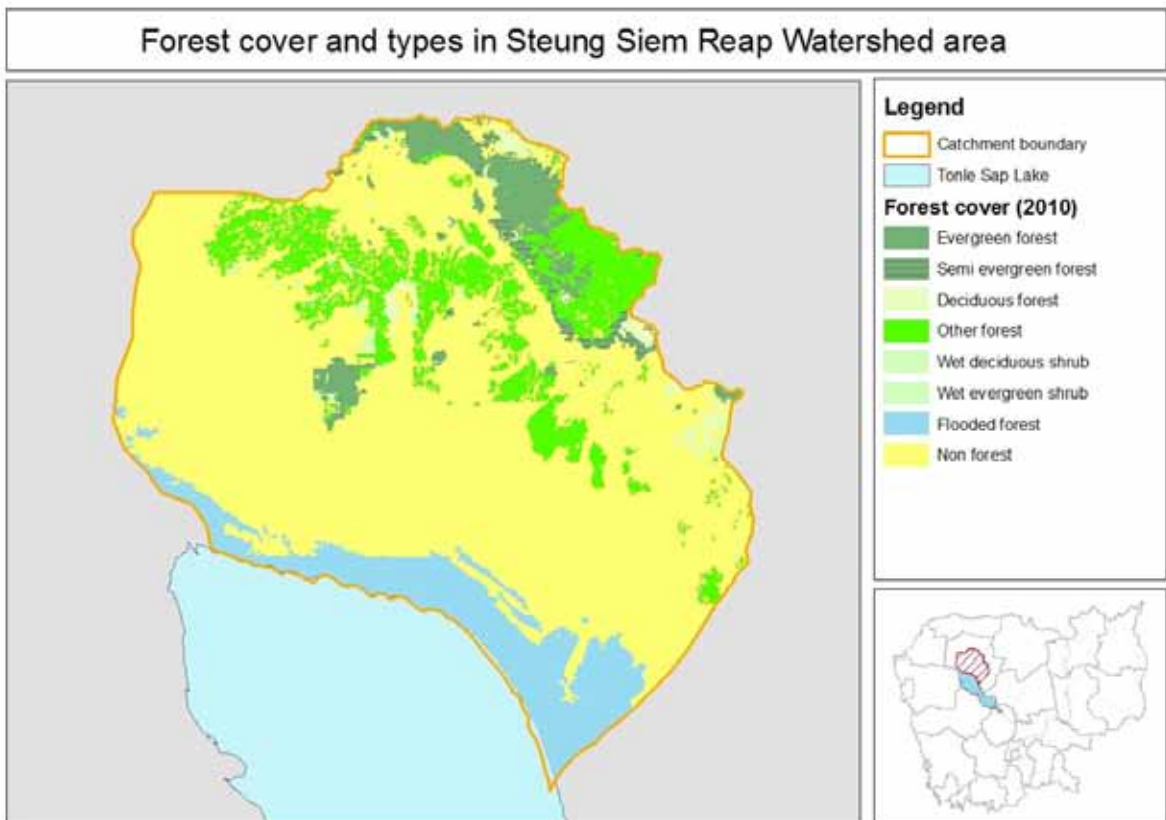
ANNEX 2

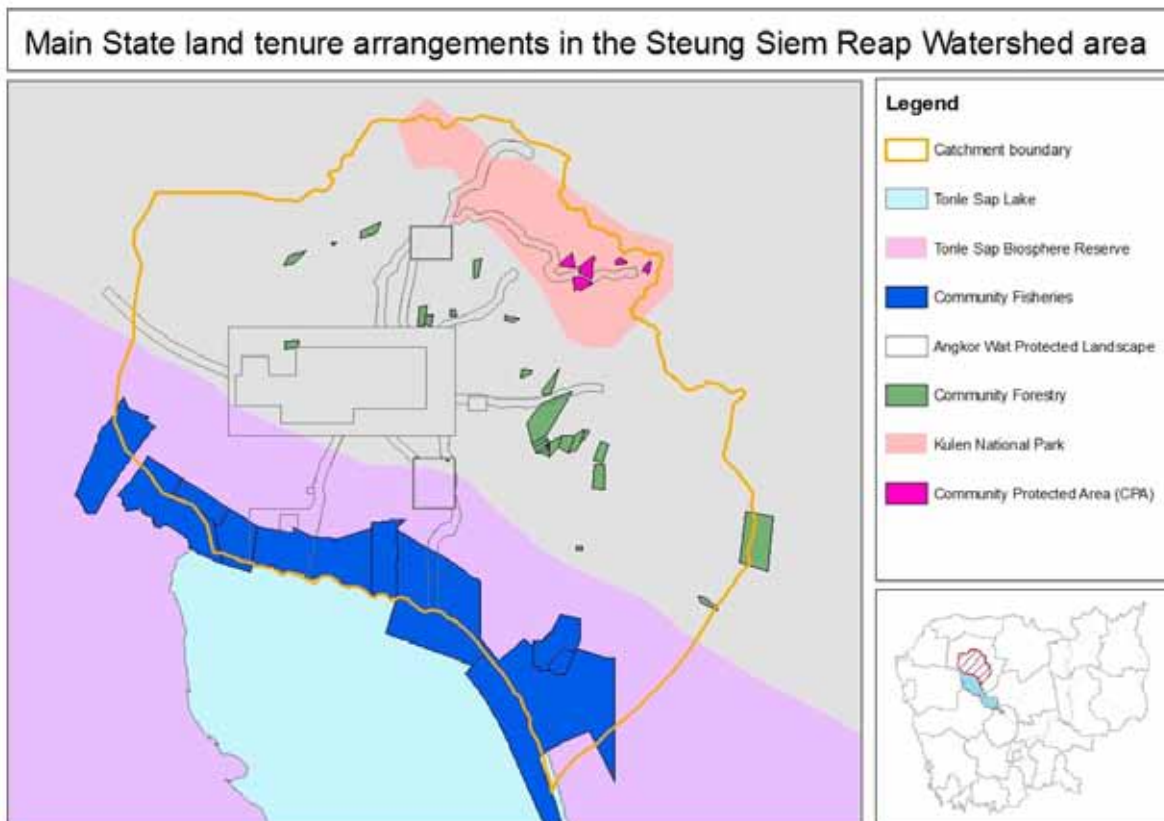
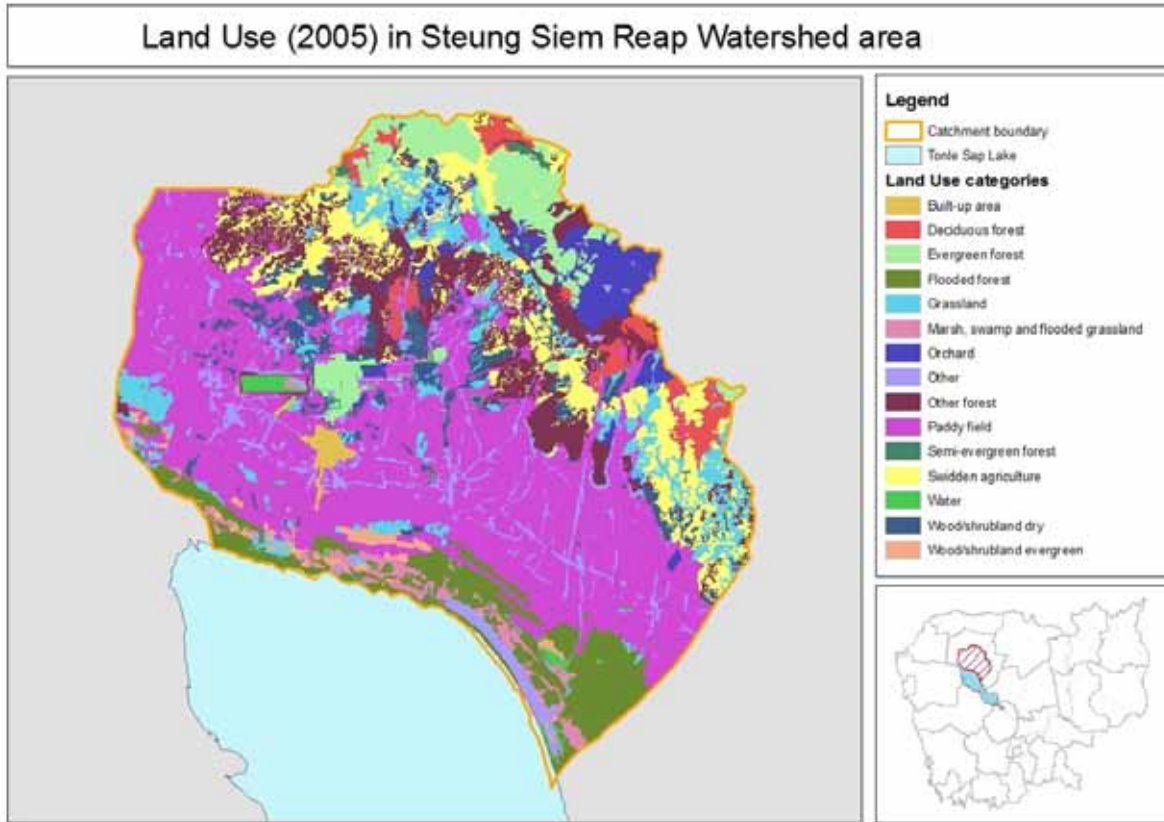


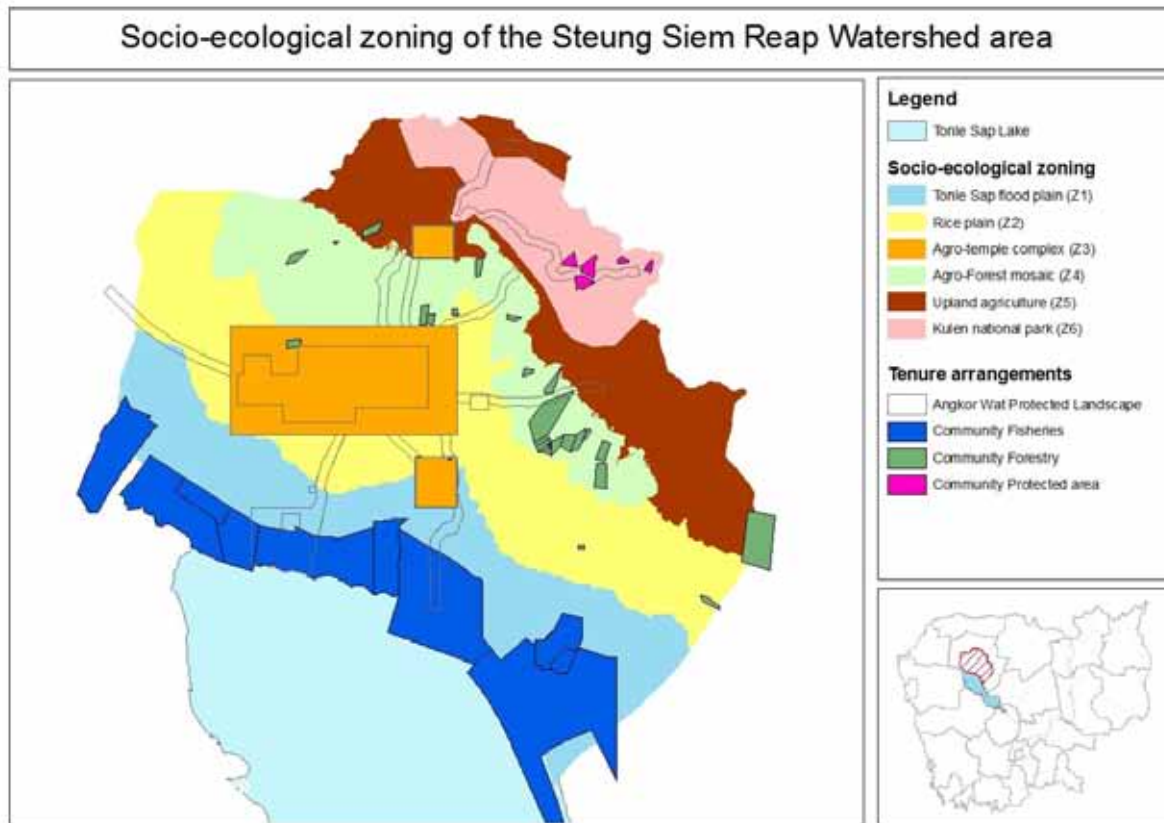
ANNEX 3



ANNEX 4







	Ecology	Land Use	Forest Cover Change	Vegetation	Land Tenure
Zone 1 Tonle Sap Flood Plain	Flat downstream area Flooded by Tonle Sap High fertility (hydromorphic gleysols, enriched with alluvium)	Flood plain: mosaic of flooded/dry grass, shrub, forest with fishing grounds and [deepwater] rice field	Increase and decrease of flooded forest	Important flooded forest tree species ¹³ Important fish species ¹⁴	Community fisheries Cancelled fishing lot Community-based ecotourism
Zone 2 Rice plain	Flat downstream area (non-flooded) by Tonle Sap Soil of medium fertility (Acrisols - Arenosols)	Paddies with rice production (one harvest per year), proximity agriculture (gardening and intensive rice production close to village)		Common fish species in rice field are ¹⁵ Aquaculture ¹⁶	Household farming with farmer association and institutionalized market relationship with private sector
Zone 3 Agro-archeological park	Flat downstream area Low fertility (arenosols)	Paddies with rice production (one harvest per year) Forest Archeological park	Reforestation	[Mostly] Evergreen vegetation ¹⁷	Household farming Management by Appalara authorities (regulatory land zoning)

⁽¹³⁾ Important species are: *Barringtonia acutangula*, *Coccoceras anisopodum*, *Crateva religiosa*, *Croton caudatus*, *Crudia chrysantha*, *Cynometra dongnaiensis*, *C. ramiflora*, *Diospyros cambodiana*, *D. sylvatica*, *Elaeocarpus hygrophilus*, *Garcinia loureiri*, *Homalium brevidens*, *Hydnocarpus antheimintica*, *Mitragyna speciosa*, *Terminallia cambodiana*.

⁽¹⁴⁾ Important species are: *Channa striata* (Snakehead), *Hemibagrus spilopterus*, *Henicorhynchus lobatus*, *Hypsibarbus lagleri*, *Pseudomystus siamensis*, *Mystus atrifasciatus*, *Cyclocheilichthys tapiensis*, *Puntius brevis*, *Trichogaster trichopterus*, *Trichogaster micolepis*, *Pristolepis fasciata*, *Anabas testudineus* and *Puntius sp.*

⁽¹⁵⁾ Important species are: *Krey AnDeng*, *Trey Kranh*, *Trey Phtok*, *Trey Chhlonh*, *Trey Komphleanh*, *Trey Kanh Chos*, *Trey ChangVa*, *Kompens* (shrimps)

⁽¹⁶⁾ The main species raised are Tilapia, Silver barb (*Puntius gonionotus*), Silver carp (*Hypophthalmichthys molitrix*), Common carp (*Cyprinus carpio*), Catfish (*Pangasianodon hypophthalmus*), Eel (*Monopterus albus*).

⁽¹⁷⁾ Important species are: *Azelia xylocapa*, *Aglaia cambodiana*, *Albiekia lebb*, *Anisoptera cochinchinensis*, *Artocarpus asperula*, *Dalbergia bariansis*, *Dialium cochinchinensis*, *Dipterocarpus alatus*, *Eugenia spp.*, *Hopea odorata*, *Irvingia oliveri*, *Knema corticosa*, *Lithocarpus elephantum*, *Mangifera duperreana*, *Parkia streptocarpa*, *Peltoforum dasyrrhachis*, *Sindora cochinchinensis*, *Shorea cochinchinensis*, *S. guiso*, *Swintonia pierrei*, *Tarrietia javanica*, *Tetrameles nudiflora*, *Vatica odorata*, *Vitex pinata*.

	Ecology	Land Use	Forest Cover Change	Vegetation	Land Tenure
Zone 4 agriculture-forest” mosaic area	Flat downstream area Slightly undulating mid-stream Mostly low fertility (arenosols)	Mosaic Forest cropping (upland crop), village (with forest dominant)	Deforestation leading to fragmentation of forest cover	Mixed evergreen and dry deciduous forest ¹⁸	Household farming Community Forestry Urban investors
Zone 5 upland agriculture zone	Slightly undulating mid-stream Slightly undulating up-stream Low fertility (arenosols)	upland crop Agriculture/village (barely any forest cover)	Deforestation leading to complete destruction of forest canopy (and upland crop)	Originally evergreen and semi-evergreen vegetation ¹⁹	Household farming, large chamcar
Zone 6 Kulen National Park	Plateau + steep escarpments Low fertility (arenosols, leptosols)	Forest + upland chamcar Caves	Limited deforestation	Evergreen and semi-evergreen vegetation	Protected area CPA Community-based tourism

¹⁸ Important species are: *Arundinaria pusilla*, *Canarium album*, *Croton joufra*, *Diospyros helferi*, *Dipterocarpus intricatus*, *D. obtusifolius*, *D. tuberculatus*, *Gardenia angkorensis*, *Gelonium multiflorum*, *Pterocarpus macrocarpus*, *Shorea obtusa*, *S. siamensis*, *Sindora cochinchinensis*, *Terminalia alata*, *T. chebula*, *Xylia dolabriformis*.

¹⁹ Important species are: *Adina cordifolia*, *Azelia xilocapar*, *Anisoptera cochinchinensis*, *Cratoxylon formosum*, *Croton joufra*, *Dalbergia bariensis*, *D. cochinchinensis*, *Dipterocarpus alatus*, *D. costatus*, *Gardenia angkorensis*, *Hopea odorata*, *Lagetroemia spp*, *Pterocarpus macrocarpus*, *Pterospermum grewiaefolium*, *Shorea hypochra*, *Sindora cochinchinensis*, *Terminalia triptera*, *Tetrameles nudiflora*, *Xylia dolabriformis*,

The Learning Institute is a non-profit, non-political Cambodian organization working with a wide range of civil society, public and private sector organizations so that they can contribute more effectively to the sustainable management of natural resources. In this way, it aims to alleviate poverty and to enhance the well being of people living in rural areas. Specifically, the Learning Institute acts as a centre of learning, working creatively with others to generate and share knowledge and practices that contribute to sustainable and fair use of natural resources.

Full details of our activities and publications can be found on our website:

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