



CAPITAL PROJECT TECHNICAL DOCUMENT

Agriculture Community Education Center

Integrated Agro-Aquaculture Training & Demonstration Facility — Phnom Samkos Wildlife Sanctuary

Prepared for

GLOBAL STUDENT OUTREACH

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

Document Rev. 1.0 — 2026

Planned Investment: \$100,000 per Center | Program Goal: 3 Centers



Design mockup — aerial view of a completed Agriculture Community Education Center

1. Executive Summary

Global Student Outreach (GSO) is planning a network of Agriculture Community Education Centers across the Phnom Samkos Wildlife Sanctuary area, at a planned investment of \$100,000 per center against a goal of 3 centers. Each center is a single integrated facility combining solar-powered aquaculture demonstration tanks, a shade house for vegetable production and tree nursery stock, a goat enterprise demonstration area, an apiary, and a classroom/workshop pavilion — built on unused sections of existing public school land and owned by the community, not GSO.

The center represents the biggest shift in how GSO works. Rather than giving families equipment they have not yet used — the model behind GSO's household-level goat, apiary, and shade house placements — the center lets villagers train and practice hands-on for a full 6-month cycle before taking their own version of a system home. This is the mechanism GSO expects to raise placement success rates across all of its livelihood programs: training and guidance before ownership, not equipment first.

This document sets out the facility's technical components (grounded in the attached design mockups), the training and curriculum model, the graduate fund and take-home system, staffing, the self-sustaining revenue model, community ownership structure, beneficiary targeting, and a full \$100,000 capital budget breakdown per center.

2. Program Overview

Parameter	Detail
Location	Phnom Samkos Wildlife Sanctuary area, on unused sections of existing public school land
Program goal	3 centers
Investment	\$100,000 per center (planned)
Impact per center	20–40 trainees per 6-month training cycle
Facility components	Solar power system, solar-powered aquaculture demonstration tanks, shade house + tree nursery, goat enterprise demonstration area, apiary, classroom & workshop pavilion, entrance/office building
Ownership	Community-owned, not GSO-owned — see Section 11
Revenue model	Self-sustaining — tourism visits, sale of fish/produce/nursery stock, not dependent on ongoing donations

3. Program Rationale — The Biggest Shift in How GSO Works

GSO's existing livelihood model gives families equipment directly — a goat shelter, an apiary hive set, a household shade house — with training delivered alongside placement. This model works, but placement success depends heavily on how much hands-on practice a household gets before they are solely responsible for a live system.

The Education Center inverts that sequence. Instead of equipment first, families train and practice first — running real aquaculture tanks, a real goat enterprise, a real shade house and nursery, and a real apiary at the center, under supervision, generating real income from what they produce, before taking their own version of a system home. The center functions simultaneously as a community learning hub, an agricultural skills training facility, and a self-sustaining enterprise.

This model does not replace GSO's existing household-level goat, apiary, and shade house programs (Chankiek, Arai, Tampor) — it is designed to feed into them, producing better-prepared graduates for exactly those take-home systems.

4. Design Mockups — Facility Overview

The following design mockups illustrate the integrated facility concept: a single connected roofline spanning the aquaculture pavilion and classroom, a raised-bed shade house and vegetable garden, an elevated goat housing area, an apiary, and a dedicated entrance/office building with vehicle parking — all arranged around a central gravel courtyard on a single community land parcel.

FOUR PERSPECTIVES OF THE INTEGRATED AGRO-AQUACULTURE DEMONSTRATION CENTER



Four perspectives of the integrated facility — aquaculture facility, classroom & gardens, goat raising & housing, and main entrance & office

4 MULTI-VIEW PERSPECTIVES: INTEGRATED AGRO-AQUACULTURE RESEARCH & DEVELOPMENT CENTER សមាគមន៍ស្រាវជ្រាវ និង អភិវឌ្ឍន៍ កសិ-ជលប្បកម្ម



Additional facility perspectives — aerial site overview, detailed aquaculture tank interior, vegetable garden and goat pen close-up, and ground-level entrance/classroom view

5. Facility Components — Technical Overview

5.1 Solar Power System

The center is fully solar powered, built around a private solar well providing an independent water supply for the aquaculture system, shade house irrigation, goat area, and general site use — removing dependency on grid power or a diesel backup, consistent with GSO's off-grid solar pump designs used at its household-level shade house and goat sites. The system is specified as a right-sized package covering essential site loads (well pump, aquaculture aeration/UV, lighting, workshop tools) rather than an oversized array carrying significant surplus capacity, keeping the line item at \$10,000 (Section 13) while

still delivering full off-grid coverage.

Component	Specification	Notes
Solar well pump system	Submersible solar pump sized to site-wide demand (aquaculture water exchange, irrigation, goat area, sanitation)	Independent water supply — no reliance on grid or diesel
Solar array	Roof or ground-mounted panel array sized to power pumps, aquaculture aerators/UV lighting, and classroom/workshop electrical needs	Sized against combined peak demand across all facility components
Battery storage & inverter	Site-wide battery bank and inverter for non-daylight operation (aquaculture aeration/UV, lighting, workshop tools)	Aquaculture aeration in particular cannot be allowed to lapse overnight

5.2 Solar-Powered Aquaculture Demonstration System

The mockups show a row of circular catfish demonstration tanks under a long open-sided gable-roof pavilion, connected by a raised central walkway for feeding and monitoring access, with solar-powered aeration and UV-filtration equipment integrated per tank.



Detail: circular aquaculture tanks under the shared pavilion roof, with raised walkway access and visible aeration equipment (View 2, lower-right reference set)

Component	Specification	Notes
Demonstration tanks	Circular concrete or reinforced poly tanks, arranged in two rows under a shared pavilion roof	Catfish selected as the primary demonstration species, consistent with regional market demand
Raised central walkway	Elevated walkway between tank rows for feeding, monitoring, and harvest access	Matches the mockups' shared-access design rather than isolated individual tanks
UV filtration	In-line UV filtration per tank or per tank cluster	Water quality management — a core curriculum module (Section 7)

Component	Specification	Notes
Solar-powered aeration	Aerator units powered from the site solar array/battery system	Continuous aeration is required overnight — battery backup is not optional (Section 5.1)
Shared pavilion roof	Long-span gable roof shared with or adjacent to the classroom pavilion	Reduces material cost versus separate roof structures and matches the mockups' connected-roofline design

5.3 Shade House — Vegetable Production & Tree Nursery

The shade house uses green shade netting over raised production and nursery beds, arranged in rows adjacent to the classroom pavilion — a production-scale version of the household shade house design already specified for GSO's Phnom Samkos chili and vegetable programs. This revision right-sizes the shade house line to a footprint closer to a small multiple of the existing household-scale module (rather than a larger standalone commercial structure), redirecting the difference into the project contingency reserve (Section 13) rather than expanding shade house capacity beyond what the training curriculum requires.



Additional facility perspectives — classroom interior, apiary, close-up goat raising infrastructure, and shade house under green netting

Component	Specification	Notes
Shade structure	Post-and-wire frame under 30–40% green shade net, production scale (larger than the household 20 m × 20 m module)	Follows the same silver/green shade net logic documented in GSO's household chili plot specification
Raised beds / nursery trays	Rows of raised beds and elevated nursery trays for tree seedling stock alongside vegetable production	Nursery stock sales are one of the center's three revenue streams (Section 10)
Drip irrigation	Fed from the shared solar well system (Section 5.1)	Consistent with GSO's household-level drip irrigation standard
Ground cover	Rice straw mulch or woven ground cover, not thin black plastic film	Consistent with GSO's established sustainable ground cover standard

5.4 Goat Enterprise Demonstration Area

The goat area uses the same elevated-platform housing principle established in GSO's household goat shelter specifications (Chankiek, Arai), scaled up with multiple training pens so trainees can practice husbandry across a working demonstration herd rather than a single household-scale shelter.

Component	Specification	Notes
Elevated housing	Timber-framed, elevated slatted-floor housing with thatch or tin roof, matching the household goat shelter design principle	Elevation for hygiene, parasite control, and predator deterrence, as documented in GSO's household goat specifications
Multiple training pens	Several pens at different scales, allowing trainees to practice shelter construction, breeding management, and daily husbandry across varied setups	Mirrors the small/medium/large shelter tiers already defined in GSO's household goat programs
Fenced demonstration yard	Perimeter-fenced browsing/exercise yard	Visible in the mockups as a fenced yard area adjoining the elevated housing

5.5 Apiary — Beekeeping Demonstration

The design mockups show an apiary component sited under natural tree cover near the facility, using standard hive boxes and full protective equipment for trainees — extending the center's curriculum to include beekeeping alongside aquaculture, livestock, and horticulture. This mirrors the husbandry and forage-siting principles GSO already documented for its Tampor village apiary program, adapted here to a training-and-demonstration context rather than a single-site household placement.

Component	Specification	Notes
Hive boxes	Standard hive boxes, sited under existing tree cover for forage access and shade	Consistent with GSO's forage-led apiary siting principle (see the Tampor apiary technical proposal)
Protective equipment	Full beekeeping suits and handling tools for trainee use	Visible in the mockups — trainee safety equipment for hands-on hive inspection training
Forage siting	Located near existing tree/forage cover rather than isolated open ground	Directly applies the forage-first siting lesson documented in GSO's apiary program

Note: the apiary was not listed in the original facility description text but appears in the design mockups as part of the expanded facility concept. It is included here on that basis and should be confirmed as in-scope before budget finalization (Section 13).

5.6 Classroom & Workshop Pavilion

The classroom is an open-sided timber pavilion sharing a connected roofline with the aquaculture facility, with bench seating, a teaching board, and adjoining garden beds visible directly from the seating area — placing trainees within sight of the systems they are being taught to operate. Because the classroom shares its primary roof structure with the adjacent aquaculture pavilion (Section 5.2) rather than requiring a separate structural build, its budget line (Section 13) covers fit-out only — bench seating, teaching board, and workshop bay walls/tool storage — not a standalone structural roof, which is why this line item is substantially smaller than a fully independent classroom building would require.

Component	Specification	Notes
Open-sided pavilion structure	Timber post-and-beam construction, gable roof	Open sides suit the tropical climate and keep construction cost below an enclosed

Component	Specification	Notes
	connected to or adjacent to the aquaculture pavilion	classroom building
Bench seating & teaching board	Fixed bench seating for 20–40 trainees, teaching board/poster display area	Sized to the per-cycle trainee capacity (Section 2)
Workshop space & tool storage	Adjoining or attached workshop bay for hands-on skills training and secure tool storage	Supports the hands-on shelter-construction and equipment-maintenance curriculum content (Section 7)

5.7 Entrance, Office & Vehicle Access

A dedicated entrance building provides site signage, a small office, and a covered carport for staff and visitor motorbikes and a pickup truck — establishing the center as a formal, identifiable community facility rather than an informal training site.

Component	Specification	Notes
Office / entrance building	Small office structure with site signage (bilingual Khmer/English per the mockups)	Functions as the project officer's on-site base (Section 9)
Covered vehicle carport	Covered parking for motorbikes and a pickup truck	Supports staff transport and produce/nursery-stock transport to market (Section 10)
Perimeter fencing & signage	Site boundary fencing and entrance signage	Formalizes the site as community-owned infrastructure (Section 11)

6. Training Model — 6-Month Cycle

Each center runs a 6-month training cycle accommodating 20–40 villagers on a part-time basis. The cycle is structured so that while some participants are in active training, others work at the center generating income — selling fish, produce, and nursery stock at local markets. This income goes directly to the working participants and into a graduate fund that helps families obtain their own home or satellite systems upon completion.

Cohort Status	Activity	Income Treatment
In active training	Hands-on instruction across the aquaculture, livestock, horticulture, apiary, and enterprise modules (Section 7)	No direct wage during instruction blocks
In active production/work rotation	Operating the center's live systems — feeding and harvesting fish, tending goats and hives, managing the shade house and nursery, selling produce at market	Income earned goes directly to the working participant
All cohorts (ongoing)	A share of center-wide sales revenue	Contributes to the graduate fund (Section 8), independent of individual work-rotation earnings

This rotation model is also what makes the center financially self-sustaining during the training cycle itself (Section 10) — the center is never fully idle, since some cohort members are always in the production/income-generating rotation.

7. Curriculum & Graduation

Track	Curriculum Content
Aquaculture	Tank setup, water quality management, feeding, solar pump maintenance, harvesting
Livestock (Goats)	Goat care, breeding, veterinary basics, shelter construction, grazing management
Horticulture	Shade house operation, organic pest management, soil health, tree nursery management
Apiary (per Section 5.5)	Hive inspection, forage-led siting principles, honey/wax handling, colony health monitoring — taught using the center's apiary demonstration area
Enterprise	Market access, pricing, bookkeeping, closed-loop farming systems

7.1 Graduation

Completion of the curriculum unlocks eligibility for a home or satellite system — a personal aquaculture setup, goat starter kit, or shade house — funded in part by the graduate fund built during the trainee's own training period (Section 8). This directly connects the center's training model to GSO's existing household-level placement programs: a center graduate moving into a household goat placement, for example, arrives having already practiced shelter construction and husbandry hands-on, rather than encountering the system for the first time at the point of ownership.

8. Graduate Fund & Take-Home System

The graduate fund is capitalized from two sources: a share of center-wide production sales revenue (Section 10) accrued throughout each 6-month cycle, and \$25,000 in seed capital included in the initial center budget (Section 13) — the single largest line item in the per-center budget, reflecting a program priority on graduation outcomes over facility scale. On completion, the fund helps a graduating trainee's household obtain their own take-home system — a personal aquaculture setup, a goat starter kit (matching GSO's existing shelter tier specifications), or a household shade house.

Take-Home Option	Linkage to Existing GSO Programs
Personal aquaculture setup	Scaled-down version of the center's solar aquaculture demonstration system
Goat starter kit	Matches GSO's existing Small/Medium/Large household goat shelter tiers (Chankiek, Arai specifications)
Household shade house	Matches GSO's existing household shade house / chili plot specification

Graduate fund sizing and the exact take-home system cost-share formula were not specified in the source material and should be confirmed before this section is treated as final (Section 17).

9. Staffing

Role	Structure
Project Officer	1 permanent position per center — on payroll, living on-site, hired from the local community
All other positions	Filled by local villagers on a community employment basis, generating income while training (Section 6)

The project officer is the only permanent payroll position per center; all other labor is drawn from the training cohort itself under the work-rotation model (Section 6), keeping the center's fixed staffing cost low relative to its training capacity.

10. Self-Sustaining Income Model

The center is designed to generate its own revenue rather than depend on ongoing donations, through

three channels operating continuously across each training cycle:

- **Tourism visits:** the center's integrated demonstration facility — aquaculture, shade house, goat area, apiary, and classroom — functions as a visitable site in its own right.
- **Sale of fish and produce:** catfish, vegetables, and other production from the aquaculture and shade house systems, sold at local markets by trainees in the work-rotation (Section 6).
- **Sale of nursery stock:** tree seedlings and planting stock from the shade house nursery bay.

Revenue from all three channels supports working participants directly and contributes to the graduate fund (Section 8), creating a facility that supports itself and its trainees rather than requiring continuous external funding once operational.

11. Community Ownership

- **The center belongs to the community — not to GSO.**
- **Built on unused sections of public school land:** siting the center on existing public school property avoids new land acquisition and keeps the facility embedded within existing community infrastructure.
- **Local employment, local management, local benefit:** from the single permanent project officer position (Section 9) through the full work-rotation training cohort, staffing and management are entirely community-sourced.

Community ownership has a direct implication for Section 13's budget: the \$100,000 figure is a GSO capital investment into community-owned infrastructure, not GSO-owned capital assets to be depreciated on GSO's books.

12. Who Benefits

20–40 villagers per training cycle — subsistence farmers with limited skills and resources — gain access to a solar-powered, self-sustaining training facility. Completion unlocks a home or satellite take-home system funded by the graduate fund, and the community-led ownership model ensures the benefit and the asset both stay local. As with GSO's other livelihood programs, needs are assessed as they become known to GSO and prioritized using UN Sustainable Development Goal (SDG) criteria.

Priority Tag	Application to This Program
Women Priority	Training access and take-home system eligibility prioritize women, consistent with GSO's cross-program targeting
Rural Poor	Subsistence farmers with limited skills and resources are the primary target population for each training cycle
Environment	Sustainable aquaculture, shade-house horticulture, apiary, and goat husbandry training directly support GSO's forest and land-use protection goals
Clean Energy	The center's fully solar-powered design (Section 5.1) is itself a demonstrated clean-energy model for trainees to replicate at the household level

12.1 Priority Criteria

- Single mothers
- Elderly women caring for grandchildren abandoned with them
- Families most vulnerable to the economic pressure that drives forest encroachment

13. Capital Budget — \$100,000 Per Center

The following allocation is a planning-level breakdown of the \$100,000 per-center investment across the facility components described in Section 5, plus staffing launch reserve and graduate fund seed capital. This revision reallocates capital toward the graduate fund and the contingency reserve: the classroom/workshop line is reduced to fit-out cost only (Section 5.6, since its structural roof is shared with the aquaculture pavilion), the solar power package is right-sized to essential loads (Section 5.1), and the shade house is right-sized to a footprint closer to the household-scale module (Section 5.3) — together funding an increase in graduate fund seed capital from \$2,500 to \$25,000 and restoring contingency to \$10,000. Individual vendor quotes were not included in the source material — see Section 17 for confirmation items before this budget is finalized.

Budget Line	Allocation	% of Total
Solar power system	\$10,000	10.0%
Solar-powered aquaculture system	\$14,000	14.0%
Shade house (production scale + nursery — right-sized, see Section 5.3)	\$10,500	10.5%
Goat enterprise demonstration area	\$9,000	9.0%
Apiary (per Section 5.5 — pending scope confirmation)	\$2,500	2.5%
Classroom & workshop pavilion (fit-out only — see Section 5.6)	\$5,000	5.0%
Entrance, office & vehicle carport	\$5,000	5.0%
Site development (fencing, signage, courtyard)	\$4,000	4.0%
Staffing & program launch reserve (Year 1)	\$5,000	5.0%
Graduate fund seed capital	\$25,000	25.0%
Subtotal	\$90,000	
Contingency / soft costs	\$10,000	
TOTAL — Per Center	\$100,000	

The apiary line item (Section 5.5) is provisionally budgeted and should be confirmed as in-scope, since it was not part of the original facility description text. If descope, its allocation should be redirected to contingency rather than reducing total project cost, given the fixed \$100,000 planning figure.

Contingency is restored to \$10,000 (11.1% of subtotal) in this revision, funded by right-sizing the shade house alongside the solar and classroom adjustments above — giving this budget a stronger buffer than the original 6.5% figure while still substantially growing the graduate fund.

14. Three-Center Rollout Plan

Phase	Focus
Center 1	First facility build, full curriculum launch, staffing and training-model validation; used to refine the Section 13 budget and Section 7 curriculum before replication
Center 2	Replication incorporating Center 1 lessons learned; site selection using the same public-school-land, community-ownership model
Center 3	Third facility, completing the 3-center program goal; cross-center graduate fund and market-access coordination assessed at this stage

Total program investment across all 3 centers, at the planned \$100,000 per center, is approximately \$300,000. Site selection for Centers 2 and 3 should prioritize the same SDG-aligned vulnerability criteria (Section 12.1) used for individual household placements, applied at the community/site level.

15. Risk Assessment

Risk	Mitigation
Revenue model underperforms, threatening self-sustainability	Staffing & program launch reserve (Section 13) covers Year 1 operations while the tourism/sales revenue model (Section 10) ramps up
Trainee dropout before graduation reduces take-home system uptake	Work-rotation income (Section 6) gives trainees a direct earnings incentive to complete the cycle, not only a deferred graduation benefit
Aquaculture system failure (aeration lapse, water quality event)	Battery-backed solar aeration (Section 5.1) and water-quality curriculum content (Section 7) directly target this failure mode
Apiary scope uncertainty	Flagged explicitly in Sections 5.5 and 13 pending confirmation, rather than silently assumed into the budget
Land tenure ambiguity on public school property	Formal agreement with school/community authority on land use should be documented before construction (Section 17)
Graduate fund insufficient to fund all eligible take-home systems	Fund sizing and cost-share formula should be modeled against expected cohort throughput before Center 1 construction (Section 8)

16. Safety & Ecosystem Alignment

- **No new land acquisition:** siting on unused public school land avoids new land conversion or clearance.
- **Clean energy demonstration:** the fully solar-powered design (Section 5.1) models a clean-energy approach for trainees to replicate at the household level.
- **Sustainable ground cover and irrigation standards:** the shade house component (Section 5.3) carries forward GSO's established sustainable ground cover and drip irrigation standards rather than reverting to lower-cost, less sustainable alternatives at production scale.
- **Forage-led apiary siting:** the apiary component (Section 5.5) applies the same forage-first siting principle documented in GSO's Tampor apiary program.
- **Community-led, not GSO-led:** ownership and management structure (Section 11) is designed to build durable local stewardship capacity rather than long-term GSO dependency.

17. Revision & Contact

This document synthesizes the Agriculture Community Education Center program's reported design, curriculum, and operating model — including the attached design mockups — into GSO's standard technical document format (Rev. 1.0, 2026). The following fields were not included in the source material provided and should be confirmed before this document is treated as a finalized permanent program record:

- Confirmed scope of the apiary component (Section 5.5), which appears in the design mockups but was not listed in the original facility description
- Specific center site location(s) and formal land-use agreement with the relevant public school/community authority
- Itemized vendor quotes underlying the Section 13 budget allocation (currently a planning-level breakdown, not vendor-confirmed)
- Graduate fund sizing formula and take-home system cost-share structure (Section 8)
- Project officer compensation and community work-rotation wage structure (Section 9)

- Site-specific dimensioned floor plans — the attached design mockups are illustrative renderings, not construction-ready architectural drawings

Global Student Outreach — Food Security, Sustainable Livelihoods, Forest & Wildlife Protection, and Climate Resilience in Rural Cambodia.