



TECHNICAL PROPOSAL

Apiculture Hive Placement — Tampor Village

Community Beekeeping Expansion into the Phnom Samkos Wildlife Sanctuary, Informed by the Chankiek Pilot

Prepared for

GLOBAL STUDENT OUTREACH

Food Security • Sustainable Livelihoods • Forest & Wildlife Protection • Climate Resilience — Rural Cambodia

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Recommendation: Proceed with Tampor Village Apiary Pilot, 12–14 Hives

1. Executive Summary

This proposal recommends that Global Student Outreach (GSO) establish a new community apiary at Tampor village, inside the Phnom Samkos Wildlife Sanctuary, as the organization's next apiculture site following the failure of the 2013 Chankiek pilot in Kampong Chhnang province.

The Chankiek pilot placed hives in a rice-farming village with no surrounding forest cover. The colonies could not find enough natural forage across the surrounding rice paddy, Mekong-bordering floodplain, and seasonal grassland landscape, and were kept alive only through sustained sugar-syrup feeding before GSO relocated the surviving colonies to the Phnom Aural Wildlife Sanctuary in early 2014, where they have since stabilized and recovered under natural forest forage.

Tampor village, by contrast, sits at the edge of continuous forest inside Phnom Samkos. Site visits through mid-2014 recorded consistently strong daily foraging activity at existing wild and test-placed colonies in the area, indicating adequate year-round floral resources without the syrup-feeding dependency that undermined Chankiek.

This document sets out the technical case for Tampor: a comparison of the Chankiek, Phnom Aural, and Tampor sites; species and hive-system recommendations; a forest-edge hive placement design; a floral forage calendar; a supplemental feeding contingency protocol; bill of materials; implementation timeline; and cost estimate for a 12–14 hive pilot apiary.

2. Background — The 2013 Chankiek Pilot and Its Failure

2.1 Site Description

Chankiek village, Kampong Chhnang province, was selected for GSO's first apiculture pilot in 2013 on the basis of community interest and road access. The surrounding landscape, however, consisted almost entirely of rice paddy under active cultivation, Mekong-bordering floodplain, and seasonal grassland — with no meaningful forest or mixed-woodland cover within practical foraging range of the apiary.

2.2 What Went Wrong

Factor	Condition at Chankiek	Effect on Colonies
Forage diversity	Near-monoculture rice paddy; grassland flowering limited to short seasonal windows	Insufficient nectar and pollen diversity to sustain brood rearing across the year
Forest cover	None within practical flight range	No year-round tree-flowering resource to buffer paddy off-seasons
Land use	Active rice cultivation bordering hive sites	Pesticide/agrochemical exposure risk during spraying windows
Seasonality	Floodplain and grassland forage tied to short wet-season bloom	Long dry-season forage gap with no forest canopy to fill it
Water access	Mekong-adjacent but subject to seasonal flood/recession	Inconsistent, sometimes distant water access during dry months

2.3 Intervention — Syrup Feeding

Once colony weight loss and brood reduction were observed, GSO field staff began supplemental sugar-syrup feeding (1:1 sugar-water ratio, later shifted to 2:1 in the driest months) to prevent colony collapse. Syrup feeding kept the Chankiek colonies alive through late 2013 and early 2014 but did not resolve the

underlying forage deficit — colonies remained weak, produced negligible surplus honey, and showed no sustained population growth. Syrup feeding at this pilot functioned as life support, not a viable long-term management strategy.

2.4 Relocation to Phnom Aural Wildlife Sanctuary

In early 2014, GSO relocated the surviving Chankiek colonies to a forested site inside the Phnom Aural Wildlife Sanctuary. Following relocation, colonies were weaned off syrup feeding over a 4–6 week transition period as natural forage intake increased. By mid-2014, field monitoring recorded recovering brood patterns, rebuilding comb, and renewed foraging activity consistent with the surrounding forest bloom calendar — confirming that forest forage access, not hive management technique, was the determining factor in the Chankiek failure.

3. Site Comparison — Chankiek, Phnom Aural, and Tampor

Attribute	Chankiek (failed, 2013)	Phnom Aural (relocation, 2014)	Tampor — Phnom Samkos (proposed)
Landscape	Rice paddy, Mekong floodplain, seasonal grassland	Continuous forest, hill terrain	Forest edge bordering continuous sanctuary forest
Forage availability	Poor — short seasonal windows only	Strong — year-round forest bloom	Strong — consistent daily foraging activity observed at existing colonies
Pesticide exposure risk	High — bordering active rice cultivation	Low — no adjacent agriculture	Low — community zone, no large-scale agrochemical use nearby
Water access	Seasonal, flood/recession dependent	Adequate — forest streams	Adequate — seasonal stream near proposed apiary zone
Syrup feeding required	Continuous, to prevent collapse	Tapered off within 4–6 weeks post-relocation	Not expected as a routine requirement — held only as contingency
Verdict	Not viable for apiculture without forest forage	Viable — successful recovery site	Recommended — strongest forage indicators of the three sites

The core lesson carried forward from Chankiek: hive placement decisions must be forage-led, not access-led or convenience-led. Tampor was shortlisted specifically because it offers the forest-forage profile Chankiek lacked.

4. Site Assessment — Tampor Village, Phnom Samkos Wildlife Sanctuary

4.1 Site Description

Tampor village sits at the edge of continuous forest cover inside the Phnom Samkos Wildlife Sanctuary, Cardamom Mountains. Unlike Chankiek, the surrounding land is not under active large-scale cultivation — forest and mixed community-zone vegetation dominate the practical foraging radius around the village.

4.2 Field Observations

- **Daily foraging activity:** field observation of existing wild and test colonies near Tampor recorded consistently strong daily flight activity, a key indicator of adequate standing forage — in clear

contrast to the weak, intermittent activity recorded at Chankiek prior to its failure.

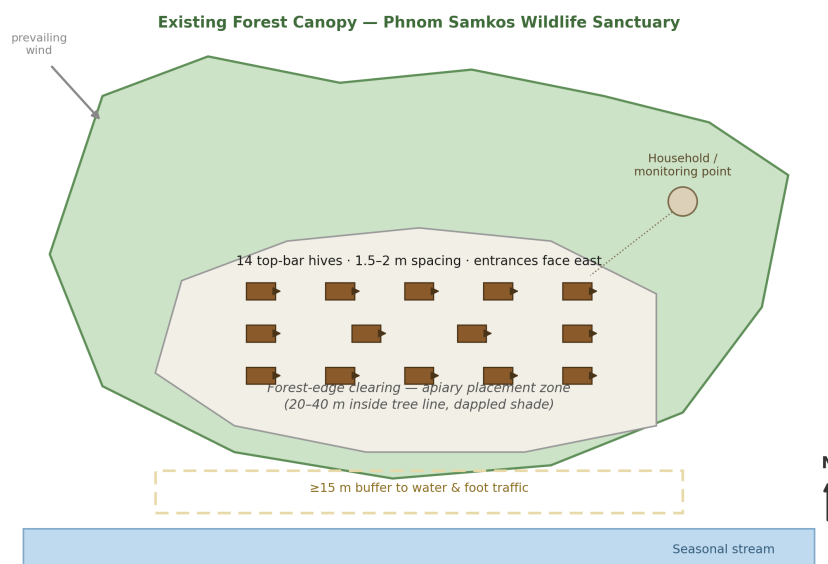
- **Forest structure:** mixed evergreen/semi-evergreen forest bordering the village provides canopy and understory flowering species across multiple seasons, rather than the single-crop bloom window seen in paddy landscapes.
- **Water:** a seasonal stream runs near the proposed apiary zone, providing accessible water within normal foraging range through most of the year.
- **Land use pressure:** community-zone land use around Tampor is lower-intensity than Chankiek's rice monoculture, reducing pesticide drift exposure risk to hives.

4.3 Suitability Conclusion

Tampor presents the forage, water, and low-agrochemical-exposure profile that Phnom Aural demonstrated as necessary for colony survival — but with the added advantage of direct village-level community engagement inside an active GSO program area. GSO recommends Tampor as the next apiculture expansion site.

5. Hive Placement Design

The proposed apiary sits in a forest-edge clearing 20–40 m inside the Tampor tree line, giving colonies immediate access to forest forage while keeping the apiary itself in dappled shade rather than full sun or full canopy darkness.



Tampor Village Apiary — Proposed Hive Placement (illustrative, not to scale)

Design Parameter	Specification	Rationale
Placement depth from tree line	20–40 m inside forest edge	Dappled shade reduces heat stress; keeps colonies close to canopy forage
Hive spacing	1.5–2.0 m between hives, staggered rows	Reduces drift/robbing between colonies; eases inspection access
Entrance orientation	East-facing	Captures morning sun to prompt early foraging; avoids afternoon

Design Parameter	Specification	Rationale
		heat load on entrance
Buffer to water/foot traffic	≥15 m	Reduces disturbance to colonies and risk of stings to village foot traffic
Elevation off ground	30–45 cm on stands	Reduces ground moisture, ant access, and predation from ground-dwelling animals
Wind exposure	Sited with prevailing wind noted, hives angled to reduce direct entrance exposure	Reduces colony cooling stress and flight disruption
Monitoring point	Household/observation point with sightline to apiary	Enables informal daily monitoring and rapid response to disturbance or theft

6. Species & Hive System Recommendation

6.1 Species Selection

Cambodia hosts four native honey bee species — *Apis dorsata* (giant honey bee), *Apis cerana* (eastern hive bee), *Apis florea* (red dwarf), and *Apis andreniformis* (black dwarf) — alongside the introduced *Apis mellifera*, which has become the mainstay of formal beekeeping regionally but is more forage- and management-intensive than the native cavity-nesting species.

Species	Suitability for Tampor	Notes
<i>Apis cerana</i> (native)	Recommended primary species	Cavity-nesting, hivable in top-bar/fixed-comb boxes; well adapted to tropical forest forage patterns and local climate; lower management burden than <i>A. mellifera</i>
<i>Apis mellifera</i> (introduced)	Not recommended for this pilot	Higher forage and management demands contributed to the Chankiek forage-deficit failure pattern; better suited to sites with sustained agricultural bloom, which Tampor is not oriented around
<i>Trigona</i> spp. (stingless bees)	Optional secondary/companion project	Lower yield but valuable for pollination and low-conflict apiculture near households; consistent with regional meliponiculture pilots elsewhere in Cambodia

6.2 Hive System

GSO recommends top-bar hives over Langstroth frame hives for the Tampor pilot: lower material cost, simpler local construction from available timber, and a management style well matched to *Apis cerana* colony behavior. Fixed-comb log or box hives, as used traditionally in parts of Cambodia, remain an acceptable low-cost fallback where top-bar material is unavailable, though they make inspection and disease monitoring harder.

7. Forest Forage Calendar — Phnom Samkos / Tampor

Unlike Chankiek's single rice-bloom window, the forest bordering Tampor offers overlapping bloom periods across the year. The following is a planning-level calendar to be refined through direct floral monitoring during the pilot's first full year.

Period	Season	Expected Forage Pattern	Colony Management Focus
Dec–Feb	Cool dry	Mixed forest understory and canopy flowering; moderate-to-strong forage	Routine inspection; monitor for swarming pressure
Mar–Apr	Hot dry (forage trough risk)	Some canopy species continue flowering; lowest-diversity stretch of the year	Watch colony weight; syrup feeding held in reserve if forage indicators drop
May–Jun	Early monsoon	Rapid understory flowering flush as rains begin	Strong buildup period; favorable for splits/new colony starts
Jul–Aug	Peak monsoon	Continued flowering, though heavy rain reduces flight days	Hive weatherproofing check; reduce disturbance during storms
Sep–Oct	Late monsoon	Sustained forest bloom diversity	Honey harvest window if colonies are established and strong
Nov	Post-monsoon transition	Bloom tapering into cool dry season pattern	Prepare colonies for cool-season management

The Mar–Apr hot dry stretch is the closest Tampor comes to replicating a Chankiek-style forage trough. This is precisely why Section 8 keeps syrup feeding as a monitored contingency rather than removing it from the toolkit entirely.

8. Supplemental Feeding Protocol — Contingency, Not Default

Chankiek's central lesson was that syrup feeding can mask a forage deficit without solving it. At Tampor, syrup feeding is retained strictly as a short-term contingency tool for identified stress periods (e.g., the Mar–Apr forage trough, or an unusually dry season), not as a routine input.

Trigger	Response	Exit Condition
Colony weight loss over 2 consecutive weekly checks	Begin 1:1 sugar-syrup feeding, small volume, evenings only	Discontinue once weight stabilizes and natural foraging activity resumes
Visible forage scarcity (per Section 7 calendar) during Mar–Apr trough	Pre-emptive light feeding only if colony is already under observed stress	Wean off as soon as early monsoon bloom begins (typically late April/May)
New colony establishment (first 2–3 weeks post-hiving)	Standard light starter feeding to support comb-building	Standard weaning once comb is established and foragers are active
Extended stress beyond 6 weeks despite feeding	Escalate to site review — this is the Chankiek failure pattern and signals the site itself, not the colony, may be the problem	Reassess site suitability; do not continue indefinite feeding

The fourth trigger row is deliberately framed as a hard stop: at Chankiek, indefinite syrup feeding was allowed to substitute for a site suitability judgment for too long. That mistake should not be repeated at Tampor.

9. Hive Construction & Bill of Materials (12–14 Hive Pilot)

Component	Specification	Qty	Unit Cost	Total
Top-bar hive body	Local timber, 1.0 m body, sloped sides, removable lid	14	\$18	\$252
Top bars	Wax-primed guide strips	280 (20/hive)	\$0.35	\$98
Hive stands	Elevated 30–45 cm, termite-resistant legs	14	\$6	\$84

Component	Specification	Qty	Unit Cost	Total
Roof/rain cover	Corrugated sheet or thatch, overhanging edges	14	\$5	\$70
Entrance reducers/guards	Adjustable, predator/pest guard	14	\$1.50	\$21
Bee veils & gloves	Basic protective gear for 4 trained handlers	4 sets	\$12	\$48
Smoker	Standard hand-pump smoker	2	\$15	\$30
Hive tool	Standard prying/inspection tool	4	\$4	\$16
Sugar (syrup contingency stock)	Reserve stock, not routine use	20 kg	\$0.90	\$18
Colony sourcing (swarm capture / local transfer)	Local Apis cerana colonies, swarm-captured or transferred with community beekeepers	14	\$8	\$112
Signage / apiary marker	Simple community notice marking active apiary	2	\$5	\$10

Subtotal — Materials & Colonies: \$759

Labor	Detail	Cost
Hive construction	4 people, 5 days, local carpentry	\$180
Site clearing & stand installation	4 people, 2 days	\$70
Colony hiving & initial training	2 trained beekeepers, 3 days	\$90
Contingency (10%)	—	\$110

TOTAL — Tampor Apiary Pilot (12–14 hives): ≈\$1,209

10. Monitoring & Colony Health Protocol

10.1 Weekly Checks

- Visual entrance activity count (foragers in/out over a fixed 2-minute window per hive)
- External hive condition — roof integrity, ant/termite pressure, entrance guard function
- Weight-lift check (hand-lift estimate) to flag sudden loss consistent with forage stress or robbing

10.2 Monthly Checks

- Internal comb inspection — brood pattern, queen presence indicators, comb condition
- Pest/disease screen — wax moth, small hive beetle indicators, mite presence if visible
- Cross-reference activity levels against the Section 7 forage calendar to catch early forage-trough stress before it becomes a Chankiek-pattern decline

10.3 Record Keeping

Each hive is logged individually (hive ID, hiving date, colony source, inspection notes, feeding events) so that any recurring underperformance can be traced to a specific hive location within the apiary layout — allowing GSO to identify micro-siting problems (e.g., a hive in a wind-exposed or shaded corner) before assuming a species- or site-wide failure.

11. Risk Assessment & Mitigation

Risk	Likelihood	Mitigation
Forage trough during Mar–Apr dry season	Moderate	Section 8 contingency feeding protocol with hard-stop escalation trigger
Honey theft / disturbance	Moderate	Household monitoring point with apiary sightline; community ownership model
Predation (ants, honey badger, birds)	Moderate	Elevated stands, entrance guards, ant-barrier grease/water moats on stand legs
Fire risk (dry season, forest-edge siting)	Low-Moderate	Apiary sited in existing clearing, not requiring new clearing; coordinate with sanctuary ranger fire-watch schedule
Colony absconding (species-typical Apis cerana behavior under stress)	Moderate	Address root stressors quickly via weekly monitoring; avoid the prolonged-stress pattern seen at Chankiek
Repeat of Chankiek-style hidden forage deficit	Low	Tampor was selected specifically on observed forage activity data, not access convenience — see Section 4

12. Implementation Timeline

Phase	Timeframe	Activities
Phase 1 — Site preparation	Weeks 1–2	Clear apiary zone, install hive stands, build hives
Phase 2 — Colony sourcing	Weeks 2–4	Swarm capture / local colony transfer with trained beekeepers
Phase 3 — Hiving & establishment	Weeks 3–6	Hive colonies, starter feeding as needed, initial comb-building monitoring
Phase 4 — Weekly monitoring begins	Week 4 onward	Full Section 10 monitoring protocol in effect
Phase 5 — First forage-trough test	Following Mar–Apr dry season	Validate Section 8 contingency protocol under real seasonal stress
Phase 6 — First harvest assessment	Following Sep–Oct bloom period	Evaluate honey yield and colony strength; report pilot outcome

13. Expected Outputs & Economics

Yield expectations are conservative for a first-year pilot, since Apis cerana colonies typically need one to two seasons to fully establish before producing consistent honey surplus.

Metric	Year 1 (establishment)	Year 2 (established colonies)
Expected honey yield per hive	1–3 kg (limited harvest, prioritize colony strength)	5–10 kg
Total apiary yield (12–14 hives)	12–40 kg	60–140 kg
Indicative local honey value	\$4–\$7/kg raw, higher for processed/bottled	\$4–\$7/kg raw, higher for processed/bottled
Non-honey value	Pollination support to household gardens and nearby GSO crop plots	Same, at greater scale as colonies strengthen

Honey yield is a secondary benefit in Year 1. The primary Year 1 success metric is colony survival and forage self-sufficiency without sustained syrup feeding — the specific outcome that failed at Chankiek.

14. Safety & Conservation Alignment

- **Forage-led siting:** hive placement decisions are driven by observed forage activity data, directly addressing the root cause of the Chankiek failure rather than repeating an access-led siting decision.
- **No new forest clearance:** the proposed apiary uses an existing forest-edge clearing at Tampor; no additional sanctuary forest is cleared.
- **Native species preference:** prioritizing *Apis cerana* over introduced *Apis mellifera* supports regional native bee conservation objectives alongside GSO's livelihood goals.
- **Reduced honey-hunting pressure:** a managed community apiary offers an alternative income source to wild honey hunting, consistent with regional conservation guidance on reducing pressure on wild forest bee colonies.
- **Pollination benefit:** colonies at Tampor will support pollination of nearby GSO household garden and crop plots as an ecological co-benefit.
- **Ranger coordination:** apiary siting and fire-season timing to be coordinated with sanctuary ranger patrol and fire-watch schedules given the forest-edge location.

15. Revision & Contact

This is a planning-stage technical proposal (Rev. 1.0) prepared to support a GSO funding and implementation decision on the Tampor apiary pilot. Forage calendar entries (Section 7) are planning-level estimates and should be refined against direct floral monitoring during the pilot's first year. Colony sourcing costs and availability should be confirmed locally in Pursat province before procurement.

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