SHARED

Calculations and Decision Rules

Companion to the Software Requirements Specification

Version 1.6

Published methods and pending decisions through Institution review

This appendix states how the prototype calculates results and how the proposed system should handle the related decisions. Read it with the main SRS. Each method shows its source, required inputs, calculation or steps, example, limits and approval needs. A correct sample calculation is not evidence of local scientific acceptance.

The main SRS, appendix and controlled registers form one Version 1.6 review package. The 57 family IDs, 820 candidate decisions and 139 method IDs are retained. Repeated examples use one family definition. Use the registers for exact inputs, units, source links, scope and pending approval.

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1 Using this appendix

The Word, PDF and web editions describe the same method content. The following registers are controlled parts of Version 1.6 and must travel with the appendix. The main coverage workbook remains the design coverage record.

Decision_Register.csv All 820 decision examples, exact configured inputs and limits, units, source roles, owners and pending approval. Open online

Method_References.csv All 139 existing reference definitions, formulas or procedures, inputs, limits and original source links. These are candidate methods, not a claim of equivalence to an implemented family. Open online

Calculation_Sources.csv The full source register, with title, URL, locator, source role and access status. Open online

Government publication and Institution publication identify direct support for the stated core method. Record the publisher, edition and exact page or section. Validation required identifies project rules, adaptations or incomplete support. A data or background source alone does not support a formula. Published methods need no repeat proof; confirm local settings and intended use. Developers test copying, arithmetic and input handling. Section 6 separates these checks from client and expert decisions.

Source IDs LOCAL SRS in the registers retain their original legacy chapter labels. They refer to the earlier separate chapter set, not to the current 14 chapter numbering. The PROTO source identifies the prototype function and decision ID; SRS identifies this main SRS. No source citation grants legal, financial or scientific authority.

Inputs and limits

Use the same population, entity, boundary, period, definition, unit and source edition for a comparison. Keep the numerator and denominator visible. Preserve original values, missing reasons, uncertainty and access rights. No data is different from a measured zero. Do not infer a complete population from a partial snapshot or sum incompatible quantities.

All family inputs are required unless an approved method explicitly permits absence. The Decision Register records each current numeric input bound and whole number constraint. These are prototype guards, not scientifically recommended ranges. Generic units in a sample must be replaced by the exact approved institutional definition. Keep calculation precision; round only for display under an agreed rule. No default weights, rates, risk categories, warning levels or legal limits become official through this appendix.

Examples use invented values to check arithmetic. They are not institutional observations or recommendations. The wider proposed procedure in each family may need more data and specialist processing than the displayed example. Where the prototype only plots inputs or completeness, that limitation is stated explicitly.

Read a family in this order: question; exact formula; inputs and units; worked example; effect of an input change; wider proposed procedure; limits; source category. The example explains the prototype rule. It does not demonstrate every part of the wider procedure.

2 Shared calculations and business rules

Counts and source coverage

Count records only within the selected source and filters. Distinct count uses the reviewed identity key. Coverage reports supplied observations and requested rows separately. A snapshot total is not the population total.

Example One person with two memberships and three support episodes counts as one person, two memberships and three episodes.

Category Validation required. Source PublicDashboardModel.metric/uniqueRows; SrsDemonstration.coverage; ReportModel.execute. Requirements FR076 FR077 FR097. Sources PROTO, SRS.

Review Local definitions and method changes: E01; E02/E03 where relevant. Developer checks arithmetic and input handling. See Section 6.

Weighted means and pooled rates

Weighted mean = sum of weight × value divided by sum of valid weights. For a pooled rate, sum compatible numerators and denominators, then divide. Missing weights or a zero total denominator withhold the result.

Example Values 10 and 20 with weights 1 and 3 give 17.5. Rates 1/2 and 9/10 pool to 10/12, or 83.3333 percent.

Category Institution publication. Publisher United Nations Statistics Division (Final Draft). Source DecisionSupportModel.project SURVEY; SRS 5.4. Requirements FR099 FR103. Sources PROTO, SRS, S91.

Review Published core needs no repeat proof. Confirm local inputs, units and settings under E01; E02/E03 where relevant. See Section 6.

Basic crop yield

Production in tonnes divided by matching positive harvested hectares gives t/ha. Do not mix cultivated, sown and harvested area. Reject negative production or zero area.

Example 400 t / 100 ha = 4 t/ha.

Category Validation required. Source SrsCalculations.yield; YIELD input contract. Requirements FR082 FR103. Sources PROTO, SRS, S67.

Review Local definitions and method changes: E01; E02/E03 where relevant. Developer checks arithmetic and input handling. See Section 6.

Break even and margin ratios

For the stated variable cost scope, break even price = variable cost / positive saleable output. Margin ratio = 100 × gross margin / positive revenue. A break even yield uses cost per hectare divided by the applicable positive net price. State which fixed costs are excluded.

Example Variable cost LKR 70000 and 1000 kg give LKR 70/kg. LKR 30000 gross margin on LKR 100000 revenue gives 30 percent.

Category Validation required. Source SRS 5.4; MARGIN; NF022; proposed algebra from the stated gross margin identity. Requirements FR082 FR103. Sources SRS, S76. Published components: Institution publication - Food and Agriculture Organization of the United Nations (FAO) (S76).

Review Local definitions and method changes: E01; E02/E03 where relevant. Developer checks arithmetic and input handling. See Section 6.

Percentage variance and target progress

Percentage variance = 100 × (actual − plan) / plan for a nonzero plan. Progress from a baseline = 100 × (actual − baseline) / (target − baseline) for unequal target and baseline. Target achievement = 100 × actual / target for a nonzero target. These are different measures. Keep underachievement and values over 100 percent visible unless an approved display rule says otherwise.

Example Actual 120 and plan 100 give +20 and +20 percent. Baseline 20, actual 60 and target 100 give 50 percent progress and 60 percent target achievement.

Category Validation required. Source SrsCalculations.variance; SRS 5.4; NF171. Requirements FR103 FR124. Sources PROTO, SRS.

Review Local definitions and method changes: E01; E02/E03 where relevant. Developer checks arithmetic and input handling. See Section 6.

Reviewed weighted criteria

Normalize each criterion as (value − worst) / (best − worst). Score = 100 × sum of weight × normalized value. Weights must be finite, nonnegative and total one within 0.000000001. Anchors must differ; every required input must lie between its anchors. Exclude infeasible options first. The prototype rounds the score to four decimals before ranking. Rank = one plus the number of strictly higher displayed scores; ties have equal rank.

Example A benefit criterion with worst 0, best 100 and value 80 scores 80. A cost criterion with worst 100, best 0 and value 20 also scores 80. Equal options both rank 1.

Category Validation required. Source SrsCalculations.weighted; SrsDemonstration.compareDecision. Requirements FR102 FR105. Sources PROTO, SRS.

Review Local definitions and method changes: E01; E02/E03 where relevant. Developer checks arithmetic and input handling. See Section 6.

Annual cash flows and payback

For years 0 to n, discounted flow = signed cash flow / (1 + rate fraction) raised to the year. NPV is the sum. The prototype accepts 2 to 51 annual flows and rate above −1 through 1. Its paybackYear is the first year greater than zero with nonnegative cumulative undiscounted cash flow. It is not discounted payback or fractional payback. Do not use it for an unusual flow pattern without a reviewed rule.

Example Flows −100, 60, 60 at 10 percent give NPV 4.1322 and undiscounted payback year 2.

Category Validation required. Source SrsCalculations.cashFlow; FINANCE; NF145 NF147 NF157. Requirements FR103 FR105. Sources PROTO, SRS, S81. Published components: Institution publication - Food and Agriculture Organization of the United Nations (FAO) (S81).

Review Local definitions and method changes: E01; E02/E03 where relevant. Developer checks arithmetic and input handling. See Section 6.

Cost per additional observed outcome

Observed change = actual − baseline. Cost per additional unit = nonnegative comparable cost / observed change only when that change is positive. A decrease, no change or missing value withholds this ratio. This rule alone does not establish causation or handle a lower is better indicator.

Example Cost LKR 10000, baseline 20 and actual 60 give change 40 and LKR 250 per additional observed unit.

Category Validation required. Source SrsCalculations.costOutcome. Requirements FR103 FR125. Sources PROTO, SRS.

Review Local definitions and method changes: E01; E02/E03 where relevant. Developer checks arithmetic and input handling. See Section 6.

Rainfall missing values and comparable pairs

Calculate a supplied value mean using only explicitly supplied readings; retain the supplied count. A required complete period mean stays unavailable if any required period is missing. Paired analysis uses only compatible pairs and reports their count. A real zero is retained.

Example Example rainfall 1200, 1300, missing, 1400, 1500 mm gives supplied mean 1350 mm and coverage 4/5. With the corresponding cultivation series, paired coverage is 3/5.

Category Validation required. Source SrsCalculations.rainfall; SRS rainfall acceptance example. Requirements FR099 FR103. Sources PROTO, SRS.

Review Local definitions and method changes: E01; E02/E03 where relevant. Developer checks arithmetic and input handling. See Section 6.

Statistical summaries in retained method references

For sorted valid observations, median is the middle value or mean of the two middle values. Sample standard deviation uses sum of squared deviations divided by n − 1 before taking the square root. CV percent = 100 × sample standard deviation / positive mean, with n at least 2 and a meaningful zero. Quartiles need a named algorithm. Shannon sample diversity uses −sum of p × natural log(p), omitting zero terms. These definitions are proposed reference methods; the simple decision plots do not perform them all.

Example For 10, 20, 30, median and mean are 20, sample SD is 10 and CV is 50 percent. For two equally common species, Shannon index is ln(2), about 0.6931.

Category Validation required. Source NF077 NF086 NF109 NF114 NF115; DISTRIBUTION and VOLATILITY catalogue. Requirements FR099 FR103. Sources SRS, S84. Published components: Government publication - United States National Institute of Standards and Technology (NIST) (S84).

Review Local definitions and method changes: E01; E02/E03 where relevant. Developer checks arithmetic and input handling. See Section 6.

Spatial measurements and intersection

The prototype uses its spatial engine on WGS84 coordinates. Area in square metres is divided by 10000 for hectares. Line length and point distance use kilometres. Intersection area is measured from the actual intersected polygons. Point containment uses the library boundary rule. These are spherical exploratory estimates. A projected authoritative analysis needs a separately approved service and CRS.

Example An intersection of 200000 square metres is 20 ha. An empty intersection is zero area. Different geographic roles cannot be substituted.

Category Validation required. Source SpatialModel.vector; GeographicWorkflow.analyse/compareHistory. Requirements SH-GEO-FEAT-008 SH-GEO-FEAT-012 FR066. Sources PROTO, SRS, S85, S86, S87, S89, S90.

Review Local definitions and method changes: E01; E02/E03 where relevant. Developer checks arithmetic and input handling. See Section 6.

Buffers proximity and spatial limits

Buffer and point proximity radius must be above zero and no more than 20 km; the buffer uses 24 steps. Viewport vector analysis requires 1 to 749 loaded features and excludes demonstration geometry. Count nearby valid points within the chosen radius and report excluded or unsupported features. These are prototype workload limits, not environmental buffer rules.

Example A point at distance 1.5 km is included by a 2 km radius; one at 2.5 km is excluded. A 0 km radius is rejected.

Category Validation required. Source SpatialModel.vector. Requirements FR066 FR074. Sources PROTO, SRS, S86, S88.

Review Local definitions and method changes: E01; E02/E03 where relevant. Developer checks arithmetic and input handling. See Section 6.

Raster pairs and change

Both rasters must retain native aligned width, height, bounding box, CRS, unit and kind. Preview supports EPSG:4326 and at most 262144 cells per grid; no resampling is performed. For each valid pair count changed cells. Continuous mean difference = sum of later minus earlier values divided by paired count. Classified grids produce transition counts. Missing pairs are excluded and counted, not set to zero. Cell counts are not automatically hectares.

Example Earlier cells 1, missing, 3 and later cells 2, 4, 3 give 2 pairs, 1 missing pair, 1 changed cell and mean difference 0.5.

Category Validation required. Source SpatialModel.rasterCheck/rasterCompare. Requirements FR067 FR074. Sources PROTO, SRS.

Review Local definitions and method changes: E01; E02/E03 where relevant. Developer checks arithmetic and input handling. See Section 6.

Reservoir ratios and capacity

Storage percentage = 100 × effective storage / positive active capacity. Capacity composition accepts positive gross capacity, nonnegative dead and effective volumes, and dead plus effective no greater than gross. Remaining volume = gross − dead − effective. Labels must match the source definitions.

Example Gross 100, dead 10 and effective 60 leave 30 in the stated source volume unit. Effective 60 / active 90 gives 66.6667 percent.

Category Validation required. Source WaterModel.ratio/capacity. Requirements FR099 FR103. Sources PROTO, SRS.

Review Local definitions and method changes: E01; E02/E03 where relevant. Developer checks arithmetic and input handling. See Section 6.

Source water level thresholds

Use the source station unit and ordered alert, minor and major thresholds. At or above major select the major band, else at or above minor the minor band, else at or above alert the alert band, else below the source alert band. Missing or unordered thresholds withhold the band. This display is not a new warning.

Example For source thresholds 2, 3 and 4 m, a 3 m reading is in the minor threshold band.

Category Validation required. Source WaterModel.status; DisasterModel.delta. Requirements FR103 FR134. Sources PROTO, SRS.

Review Local definitions and method changes: E01; E02/E03 where relevant. Developer checks arithmetic and input handling. See Section 6.

Observation age and endpoint trend

Age in minutes = max(0, as of time − observation time) / 60000. A future timestamp is still a quality issue requiring review. Endpoint trend = (last value − first value) / elapsed hours for the same station and basin with verified, identical units and a positive elapsed time. It is not regression, a forecast or a warning.

Example A 2 m to 3 m change over 2 hours gives +0.5 m/hour.

Category Validation required. Source DisasterModel.age/latest/trend; WaterModel.stationRecords. Requirements FR055 FR099 FR103. Sources PROTO, SRS.

Review Local definitions and method changes: E01; E02/E03 where relevant. Developer checks arithmetic and input handling. See Section 6.

Official warning display

Only a nonsynthetic public actual alert or update, without a superseding record, and with at least one interval containing as of time is active. The valid from boundary is inclusive and valid to is exclusive. Derived values and stale warnings must not become official alerts.

Example A warning valid from 10:00 to 12:00 is active at 10:00 and inactive at 12:00.

Category Validation required. Source DisasterModel.active/publicRows. Requirements FR134 FR135. Sources PROTO, SRS.

Review Local definitions and method changes: E01; E02/E03 where relevant. Developer checks arithmetic and input handling. See Section 6.

Dashboard aggregation and display

Apply source, period and place filters first. Sum only a declared additive measure within compatible category groups. Count rows separately from distinct identities. Melt named compatible measure columns into chart points. A scatter requires both values. Missing numbers stay absent with a missing count; incomplete snapshots stay marked partial. Funding chart separates disbursed grant from grant not yet disbursed and requires grant no less than paid.

Example Grant 100 and disbursed 60 show 60 disbursed and 40 not disbursed. Unknown amounts do not create a zero total.

Category Validation required. Source PublicDashboardModel.project/metric/chartModel; IrrigationModel.chart; ApprovedChartModel.project. Requirements FR099 FR100. Sources PROTO, SRS.

Review Local definitions and method changes: E01; E02/E03 where relevant. Developer checks arithmetic and input handling. See Section 6.

Report joins and reproducibility

Use a reviewed record, geography and period, or identity and period grain. Combine at most four sources with one to twelve chosen measures, at most 500 rows per source and 2000 result rows. Reject duplicate matching keys and unsupported aggregation before joining. Retain unmatched source rows and exact input versions. Changed plans or sources invalidate their review. Limits are prototype input guards.

Example Two source rows with the same join key are rejected before they can multiply a total. An unmatched observation stays missing.

Category Validation required. Source ReportModel.validate/execute/approve/run. Requirements FR094 FR095 FR096 FR097 FR098. Sources PROTO, SRS.

Review Local definitions and method changes: E01; E02/E03 where relevant. Developer checks arithmetic and input handling. See Section 6.

Numeric and date validation

Keep zero distinct from blank. Reject booleans and nonfinite numbers as measurements. Respect each declared type, minimum, maximum, precision and scale; integer fields require safe whole numbers. Provider decimal inputs default to at most 15 significant digits and 8 fractional digits, and reject exponent notation. Validate real calendar dates. Use the exact field contract, not a displayed rounded number, for acceptance.

Example 0 is accepted as a reading. A blank, false and an impossible calendar date are rejected.

Category Validation required. Source SrsCalculations.number; ProviderWorkflows.validate; SrsDemonstration.validate; DecisionSupportModel.validate. Requirements FR038 FR058 FR103. Sources PROTO, SRS.

Review Developer tests valid, invalid and missing inputs. C04 confirms allowed values; expert review applies only to scientific limits.

Identity and competing source claims

An independent steward reviews both source identities before adding a relationship. Preserve the separate objects, source claims and histories. A preferred claim records a purpose and reason; it does not delete alternatives. Similar names do not prove identity.

Example Two reviewed records can be linked as related source identities while both original claims remain visible.

Category Validation required. Source SrsDemonstration.linkIdentity/preferClaim. Requirements FR029 FR030 FR033. Sources PROTO, SRS.

Review C02/C04 confirm identity keys, source owners and conflict resolution. Developer tests matching and preserved versions.

Document suggestions and source purpose

Match existing field labels or keys after normalizing text. Rank possible destination forms by count of matched fields, then form name. This is a name match aid, not a scientific or confidence score. Conflicting values, ambiguous numbers and incompatible units require a person to resolve them. Guidance text cannot supply a measured observation. Independent field mapping review and value review are separate.

Example A document stating two different values for rainfall creates a conflict requiring a checked choice; it does not average them.

Category Validation required. Source DocumentSlotModel.matches/rank/values; SrsDemonstration.reviewMapping/mappingKey. Requirements FR046 FR047 FR048 FR049 FR050. Sources PROTO, SRS.

Review C04/C05 confirm source rights and permitted purpose. Developer tests evidence links and restricted outputs.

Feed mapping and duplicate events

Freeze the reviewed source, destination dataset and version, field list, event/time/value keys, protocol, schema and device mapping. Preserve original raw keys and values. A changed contract invalidates mapping review. Replay uses the stable event identity to return the original receipt or reject changed content under that identity. A typed or sample payload is not a provider receipt.

Example Replay of the same event returns the same receipt; the same event key with different measured content is rejected.

Category Validation required. Source SrsDemonstration.feedContract/reviewFeedMapping/feedReplay/importAtomic. Requirements FR051 FR052 FR053 FR054 FR055 FR056. Sources PROTO, SRS.

Review C04 confirms field mapping and source contract. Developer tests duplicates, rejected rows and safe retries.

Review independence and stale evidence

Authors cannot perform protected independent reviews of their own work. Actions require the correct role, institution, state and exact record version. Revisions preserve predecessors and clear checks tied to changed evidence. A saved sample or a successful arithmetic check does not approve a scientific method.

Example A revised input version cannot reuse an approval for the earlier values.

Category Validation required. Source SrsDemonstration.role/independent/review/revise; ProviderWorkflows.review; DecisionSupportModel.adviceTransition. Requirements FR050 FR107 FR113 FR121. Sources PROTO, SRS.

Review C02 confirms reviewer roles. Developer tests separation of roles, changed versions and stale evidence.

Dependencies and project authorization

Check required people, prerequisites, finance, conditions and institutional authorization before activating work. Block cyclic dependencies and unavailable prerequisites. Track recommendation, authorized decision, performed work and verified outcome separately.

Example A task with an unfinished required prerequisite remains blocked.

Category Validation required. Source SrsDemonstration.dependency/dependenciesComplete/authorize/activate. Requirements FR105 FR110 FR111 FR112 FR114 FR115. Sources PROTO, SRS.

Review C01/C02 confirm scope, roles and approval steps. Developer tests dependencies and authorization rules.

Actual progress and outcome evidence

Only the assigned person records progress on open work. Require nonnegative quantity, unit, observation date, evidence and actual geographic support. A reviewer checks the submitted observation independently before it becomes verified progress. Outcome learning records observed results and source against the decision version.

Example Repeating identical progress evidence returns the existing entry; changed content under the same evidence identity is rejected.

Category Validation required. Source SrsDemonstration.progress/reviewProgress/outcome. Requirements FR120 FR121 FR123 FR124 FR125. Sources PROTO, SRS.

Review C10 confirms progress and outcome definitions. Developer tests evidence links and calculations.

PES verification and payment evidence

A recorded payment requires reviewed evidence, an authorized or active agreement, matching verified service evidence and a source payment reference. Client authority, rights, rates and funding are separate decisions. The prototype records evidence and transfers no money.

Example A service verification for another agreement cannot support a payment record.

Category Validation required. Source SrsDemonstration.recordPayment; PES. Requirements FR092 FR093. Sources PROTO, SRS, S60, S61.

Review E03/C10 confirm rights, service evidence, rates, funding and payment authority. Developer tests the agreed rules.

Closure handover and reopening

Freeze the closure checklist and source versions. Verify each required item independently, with current receiving evidence where needed. Close only after all checks and authority requirements pass. Changing the checklist or linked evidence invalidates its checks. Reopening or a revision keeps the prior closure and history.

Example A receiving asset changed after its review blocks closure until the new evidence is checked.

Category Validation required. Source PrototypeCompletion.closureSignature; SrsDemonstration.prepareClosure/fulfil/linkHandover/close/reopen. Requirements FR126 FR127 FR128. Sources PROTO, SRS.

Review C02/C11 confirm receiving roles and closure evidence. Developer tests the agreed workflow.

Source rights and publication

Apply scoped permissions for source, recipient, purpose, area, right, field list and validity period. A matching deny overrides an allow. Dataset provider views also require the active policy, role and institution. Public knowledge requires Published state, Public classification, unexpired rights and eligible citations recursively. Cycles, withdrawn sources and missing evidence block publication. No organization membership gives unrestricted access.

Example Expiry of a parent source removes dependent public guidance from the eligible list.

Category Validation required. Source SrsCalculations.permit; ProviderWorkflows.permitted; SrsDemonstration.sourceEligible/publishableSource. Requirements FR095 FR106 FR133 FR134. Sources PROTO, SRS.

Review C04/C05 confirm permitted use and audiences. Developer tests publication and source withdrawal.

Feedback appeal and safeguarding

Use the approved receiving institution and response policy. Retain the original feedback, evidence, response, independent appeal and final disposition. A response or attendance record is not consent. Publication checks remove restricted or sensitive content.

Example An unresolved appeal remains open with its accountable receiver.

Category Validation required. Source SrsDemonstration.submitFeedback/respondFeedback/appealFeedback/resolveAppeal; CONSENT. Requirements FR135 FR136. Sources PROTO, SRS, S47.

Review C05/C09 confirm privacy, receiving roles and appeals. Developer tests the agreed workflow.

Optional offline work background jobs and recovery

If the client selects offline operation, retain the base version and original evidence under approved protection and retention. Send stale or changed content to conflict review. Atomic receipts prevent a committed import being repeated. Queued jobs can be cancelled or retried; recover a lost response using its existing receipt. Additional channels and offline synchronisation remain proposed options under C01/C06/C07. Operational evidence is still required.

Example Retry after a lost response returns the committed receipt and does not import a second copy.

Category Validation required. Source SrsDemonstration.queueOffline/syncOffline/importAtomic/jobAction. IDs FR139 FR140 FR141 FR145 FR148 SH-GEO-FEAT-017. Sources PROTO, SRS.

Review C01/C06/C07/C08 confirm the selected options and targets. Developer tests the agreed implementation.

Acceptance and release decisions

Mock design coverage means the screen behavior is shown. It does not prove production implementation, local scientific validity, consultation, legal permission, service operations or formal acceptance. Client and experts approve this SRS and its appendix as one version through Institution review; no separate TOR review or UI reviewer gate is added.

Example An arithmetically correct erosion example still needs local factor and method approval before an operational decision.

Category Validation required. Source SRS Chapter 12 acceptance and Chapter 13 review decisions; Institution review. Requirements FR150 FR151 FR152 FR153 FR154 FR155 FR156. Sources SRS, PROTO.

Review C11 records final acceptance after the relevant C01 to C12 and E01 to E03 decisions. Developer evidence does not grant approval.

3 Calculation families

Find the family by its existing ID. Inputs below show a representative configured decision. The Decision Register supplies every decision specific input, unit and bound, including the crop water, productivity, trend and cash balance variants. Read the shared rules in Section 2 with each family. All source codes resolve in Calculation Sources and the web source register.

CHANGE Comparable change

Decision example. Prioritize bathymetric surveys and desilting appraisal.

$$\text{change} = \text{current} - \text{baseline}$$

Inputs and units. Earlier/source value (m³); Later/comparison value (m³).

Worked example. DEC-DP05-008 — Laggala Pallegama — reservoir sedimentation, 2025. Earlier/source value = 100 m³; Later/comparison value = 90 m³. Difference = -10 m³; Relative change = -10 %. Realistic sample data; the exact evidence fields remain in the decision register.

Input changes. Recalculate the same selected evidence; reject invalid components and keep missing values distinct from zero. Retain exact source and method versions in the output.

Procedure. Later/comparison value minus Earlier/source value. Relative change = 100 × difference / Earlier/source value when the earlier value is positive.

Method sources. Validation required. Project rule or local adaptation. Sources and evidence are listed in the controlled decision register.

Domain variants. land change, change. Use the exact decision contract and unit in Decision_Register.csv; a family name alone does not establish equivalence. Confirm local choices in Institution review only.

OVERLAY Spatial constraint screening

Decision example. Refer proposed developments overlapping constraints.

$$\text{overlap share} = 100 \times \text{overlap area} \div \text{footprint area}$$

Inputs and units. Proposal footprint (ha); Union of overlapping constraint areas (ha); Boundary edition; Constraint definition.

Worked example. DEC-DP01-002 — Laggala Pallegama — development screening, 2025. Proposal footprint = 75 ha; Union of overlapping constraint areas = 18 ha. Overlap share = 24 %; Overlapping area = 18 ha. Realistic sample data; the exact evidence fields remain in the decision register.

Input changes. Recalculate the same selected evidence; reject invalid components and keep missing values distinct from zero. Retain exact source and method versions in the output.

Procedure. 100 × union of constraint overlap / proposal footprint. Count intersecting constraint areas once.

Limits. Geometry preparation must use matching coordinate systems, dated boundary editions and valid spatial predicates. Overlap supports referral; it does not determine ownership, permission or site safety.

Method sources. Validation required. Project rule or local adaptation. Sources and evidence are listed in the controlled decision register.

Domain variants. overlay, point overlay, well proximity. Use the exact decision contract and unit in Decision_Register.csv; a family name alone does not establish equivalence. Confirm local choices in Institution review only.

COVERAGE Coverage and unmet need

Decision example. Commission missing divisional land-use plans.

$$\text{coverage} = 100 \times \text{served eligible units} \div \text{eligible units}$$

Inputs and units. Required eligible frame (divisions); Distinct members of that frame covered (divisions); Frame members with unknown coverage (divisions).

Worked example. DEC-DP01-003 — Laggala Pallegama — planning coverage, 2025. Required eligible frame = 100 divisions; Distinct members of that frame covered = 65 divisions; Frame members with unknown coverage = 5 divisions. Verified coverage = 65 %; Known uncovered = 30 divisions; Unknown coverage = 5 divisions. Realistic sample data; the exact evidence fields remain in the decision register.

Input changes. Recalculate the same selected evidence; reject invalid components and keep missing values distinct from zero. Retain exact source and method versions in the output.

Procedure. 100 × distinct covered eligible units / eligible frame. Known uncovered = frame − covered − unknown.

Limits. Count each eligible unit once for the selected service and period. Received messages, attendance, adoption and outcomes are separate measures.

Method sources. Validation required. Project rule or local adaptation. Sources and evidence are listed in the controlled decision register.

Domain variants. coverage. Use the exact decision contract and unit in Decision_Register.csv; a family name alone does not establish equivalence. Confirm local choices in Institution review only.

MISMATCH Independent evidence reconciliation

Decision example. Investigate field and map classification disagreements.

$$unresolved\ comparisons\ =\ count(missing\ or\ conflicting\ equivalence)$$

Inputs and units. Original source value/definition; Comparison source value/definition; Original version; Comparison version; Documented equivalence evidence.

Worked example. DEC-DP01-004 — Laggala Pallegama — field verification, 2025. . Unresolved equivalence items = 1 items. Realistic sample data; the exact evidence fields remain in the decision register.

Input changes. Recalculate the same selected evidence; reject invalid components and keep missing values distinct from zero. Retain exact source and method versions in the output.

Procedure. Compare original definitions, identifiers, units and versions against documented equivalence evidence. Preserve conflicts and unresolved mappings; do not subtract category labels or silently merge records.

Method sources. Validation required. Project rule or local adaptation. Sources and evidence are listed in the controlled decision register.

Domain variants. mismatch, series mismatch, numeric mismatch, lineage, location mismatch, schema mismatch, affected lots. Use the exact decision contract and unit in Decision_Register.csv; a family name alone does not establish equivalence. Confirm local choices in Institution review only.

EROSION Erosion model comparison

Decision example. Target detailed soil-loss assessment in planning units.

$$\text{soil loss} = R \times K \times LS \times C \times P$$

Inputs and units. Rainfall erosivity (MJ mm/(ha h year)); Soil erodibility (t ha h/(ha MJ mm)); Slope-length and steepness factor (ratio); Cover-management factor (fraction); Support-practice factor (fraction).

Worked example. DEC-DP01-016 — Laggala Pallegama — land degradation, 2025. Rainfall erosivity = 950 MJ mm/(ha h year); Soil erodibility = 0.035 t ha h/(ha MJ mm); Slope-length and steepness factor = 2.8 ratio; Cover-management factor = 0.24 fraction; Support-practice factor = 0.7 fraction. Estimated annual sheet/rill loss = 15.641 t/ha/year. Realistic sample data; the exact evidence fields remain in the decision register.

Input changes. Recalculate the same selected evidence; reject invalid components and keep missing values distinct from zero. Retain exact source and method versions in the output.

Procedure. R × K × LS × C × P, using a mutually consistent SI factor set.

Limits. This USLE factor product is not a full RUSLE2 run, measured loss, delivered sediment, gully loss or landslide forecast. Local factors and uncertainty need review.

Method sources. Verified published formula — USLE factor product. Government publication — United States Department of Agriculture Forest Service. 1980 technical publication SA-TP 11; Universal Soil Loss Equation, printed page 2; metric conversion appendix, printed page 40. https://www.ars.usda.gov/ARSUserFiles/60600505/RUSLE/A%20guide%20for%20predicting%20sheet%20and%20rill%20erosion%20on%20forest%20land.pdf. The historical source verifies the factor product. Local factor choice and suitability still need confirmation; this is not a full RUSLE2 implementation.

Domain variants. erosion. Use the exact decision contract and unit in Decision_Register.csv; a family name alone does not establish equivalence. Confirm local choices in Institution review only.

OPTIONS Alternative appraisal

Decision example. Compare candidate settlement expansion areas.

$$\text{affordability difference} = \text{available budget} - \text{estimated option cost}$$

Inputs and units. Option cost (LKR); Available budget (LKR); Mandatory constraints; Expected benefit and its evidence; Resource needs and adverse effects.

Worked example. DEC-DP01-007 — Assisted natural regeneration, 2025. Option cost = 1,500,000 LKR; Available budget = 1,800,000 LKR. Budget remaining after option = 300,000 LKR. Realistic sample data; the exact evidence fields remain in the decision register.

Input changes. Recalculate the same selected evidence; reject invalid components and keep missing values distinct from zero. Retain exact source and method versions in the output.

Procedure. Budget minus option cost. Compare benefits, adverse effects and mandatory constraints separately; no weighted score or automatic best option.

Limits. Affordability does not prove feasibility or scientific suitability. A missing mandatory condition keeps an option unresolved.

Method sources. Validation required. Project rule or local adaptation. Sources and evidence are listed in the controlled decision register.

Domain variants. options. Use the exact decision contract and unit in Decision_Register.csv; a family name alone does not establish equivalence. Confirm local choices in Institution review only.

COMPOSITION Composition without false aggregation

Decision example. Plan seed support around observed rice-category uptake.

$$\text{category share} = 100 \times \text{category count} \div \text{sum of compatible category counts}$$

Inputs and units. Distinct eligible original plots (plots); Sown area recorded separately (ha).

Worked example. DEC-DP03-001 — Bg 300, 2025. Distinct eligible original plots = 107 plots; Sown area recorded separately = 115 ha. Plot count = 107 plots; Share of eligible plots = 18.259 %; Share of recorded sown area = 14.303 %. Realistic sample data; the exact evidence fields remain in the decision register.

Input changes. Recalculate the same selected evidence; reject invalid components and keep missing values distinct from zero. Retain exact source and method versions in the output.

Procedure. Plot share =100 × distinct eligible plots in category / eligible plots in all categories. Sown-area shares use a separate hectare denominator; grouped inputs do not verify plot identity.

Limits. Categories must be mutually exclusive and cover the stated frame. Do not mix values, quantities, plots or hectares, or treat an HHI competition threshold as an institutional policy.

Method sources. Validation required. Project rule or local adaptation. Sources and evidence are listed in the controlled decision register.

Domain variants. fragmentation, erosion area, rice plots, variety area, export composition, feedback. Use the exact decision contract and unit in Decision_Register.csv; a family name alone does not establish equivalence. Confirm local choices in Institution review only.

TREND Trend with uncertainty

Decision example. Review long-term trends in homogeneous station records.

Current rule. Use the exact DOMAIN-1 decision variant; the representative example does not establish all local applications.

display the observed value against its recorded observation period

Inputs and units. Comparable observation (°C).

Worked example. DEC-DP08-017 — Laggala Pallegama — climate trends, 2025. Comparable observation = 28.1 °C. Observed value = 28.1 °C. Realistic sample data; the exact evidence fields remain in the decision register.

Input changes. Recalculate the same selected evidence; reject invalid components and keep missing values distinct from zero. Retain exact source and method versions in the output.

Procedure. Display dated air temperatures and their mean/sample standard deviation in °C. Celsius has an arbitrary zero; do not report relative percentage change or a coefficient of variation.

Limits. Match definitions, methods, grade, location and reference basis. Gaps are not joined. Descriptive variation is not a forecast, causal effect or significant trend.

Method sources. Validation required. Project rule or local adaptation. Sources and evidence are listed in the controlled decision register.

Domain variants. trend, groundwater trend. Use the exact decision contract and unit in Decision_Register.csv; a family name alone does not establish equivalence. Confirm local choices in Institution review only.

COST Unit cost and cost drivers

Decision example. Compare conservation cost per verified treated hectare.

operating cost = labour + materials and inputs + transport and handling

Inputs and units. Labour cost (LKR); Material/input cost (LKR); Other non-overlapping cost (LKR); Verified matching hectares (ha).

Worked example. DEC-DP02-017 — Laggala Pallegama — conservation economics, 2025. Labour cost = 180,000 LKR; Material/input cost = 255,000 LKR; Other non-overlapping cost = 62,000 LKR; Verified matching hectares = 5.4 ha. Cost per matching unit = 92,037.037 LKR/ha; Total cost = 497,000 LKR. Realistic sample data; the exact evidence fields remain in the decision register.

Input changes. Recalculate the same selected evidence; reject invalid components and keep missing values distinct from zero. Retain exact source and method versions in the output.

Procedure. Sum non-overlapping costs, then divide by the matching verified quantity for the same currency and accounting period.

Limits. An absent or zero denominator has no unit-cost result. Keep fixed, variable and opportunity costs identifiable.

Method sources. Validation required. Project rule or local adaptation. Sources and evidence are listed in the controlled decision register.

Domain variants. cost ha, survey cost, damage loss, basket cost, input expenditure, cost output, tonne km, verification cost. Use the exact decision contract and unit in Decision_Register.csv; a family name alone does not establish equivalence. Confirm local choices in Institution review only.

WATER Crop water requirement

Decision example. Prepare crop-stage irrigation recommendations.

$$ETc = ETo \times Kc$$

$$net = max(0, ETc + DP + dS - (P - RO) - CR)$$

$$gross = net \times area \times 10 \div efficiency$$

N is stage water need in mm; P is daily seepage and percolation in mm/day; d is stage days; L is preparation water and W is ponding establishment in mm; Pe is effective rain and S is usable stored water in mm; A is hectares; e is additional delivery efficiency as a fraction; V is m³ per stage. ETo is mm/day and Kc is dimensionless.

Inputs and units. Irrigated crop area (ha); Reference evapotranspiration (mm/day); Crop coefficient (ratio); Rainfall reaching the field after runoff (mm/day); Deep percolation and

paddy allowance (mm/day); Capillary contribution (mm/day); Desired change in stored soil water (mm/day); Field application efficiency (fraction).

Worked example. DEC-DP03-003 — Laggala Pallegama — irrigation advice, 2025. Irrigated crop area = 85 ha; Reference evapotranspiration = 4.5 mm/day; Crop coefficient = 1.1 ratio; Rainfall reaching the field after runoff = 1.6 mm/day; Deep percolation and paddy allowance = 2 mm/day; Capillary contribution = 0 mm/day; Desired change in stored soil water = 0 mm/day; Field application efficiency = 0.68 fraction. Gross daily irrigation requirement = 6,687.5 m³/day; Net field requirement = 5.35 mm/day. Realistic sample data; the exact evidence fields remain in the decision register.

Input changes. Recalculate the same selected evidence; reject invalid components and keep missing values distinct from zero. Retain exact source and method versions in the output.

Procedure. ETc = ETo × Kc. Net = max(0, ETc + percolation + desired storage increase − rainfall after runoff − capillary contribution). Gross = net × hectares ×10 / application efficiency.

Limits. The full local balance, rooting depth, stress, crop stage and operating constraints still matter. The paddy allowance is explicit and must be zero where inapplicable. This is not an authorized reservoir release.

Method sources. Verified published component — Crop evapotranspiration ETc component. Institution publication — Food and Agriculture Organization of the United Nations. Chapter 5, Crop coefficient approach, equation 56. https://www.fao.org/4/X0490E/x0490e0a.htm. This verifies the ETc component only. Local water-balance allowances, coefficients and operating decisions still need confirmation.

Domain variants. water. Use the exact decision contract and unit in Decision_Register.csv; a family name alone does not establish equivalence. Confirm local choices in Institution review only.

VARIANCE Plan versus actual

Decision example. Investigate differences between planned and actual use.

$$\text{variance} = \text{actual} - \text{plan}$$

Inputs and units. Planned value (ha); Observed value (ha).

Worked example. DEC-DP01-017 — Laggala Pallegama — plan implementation, 2025. Planned value = 100 ha; Observed value = 90 ha. Difference = -10 ha; Relative change = -10 %. Realistic sample data; the exact evidence fields remain in the decision register.

Input changes. Recalculate the same selected evidence; reject invalid components and keep missing values distinct from zero. Retain exact source and method versions in the output.

Procedure. Observed value minus Planned value. Relative change = 100 × difference / Planned value when the earlier value is positive.

Method sources. Validation required. Project rule or local adaptation. Sources and evidence are listed in the controlled decision register.

Domain variants. variance, dated variance, cost progress. Use the exact decision contract and unit in Decision_Register.csv; a family name alone does not establish equivalence. Confirm local choices in Institution review only.

REPEAT Repeated support or overlapping claims

Decision example. Review repeated farmer assistance before new allocation.

$$overlap = max(0, min(end1, end2) - max(start1, start2) + 1)$$

Inputs and units. Permitted recipient/service reference; Support purpose; Earlier support period begins; Earlier support period ends; Other support period begins; Other support period ends; Same purpose and qualifying unit.

Worked example. DEC-DP04-002 — Laggala Pallegama — support overlap, 2025. . Overlapping days = 61 days. Realistic sample data; the exact evidence fields remain in the decision register.

Input changes. Recalculate the same selected evidence; reject invalid components and keep missing values distinct from zero. Retain exact source and method versions in the output.

Procedure. Compare the same permitted entity, purpose and qualifying unit. Intersect dated support intervals; overlapping support is a review flag, not proof of duplicate entitlement.

Method sources. Validation required. Project rule or local adaptation. Sources and evidence are listed in the controlled decision register.

Domain variants. repeat. Use the exact decision contract and unit in Decision_Register.csv; a family name alone does not establish equivalence. Confirm local choices in Institution review only.

QUEUE Age due date and response

Decision example. Clear delayed farmer-service requests.

$$past\ due = max(0, assessment\ date - due\ date), when\ open$$

Inputs and units. Received or defect observed; Recorded due date; Assessment date; Case/work closed; Documented critical unresolved condition; Responsible office or maintainer; Actual closure date when closed.

Worked example. DEC-DP04-004 — Laggala Pallegama — agrarian services, 2025. . Open days past due = 29 days; Calendar age = 90 days. Realistic sample data; the exact evidence fields remain in the decision register.

Input changes. Recalculate the same selected evidence; reject invalid components and keep missing values distinct from zero. Retain exact source and method versions in the output.

Procedure. Open age = assessment date − received date. Days past due = max(0, assessment date − recorded due date) for open cases. Show documented critical conditions separately.

Limits. Example due dates are not legal service standards. Do not alter statutory deadlines by silently subtracting pauses, or infer severity from age alone.

Method sources. Validation required. Project rule or local adaptation. Sources and evidence are listed in the controlled decision register.

Domain variants. queue. Use the exact decision contract and unit in Decision_Register.csv; a family name alone does not establish equivalence. Confirm local choices in Institution review only.

FRESH Observation freshness and completeness

Decision example. Repair incomplete soil and weather observation coverage.

completeness = 100 × valid received observations ÷ scheduled observations

Inputs and units. Expected observations in the window (observations); Distinct valid observations (observations); Latest valid observation; Assessment date; Required observation interval (days).

Worked example. DEC-DP02-014 — Laggala Pallegama — monitoring network, 2025. Expected observations in the window = 30 observations; Distinct valid observations = 24 observations; Required observation interval = 1 days. Completeness = 80 %; Age of latest observation = 2 days; Missing observations = 6 observations. Realistic sample data; the exact evidence fields remain in the decision register.

Input changes. Recalculate the same selected evidence; reject invalid components and keep missing values distinct from zero. Retain exact source and method versions in the output.

Procedure. Completeness = 100 × valid / expected. Age = assessment date − latest valid observation; compare with the explicitly supplied interval.

Limits. A recent observation does not fill earlier gaps. Unknown schedule or observation time cannot establish freshness.

Method sources. Validation required. Project rule or local adaptation. Sources and evidence are listed in the controlled decision register.

Domain variants. fresh. Use the exact decision contract and unit in Decision_Register.csv; a family name alone does not establish equivalence. Confirm local choices in Institution review only.

BALANCE Physical mass or water balance

Decision example. Review storage consequences of proposed releases.

closing amount = opening amount + inflow − release or payment − other loss or adjustment

Inputs and units. Opening storage (m³); All measured inflows and transfers in (m³); Releases and transfers out (m³); Evaporation and other outflows (m³); Independently observed closing storage (m³).

Worked example. DEC-DP05-004 — Laggala Pallegama — reservoir operation, 2025. Opening storage = 160,000 m³; All measured inflows and transfers in = 48,000 m³; Releases and transfers out = 35,000 m³; Evaporation and other outflows = 9,000 m³; Independently observed closing storage = 163,500 m³. Calculated closing storage = 164,000 m³; Observed minus calculated closing = -500 m³. Realistic sample data; the exact evidence fields remain in the decision register.

Input changes. Recalculate the same selected evidence; reject invalid components and keep missing values distinct from zero. Retain exact source and method versions in the output.

Procedure. Calculated closing = opening + inflows − releases/transfers − other outflows. Residual = independently observed closing − calculated closing.

Limits. Use the same physical boundary, period and units. A residual is a reconciliation issue, not automatically a measured loss.

Method sources. Validation required. Project rule or local adaptation. Sources and evidence are listed in the controlled decision register.

Domain variants. cash balance, balance, aquifer balance. Use the exact decision contract and unit in Decision_Register.csv; a family name alone does not establish equivalence. Confirm local choices in Institution review only.

SURVIVAL Cohort survival and retention

Decision example. Target maintenance to poorly surviving planting cohorts.

Calculation or steps confirmed survival = 100 × confirmed survivors ÷ original cohort; recorded losses = original cohort − confirmed survivors − unobserved.

Inputs and units. Original cohort (plants); Known surviving original members (plants); Known failed original members (plants); Original members with unknown follow-up (plants); Replacements in a separate cohort (plants).

Worked example. DEC-DP07-003 — Laggala Pallegama — restoration survival, 2025. Original cohort = 450 plants; Known surviving original members = 351 plants; Known failed original members = 70 plants; Original members with unknown follow-up = 29 plants; Replacements in a separate cohort = 18 plants. Confirmed survival lower bound = 78 %; Survival upper bound = 84.444 %; Unknown follow-up = 29 plants. Realistic sample data; the exact evidence fields remain in the decision register.

Input changes. Recalculate the same selected evidence; reject invalid components and keep missing values distinct from zero. Retain exact source and method versions in the output.

Procedure. Lower =100 × known survivors / original cohort. Upper =100 × (known survivors + unknown) / original cohort. Survivors + known failures + unknown = original cohort; replacements do not enter it.

Limits. These bounds account for unknown status; they are not statistical confidence intervals. Use actual follow-up dates and distinguish cohort membership from repeated visits.

Method sources. Validation required. Project rule or local adaptation. Sources and evidence are listed in the controlled decision register.

Domain variants. survival, business retention, followup retention. Use the exact decision contract and unit in Decision_Register.csv; a family name alone does not establish equivalence. Confirm local choices in Institution review only.

ANOMALY Departure from a reviewed reference

Decision example. Issue evidence packages for local agricultural advisories.

$$\text{departure} = \text{current observation} - \text{comparable baseline}$$

Inputs and units. Comparable reference value (mm); Later/comparison value (mm).

Worked example. DEC-DP02-013 — Laggala Pallegama — agroclimate advice, 2025. Comparable reference value = 100 mm; Later/comparison value = 90 mm. Difference = -10 mm; Relative change = -10 %. Realistic sample data; the exact evidence fields remain in the decision register.

Input changes. Recalculate the same selected evidence; reject invalid components and keep missing values distinct from zero. Retain exact source and method versions in the output.

Procedure. Later/comparison value minus Comparable reference value. Relative change = 100 × difference / Comparable reference value when the earlier value is positive.

Method sources. Validation required. Project rule or local adaptation. Sources and evidence are listed in the controlled decision register.

Domain variants. anomaly. Use the exact decision contract and unit in Decision_Register.csv; a family name alone does not establish equivalence. Confirm local choices in Institution review only.

SPELL Dry or wet spell duration

Decision example. Identify prolonged rainfall spells requiring advisory review.

Current rule. Use the exact DOMAIN-1 decision variant; the representative example does not establish all local applications.

$$dry\ run\ continues\ only\ across\ observed\ consecutive\ dry\ days$$

Inputs and units. Observation day; Daily rainfall (mm); Example dry-day threshold (mm); Day classified as dry when rainfall.

Worked example. DEC-DP08-002 — Rattota rainfall station scenario, 2025. Daily rainfall = 4 mm; Example dry-day threshold = 1 mm. Daily rainfall = 4 mm. Realistic sample data; the exact evidence fields remain in the decision register.

Input changes. Recalculate the same selected evidence; reject invalid components and keep missing values distinct from zero. Retain exact source and method versions in the output.

Procedure. Count consecutive dated observations satisfying the stated rainfall rule. Missing days interrupt a spell; do not count unknown rain as zero.

Limits. The example threshold is configurable and is not an official warning criterion.

Method sources. Validation required. Project rule or local adaptation. Sources and evidence are listed in the controlled decision register.

Domain variants. spell. Use the exact decision contract and unit in Decision_Register.csv; a family name alone does not establish equivalence. Confirm local choices in Institution review only.

SPI Standardized precipitation index

Decision example. Determine where historical rainfall supports SPI analysis.

Current rule. Use the exact DOMAIN-1 decision variant; the representative example does not establish all local applications.

display rainfall input; no SPI value is calculated here

Inputs and units. Complete comparable baseline years (years); Expected monthly observations (observations); Valid comparable monthly observations (observations); Proposed accumulation period; Station history and series homogeneity checked; Distribution fit and zero-rainfall handling documented.

Worked example. DEC-DP08-004 — Laggala Pallegama — drought monitoring, 2025. Complete comparable baseline years = 30 years; Expected monthly observations = 360 observations; Valid comparable monthly observations = 350 observations. Baseline completeness = 97.222 %; Missing monthly observations = 10 observations. Realistic sample data; the exact evidence fields remain in the decision register.

Input changes. Recalculate the same selected evidence; reject invalid components and keep missing values distinct from zero. Retain exact source and method versions in the output.

Procedure. Show valid/expected monthly coverage and complete baseline years. Assess distribution fit, zero rainfall, timescale and homogeneity separately; no SPI is invented.

Limits. WMO recommends a long rainfall record, ideally at least30 years. Readiness counts alone do not validate the fitted SPI method.

Method sources. Validation required. Project rule or local adaptation. Sources and evidence are listed in the controlled decision register.

Domain variants. spi. Use the exact decision contract and unit in Decision_Register.csv; a family name alone does not establish equivalence. Confirm local choices in Institution review only.

LOSS Loss measurement by supply chain stage

Decision example. Select crop stages needing loss-reduction measures.

Calculation or steps loss share = 100 × (input − saleable output − usable byproduct − closing stock) ÷ input.

Inputs and units. Batch input on stated moisture basis (kg); Saleable output (kg); Usable by-product (kg); Closing stock (kg); Documented transfers out (kg).

Worked example. DEC-DP03-014 — Laggala Pallegama — post-harvest loss, 2025. Batch input on stated moisture basis = 1,200 kg; Saleable output = 970 kg; Usable by-product = 85 kg; Closing stock = 45 kg; Documented transfers out = 20 kg. Unaccounted physical share = 6.667 %; Unaccounted mass = 80 kg. Realistic sample data; the exact evidence fields remain in the decision register.

Input changes. Recalculate the same selected evidence; reject invalid components and keep missing values distinct from zero. Retain exact source and method versions in the output.

Procedure. Unaccounted = input − saleable output − usable by-products − closing stock − transfers out. Share =100 × unaccounted / input.

Limits. Use a consistent moisture basis and process boundary. Unaccounted mass is not automatically avoidable food loss or spoilage.

Method sources. Validation required. Project rule or local adaptation. Sources and evidence are listed in the controlled decision register.

Domain variants. loss. Use the exact decision contract and unit in Decision_Register.csv; a family name alone does not establish equivalence. Confirm local choices in Institution review only.

MARGIN Enterprise gross margin and break even

Decision example. Identify crop enterprises with weak gross margins.

$$\text{gross margin} = \text{saleable quantity} \times \text{realized unit price} - \text{variable cost}$$

Inputs and units. Saleable output (kg); Realized price (LKR/kg); Variable costs (LKR); Matching crop area (ha).

Worked example. DEC-DP03-017 — Laggala Pallegama — farm income, 2025. Saleable output = 3,800 kg; Realized price = 112 LKR/kg; Variable costs = 295,000 LKR; Matching crop area = 1 ha. Enterprise gross margin = 130,600 LKR; Gross margin per hectare = 130,600 LKR/ha; Variable-cost break-even price = 77.632 LKR/kg. Realistic sample data; the exact evidence fields remain in the decision register.

Input changes. Recalculate the same selected evidence; reject invalid components and keep missing values distinct from zero. Retain exact source and method versions in the output.

Procedure. Gross margin = saleable output × realized price − variable costs. Divide by matching hectares for margin/ha; variable-cost break-even price = variable costs / output.

Limits. Keep fixed costs, family-labour opportunity cost, taxes and financing identifiable. Gross margin is not net profit.

Method sources. Verified published formula — Enterprise gross margin. Institution publication — Food and Agriculture Organization of the United Nations. Chapter 4, Gross margin and section 4.7.1. https://www.fao.org/4/W7365E/w7365e07.htm. Per-hectare and variable-cost break-even outputs are algebraic rearrangements. Local costs, prices and interpretation still need confirmation.

Domain variants. margin. Use the exact decision contract and unit in Decision_Register.csv; a family name alone does not establish equivalence. Confirm local choices in Institution review only.

SUITABILITY Expert reviewed suitability

Decision example. Shortlist land uses compatible with local conditions.

Current rule. Use the exact DOMAIN-1 decision variant; the representative example does not establish all local applications.

$$\textit{evidence gaps} = \textit{count}(\textit{missing or conflicting required items})$$

Inputs and units. Land polygon; Land polygon evidence reference; soil depth; soil depth evidence reference; slope degrees; slope degrees evidence reference; rainfall; rainfall evidence reference; water access; water access evidence reference; crop requirements; crop requirements evidence reference.

Worked example. DEC-DP01-005 — Laggala Pallegama — agricultural suitability, 2025. . Evidence gaps = 1 items. Realistic sample data; the exact evidence fields remain in the decision register.

Input changes. Recalculate the same selected evidence; reject invalid components and keep missing values distinct from zero. Retain exact source and method versions in the output.

Procedure. Check each required item and retain its reference. A documented item is not a scientific, legal or institutional approval.

Limits. Evidence completeness alone cannot establish suitability, eligibility, safety, permission or method validity.

Method sources. Validation required. Project rule or local adaptation. Sources and evidence are listed in the controlled decision register.

Domain variants. suitability. Use the exact decision contract and unit in Decision_Register.csv; a family name alone does not establish equivalence. Confirm local choices in Institution review only.

QUALITY Applicable quality limit comparison

Decision example. Refer nutrient and acidity limitations for agronomic advice.

Calculation or steps conforming share = 100 × checks recorded as conforming ÷ completed checks; exceptions = tested − conforming − awaiting interpretation.

Inputs and units. Parameter and applicable use; Measured result (pH); Example lower comparison bound (pH); Example upper comparison bound (pH); Original and limit unit; Sampling and analytical method/version; Limit source, version and use; Parameter, unit, use and averaging period match; Result is below a reporting/detection limit; Averaging interval, sampling depth or process basis.

Worked example. DEC-DP02-005 — Laggala Pallegama — soil fertility, 2025. Measured result = 6.2 pH; Example lower comparison bound = 5.5 pH; Example upper comparison bound = 7.5 pH. Measured value = 6.2 pH. Realistic sample data; the exact evidence fields remain in the decision register.

Input changes. Recalculate the same selected evidence; reject invalid components and keep missing values distinct from zero. Retain exact source and method versions in the output.

Procedure. Compare the measured value only with matching parameter, unit, use and averaging period. Retain limit source/version and censored-result status.

Limits. Example bounds establish no compliance or diagnosis. Ambient, drinking-water, effluent, crop, food, air and noise standards are not interchangeable. A censored result is not an exact zero.

Method sources. Validation required. Project rule or local adaptation. Sources and evidence are listed in the controlled decision register.

Domain variants. quality. Use the exact decision contract and unit in Decision_Register.csv; a family name alone does not establish equivalence. Confirm local choices in Institution review only.

SCHEDULE Resource constrained scheduling

Decision example. Schedule priority land-use map updates.

$$duration = end\ date - start\ date;\ check\ windows\ and\ conflicts$$

Inputs and units. Required resource; Task start; Task end; Earliest permitted start; Latest permitted finish; Required resource effort (hours); Available resource effort (hours); Predecessor task reference; Mandatory permits and prerequisites.

Worked example. DEC-DP01-020 — Laggala Pallegama — survey scheduling, 2025. Required resource effort = 16 hours; Available resource effort = 24 hours. Planned duration = 3 days; Resource hours remaining = 8 hours. Realistic sample data; the exact evidence fields remain in the decision register.

Input changes. Recalculate the same selected evidence; reject invalid components and keep missing values distinct from zero. Retain exact source and method versions in the output.

Procedure. Check start/end order, operating window, effort, predecessor completion and overlapping bookings for the same resource. A conflict is flagged; no optimal schedule is invented.

Method sources. Validation required. Project rule or local adaptation. Sources and evidence are listed in the controlled decision register.

Domain variants. schedule. Use the exact decision contract and unit in Decision_Register.csv; a family name alone does not establish equivalence. Confirm local choices in Institution review only.

YIELD Productivity and efficiency

Decision example. Select improvements for low water productivity.

Calculation or steps productivity = matching output ÷ resource input; multiply by 100 only for the declared output share variants.

Inputs and units. Saleable crop output (kg); Matching irrigation water input (m³).

Worked example. DEC-DP02-010 — Laggala Pallegama — on-farm irrigation, 2025. Saleable crop output = 19,780 kg; Matching irrigation water input = 7,200 m³. Crop water productivity = 2.747 kg/m³. Realistic sample data; the exact evidence fields remain in the decision register.

Input changes. Recalculate the same selected evidence; reject invalid components and keep missing values distinct from zero. Retain exact source and method versions in the output.

Procedure. Saleable crop output / Matching irrigation water input, for the same product, process and period.

Method sources. Validation required. Project rule or local adaptation. Sources and evidence are listed in the controlled decision register.

Domain variants. water productivity, crop yield, pump energy, drilling, labour, export unit value, resource efficiency, mass conversion, process energy. Use the exact decision contract and unit in Decision_Register.csv; a family name alone does not establish equivalence. Confirm local choices in Institution review only.

DISTRIBUTION Distribution and outlier review

Decision example. Identify markets requiring closer price-distribution study.

Current rule. Use the exact DOMAIN-1 decision variant; the representative example does not establish all local applications.

display comparable observations; no quartiles or outlier test is calculated here

Inputs and units. Comparable observation (LKR/kg).

Worked example. DEC-DP25-004 — Laggala Pallegama — market comparisons, 2025. Comparable observation = 104 LKR/kg. Observed value = 104 LKR/kg. Realistic sample data; the exact evidence fields remain in the decision register.

Input changes. Recalculate the same selected evidence; reject invalid components and keep missing values distinct from zero. Retain exact source and method versions in the output.

Procedure. Display observations in dated order. Sample SD uses n−1; coefficient of variation = 100 × SD / positive mean.

Limits. Match definitions, methods, grade, location and reference basis. Gaps are not joined. Descriptive variation is not a forecast, causal effect or significant trend.

Method sources. Validation required. Project rule or local adaptation. Sources and evidence are listed in the controlled decision register.

Domain variants. distribution. Use the exact decision contract and unit in Decision_Register.csv; a family name alone does not establish equivalence. Confirm local choices in Institution review only.

CONCENTRATION Concentration and dependence

Decision example. Identify excessive dependence on few export markets.

Calculation or steps concentration = sum of squared fractional category shares.

Inputs and units. Compatible category amount (LKR).

Worked example. DEC-DP26-002 — India, 2025. Compatible category amount = 95 LKR. Category amount = 95 LKR; Share of selected total = 4.762 %. Realistic sample data; the exact evidence fields remain in the decision register.

Input changes. Recalculate the same selected evidence; reject invalid components and keep missing values distinct from zero. Retain exact source and method versions in the output.

Procedure. Category share = 100 × category amount / total compatible category amounts. HHI = sum of squared fractional shares, displayed on a 0–1 scale.

Limits. Categories must be mutually exclusive and cover the stated frame. Do not mix values, quantities, plots or hectares, or treat an HHI competition threshold as an institutional policy.

Method sources. Verified published component — HHI concentration component. Government publication — United States Department of Justice. Definition and four-firm worked example. https://www.justice.gov/atr/herfindahl-hirschman-index. The screen uses fractional shares on a 0–1 scale, equivalent to the published percentage-share score divided by 10000. Local exposure categories and policy thresholds are not verified by this source.

Domain variants. concentration. Use the exact decision contract and unit in Decision_Register.csv; a family name alone does not establish equivalence. Confirm local choices in Institution review only.

MATCH Supply demand compatibility matching

Decision example. Match verified exporter offers with buyer requirements.

$$\text{supply difference} = \text{available uncommitted supply} - \text{requested demand}$$

Inputs and units. Offered product and grade; Required product and grade; Available uncommitted quantity (kg); Required quantity (kg); Supply available from; Supply available until; Delivery window begins; Delivery window ends; Required quality, rights and conditions.

Worked example. DEC-DP26-008 — Laggala Pallegama — buyer matching, 2025. Available uncommitted quantity = 1,200 kg; Required quantity = 1,500 kg. Supply minus demand = -300 kg. Realistic sample data; the exact evidence fields remain in the decision register.

Input changes. Recalculate the same selected evidence; reject invalid components and keep missing values distinct from zero. Retain exact source and method versions in the output.

Procedure. Compare the same specification and unit, uncommitted quantity and overlapping delivery windows. Keep mandatory quality and use conditions explicit.

Limits. A candidate match does not reserve stock, appoint a person, authorize waste reuse or form a contract.

Method sources. Validation required. Project rule or local adaptation. Sources and evidence are listed in the controlled decision register.

Domain variants. match, human match, plot match. Use the exact decision contract and unit in Decision_Register.csv; a family name alone does not establish equivalence. Confirm local choices in Institution review only.

CAPACITY Capacity gap assessment

Decision example. Allocate staff to agrarian centres with workload gaps.

capacity balance = usable staffed capacity − required capacity

Inputs and units. Demand in the selected period (staff hours); Rated capacity for that period (staff hours); Unavailable or restricted capacity (staff hours).

Worked example. DEC-DP04-014 — Laggala Pallegama — service centres, 2025. Demand in the selected period = 150 staff hours; Rated capacity for that period = 180 staff hours; Unavailable or restricted capacity = 45 staff hours. Usable capacity minus demand = -15 staff hours; Usable capacity = 135 staff hours. Realistic sample data; the exact evidence fields remain in the decision register.

Input changes. Recalculate the same selected evidence; reject invalid components and keep missing values distinct from zero. Retain exact source and method versions in the output.

Procedure. Usable capacity = rated capacity − documented unavailable capacity. Surplus/shortfall = usable − matching demand.

Limits. Match peak/average basis, time window, skill, staffing, accessibility and other binding constraints. One aggregate capacity does not override a safety constraint.

Method sources. Validation required. Project rule or local adaptation. Sources and evidence are listed in the controlled decision register.

Domain variants. capacity. Use the exact decision contract and unit in Decision_Register.csv; a family name alone does not establish equivalence. Confirm local choices in Institution review only.

RISK Reviewed risk and control assessment

Decision example. Prepare response options from authorized hydrological evidence.

Current rule. Use the exact DOMAIN-1 decision variant; the representative example does not establish all local applications.

display exposed units and verified controls; no risk score is calculated here

Inputs and units. River levels; River levels evidence reference; official forecast; official forecast evidence reference; flood exposure; flood exposure evidence reference; warning protocol; warning protocol evidence reference; evacuation constraints; evacuation constraints evidence reference; Documented unresolved critical condition; Evidence observation date; Existing control and its evidence; Competent recipient.

Worked example. DEC-DP05-006 — Laggala Pallegama — flood readiness, 2025. . Evidence gaps = 1 items. Realistic sample data; the exact evidence fields remain in the decision register.

Input changes. Recalculate the same selected evidence; reject invalid components and keep missing values distinct from zero. Retain exact source and method versions in the output.

Procedure. Check each required item and retain its reference. A documented item is not a scientific, legal or institutional approval.

Limits. Show the hazard, exposure and verified controls separately. No generic score, probability, diagnosis, site clearance or official warning is derived from a count.

Method sources. Validation required. Project rule or local adaptation. Sources and evidence are listed in the controlled decision register.

Domain variants. risk. Use the exact decision contract and unit in Decision_Register.csv; a family name alone does not establish equivalence. Confirm local choices in Institution review only.

INSPECT Inspection and evidence checklist

Decision example. Follow up incomplete conservation works.

Current rule. Use the exact DOMAIN-1 decision variant; the representative example does not establish all local applications.

$$evidence\ gaps\ =\ count(missing\ or\ conflicting\ required\ items)$$

Inputs and units. Work ID; Work ID evidence reference; approved design; approved design evidence reference; inspection items; inspection items evidence reference; photographs; photographs evidence reference; completion evidence; completion evidence evidence reference.

Worked example. DEC-DP02-012 — Laggala Pallegama — conservation inspection, 2025. . Evidence gaps = 1 items. Realistic sample data; the exact evidence fields remain in the decision register.

Input changes. Recalculate the same selected evidence; reject invalid components and keep missing values distinct from zero. Retain exact source and method versions in the output.

Procedure. Check each required item and retain its reference. A documented item is not a scientific, legal or institutional approval.

Limits. Evidence completeness alone cannot establish suitability, eligibility, safety, permission or method validity.

Method sources. Validation required. Project rule or local adaptation. Sources and evidence are listed in the controlled decision register.

Domain variants. inspect. Use the exact decision contract and unit in Decision_Register.csv; a family name alone does not establish equivalence. Confirm local choices in Institution review only.

ELIGIBILITY Rules based referral for authorized determination

Decision example. Refer land-conversion applications for determination.

Current rule. Use the exact DOMAIN-1 decision variant; the representative example does not establish all local applications.

$$evidence\ gaps\ =\ count(missing\ or\ conflicting\ required\ items)$$

Inputs and units. Application ID; Application ID evidence reference; current use; current use evidence reference; proposed use; proposed use evidence reference; ownership evidence; ownership evidence evidence reference; applicable rules; applicable rules evidence reference; objections; objections evidence reference.

Worked example. DEC-DP01-006 — Laggala Pallegama — land conversion, 2025. . Evidence gaps = 1 items. Realistic sample data; the exact evidence fields remain in the decision register.

Input changes. Recalculate the same selected evidence; reject invalid components and keep missing values distinct from zero. Retain exact source and method versions in the output.

Procedure. Check each required item and retain its reference. A documented item is not a scientific, legal or institutional approval.

Limits. Evidence completeness alone cannot establish suitability, eligibility, safety, permission or method validity.

Method sources. Validation required. Project rule or local adaptation. Sources and evidence are listed in the controlled decision register.

Domain variants. eligibility. Use the exact decision contract and unit in Decision_Register.csv; a family name alone does not establish equivalence. Confirm local choices in Institution review only.

FINANCE Discounted cash flow appraisal

Decision example. Appraise reservoir rehabilitation cash-flow alternatives.

Calculation or steps NPV = sum of annual net cash flow ÷ (1 + discount rate fraction) raised to the year, for years 1 to n, less initial investment.

Inputs and units. Initial investment (LKR); Net cash flow year1 (LKR); Net cash flow year2 (LKR); Net cash flow year3 (LKR); Net cash flow year4 (LKR); Net cash flow year5 (LKR); Residual value at end of year5 (LKR); Example discount rate (%).

Worked example. DEC-DP05-017 — Laggala Pallegama — rehabilitation investment, 2025. Initial investment = 2,400,000 LKR; Net cash flow year1 = 400,000 LKR; Net cash flow year2 = 550,000 LKR; Net cash flow year3 = 680,000 LKR; Net cash flow year4 = 720,000 LKR; Net cash flow year5 = 760,000 LKR; Residual value at end of year5 = 120,000 LKR; Example discount rate = 8 %. Five-year net present value = 109,847.353 LKR. Realistic sample data; the exact evidence fields remain in the decision register.

Input changes. Recalculate the same selected evidence; reject invalid components and keep missing values distinct from zero. Retain exact source and method versions in the output.

Procedure. NPV = −initial investment + sum of year1…5 net cash flows discounted at the stated annual rate, including residual value once in year5.

Limits. Match currency, price year, real/nominal basis and cash-flow timing. The example rate and five-year horizon are assumptions, not institutional financing terms; no credit approval follows.

Method sources. Verified published formula — Discounted cash-flow NPV. Institution publication — Food and Agriculture Organization of the United Nations. Sections 2.2.2 and 2.2.3, discounting and Net Present Value. https://www.fao.org/4/w8212e/w8212e06.htm. The five-year horizon, discount rate and cash assumptions are local settings. Verification does not approve an investment or loan.

Domain variants. finance. Use the exact decision contract and unit in Decision_Register.csv; a family name alone does not establish equivalence. Confirm local choices in Institution review only.

DEBT Debt service assessment

Decision example. Assess debt-service coverage under lender-defined scenarios.

debt service coverage = cash available for debt service ÷ scheduled principal and interest

Inputs and units. Cash available for debt service (LKR); Scheduled principal for same period (LKR); Scheduled interest for same period (LKR); Repayment and cash-flow period.

Worked example. DEC-DP38-002 — Laggala Pallegama — repayment capacity, 2025. Cash available for debt service = 860,000 LKR; Scheduled principal for same period = 500,000 LKR; Scheduled interest for same period = 120,000 LKR. Debt-service coverage = 1.387 ratio; Cash after scheduled debt service = 240,000 LKR. Realistic sample data; the exact evidence fields remain in the decision register.

Input changes. Recalculate the same selected evidence; reject invalid components and keep missing values distinct from zero. Retain exact source and method versions in the output.

Procedure. Debt-service coverage = cash available / (principal + interest) for the same period. Zero scheduled debt has no coverage ratio.

Limits. No lender covenant, credit decision, borrower eligibility or legal consequence is inferred. Seasonal repayment timing and downside scenarios remain explicit.

Method sources. Validation required. Project rule or local adaptation. Sources and evidence are listed in the controlled decision register.

Domain variants. debt. Use the exact decision contract and unit in Decision_Register.csv; a family name alone does not establish equivalence. Confirm local choices in Institution review only.

FUNDING Funding and commitment reconciliation

Decision example. Reconcile provincial agriculture funding and verified activities.

$$funding\ gap\ =\ financing\ need\ -\ confirmed\ commitments$$

Inputs and units. Approved financing need (LKR); Confirmed commitments (LKR); Funds actually disbursed (LKR); Verified eligible expenditure (LKR).

Worked example. DEC-DP10-017 — Laggala Pallegama — budget delivery, 2025. Approved financing need = 3,500,000 LKR; Confirmed commitments = 2,650,000 LKR; Funds actually disbursed = 1,640,000 LKR; Verified eligible expenditure = 1,200,000 LKR. Unfunded need = 850,000 LKR; Committed but not disbursed = 1,010,000 LKR; Disbursed but not spent = 440,000 LKR. Realistic sample data; the exact evidence fields remain in the decision register.

Input changes. Recalculate the same selected evidence; reject invalid components and keep missing values distinct from zero. Retain exact source and method versions in the output.

Procedure. Unfunded = need − commitments. Undisbursed = commitments − disbursements. Unspent = disbursements − eligible spending.

Limits. Keep commitments, cash receipts, expenditure and verified physical outputs separate. Negative balances flag overcommitment or reconciliation; no automatic accounting adjustment.

Method sources. Validation required. Project rule or local adaptation. Sources and evidence are listed in the controlled decision register.

Domain variants. funding. Use the exact decision contract and unit in Decision_Register.csv; a family name alone does not establish equivalence. Confirm local choices in Institution review only.

CARBON Carbon stock and stock change assessment

Decision example. Review inventory evidence for carbon-stock estimates.

carbon stock change = (current carbon density − baseline carbon density) × inventory area

Inputs and units. Earlier carbon density (t C/ha); Later carbon density (t C/ha); Same inventory area (ha); Included pools and allometry references.

Worked example. DEC-DP07-013 — Laggala Pallegama — forest carbon, 2025. Earlier carbon density = 100 t C/ha; Later carbon density = 90 t C/ha; Same inventory area = 85 ha. Carbon stock change = -850 t C; Carbon-density change = -10 t C/ha. Realistic sample data; the exact evidence fields remain in the decision register.

Input changes. Recalculate the same selected evidence; reject invalid components and keep missing values distinct from zero. Retain exact source and method versions in the output.

Procedure. (Later carbon density − earlier carbon density) × same inventory area, with identical pools, method and boundaries.

Limits. Inventory plots, allometry and uncertainty remain required evidence. Stock change is not an issued carbon credit, additionality test or payable service.

Method sources. Verified published component — Carbon stock-difference component. Institution publication — Intergovernmental Panel on Climate Change. Section 2.3.1.1, equation 2.8, stock-difference method. https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/4_Volume4/V4_02_Ch2_Generic.pdf. The screen reports the period total. IPCC annualisation requires elapsed years. Pools, inventory inputs and local application still need confirmation.

Domain variants. carbon. Use the exact decision contract and unit in Decision_Register.csv; a family name alone does not establish equivalence. Confirm local choices in Institution review only.

SOILCARBON Soil carbon stock comparison

Decision example. Select sites for comparable soil-carbon monitoring.

Calculation or steps soil carbon stock = carbon percent ÷ 100 × bulk density × depth × 10000 × (1 − coarse fragment percent ÷ 100).

Inputs and units. Soil organic carbon (%); Fine-earth bulk-density basis (t/m³); Sample depth (m); Coarse-fragment volume fraction (%); Sampling depth, design and density convention.

Worked example. DEC-DP02-004 — Laggala Pallegama — soil carbon, 2025. Soil organic carbon = 1.8 %; Fine-earth bulk-density basis = 1.25 t/m³; Sample depth = 0.3 m; Coarse-fragment volume fraction = 12 %. Soil-carbon stock = 59.4 t C/ha. Realistic sample data; the exact evidence fields remain in the decision register.

Input changes. Recalculate the same selected evidence; reject invalid components and keep missing values distinct from zero. Retain exact source and method versions in the output.

Procedure. (Organic carbon% /100) × bulk density × depth ×10000 × (1−coarse% /100). Confirm that the density and coarse-fragment conventions are mutually consistent.

Limits. A carbon concentration is not a stock. Change comparisons require consistent depth/mass, sampling, density convention and uncertainty review.

Method sources. Verified published formula — Soil-carbon stock with volume correction. Institution publication — Intergovernmental Panel on Climate Change. Section 4.3.3.5.4, equation 4.3.3, printed page 4.106, PDF page 18. https://www.ipcc-nggip.iges.or.jp/public/gpglulucf/gpglulucf_files/Chp4/Chp4_3_Projects.pdf. The screen

converts carbon percent to a fraction and uses the published coarse-fragment volume convention. Sampling and bulk-density conventions still need confirmation.

Domain variants. soilcarbon. Use the exact decision contract and unit in Decision_Register.csv; a family name alone does not establish equivalence. Confirm local choices in Institution review only.

BIODIVERSITY Comparable biodiversity assessment

Decision example. Select comparable forest biodiversity surveys.

Current rule. Use the exact DOMAIN-1 decision variant; the representative example does not establish all local applications.

display observed species richness alongside survey effort

Inputs and units. Observed distinct species (species); Survey effort (hours); Survey protocol and version; Survey season and taxonomic scope; All planned survey visits completed.

Worked example. DEC-DP07-018 — Laggala Pallegama — biodiversity monitoring, 2025. Observed distinct species = 28 species; Survey effort = 18 hours. Observed richness = 28 species; Recorded effort = 18 hours. Realistic sample data; the exact evidence fields remain in the decision register.

Input changes. Recalculate the same selected evidence; reject invalid components and keep missing values distinct from zero. Retain exact source and method versions in the output.

Procedure. Show distinct observed species with survey effort, protocol, season and completed visits. No correction for detection is silently inferred.

Limits. Observed richness is not population size or occupancy. Comparable effort alone does not remove detection bias or establish a biodiversity trend.

Method sources. Validation required. Project rule or local adaptation. Sources and evidence are listed in the controlled decision register.

Domain variants. biodiversity. Use the exact decision contract and unit in Decision_Register.csv; a family name alone does not establish equivalence. Confirm local choices in Institution review only.

IMPACT Outcome and attribution evaluation

Decision example. Evaluate conservation practice outcomes.

Calculation or steps difference in differences = (treatment after − treatment before) − (comparison after − comparison before).

Inputs and units. Treatment Measured runoff before (mm/season); Treatment Measured runoff after (mm/season); Comparison Measured runoff before (mm/season); Comparison

Measured runoff after (mm/season); Study design and comparability evidence; Outcome definition, method and reference basis.

Worked example. DEC-DP02-016 — Laggala Pallegama — demonstration trials, 2025. Treatment Measured runoff before = 42 mm/season; Treatment Measured runoff after = 59 mm/season; Comparison Measured runoff before = 39 mm/season; Comparison Measured runoff after = 46 mm/season. Difference in changes = 10 mm/season. Realistic sample data; the exact evidence fields remain in the decision register.

Input changes. Recalculate the same selected evidence; reject invalid components and keep missing values distinct from zero. Retain exact source and method versions in the output.

Procedure. (Treatment after−before) − (comparison after−before), using the same outcome definition and periods.

Limits. The arithmetic alone does not establish causation. Design, parallel trends, confounding, attrition, uncertainty and adverse effects need appropriate evidence.

Method sources. Verified published formula — Difference-in-differences arithmetic. Institution publication — World Bank. Chapter 7, table 7.2, printed page 140, PDF page 170. https://documents1.worldbank.org/curated/en/698441474029568469/pdf/Impact-evaluation-in-practice.pdf. The formula is verified. Causal interpretation still requires a defensible study design, comparison and assumptions.

Domain variants. impact, study design. Use the exact decision contract and unit in Decision_Register.csv; a family name alone does not establish equivalence. Confirm local choices in Institution review only.

PRICE Comparable market price analysis

Decision example. Investigate large comparable farmgate wholesale and retail spreads.

$$net\ quote\ return\ =\ sell\ \times\ (1\ -\ loss\ fraction)\ -\ buy\ -\ transfer\ cost$$

Inputs and units. Comparable purchase quotation (LKR/kg); Comparable selling quotation (LKR/kg); Non-overlapping transfer costs (LKR/kg); Expected saleable mass loss (%); Product, grade and price basis.

Worked example. DEC-DP25-001 — Laggala Pallegama — price spreads, 2025. Comparable purchase quotation = 180 LKR/kg; Comparable selling quotation = 222 LKR/kg; Non-overlapping transfer costs = 20 LKR/kg; Expected saleable mass loss = 5 %. Quoted net return per purchased kg = 10.9 LKR/kg; Unadjusted quoted spread = 42 LKR/kg. Realistic sample data; the exact evidence fields remain in the decision register.

Input changes. Recalculate the same selected evidence; reject invalid components and keep missing values distinct from zero. Retain exact source and method versions in the output.

Procedure. Quoted spread = sell−buy. Net scenario return per purchased kg = sell×(1−loss%/100)−buy−matching transfer costs.

Limits. Use matching grade, price date, currency, mass basis and payment terms. This quotation scenario excludes unlisted costs and is not realized profit or a forecast.

Method sources. Validation required. Project rule or local adaptation. Sources and evidence are listed in the controlled decision register.

Domain variants. price. Use the exact decision contract and unit in Decision_Register.csv; a family name alone does not establish equivalence. Confirm local choices in Institution review only.

VOLATILITY Price variability and seasonality

Decision example. Prioritize commodities with unusual price variability.

Current rule. Use the exact DOMAIN-1 decision variant; the representative example does not establish all local applications.

$$sample\ CV\ =\ 100\ \times\ sample\ SD\ \div\ positive\ mean$$

Inputs and units. Comparable observation (LKR/kg).

Worked example. DEC-DP25-002 — Laggala Pallegama — price volatility, 2025. Comparable observation = 104 LKR/kg. Observed value = 104 LKR/kg. Realistic sample data; the exact evidence fields remain in the decision register.

Input changes. Recalculate the same selected evidence; reject invalid components and keep missing values distinct from zero. Retain exact source and method versions in the output.

Procedure. Display observations in dated order. Sample SD uses n−1; coefficient of variation = 100 × SD / positive mean.

Limits. Match definitions, methods, grade, location and reference basis. Gaps are not joined. Descriptive variation is not a forecast, causal effect or significant trend.

Method sources. Verified published formula — Sample coefficient of variation. Government publication — National Institute of Standards and Technology United States. Description, sample coefficient of variation and ratio-scale restrictions. https://www.itl.nist.gov/div898/software/dataplot/refman2/auxillar/coefvari.htm. Use a meaningful zero and positive mean. Local series selection and decision limits still need confirmation.

Domain variants. volatility. Use the exact decision contract and unit in Decision_Register.csv; a family name alone does not establish equivalence. Confirm local choices in Institution review only.

INVENTORY Stock expiry and reorder planning

Decision example. Plan seed procurement against seasonal demand.

available stock = usable stock − confirmed commitments

Inputs and units. Physical stock (kg seed); Quarantined stock (kg seed); Expired stock (kg seed); Committed usable stock (kg seed); Additional demand (kg seed); Supplier lead time (days); Remaining shelf life of usable stock (days).

Worked example. DEC-DP03-010 — Laggala Pallegama — seed supply, 2025. Physical stock = 1,200 kg seed; Quarantined stock = 100 kg seed; Expired stock = 50 kg seed; Committed usable stock = 740 kg seed; Additional demand = 500 kg seed; Supplier lead time = 14 days; Remaining shelf life of usable stock = 30 days. Uncommitted usable stock = 310 kg seed; Additional demand gap = 190 kg seed. Realistic sample data; the exact evidence fields remain in the decision register.

Input changes. Recalculate the same selected evidence; reject invalid components and keep missing values distinct from zero. Retain exact source and method versions in the output.

Procedure. Usable = physical−quarantined−expired (non-overlapping groups). Available = usable−commitments. Additional gap = max(0, new demand−available).

Limits. Stock must be compatible by item, lot, condition, expiry and delivery window. Do not allocate quarantined/expired stock or silently erase overcommitment.

Method sources. Validation required. Project rule or local adaptation. Sources and evidence are listed in the controlled decision register.

Domain variants. inventory. Use the exact decision contract and unit in Decision_Register.csv; a family name alone does not establish equivalence. Confirm local choices in Institution review only.

MAINTENANCE Asset maintenance prioritization

Decision example. Prioritize repair packages within engineering and budget limits.

$$past\ due\ =\ max(0, assessment\ date\ -\ due\ date), when\ open$$

Inputs and units. Received or defect observed; Recorded due date; Assessment date; Case/work closed; Documented critical unresolved condition; Responsible office or maintainer; Actual closure date when closed.

Worked example. DEC-DP05-009 — Laggala Pallegama — canal rehabilitation, 2025. . Open days past due = 29 days; Calendar age = 90 days. Realistic sample data; the exact evidence fields remain in the decision register.

Input changes. Recalculate the same selected evidence; reject invalid components and keep missing values distinct from zero. Retain exact source and method versions in the output.

Procedure. Open age = assessment date − received date. Days past due = max(0, assessment date − recorded due date) for open cases. Show documented critical conditions separately.

Limits. Example due dates are not legal service standards. Do not alter statutory deadlines by silently subtracting pauses, or infer severity from age alone.

Method sources. Validation required. Project rule or local adaptation. Sources and evidence are listed in the controlled decision register.

Domain variants. maintenance. Use the exact decision contract and unit in Decision_Register.csv; a family name alone does not establish equivalence. Confirm local choices in Institution review only.

FLOW Process progression and conversion

Decision example. Follow up farmers who received technical guidance.

$$\text{completion share} = 100 \times \text{completed cases} \div \text{entered cases}$$

Inputs and units. Unique original cohort entrants (cases); Entrants reviewed (cases); Entrants with verified completion (cases); Entrants with unknown follow-up (cases).

Worked example. DEC-DP03-019 — Laggala Pallegama — advisory effectiveness, 2025. Unique original cohort entrants = 180 cases; Entrants reviewed = 132 cases; Entrants with verified completion = 96 cases; Entrants with unknown follow-up = 12 cases. Verified completion share = 53.333 %; Not verified complete = 84 cases. Realistic sample data; the exact evidence fields remain in the decision register.

Input changes. Recalculate the same selected evidence; reject invalid components and keep missing values distinct from zero. Retain exact source and method versions in the output.

Procedure. 100 × verified completed members / original unique cohort. Keep unknown follow-up separate; stages are nested, not independent populations.

Limits. Attendance, receipt, adoption, delivered service and outcomes are distinct stages. Repeated visits must not become new people.

Method sources. Validation required. Project rule or local adaptation. Sources and evidence are listed in the controlled decision register.

Domain variants. flow. Use the exact decision contract and unit in Decision_Register.csv; a family name alone does not establish equivalence. Confirm local choices in Institution review only.

ROUTE Access and logistics comparison

Decision example. Compare access improvements for isolated planning areas.

Current rule. Use the exact DOMAIN-1 decision variant; the representative example does not establish all local applications.

display supplied route distance, travel time and vehicle capacity; no route is calculated here

Inputs and units. Verified route distance (km); Estimated route travel time (minutes); Usable vehicle/team capacity (units); Required capacity (units); Access, closures and operating conditions; Operating and service window.

Worked example. DEC-DP01-014 — Laggala Pallegama — service access, 2025. Verified route distance = 24 km; Estimated route travel time = 65 minutes; Usable vehicle/team capacity = 18 units; Required capacity = 15 units. Estimated travel time = 65 minutes; Capacity minus demand = 3 units. Realistic sample data; the exact evidence fields remain in the decision register.

Input changes. Recalculate the same selected evidence; reject invalid components and keep missing values distinct from zero. Retain exact source and method versions in the output.

Procedure. Compare supplied route times/distances, usable capacity and documented access/window constraints. Display feasible candidates; no route optimization is implied.

Limits. Straight-line distance is not a road route. Example routes establish no current road status, emergency clearance or safe evacuation instruction.

Method sources. Validation required. Project rule or local adaptation. Sources and evidence are listed in the controlled decision register.

Domain variants. route. Use the exact decision contract and unit in Decision_Register.csv; a family name alone does not establish equivalence. Confirm local choices in Institution review only.

PES Environmental service verification and payment proposal

Decision example. DEC-DP39-011 — What payment can we propose?

payment proposal = min(verified service quantity × proposed contract rate, contract cap)

Inputs and units. Agreement and version; provider; payer; area meeting annual conditions (ha); illustrative annual rate (LKR/ha/year); annual cap (LKR/year); amount already paid (LKR); field-check, rights and funding evidence; available funds and references.

Worked example. Laggala Pallegama farmer group, 2025: 20 accepted ha × LKR 12,500 per ha/year = LKR 250,000, below the LKR 300,000 annual cap. Already paid = zero. Funding evidence is missing, so no amount is ready for authorisation. All figures are fictional.

Input changes. Recalculate the same selected evidence; reject invalid components and keep missing values distinct from zero. Retain exact source and method versions in the output.

Procedure. In the retained equation, verified service quantity means hectares meeting this annual agreement, rate means the illustrative annual rate and cap means the annual cap. Subtract payments for these same annual conditions to avoid paying twice. Check independent verification, rights and matching funds before referring the remaining proposal.

Limits. This is a project example, not a published PES tariff. Work compliance does not establish a measured ecosystem outcome, eligibility, entitlement or payment authorisation.

Method sources. FAO Working Paper 11-20, section 2, supplies PES context and cautions. It does not prescribe this rate, cap or payment rule. The local payment example requires validation.

PES decisions. DEC-DP39-002 checks physical work only. DEC-DP39-011 calculates the proposal. The 20 separate questions and required evidence are listed in section 6 4 and the decision register.

ACCOUNT Physical and monetary ecosystem accounting

Decision example. Prepare separate physical service accounts.

$$\text{closing physical stock} = \text{opening stock} + \text{additions} - \text{reductions}$$

Inputs and units. Opening ecosystem extent (ha); Extent additions (ha); Extent reductions (ha); Measured service flow in the period (physical service units); Service definition and flow unit; Separate monetary valuation method/price year.

Worked example. DEC-DP12-012 — Laggala Pallegama — ecosystem services, 2025. Opening ecosystem extent = 750 ha; Extent additions = 92 ha; Extent reductions = 48 ha; Measured service flow in the period = 1,200 physical service units. Closing ecosystem extent = 794 ha; Physical service flow = 1,200 physical service units. Realistic sample data; the exact evidence fields remain in the decision register.

Input changes. Recalculate the same selected evidence; reject invalid components and keep missing values distinct from zero. Retain exact source and method versions in the output.

Procedure. Closing extent = opening + additions − reductions. Record the period service flow separately; do not add a flow to an asset stock or multiply by an arbitrary PES rate.

Limits. Keep extent, condition, physical service flows and monetary accounts distinct. A defensible valuation method, price year and accounting boundary are needed for monetary results.

Method sources. Validation required. Project rule or local adaptation. Sources and evidence are listed in the controlled decision register.

Domain variants. account. Use the exact decision contract and unit in Decision_Register.csv; a family name alone does not establish equivalence. Confirm local choices in Institution review only.

CONSENT Consultation and unresolved condition review

Decision example. Resolve unresolved tenure objections before planning.

$$\text{response share} = 100 \times \text{participants responding} \div \text{invited participants}$$

Inputs and units. Distinct relevant people invited (people); People who responded (people); Unresolved issues (issues); Proposal/version being discussed; Required participation channels accessible.

Worked example. DEC-DP01-011 — Laggala Pallegama — tenure conflicts, 2025. Distinct relevant people invited = 95 people; People who responded = 68 people; Unresolved issues = 16 issues. Response share = 71.579 %; Unresolved issues = 16 issues. Realistic sample data; the exact evidence fields remain in the decision register.

Input changes. Recalculate the same selected evidence; reject invalid components and keep missing values distinct from zero. Retain exact source and method versions in the output.

Procedure. 100 × distinct respondents / invited people. Record unresolved issues individually; one respondent may raise several issues.

Limits. Response, attendance and silence are not consent. Participation does not transfer decision authority or settle rights.

Method sources. Validation required. Project rule or local adaptation. Sources and evidence are listed in the controlled decision register.

Domain variants. consent. Use the exact decision contract and unit in Decision_Register.csv; a family name alone does not establish equivalence. Confirm local choices in Institution review only.

ACCESS Permission and publication review

Decision example. Check source rights and approval before publishing products.

$$evidence\ gaps\ =\ count(missing\ or\ conflicting\ required\ items)$$

Inputs and units. Product version; Product version evidence reference; forecast validity; forecast validity evidence reference; review; review evidence reference; publication authority; publication authority evidence reference; license; license evidence reference; audience; audience evidence reference.

Worked example. DEC-DP08-020 — Laggala Pallegama — forecast publication, 2025. . Evidence gaps = 1 items. Realistic sample data; the exact evidence fields remain in the decision register.

Input changes. Recalculate the same selected evidence; reject invalid components and keep missing values distinct from zero. Retain exact source and method versions in the output.

Procedure. Check each required item and retain its reference. A documented item is not a scientific, legal or institutional approval.

Limits. Evidence completeness alone cannot establish suitability, eligibility, safety, permission or method validity.

Method sources. Validation required. Project rule or local adaptation. Sources and evidence are listed in the controlled decision register.

Domain variants. access. Use the exact decision contract and unit in Decision_Register.csv; a family name alone does not establish equivalence. Confirm local choices in Institution review only.

METADATA Dataset fitness and interoperability

Decision example. Correct incomplete land-use layer metadata.

Current rule. Use the exact DOMAIN-1 decision variant; the representative example does not establish all local applications.

$$evidence\ gaps\ =\ count(missing\ or\ conflicting\ required\ items)$$

Inputs and units. Layer ID; Layer ID evidence reference; scale; scale evidence reference; coordinate system; coordinate system evidence reference; classification edition; classification edition evidence reference; owner; owner evidence reference; survey date; survey date evidence reference.

Worked example. DEC-DP01-019 — Laggala Pallegama — map documentation, 2025. . Evidence gaps = 1 items. Realistic sample data; the exact evidence fields remain in the decision register.

Input changes. Recalculate the same selected evidence; reject invalid components and keep missing values distinct from zero. Retain exact source and method versions in the output.

Procedure. Check each required item and retain its reference. A documented item is not a scientific, legal or institutional approval.

Limits. Evidence completeness alone cannot establish suitability, eligibility, safety, permission or method validity.

Method sources. Validation required. Project rule or local adaptation. Sources and evidence are listed in the controlled decision register.

Domain variants. metadata. Use the exact decision contract and unit in Decision_Register.csv; a family name alone does not establish equivalence. Confirm local choices in Institution review only.

REPRODUCE Reproducibility and result verification

Decision example. Review reproducibility of soil and land assessments.

$$\text{reproduction difference} = \text{reproduced result} - \text{expected result}$$

Inputs and units. Earlier/source value (t/ha/year); Independently reproduced value (t/ha/year); Original measurement unit; Comparison measurement unit; Compared measure and definition; Documented absolute comparison tolerance (t/ha/year); Expected input/method version; Reproduced input/method version; Original result creator; Independent reproducer.

Worked example. DEC-DP02-020 — Laggala Pallegama — model assurance, 2025. Earlier/source value = 100 t/ha/year; Independently reproduced value = 90 t/ha/year; Documented absolute comparison tolerance = 0.01 t/ha/year. Difference = -10 t/ha/year; Relative change = -10 %. Realistic sample data; the exact evidence fields remain in the decision register.

Input changes. Recalculate the same selected evidence; reject invalid components and keep missing values distinct from zero. Retain exact source and method versions in the output.

Procedure. Reproduced minus expected result, within an explicitly supplied absolute tolerance, using the same exact input/method versions and a separate checker. Retain originals, code, parameters and environment evidence.

Method sources. Validation required. Project rule or local adaptation. Sources and evidence are listed in the controlled decision register.

Domain variants. reproduce. Use the exact decision contract and unit in Decision_Register.csv; a family name alone does not establish equivalence. Confirm local choices in Institution review only.

CLASSIFY Controlled classification and taxonomy review

Decision example. Reconcile inconsistent land and water system codes.

$$evidence\ gaps\ =\ count(missing\ or\ conflicting\ required\ items)$$

Inputs and units. Source system labels; Source system labels evidence reference; official system registry; official system registry evidence reference; geometry edition; geometry edition evidence reference; steward decisions; steward decisions evidence reference.

Worked example. DEC-DP06-020 — Laggala Pallegama — system reporting, 2025. . Evidence gaps = 1 items. Realistic sample data; the exact evidence fields remain in the decision register.

Input changes. Recalculate the same selected evidence; reject invalid components and keep missing values distinct from zero. Retain exact source and method versions in the output.

Procedure. Check each required item and retain its reference. A documented item is not a scientific, legal or institutional approval.

Limits. Evidence completeness alone cannot establish suitability, eligibility, safety, permission or method validity.

Method sources. Validation required. Project rule or local adaptation. Sources and evidence are listed in the controlled decision register.

Domain variants. classify. Use the exact decision contract and unit in Decision_Register.csv; a family name alone does not establish equivalence. Confirm local choices in Institution review only.

RELIABILITY Service reliability

Decision example. Prioritize aviation meteorological service interruptions.

availability = 100 × (scheduled service time − verified downtime) ÷ scheduled service time

Inputs and units. Scheduled observation window (hours); Union of qualifying outage intervals (hours); Eligible service requests (requests); Failed eligible requests (requests); Measured response time (ms).

Worked example. DEC-DP08-015 — Laggala Pallegama — aviation services, 2025. Scheduled observation window = 168 hours; Union of qualifying outage intervals = 13 hours; Eligible service requests = 1,000 requests; Failed eligible requests = 40 requests; Measured response time = 800 ms. Time availability = 92.262 %; Request success = 96 %; Measured response time = 800 ms. Realistic sample data; the exact evidence fields remain in the decision register.

Input changes. Recalculate the same selected evidence; reject invalid components and keep missing values distinct from zero. Retain exact source and method versions in the output.

Procedure. Time availability =100 ×(scheduled−non-overlapping outage)/scheduled. Request success =100 ×(requests−failed)/requests. Response time is a separate measure.

Limits. State maintenance exclusions, operating window, probe, workload and service objective. Observed response time is not a p95 claim unless the percentile is actually measured.

Method sources. Validation required. Project rule or local adaptation. Sources and evidence are listed in the controlled decision register.

Domain variants. reliability. Use the exact decision contract and unit in Decision_Register.csv; a family name alone does not establish equivalence. Confirm local choices in Institution review only.

NRW Non revenue water diagnosis

Decision example. Prioritize systems with large unexplained water balances.

Calculation or steps non revenue water = system input − billed authorized consumption; estimated real loss = input − billed − unbilled authorized use − apparent losses.

Inputs and units. Corrected system input (m³); Billed authorized consumption (m³); Unbilled authorized consumption (m³); Estimated apparent losses (m³).

Worked example. DEC-DP22-001 — Laggala Pallegama — non-revenue water, 2025. Corrected system input = 80,000 m³; Billed authorized consumption = 57,000 m³; Unbilled authorized consumption = 3,200 m³; Estimated apparent losses = 4,500 m³. Non-revenue water = 23,000 m³; NRW share = 28.75 %; Water losses = 19,800 m³; Residual real-loss estimate = 15,300 m³. Realistic sample data; the exact evidence fields remain in the decision register.

Input changes. Recalculate the same selected evidence; reject invalid components and keep missing values distinct from zero. Retain exact source and method versions in the output.

Procedure. NRW=input−billed authorized use. Water losses=NRW−unbilled authorized use. Residual real loss=water losses−estimated apparent losses, only when all components are available.

Limits. NRW is not all leakage. An unknown apparent-loss estimate keeps residual real loss unavailable. Meter uncertainty and matching time/zone boundaries matter.

Method sources. Verified published component — IWA water-balance components. Institution publication — Asian Development Bank. Figure 4, printed page 15; Annex 1 Water Balance Definitions, printed pages 39–41, PDF pages 47–49. https://www.adb.org/sites/default/files/publication/27473/reducing-nonrevenue-water.pdf. Apparent-loss estimates and the residual real-loss estimate remain local inputs with measurement uncertainty.

Domain variants. billed water, leakage evidence. Use the exact decision contract and unit in Decision_Register.csv; a family name alone does not establish equivalence. Confirm local choices in Institution review only.

STAR Specialist species threat and restoration appraisal

Decision example. Refer candidate conservation actions for specialist threat assessment.

Current rule. Use the exact DOMAIN-1 decision variant; the representative example does not establish all local applications.

$$evidence\ gaps\ =\ count(missing\ or\ conflicting\ required\ items)$$

Inputs and units. Species range; Species range evidence reference; threats; threats evidence reference; action feasibility; action feasibility evidence reference; threat reduction

evidence; threat reduction evidence evidence reference; uncertainty; uncertainty evidence reference.

Worked example. DEC-DP19-004 — Laggala Pallegama — threat reduction, 2025. . Evidence gaps = 1 items. Realistic sample data; the exact evidence fields remain in the decision register.

Input changes. Recalculate the same selected evidence; reject invalid components and keep missing values distinct from zero. Retain exact source and method versions in the output.

Procedure. Check each required item and retain its reference. A documented item is not a scientific, legal or institutional approval.

Limits. Evidence completeness alone cannot establish suitability, eligibility, safety, permission or method validity.

Method sources. Validation required. Project rule or local adaptation. Sources and evidence are listed in the controlled decision register.

Domain variants. star. Use the exact decision contract and unit in Decision_Register.csv; a family name alone does not establish equivalence. Confirm local choices in Institution review only.

SURVEY Design based statistical estimation

Decision example. Select defensible geographic poverty and income comparisons.

Calculation or steps weighted mean = sum of weight × observation ÷ sum of weights.

Inputs and units. Final design weight (weight); Observed variable (LKR/household); Stratum and primary sampling unit.

Worked example. DEC-DP20-002 — Laggala Pallegama — poverty reporting, 2025. Final design weight = 2 weight; Observed variable = 68,000 LKR/household. Observed variable = 68,000 LKR/household. Realistic sample data; the exact evidence fields remain in the decision register.

Input changes. Recalculate the same selected evidence; reject invalid components and keep missing values distinct from zero. Retain exact source and method versions in the output.

Procedure. Weighted mean = sum(weight×observation)/sum(weight). Estimated total = sum(weight×observation), only for weights and population coverage suitable for that estimand.

Limits. Retain sampling frame, strata, clusters, nonresponse and calibration. The prototype does not invent complex-design variance, confidence intervals or small-area precision.

Method sources. Verified published component — Weighted estimation component. Institution publication — United Nations Statistics Division. Chapter 9, paragraphs 38 and 39, printed page 9-9, PDF page 417; Chapter 8 weighting.

https://unstats.un.org/UNSDWebsite/statcom/session_57/documents/BG-3k-Handbook_on_Surveys_of_Household_and_Individuals-E.pdf. Local weights, population coverage, design variance and ratio-yield interpretation still need confirmation. Positive illustrative weights do not demonstrate every calibration design.

Domain variants. weighted proportion, survey, survey precision, weighted area production. Use the exact decision contract and unit in Decision_Register.csv; a family name alone does not establish equivalence. Confirm local choices in Institution review only.

FORECAST Forecast verification

Decision example. Review forecast errors before operational changes.

Calculation or steps error = forecast − observed; RMSE = square root of mean squared errors.

Inputs and units. Archived forecast rainfall (mm); Verifying observed rainfall (mm); Forecast lead time (hours); Forecast issue date; Forecast valid date.

Worked example. DEC-DP08-007 — Laggala Pallegama — forecast verification, 2025. Archived forecast rainfall = 48 mm; Verifying observed rainfall = 41.76 mm; Forecast lead time = 24 hours. Forecast minus observed = 6.24 mm. Realistic sample data; the exact evidence fields remain in the decision register.

Input changes. Recalculate the same selected evidence; reject invalid components and keep missing values distinct from zero. Retain exact source and method versions in the output.

Procedure. Error=forecast−observed. Matched-pair RMSE=sqrt(mean(error²)); MAE=mean(abs(error)); bias=mean(error).

Limits. Match lead, valid interval, location, variable, units and observation quality. Do not verify a forecast against data available when it was issued.

Method sources. Verified published formula — Matched-pair RMSE. Government publication — Environment and Climate Change Canada. Displayed RMSE equation and definitions of forecast, observation and verification count. https://weather.gc.ca/verification/scores/rmse_e.html. Local verification periods, observation quality and forecast applicability still need confirmation.

Domain variants. forecast, probability forecast. Use the exact decision contract and unit in Decision_Register.csv; a family name alone does not establish equivalence. Confirm local choices in Institution review only.

4 Retained method references

Method References is the controlled catalogue of all 139 retained definitions. Each row preserves the original formula or procedure, inputs, units, limits and context link. Its category identifies direct publication support or Validation required, with the publisher and method-source locator where checked. Family mappings are candidates only. A published retained method is not implemented merely because a related prototype screen exists.

The source register separates link access from formula support. Official alternatives are now linked for the three previously unavailable entries, so all 33 follow-up entries have readable preferred references. The LUPPD report and FAO guide support planning context; they are not approved replacements for the local divisional manual. Experts must still confirm each selected method, source edition, units and local suitability.

NF012 is an absolute forecast error; VARIANCE is a signed plan difference. NF147 specifies discounted payback, but its linked appraisal and the current cash flow helper use simple or undiscounted payback. NF049 to NF053 and NF055 to NF058 use a water-stress context link that does not establish their methods. NF107 parameter compliance is not the full SDG 6.3.2 water-body indicator. These methods remain separate review questions.

Open all 139 retained method references

5 Sources

Calculation Sources contains all 133 records, original links, checked alternatives, locators and access results. S01 links the LUPPD report hosted by Parliament; NF-SOURCE-04 links FAO planning guidance; NF-SOURCE-12 links a HARTI price bulletin with market, unit and date columns. The original LUPPD manual was not recovered. Local procedure, data rights and method acceptance remain pending in Institution review.

S69 FAO 56: crop evapotranspiration

Published method. FAO 56 Chapter 5 equation 56; ETc = Kc × ETo. Retrieved text for review.

Open source

S71 IUCN Species Threat Abatement and Restoration metric

Published specialist method overview. Scientific underpinning and approach; full STAR calculation is not implemented. Retrieved text for review.

Open source

S72 IWA non-revenue water management

Published definition. Opening NRW definition; detailed water audit protocol not supplied. Retrieved text for review.

Open source

S75 Environment Canada: root mean squared error

Published method. What is Root Mean Square Error; displayed formula. Retrieved text for review.

Open source

S76 FAO enterprise and activity budgeting

Published method. Section 4.3.8 Gross margin; section 4.7 Parametric budgeting. Retrieved text for review.

Open source

PROTO SHARED prototype calculation and workflow implementation

Project implementation. DecisionSupportModel.spec/project and named model functions in each entry. Read only prototype inspection.

Open source

SRS SHARED Software Requirements Specification

Project requirement. Sections 5.4, 10, 12 and named requirement IDs in each rule. Version 1.6.

Open source

S78 FAO Irrigation Water Management Training Manual 3

Published method. Chapter 4.4 Irrigation water need of rice; steps 1 to 8. Method text checked.

Open source

S79 IPCC 2006 Guidelines Volume 4 Chapter 2

Published method. Sections 2.2.3, 2.3.1 and 2.3.3; soil stock guidance printed page 2.37. Method text checked.

Open source

S80 USDA Forest Service A guide for predicting sheet and rill erosion on forest land

Historical published method. Universal Soil Loss Equation and Applying the USLE; printed page 2. Historical method text checked; current local calibration not established.

Open source

S81 FAO Guidelines for financial economic environmental and social information

Published method. Net Present Value and Internal Rate of Return subsections. Method text checked.

Open source

S82 WMO Standardized Precipitation Index User Guide

Published method. WMO No 1090; SPI calculation and interpretation guidance. Full guide checked; local fit and baseline pending.

Open source

S83 US Department of Justice Herfindahl Hirschman Index

Published definition. Definition of the sum of squared market shares. Definition checked; US legal thresholds do not apply to this project.

Open source

S84 NIST Coefficient of Variation

Published definition. Description of sample CV and ratio scale restriction. Definition checked.

Open source

S85 Turf area API

Software method. Version 7.2.0 area; square metres. Documentation checked.

Open source

S86 Turf distance API

Software method. Version 7.2.0 distance; Haversine method. Documentation checked.

Open source

S87 Turf length API

Software method. Version 7.2.0 length; selected units. Documentation checked.

Open source

S88 Turf buffer API

Software method. Version 7.2.0 buffer; radius and steps. Documentation checked.

Open source

S89 Turf intersect API

Software method. Version 7.2.0 intersect; polygon intersection. Documentation checked.

Open source

S90 Turf point in polygon API

Software method. Version 7.2.0 booleanPointInPolygon; boundary option. Documentation checked.

Open source

S91 UN Handbook of Surveys on Households and Individuals

Published guidance. Chapter 9 section 9.4.2, equation 9-16, printed page 9-19 (PDF page 427); Chapter 8 weighting; Final Draft. Weighting guidance checked; draft status retained.

Open source

S92 World Bank Impact Evaluation in Practice Second Edition

Published method. Chapter 7 Difference in Differences. Method text checked.

Open source

Specific source limits remain open: S16 needs custodian confirmation of jurisdiction; S51 does not establish the intended budgeting guide; S72 gives the NRW definition but not the full utility audit protocol. S80 is a historical USLE source, not a current local calibration. The WMO SPI guide and IUCN STAR overview do not make those full methods implemented in the prototype.

6 Approval and acceptance

Use published methods as their documented basis. Check the exact source and the copied calculation once. Ask the client or expert to confirm only local use, project choices and new or changed rules. Review each shared method once and list where it is used.

Published methods and sources

The core methods below already have a published basis. They do not need to be proved again for every screen. Their local inputs, settings, suitability and intended use remain subject to the confirmation list below. A published reference does not mean that the prototype implements the full method.

Published method	Publication and locator	Local use
Sheet and rill erosion EROSION, NF023	S80 USDA Forest Service A guide for predicting sheet and rill erosion on forest land. Universal Soil Loss Equation and Applying the USLE; printed page 2 NF-SOURCE-03 FAO Revised Universal Soil Loss Equation toolbox. FAO RUSLE toolbox: equation A = R K L S C P and factor definitions	The USDA source is historical. Confirm current local factors and suitability.
Enterprise gross margin MARGIN	S76 FAO enterprise and activity budgeting. Section 4.3.8 Gross margin; section 4.7 Parametric budgeting	Confirm which revenue and variable costs are included.
Net present value FINANCE	S81 FAO Guidelines for financial economic environmental and social information. Net Present Value and Internal Rate of Return subsections	Confirm cash flows, price basis and discount rate.
Soil carbon stock SOILCARBON, NF034	S79 IPCC 2006 Guidelines Volume 4 Chapter 2. Sections 2.2.3, 2.3.1 and 2.3.3; soil stock guidance printed page 2.37	Confirm sampling, depth, bulk density, units and coarse-fragment basis.

Published method	Publication and locator	Local use
Impact comparison using difference in differences IMPACT	S92 World Bank Impact Evaluation in Practice Second Edition. Chapter 7 Difference in Differences	Confirm the comparison group and study assumptions.
Weighted mean SURVEY	S91 UN Handbook of Surveys on Households and Individuals. Chapter 9 section 9.4.2, equation 9-16, printed page 9-19 (PDF page 427); Chapter 8 weighting; Final Draft	The cited UN handbook is a Final Draft. Confirm the survey design and weights. This citation does not cover every pooled-rate rule.
Forecast error using RMSE FORECAST	S75 Environment Canada: root mean squared error. What is Root Mean Square Error; displayed formula	Confirm matching observations, locations, periods and forecast lead times.
Paddy irrigation depth requirement NF037	S78 FAO Irrigation Water Management Training Manual 3. Chapter 4.4 Irrigation water need of rice; steps 1 to 8	Confirm crop stage, soil, rainfall and water-management inputs.
Coefficient of variation NF086, NF115	S84 NIST Coefficient of Variation. Description of sample CV and ratio scale restriction	Confirm compatible observations and a meaningful positive mean. It is not a return-volatility method.
Standardized Precipitation Index NF095	S82 WMO Standardized Precipitation Index User Guide. WMO No 1090; SPI calculation and interpretation guidance	Confirm the rainfall record, fitting procedure and local interpretation. The separate SPI demonstration remains Validation required.

How to check each item

Category	Check needed
Government publication	Record the government publisher, publication, edition and exact page or section. Confirm local inputs and settings where needed.

Category	Check needed
Institution publication	Record the institution, publication, edition and exact page or section. Keep draft and historical status visible. Confirm local inputs and settings where needed.
Validation required	Review new or changed domain rules, incomplete source matches and local assumptions. A data table or background page alone does not support a formula.
Software check	The developer tests the copied formula, arithmetic, units and invalid or missing inputs. Ordinary arithmetic does not need separate scientific approval.

Client and expert decisions

These decisions remain pending in Institution review. Each decision should state what was checked, who checked it, the outcome and any conditions. One review can cover the same method used by several screens.

Topic	What to confirm	Who
Scope and institutions C01, C02, C12	Confirm the final features, proposed decisions, participating institutions and what stays in existing tools.	Client
Responsibilities C02	Name who owns data, submits records, reviews them and approves sharing.	Client and institutions
Maps and boundaries C03	Confirm official boundaries and area codes. Resolve the different GN totals.	Data custodian and GIS expert
Data sources C04	Confirm datasets, fields, units, update frequency and access or sharing conditions.	Source institutions
Privacy C05	Confirm access to personal records, sensitive locations and retention periods.	Client and privacy specialist
New or changed calculations E01	Review proposed scores, weights, thresholds, missing-value rules and method changes. For published methods, confirm local inputs, units, settings and intended use.	Relevant expert or statistician

Topic	What to confirm	Who
Land soil and water methods E02	Confirm local suitability, sampling, laboratory methods and model factors.	Relevant domain experts
Ecosystem services and PES E03	Confirm eligibility, rights, rates, safeguards, verification and payment authority.	Client and relevant experts
Indicators and payments C10	Confirm indicator definitions, acceptance measures, milestones and payment weights.	Client and monitoring or finance specialists
Languages and access needs C06	Confirm wording, supported devices and accessibility requirements.	Client and representative users
Technical choices and service targets C07, C08	Agree architecture, hosting, operator, costs, performance, security and recovery targets.	Client and technical adviser
Complaints and appeals C09	Confirm receiving officers, response times and the appeal process.	Client
Final SRS acceptance C11	Confirm consultation comments, agreed revisions, validation, final presentation and final acceptance.	Authorized client representative

Source details to confirm

LUPPD: the alternative publications provide planning context. The applicable local planning procedure still needs confirmation under C04 and E02.

HARTI: the published prices support the quoted observations. They do not automatically support proposed volatility, spread or other analysis; review these under C04 and E01.

Live-system security, load and recovery tests belong to implementation. The SRS needs agreed requirements and a test plan. No separate expert approval is needed for each mock screen or repeated calculation.

Record decisions in Institution review only. Keep the source reference, method and affected uses with the decision. A changed method or changed local settings needs a new review of the change; an unchanged shared method can reuse the recorded decision.

The rice-plot examples NF001 and NF002 use fictional grouped counts; plot identity and local category definitions still need confirmation. The disputed PMU finance and procurement examples remain proposed until the client confirms scope.

6 1 Architecture Rules and Worked Examples

Category: Validation required. Source: prototype model functions capacity, expertReport, intervalAggregate, rasterExample, evolutionDemo, extractionDemo and canRead; storage proposals use the versioned architecture catalogue. These project-defined demonstrations extend SRS section 10.9. Named official references support only their stated components, not local adoption. The model, worked examples, field mappings and exact source locators are supplied at system-diagrams/data-architecture-model.js and data-architecture-research.json. Device specifications establish neither local scientific suitability nor access permission.

Packet counts and storage arithmetic

Scalar observations per day = devices × observed properties × samples per day. Packets per day = devices × transmissions per day when one transmission contains all the properties. For 100 stations and one-minute reporting: 100 × 10 × 1,440 = 1,440,000 scalar observations/day, while 100 × 1,440 = 144,000 packets/day. Database rows depend on the chosen packet and observation representation. Bytes/day must use declared measured or assumed bytes per packet and scalar record, plus separate index, projection, file and backup allowances. These are sizing illustrations, not benchmarks or prices.

Cultivation fact grain and annual aggregation

Keep one value per source release, area/boundary version, crop category, season and year. Reject duplicate category-season keys and overlapping definitions before aggregation. Sum compatible seasonal hectares into gross annual cultivated area. Do not call this unique physical land area without plot geometry and an approved union method. Preserve source coverage, missing values and the category definition used in the saved report. A later category crosswalk creates a new projection version; earlier reports retain their original categories.

Weather facts and safe joins

Keep rainfall accumulation and temperature intervals independent from cultivation facts. Reconcile duplicate intervals, counter resets and corrections before accumulating rainfall. Average compatible temperature measurements using explicit duration or approved spatial weights. Required missing coverage withholds a complete annual result. Aggregate weather to one compatible area-year result before joining cultivation categories. One weather result can be displayed beside several categories, but must not be summed once per category. A station point represents its recorded location; district coverage requires a reviewed mapping and weighting method.

Raster example

A rainfall or vegetation raster product retains provider/product version, grid, time step, variable or band, unit, resolution, no-data and quality masks, coordinate system and licence. Align grids using declared reprojection and resampling appropriate to the variable. Preserve masks and cell areas for zonal extraction. Sum rainfall only over compatible time intervals and valid coverage. Use area-weighted means for compatible cell values; do not mix differing resolutions or treat masked cells as zero. Record chunking, input asset references, boundary version and extraction-method version so a revised source or boundary triggers an identifiable rebuild.

Four definition-change examples

Soil electrical conductivity: add a versioned optional attribute with an explicit unit, method, sampling context and effective date. Older records remain not collected rather than zero. Crop reclassification: retain the original category edition and apply a reviewed many-to-many crosswalk only in a new report version. Station relocation: create a new deployment/location interval and link readings to the deployment effective at measurement time. Reservoir capacity: retain separate institution-owned gross and effective capacity claims with units, level/datum context, source editions and periods. Neither a similar label nor a newer receipt silently chooses the authoritative claim.

AI candidate checks

An extraction result must identify the exact source version and evidence spans. An unknown unit, ambiguous place, missing total or unresolved field remains unresolved. Parse and reconcile reliable structured tables deterministically, using AI only where the selected method adds value. Validate candidate types, units, periods, geography and totals, then display the source and editable candidate side by side. Only an explicit authorised review commits the candidate in the simulation. A schema-conforming response or an invented confidence number does not establish factual accuracy.

Source rights and derived outputs

Derived rows, map tiles, aggregates, report artifacts and retrieval chunks retain source-version dependencies. A read or export applies current actor access and current source rights. A withdrawal invalidates affected caches and prevents new public retrieval and exports, even before a full index rebuild. Retain historical material only under an explicit restricted retention policy. A withdrawn source must not remain available through a stale cached report. Copies already downloaded outside the platform cannot be recalled by this demonstration.

Storage options and upgrade decisions

Option A is the starting point: the existing modular application, operational/geospatial capability, protected files and bounded analytical views. Choose Option B when measured cross-domain query cost or repeatable reporting needs justify a governed mart, semantic measures and selected cubes or retrieval indexes. Choose Option C only when measured telemetry throughput, stream latency, raster volume or research queries justify specialist engines. Set and measure the required workload, lag, query and recovery budgets before adoption. Do not install every logical store or assume that a vector index, relational store and OLAP cube are interchangeable.

Provider and evaluation evidence

The research catalogue separates documentation, successful bounded public reads, credential-blocked integration and simulated adapters. It retains official URLs, supporting sections, source dates, measured variables, protocols, access and reuse limits. The local AI evaluation uses a small synthetic set with exact expected fields, missing values, ambiguous units and corrected evidence. It reports field correctness and unresolved review work rather than a successful network response. Representative Sinhala or Tamil evaluation remains dependent on an appropriate reviewed corpus. No private document is transmitted to an AI provider by this prototype.

Synthetic Polonnaruwa calculation results

Reporting years end in August. Maha is attributed to its ending year and Yala to that same year; the weather interval runs from September of the preceding year through August. This is an explicit demonstration policy based on the documented season boundaries, not an approved institutional reporting rule. The synthetic grid weights are 0.25 and 0.75.

Reporting year 2023 (2022-09-01 to 2023-08-31): category areas A: 100; B: 60 ha; gross seasonal cultivated area 160 ha; area-weighted annual rainfall 1300 mm; temperature 28.5 degrees C. Unique physical land area is unavailable without plot/overlap evidence.

Reporting year 2024 (2023-09-01 to 2024-08-31): category areas A: 120; B: 80 ha; gross seasonal cultivated area 200 ha; area-weighted annual rainfall 1500 mm; temperature 29.5 degrees C. Unique physical land area is unavailable without plot/overlap evidence.

The 2023 rainfall calculation is 0.25 × 1,000 + 0.75 × 1,400 = 1,300 mm. Temperature is 0.25 × 27 + 0.75 × 29 = 28.5 degrees C because the two grid summaries cover the same full reporting interval. The 2024 figures use the corresponding complete 366-day interval. These weather values are calculated once before joining the category summaries.

A rerun after correction creates a new source/method snapshot and preserves the original manifest. The ordinary report wizard exposes missing weather coverage, incompatible periods, repeated categories, restricted sources and ambiguous meanings as failures rather than plausible numbers. Exact manifest fields and rows are supplied in the downloadable worked example.

Research and integration catalogue

The following are documented, replaceable examples. Source permissions, regional variants, calibration, siting, local network compatibility and operational acceptance must be confirmed before use. The controlled JSON catalogue supplies the full variable, accuracy, protocol, equipment, access and evidence records.

ClimaVue 50 G2, item 43314

Exact model and configuration: ClimaVue 50 G2, item 43314

Manufacturer: Campbell Scientific

Classification: Compact weather sensor; not a complete Internet station

Measured variables

Air temperature (°C): ±0.6 °C. Published measuring range −50 to +60 °C; siting and radiation correction apply. Sources: ARC-S01; ARC-S43; ARC-S44.

Rain accumulation/rate (mm / mm/h): ±5% of measurement. 0–1, 000 mm/h accuracy band; measurement range to 1, 500 mm/h. Liquid precipitation only. Sources: ARC-S01; ARC-S43; ARC-S44.

Relative humidity (%RH): ±2.5% RH typical on current product page. Temperature/humidity dependent; older indexed manual states ±3% RH typical. Supplier must resolve revision. Sources: ARC-S01; ARC-S43; ARC-S44.

Barometric pressure (hPa): ±0.1 hPa at −10 to +50 °C; ±0.5 hPa at −40 to +60 °C on current page. Older indexed manual states ±5 hPa at 25 °C. Do not combine these as equivalent specifications. Sources: ARC-S01; ARC-S43; ARC-S44.

Wind speed (m/s): 0.3 m/s or 6%, whichever is greater. Published range 0–60 m/s; site exposure applies. Sources: ARC-S01; ARC-S43; ARC-S44.

Wind direction (degrees): ±5°. Published 0–359° range; orientation must be recorded. Sources: ARC-S01; ARC-S43; ARC-S44.

Solar radiation (W/m²): ±5% of measurement, typical. Published 0–1, 750 W/m² range; keep sensor level. Sources: ARC-S01; ARC-S43; ARC-S44.

Vapour pressure (kPa): ±0.2 kPa typical below 40 °C. Calculated from temperature/humidity; accuracy varies with both. Sources: ARC-S01; ARC-S43; ARC-S44.

Tilt (degrees): ±1°. Published 0–180° range; supporting instrument-health variable. Sources: ARC-S01; ARC-S43; ARC-S44.

Lightning strike count (strikes): >25% detection at distances under 10 km, typical. Detection varies with distance; not warning authority. Sources: ARC-S01; ARC-S43; ARC-S44.

Lightning average distance (km): Variable; no fixed accuracy adopted. Published 0–40 km range and 3 km resolution. Sources: ARC-S01; ARC-S43; ARC-S44.

Precipitation electrical conductivity (Not confirmed in reviewed specification extract): Not confirmed. Listed among measurements; obtain exact field/unit/method before enabling mapping. Sources: ARC-S01; ARC-S43; ARC-S44.

Accuracy: Temperature ±0.6 °C; rain ±5% at 0–1, 000 mm/h. Variable-specific conditions and the RH/pressure document discrepancy are listed below. Supplier confirmation is required before procurement or scientific use.

Protocol: SDI-12. Overview identifies an eight-pin M12 connector; the specification also uses AQ terminology. Confirm the delivered cable/connector and compatible logger.

Equipment: Compatible SDI-12 logger. Aspen10 is documented; mounting, power and permitted network are separate components.

Power: 3.6–15 V DC. At 12 V: 1.0 mA average using R7! every 10 s; 0.4 mA every 60 s or slower; peak 33 mA. Size logger, modem and power reserve separately.

Connectivity: Logger/edge uplink. No direct sensor web API established.

Maintenance: Check tilt/level and funnel contamination; retain service/calibration record.

Data access: Authorised logger export/adapter into common intake.

Restrictions: No heated solid-precipitation capability. Product/manual discrepancies need supplier resolution. Lightning detection is not an authorised hazard warning.

Local uncertainties: Local availability, scientific approval, installation design, radio/network suitability and institutional acceptance remain unverified.

Downstream use: Weather observations and coverage-aware Expert Hub comparisons.

Source date: 2026-11-02

Status: Optional extension; researched documentation only

Cost category: Current local quotation and lifetime operating cost not established.

Sources: ARC-S01; ARC-S43; ARC-S44

WXT536 within WXT530 series

Exact model and configuration: WXT536 within WXT530 series

Manufacturer: Vaisala

Classification: Weather transmitter; logger,power and communication unit separate

Measured variables

Temperature (°C): ±0.3 °C at +20 °C for the sensor element. Naturally aspirated shield can affect readings in calm wind. Sources: ARC-S02; ARC-S03; ARC-S04; ARC-S40.

Relative humidity (%RH): ±3% RH at 0–90% RH; ±5% RH at 90–100% RH. Sensor-element specification; natural aspiration caveat applies. Sources: ARC-S02; ARC-S03; ARC-S04; ARC-S40.

Pressure (hPa): ±0.5 hPa at 0 to +30 °C; ±1 hPa at −52 to +60 °C. Specified for 600–1, 100 hPa. Sources: ARC-S02; ARC-S03; ARC-S04; ARC-S40.

Rain accumulation/intensity (mm / mm/h): Better than 5% for daily accumulation, weather dependent. Liquid precipitation; excludes wind-induced error. Totals are cumulative since reset. Intensity range 0–200 mm/h, wider with reduced accuracy. Sources: ARC-S02; ARC-S03; ARC-S04; ARC-S40.

Wind speed (m/s): ±3% at 10 m/s. Observation range 0–60 m/s. Sources: ARC-S02; ARC-S03; ARC-S04; ARC-S40.

Wind direction (degrees): ±3° at 10 m/s. Averaging interval and sampling rate are configurable. Sources: ARC-S02; ARC-S03; ARC-S04; ARC-S40.

Hail detection/intensity (hits/cm² / hits/(cm²·h)): No fixed hail accuracy adopted. Manufacturer reports hail-hit outputs; do not convert these to rainfall volume. Sources: ARC-S02; ARC-S03; ARC-S04; ARC-S40.

Accuracy: Element temperature ±0.3°C at20°C; wind±3% at10m/s; daily rain better than5%, weather-dependent, excluding wind-induced error. Calm-weather natural aspiration affects field equivalence.

Protocol: SDI-12, ASCII automatic/polled, NMEA 0183 with query option, or Modbus RTU; configurable RS-232/485/422 or SDI-12 interfaces. Confirm ordered mode and wiring.

Equipment: Compatible logger, mast, power and uplink. AWS810/DMU801 is one documented station context.

Power: 5–32 V DC power-up per M211840EN-G. Current consumption depends on mode, interface and intervals; optional heating requires a separately checked power budget.

Connectivity: Serial/logger boundary is not an Internet API.

Maintenance: Inspect siting, shield and precipitation surface; retain service/calibration.

Data access: Authorised logging adapter; not connected in prototype.

Restrictions: Solar radiation is not included in this standard variable bundle. Rain totals have reset semantics.

Local uncertainties: Local availability, scientific approval, installation design, radio/network suitability and institutional acceptance remain unverified.

Downstream use: Weather datastreams and explicitly weighted area comparisons.

Source date: 2026-11-02

Status: Optional extension; researched documentation only

Cost category: Current local quotation and lifetime operating cost not established.

Sources: ARC-S02; ARC-S03; ARC-S04; ARC-S40

Davis Instruments DEV-03

Exact model and configuration: Wireless Vantage Pro2 6323M metric sensor suite with 24-hour fan-aspirated shield

Manufacturer: Davis Instruments

Classification: Wireless sensor suite plus separate gateway/service

Measured variables

Outside temperature (°C): See the device accuracy conditions; any unlisted variable-specific tolerance must be confirmed.. Use the exact manufacturer revision and ordered variant; no local deployment validation has been completed. Sources: ARC-S05; ARC-S06; ARC-S07; ARC-S08; ARC-S13; ARC-S15.

Outside humidity (%RH): See the device accuracy conditions; any unlisted variable-specific tolerance must be confirmed.. Use the exact manufacturer revision and ordered variant; no local deployment validation has been completed. Sources: ARC-S05; ARC-S06; ARC-S07; ARC-S08; ARC-S13; ARC-S15.

Wind speed/direction (m/s / degrees): See the device accuracy conditions; any unlisted variable-specific tolerance must be confirmed.. Use the exact manufacturer revision and ordered variant; no local deployment validation has been completed. Sources: ARC-S05; ARC-S06; ARC-S07; ARC-S08; ARC-S13; ARC-S15.

Rain accumulation (mm): See the device accuracy conditions; any unlisted variable-specific tolerance must be confirmed.. Use the exact manufacturer revision and ordered variant; no local deployment validation has been completed. Sources: ARC-S05; ARC-S06; ARC-S07; ARC-S08; ARC-S13; ARC-S15.

Accuracy: Manufacturer-linked family sheet: outside temperature ±0.5 °C typical; rain ±3% or one 0.2 mm tip up to 250 mm/h. Confirm these against the current exact regional SKU. Unlisted per-variable tolerances are not adopted.

Protocol: Compatible Davis wireless receiver, then authorised WeatherLink v2 API.

Equipment: WeatherLink Live 6100 or another compatible receiver, router, separate gateway power and mounting. UV, solar, soil and leaf sensors are optional.

Power: Suite solar/battery; gateway has separate supply; fan backup and servicing add operating requirements.

Connectivity: WeatherLink Live Wi-Fi/Ethernet. Local app cadence differs from cloud/API.

Maintenance: Clean gauge/shield; inspect fan, batteries, alignment using current manual.

Data access: Owned/shared eligible account and protected API key/secret; subscription controls history.

Restrictions: Verify metric/US order, regional radio band and entitlement. Public webpage is not API permission.

Local uncertainties: Local availability, scientific approval, installation design, radio/network suitability and institutional acceptance remain unverified.

Downstream use: Station observations retaining packet, unit, time; not automatic district coverage.

Source date: 2026-11-02

Status: Optional extension; credential-blocked integration

Cost category: Current local quotation and lifetime operating cost not established.

Sources: ARC-S05; ARC-S06; ARC-S07; ARC-S08; ARC-S13; ARC-S15

TEROS 12 with compatible ZL6 logger option

Exact model and configuration: TEROS 12 with compatible ZL6 logger option

Manufacturer: METER Group

Classification: Soil sensor; logger/gateway separate

Measured variables

Volumetric water content (m^3/m^3): See the device accuracy conditions; any unlisted variable-specific tolerance must be confirmed.. Use the exact manufacturer revision and ordered variant; no local deployment validation has been completed. Sources: ARC-S09.

Temperature (°C): See the device accuracy conditions; any unlisted variable-specific tolerance must be confirmed.. Use the exact manufacturer revision and ordered variant; no local deployment validation has been completed. Sources: ARC-S09.

Bulk electrical conductivity (µS/cm): See the device accuracy conditions; any unlisted variable-specific tolerance must be confirmed.. Use the exact manufacturer revision and ordered variant; no local deployment validation has been completed. Sources: ARC-S09.

Accuracy: VWC ±0.03 m³/m³, typical in mineral soils with solution EC below 8, 000 µS/cm; medium-specific calibration ±0.01–0.02. Temperature ±1 °C from −40 to 0 °C and ±0.5 °C from 0 to +60 °C. Bulk EC ±(5% + 10 µS/cm) from 0–10, 000; ±8% from 10, 000–20, 000 µS/cm.

Protocol: DDI serial or SDI-12

Equipment: ZL6, EM60, Em50 or another compatible 4–15 V DC serial/SDI-12 logger. Retain depth and location metadata.

Power: 4–15VDC sensor; logger/uplink power separate.

Connectivity: Sensor cable to logger; connected logger/cloud entitlement separately verified.

Maintenance: Ensure soil contact, depth and calibration; verification clip or medium-specific calibration as justified.

Data access: Authorised logger file/API after provider contract verification.

Restrictions: BulkEC is not pore-waterEC or laboratory extractEC. Depth/deployment affect meaning.

Local uncertainties: Local availability, scientific approval, installation design, radio/network suitability and institutional acceptance remain unverified.

Downstream use: Soil observations, definition-evolution example and land-management evidence.

Source date: 2026-11-02

Status: Optional extension; researched documentation only

Cost category: Current local quotation and lifetime operating cost not established.

Sources: ARC-S09

OTT HydroMet DEV-05

Exact model and configuration: ecoLog 1000 SKU 5545000190-10UC, 0–10 m, 26 Ah, conductivity-equipped LTE-M example

Manufacturer: OTT HydroMet

Classification: Pressure/temperature/conductivity logger with cellular modem

Measured variables

Pressure-derived water level (m relative to declared datum): See the device accuracy conditions; any unlisted variable-specific tolerance must be confirmed.. Use the exact manufacturer revision and ordered variant; no local deployment validation has been completed. Sources: ARC-S10; ARC-S11; ARC-S12.

Temperature (°C): See the device accuracy conditions; any unlisted variable-specific tolerance must be confirmed.. Use the exact manufacturer revision and ordered variant; no local deployment validation has been completed. Sources: ARC-S10; ARC-S11; ARC-S12.

Conductivity (µS/cm or mS/cm): See the device accuracy conditions; any unlisted variable-specific tolerance must be confirmed.. Use the exact manufacturer revision and ordered variant; no local deployment validation has been completed. Sources: ARC-S10; ARC-S11; ARC-S12.

Accuracy: Pressure±0.05%FS; temperature±0.1°C. EC±0.5%(minimum1µS/cm) at5–2000µS/cm; ±1.5%(minimum0.01mS/cm) at0.1–100mS/cm; EC calibration5–45°C.

Protocol: Listed HTTPS/TLS1.2, HTTP, FTP/FTPS, MQTT/MQTTS; BLE service.

Equipment: Correct modem/SIM/antenna, probe/cable, mounting, water-level datum and authorised receiving endpoint.

Power: 3.6 V, 26 Ah lithium battery for the researched option. Life depends on sampling, transmission, temperature and conductivity operation.

Connectivity: The 10UC example uses LTE-M. Family EU 4G/2G variants differ; suitability for a local mobile network is unverified.

Maintenance: Inspect pressure datum/vent, fouling, calibration and battery; current regional manual required.

Data access: Authorised IP/file adapter only; real device not configured.

Restrictions: 10U lacks conductivity; 10UC includes it. Do not generalise across family variants.

Local uncertainties: Local availability, scientific approval, installation design, radio/network suitability and institutional acceptance remain unverified.

Downstream use: Water-level/quality observations. Reservoir volume requires reviewed level-volume relationship.

Source date: 2026-11-02

Status: Optional extension; official documentation partly available, no device test

Cost category: Current local quotation and lifetime operating cost not established.

Sources: ARC-S10; ARC-S11; ARC-S12

WeatherLink v2 authorised station data

Type: Station observations through provider cloud

Variables: Configured sensor-type weather fields

Source date: 2026-11-02

Status: Credential-blocked integration

Endpoint example: GET https://api.weatherlink.com/v2/current/{station-id}?api-key={server-side-key}

Coverage: Entitled owned/shared/qualifying stations only

Time coverage: History depends on entitlement. Unix timestamps mark the archive interval end; the historic API selects (start, end]. Preserve the source interval and timezone.

Latency: Basic 15-minute current, Pro 5-minute, Pro+ most recent for WeatherLink Live

Authentication: api-key query and X-Api-Secret header; protected server-side adapter

Licensing: Station relationship, subscription and redistribution permission required

Permissions: Source owner and intended audience must authorise use; no blanket redistribution claim.

Schema: station_id, sensors, sensor_type, data_structure_type, lsid, ts and sensor-specific data

Units: Preserve native units and map from exact sensor catalogue/data structure

Pagination: Provider-specific bounded pages/windows; retain cursor, overlap and replay-safe source key.

Error handling: Validate HTTP/schema; retain rejected evidence. Bounded backoff, quarantine/failure queue, resumable watermark and deduplication. Missing delivery is not zero.

Freshness: Keep phenomenon period, provider issue time, receipt and last successful fetch separately; show stale coverage.

Cost category: No price adopted; institutional/service cost and procurement remain unconfirmed.

Limits: 1000calls/hour, 10/second; history window≤86400seconds

Sources: ARC-S13; ARC-S14; ARC-S15; ARC-S16; ARC-S17; ARC-S39

Sri Lankan Weather Advisory System JSON

Type: Official issued warnings/advisories

Variables: Level, areas, language, validity, publication

Source date: 2026-11-02

Status: Credential-blocked integration

Endpoint example: GET https://was.meteo.gov.lk/api/warnings/changes?since={server-cursor}&lang=en

Coverage: Sri Lanka issued warning areas; not station coverage

Time coverage: Current and cursor changes; complete archive unverified

Latency: About60s changes polling recommended; no SLA

Authentication: X-API-Key; not obtained or used

Licensing: Read-only warning feed; preserve issuer/terms

Permissions: Source owner and intended audience must authorise use; no blanket redistribution claim.

Schema: id, day_key, name, level, valid_from, valid_to, summary_en/si/ta, areas_en, published_at; changes since

Units: Offset timestamps; no measured weather unit implied

Pagination: Provider-specific bounded pages/windows; retain cursor, overlap and replay-safe source key.

Error handling: 401invalidkey, 400since/lang, 429ratelimit. Retain returned server cursor; never fabricate a newer cursor.

Freshness: Keep phenomenon period, provider issue time, receipt and last successful fetch separately; show stale coverage.

Cost category: No price adopted; institutional/service cost and procurement remain unconfirmed.

Limits: 120requests/60s; limit1–200(default50)

Sources: ARC-S18

Sri Lankan Weather Advisory System CAP/RSS

Type: Official warning metadata and CAP1.2 XML

Variables: Alert identity, area, validity, language

Source date: 2026-11-02

Status: Successfully tested public read

Endpoint example: GET https://was.meteo.gov.lk/cap/en/rss.xml

Coverage: Sri Lanka warning areas

Time coverage: Active warnings; full archive not established

Latency: Provider issue/expiry distinct from fetch cadence

Authentication: Documented CAP/RSS requires no key

Licensing: Preserve issuing authority; review terms

Permissions: Source owner and intended audience must authorise use; no blanket redistribution claim.

Schema: RSS linking CAP1.2 XML resources

Units: Official event/area/timestamps

Pagination: Follow only authorised CAP links; retain replacements/cancellations.

Error handling: Validate HTTP/schema; retain rejected evidence. Bounded backoff, quarantine/failure queue, resumable watermark and deduplication. Missing delivery is not zero.

Freshness: Keep phenomenon period, provider issue time, receipt and last successful fetch separately; show stale coverage.

Cost category: No price adopted; institutional/service cost and procurement remain unconfirmed.

Limits: Rate limited; confirm CAP-specific service policy

Sources: ARC-S18

Open-Meteo forecast

Type: Gridded weather-model forecast

Variables: temperature_2m, precipitation and selected variables

Source date: 2026-11-02

Status: Successfully tested public read

Endpoint example: GET https://api.open-meteo.com/v1/forecast?latitude=52.52&longitude=13.41&hourly=temperature_2m,precipitation&forecast_days=1&timezone=UTC

Coverage: Global model grid; resolution depends on product

Time coverage: Normally7days; up to16days per product

Latency: Model-run dependent; no operational latency commitment

Authentication: Keyless public evaluation; customer endpoint/plan separately authorised

Licensing: Weather data is CC BY 4.0 with attribution and modification notices. The free API service is non-commercial; commercial service use requires a suitable subscription.

Permissions: Source owner and intended audience must authorise use; no blanket redistribution claim.

Schema: hourly.time, value arrays, hourly_units, grid coordinates, timezone

Units: Tested temperature_2m°C, precipitationmm

Pagination: Provider-specific bounded pages/windows; retain cursor, overlap and replay-safe source key.

Error handling: Validate HTTP/schema; retain rejected evidence. Bounded backoff, quarantine/failure queue, resumable watermark and deduplication. Missing delivery is not zero.

Freshness: Keep phenomenon period, provider issue time, receipt and last successful fetch separately; show stale coverage.

Cost category: Evaluation tier documented; production/commercial plan not selected.

Limits: Free600/min, 5000/hour, 10000/day, 300000/month at check date

Sources: ARC-S19; ARC-S21

Open-Meteo historical weather

Type: Gridded reanalysis/historical model

Variables: temperature_2m, precipitation and selected hourly measures

Source date: 2026-11-02

Status: Researched documentation; adapter simulated

Endpoint example: GET https://archive-api.open-meteo.com/v1/archive?latitude=7.9&longitude=81.0&start_date=2020-01-01&end_date=2020-01-02&hourly=temperature_2m,precipitation&models=era5&timezone=UTC

Coverage: ERA5/ERA5-Land/IFS distinct grids

Time coverage: ERA5from1940; ERA5-Landfrom1950; IFSfrom2017

Latency: Historical release/product-dependent

Authentication: Evaluation or licensed route as applicable

Licensing: Retain CC BY 4.0 attribution and product-specific provenance. Commercial historical API access requires Professional or higher at the checked date; no plan is selected.

Permissions: Source owner and intended audience must authorise use; no blanket redistribution claim.

Schema: Time/value arrays, units; pin product/model

Units: Use returned units and interval meaning

Pagination: Provider-specific bounded pages/windows; retain cursor, overlap and replay-safe source key.

Error handling: Validate HTTP/schema; retain rejected evidence. Bounded backoff, quarantine/failure queue, resumable watermark and deduplication. Missing delivery is not zero.

Freshness: Keep phenomenon period, provider issue time, receipt and last successful fetch separately; show stale coverage.

Cost category: No price adopted; institutional/service cost and procurement remain unconfirmed.

Limits: Bound ranges/variables and confirm account limits

Sources: ARC-S20; ARC-S21

NASA POWER Hourly

Type: Gridded assimilation/satellite-derived analysis

Variables: T2M and selected solar/meteorology

Source date: 2026-11-02

Status: Successfully tested public read

Endpoint example: GET https://power.larc.nasa.gov/api/temporal/hourly/point?parameters=T2M&community=SB&longitude=0&latitude=0&start=20170101&end=20170102&format=JSON&time-standard=UTC

Coverage: Native source grid point/regional product; not station observations

Time coverage: Hourlyfrom2001-01-01 to near-real-time

Latency: Source/parameter dependent

Authentication: Public unauthenticated read tested

Licensing: Preserve NASA source attribution and exact dataset terms

Permissions: Source owner and intended audience must authorise use; no blanket redistribution claim.

Schema: properties.parameter byvariable/hour; header and parameters

Units: Community/parameter-specific; testedT2M C; explicitUTC

Pagination: Provider-specific bounded pages/windows; retain cursor, overlap and replay-safe source key.

Error handling: Validate HTTP/schema; retain rejected evidence. Bounded backoff, quarantine/failure queue, resumable watermark and deduplication. Missing delivery is not zero.

Freshness: Keep phenomenon period, provider issue time, receipt and last successful fetch separately; show stale coverage.

Cost category: No price adopted; institutional/service cost and procurement remain unconfirmed.

Limits: At most15parameters/request; bounded windows

Sources: ARC-S22; ARC-S23

Irrigation Department authorised exchange

Type: Institutional water records/publications

Variables: Reservoir/rain/river data only after dataset agreement

Source date: 2026-11-02

Status: Researched source catalogue; operational adapter unavailable

Endpoint example: No verified public observation API;catalogue https://www.irrigation.gov.lk/web/index.php?lang=en

Coverage: Named stations/assets/basins; exact roster/version required

Time coverage: Dataset-specific

Latency: Owner update policy unconfirmed

Authentication: Operational feed access unknown; no credentials used

Licensing: Custodian use/redistribution agreement required

Permissions: Source owner and intended audience must authorise use; no blanket redistribution claim.

Schema: Obtain approved file/API contract; retain asset/table/row/period

Units: Declared water-level datum, m^3 or approved capacity unit, rainmm; gross/effective capacity separate

Pagination: Provider-specific bounded pages/windows; retain cursor, overlap and replay-safe source key.

Error handling: Validate HTTP/schema; retain rejected evidence. Bounded backoff, quarantine/failure queue, resumable watermark and deduplication. Missing delivery is not zero.

Freshness: Keep phenomenon period, provider issue time, receipt and last successful fetch separately; show stale coverage.

Cost category: No price adopted; institutional/service cost and procurement remain unconfirmed.

Limits: Observation API/rate/size contract not established

Sources: ARC-S24

NSDI spatial metadata/services

Type: Institution-owned GIS services via catalogue

Variables: Permitted layer descriptions/places/geometries

Source date: 2026-11-02

Status: Researched documentation; endpoint not tested

Endpoint example: GET https://gisapps.nsdi.gov.lk/server/services/SLNSDI/Locations/MapServer/WMSServer?SERVICE=WMS&VERSION=1.3.0&REQUEST=GetCapabilities

Coverage: Layer extent, CRS, boundary edition, original scale

Time coverage: Layer version/validity

Latency: Owner-defined refresh

Authentication: Per-service access; discovery is not open feature permission

Licensing: Free/commercial datasets; owner approval

Permissions: Source owner and intended audience must authorise use; no blanket redistribution claim.

Schema: WMS1.3.0 capabilities documented; feature API only if separately authorised

Units: Layer CRS axes, scale and measurement semantics

Pagination: Provider-specific bounded pages/windows; retain cursor, overlap and replay-safe source key.

Error handling: Validate HTTP/schema; retain rejected evidence. Bounded backoff, quarantine/failure queue, resumable watermark and deduplication. Missing delivery is not zero.

Freshness: Keep phenomenon period, provider issue time, receipt and last successful fetch separately; show stale coverage.

Cost category: No price adopted; institutional/service cost and procurement remain unconfirmed.

Limits: Per-service limits unverified; boundedBBOX/CRS

Sources: ARC-S25; ARC-S26; ARC-S38

DCS Paddy Statistics

Type: Official periodic tables

Variables: Sown/harvested area, yield, production

Source date: 2026-11-02

Status: Researched documentation; table-import adapter simulated

Endpoint example: Catalogue https://www.statistics.gov.lk/Agriculture/%20StaticalInformation/PaddyStatistics

Coverage: Published district/season/irrigation grain; variety breakdown not inferred

Time coverage: Maha cross-year, Yala; exact revised release

Latency: Seasonal publication and revision

Authentication: Public table documents; no API claim

Licensing: Confirm exact release rights

Permissions: Source owner and intended audience must authorise use; no blanket redistribution claim.

Schema: Season, district, area meaning, unit, extent, yield, production, release

Units: Metric/imperial separate; ha, t/ha, t only when table specifies

Pagination: Provider-specific bounded pages/windows; retain cursor, overlap and replay-safe source key.

Error handling: Validate HTTP/schema; retain rejected evidence. Bounded backoff, quarantine/failure queue, resumable watermark and deduplication. Missing delivery is not zero.

Freshness: Keep phenomenon period, provider issue time, receipt and last successful fetch separately; show stale coverage.

Cost category: No price adopted; institutional/service cost and procurement remain unconfirmed.

Limits: Complete deterministic table parsing

Sources: ARC-S27

DOA SEPC / Agstat

Type: Official agriculture publications

Variables: Agstat, cultivation cost, crop forecasts, budgets

Source date: 2026-11-02

Status: Researched documentation; document-import fallback

Endpoint example: Catalogue https://doa.gov.lk/sepc-downloads_en/

Coverage: Publication-specific geographic grain

Time coverage: Periodic editions

Latency: Publication schedule; not real-time

Authentication: Public catalogue; API discovery unreadable, so no routes inferred

Licensing: Edition/rights need custodian review

Permissions: Source owner and intended audience must authorise use; no blanket redistribution claim.

Schema: Table/page/schema contract; no undocumented API

Units: Table-specific unit, season, crop meaning

Pagination: Provider-specific bounded pages/windows; retain cursor, overlap and replay-safe source key.

Error handling: Validate HTTP/schema; retain rejected evidence. Bounded backoff, quarantine/failure queue, resumable watermark and deduplication. Missing delivery is not zero.

Freshness: Keep phenomenon period, provider issue time, receipt and last successful fetch separately; show stale coverage.

Cost category: No price adopted; institutional/service cost and procurement remain unconfirmed.

Limits: Parse all rows deterministically

Sources: ARC-S28

DMC official warning documents

Type: Issued bulletins/withdrawals

Variables: Issuer, issue/validity, area, replacement

Source date: 2026-11-02

Status: Researched documentation; manual/reference fallback

Endpoint example: Catalogue https://www.dmc.gov.lk/index.php?Itemid=279&lang=en&option=com_dmcreports&report_type_id=8&view=reports

Coverage: Named basins/areas in bulletin

Time coverage: Dated notices; complete archive not guaranteed

Latency: Issue time; no polling SLA

Authentication: Public document list; no API inferred

Licensing: Preserve issuer; automation/reproduction rights reviewed

Permissions: Source owner and intended audience must authorise use; no blanket redistribution claim.

Schema: Document with exact page and metadata

Units: Source-issued warning classifications; no sensor-derived authority

Pagination: Provider-specific bounded pages/windows; retain cursor, overlap and replay-safe source key.

Error handling: Validate HTTP/schema; retain rejected evidence. Bounded backoff, quarantine/failure queue, resumable watermark and deduplication. Missing delivery is not zero.

Freshness: Keep phenomenon period, provider issue time, receipt and last successful fetch separately; show stale coverage.

Cost category: No price adopted; institutional/service cost and procurement remain unconfirmed.

Limits: Bounded catalogue checks

Sources: ARC-S29

LUPPD authorised land-use release

Type: Custodian spatial/statistical release

Variables: Land-use classes, coverage, planning definitions

Source date: 2026-11-02

Status: External institutional dependency; current interface unavailable

Endpoint example: No verified endpoint;retain existing LUPPD source identity and approved file/manual fallback

Coverage: Official coverage/geometry/class release unconfirmed

Time coverage: Release-specific

Latency: Unconfirmed

Authentication: Custodian agreement; no verified public API

Licensing: Rights and exact release unconfirmed

Permissions: Source owner and intended audience must authorise use; no blanket redistribution claim.

Schema: Reuse authorised GIS/file intake; retain institutional claims

Units: Owner-declaredCRS, area unit, categorical meaning

Pagination: Provider-specific bounded pages/windows; retain cursor, overlap and replay-safe source key.

Error handling: Validate HTTP/schema; retain rejected evidence. Bounded backoff, quarantine/failure queue, resumable watermark and deduplication. Missing delivery is not zero.

Freshness: Keep phenomenon period, provider issue time, receipt and last successful fetch separately; show stale coverage.

Cost category: No price adopted; institutional/service cost and procurement remain unconfirmed.

Limits: No machine contract verified

Sources: No verified current interface reference; institutional confirmation required.

CEA water-quality institutional source

Type: Official laboratory reports and environmental data catalogue

Variables: Approved sample parameters, laboratory method and results; exact released table required

Source date: 2026-11-02

Status: Researched official source; authorised report/file fallback

Endpoint example: Catalogue https://cea.lk/web/en/2013-05-07-07-51-07/environmental-pollution-contorl-division/water-quality-unit

Coverage: Named water bodies/sites and sample locations; no project-area coverage inferred

Time coverage: Release/sample-specific; complete archive not established

Latency: Owner publication or authorised exchange schedule

Authentication: Public service catalogue; restricted records require custodian agreement

Licensing: Exact dataset and reuse rights unconfirmed; some laboratory/project services commercial

Permissions: Source owner and intended audience must authorise use; no blanket redistribution claim.

Schema: Source report/table, sample identity, location, depth, time, method, result, unit and qualifier

Units: Parameter- and method-specific; retain detection limits and censored values

Pagination: Provider-specific bounded pages/windows; retain cursor, overlap and replay-safe source key.

Error handling: Validate HTTP/schema; retain rejected evidence. Bounded backoff, quarantine/failure queue, resumable watermark and deduplication. Missing delivery is not zero.

Freshness: Keep phenomenon period, provider issue time, receipt and last successful fetch separately; show stale coverage.

Cost category: No price adopted; institutional/service cost and procurement remain unconfirmed.

Limits: No public observation API contract established

Sources: ARC-S41; ARC-S42

Complete source locators and provider options

Official device, data-provider, OGC, dimensional-modelling, earth-observation and OpenAI references are retained in the architecture research catalogue with exact supporting passages and verification dates. They supplement the retained calculation source register without changing its

historical identities. Open https://sharedproto.wkslabs.com/reviews/dashboard-portfolio-20261027/system-diagrams/#data-ai

ARC-S01 Campbell Scientific ClimaVue 50 G2

https://www.campbellsci.com/products/climavue50-g2 Overview and Specifications: supply, Air Temperature, Wind Speed, Precipitation SDI-12; compatible Aspen10/loggers; 3.6–15VDC; temperature±0.6°C; wind max(0.3m/s, 6%); rain±5% at0–1000mm/h. Liquid precipitation and stated siting/operating conditions. Version: Official live documentation. Checked: 2026-11-02. Status: Researched documentation

ARC-S02 Vaisala WXT536 station context

https://docs.vaisala.com/r/M212902EN-G/en-US/GUID-E6912022-5F36-44DF-90CA-2721236D948C Vaisala Weather Transmitter WXT536 WXT536 is a transmitter within a complete station. Power, logger and communications are separate responsibilities. Version: M212902EN-G. Checked: 2026-11-02. Status: Researched documentation

ARC-S03 Vaisala WXT536 specifications

https://docs.vaisala.com/r/M212902EN-G/en-US/GUID-AD3DAFAA-7537-453B-969B-B3229E311DD7 Measurement tables and footnotes1, 2, 5, 7 Temperature sensor element±0.3°C at20°C; wind±3% at10m/s; daily rain better than5%, weather-dependent, excluding wind-induced error. Natural aspiration affects calm-weather readings. Version: M212902EN-G. Checked: 2026-11-02. Status: Researched documentation

ARC-S04 Vaisala configurable WXT530

https://store.vaisala.com/en/products/WXT530 Digital outputs and WXT536 variant Official indexed catalogue lists SDI-12, RS-232, RS-485, RS-422. Page body unreadable; confirm exact power, heater, protocol and order bundle. Version: Current configurable family. Checked: 2026-11-02. Status: Official source partly readable

ARC-S05 Davis Vantage Pro2 fan-aspirated suite

https://www.davisinstruments.com/products/wireless-vantage-pro2-iss-with-24-hr-fan-aspirated-radiation-shield Product title and Highlights Listed6323/6323M; outside temperature/RH, wind, rain; solar/battery. WeatherLinkLive6100 is optional. UV, solar-radiation and soil/leaf sensors are additional options. Version: Official live documentation. Checked: 2026-11-02. Status: Researched documentation

ARC-S06 Davis WeatherLink Live

https://www.davisinstruments.com/pages/weatherlink-live Live Data; Wi-Fi and Ethernet; compatible stations Separate compatible wireless gateway with Wi-Fi/Ethernet uplink. Local same-network app cadence differs from cloud API permissions. Version: Official live documentation. Checked: 2026-11-02. Status: Researched documentation

ARC-S07 Davis wireless family specification

https://cdn.shopify.com/s/files/1/0515/5992/3873/files/6152_6162_6153_6163_Spec_SheetFF__Web.pdf?v=1661460993 Printed pp1, 5, 6, 8: rain tip, rainfall, outside temperature, wind Metric tip0.2mm; rain total±3% or one tip up to250mm/h; outside temperature±0.5°C typical. Family sheet is not proof of unchanged current regional SKU. Version: Manufacturer-linked historical family sheet. Checked: 2026-11-02. Status: Researched documentation

ARC-S08 Davis fan-aspirated ISS addendum

https://cdn.shopify.com/s/files/1/0515/5992/3873/files/VP2_Fan_Aspirated_ISS_Rev_C.pdf Printed p7 Fan-Aspirated Shield Specifications; maintenance Solar-powered fan, backup cells and cleaning/service requirements. Reconcile historical manual with current purchased hardware. Version: RevC22March2006. Checked: 2026-11-02. Status: Researched documentation

ARC-S09 METER TEROS12

https://metergroup.com/products/teros-12/ Measurement, Communication, Electrical Specifications VWC, temperature, bulkEC; DDI/SDI-12; 4–15VDC; compatibleZL6/EM60/Em50. Generic mineral-soilVWC±0.03m³/m³ when solutionEC<8000µS/cm; medium calibration±0.01–0.02. BulkEC is not laboratory/pore-waterEC. Version: Official live documentation. Checked: 2026-11-02. Status: Researched documentation

ARC-S10 OTT ecoLog1000 conductivity SKU

https://www.ott.com/products/5545000190-10uc Product title and Technical Attributes 5545000190-10UC:0–10m, 26Ah, conductivity, LTE-M. Pressure±0.05%FS; temperature±0.1°C; EC conditions vary. Later full-page reads timed out; official indexed specifications retained. Version: Exact10UC variant. Checked: 2026-11-02. Status: Official documentation partly available; no device test

ARC-S11 OTT ecoLog1000 instructions

https://www.ott.com/download/operating-instructions-groundwater-datalogger-ott-ecolog-1000-5/ Section2.2 USA variant table Indexed manufacturer manual distinguishes10U from conductivity10UC, LTE-M. Current download redirects; obtain current regional manual before purchase. Version: Indexed manual; direct download unresolved. Checked: 2026-11-02. Status: Current direct download unavailable

ARC-S12 OTT ecoLog1000 data sheet

https://www.ott.com/products/download/data-sheet-ott-ecolog-1000-en/ Communications, measured values, power Indexed sheet distinguishes EU4G/2G and globalLTE-M. Conductivity optional at family level. Current link redirects to general resources. Version: Indexed sheet; current link redirects. Checked: 2026-11-02. Status: Current direct download unavailable

ARC-S13 WeatherLinkv2 introduction

https://weatherlink.github.io/v2-api/ Station access criteria Ownership, owner-share or qualifying upgrade determines access. Public visibility does not grant unrestricted observation API access. Version: WeatherLinkv2. Checked: 2026-11-02. Status: Researched documentation

ARC-S14 WeatherLink authentication

https://weatherlink.github.io/v2-api/authentication API Key; API Secret api-key query parameter and X-Api-Secret header. Connector keeps credentials server-side and redacts URL logs. Version: WeatherLinkv2 current authentication. Checked: 2026-11-02. Status: Researched documentation

ARC-S15 WeatherLink data permissions

https://weatherlink.github.io/v2-api/data-permissions WeatherLink Console/Live table Basic 15-minute current records, no history; Pro 5-minute current and history; Pro+latest/history, subject to station relationship. Version: WeatherLinkv2. Checked: 2026-11-02. Status: Researched documentation

ARC-S16 WeatherLink rate limits

https://weatherlink.github.io/v2-api/rate-limits Default rate limits 1000calls/hour and10calls/second per API key. Version: WeatherLinkv2. Checked: 2026-11-02. Status: Researched documentation

ARC-S17 WeatherLink size limits

https://weatherlink.github.io/v2-api/size-limits Historic windows Starting/ending Unix timestamps; historic request window at most86400seconds. Version: WeatherLinkv2. Checked: 2026-11-02. Status: Researched documentation

ARC-S18 Sri Lankan Weather Advisory System

https://was.meteo.gov.lk/api-docs Authentication; Warnings; Changes; Timestamps; CAP/RSS; Errors KeyedJSON warnings vs keylessCAP1.2/RSS; en/si/ta; 120requests/60s; limit1–200(default50); changes uses returned since cursor. This is an issued warning feed, not a station API. Version: Official live documentation. Checked: 2026-11-02. Status: Researched documentation

ARC-S19 Open-Meteo forecast API

https://open-meteo.com/en/docs Weather Forecast API; hourly variables; response Gridded model forecast arrays with timestamps and units; retain product/run, resolution and interval. Not physical station observations. Version: Official live documentation. Checked: 2026-11-02. Status: Researched documentation

ARC-S20 Open-Meteo historical weather

https://open-meteo.com/en/docs/historical-weather-api Historical Weather introduction/data sources ERA5from1940 at0.25°, ERA5-Landfrom1950 at0.1°, IFSfrom2017 at9km. Use

consistent product for comparisons; coordinate is not district coverage. Version: Official live documentation. Checked: 2026-11-02. Status: Researched documentation

ARC-S21 Open-Meteo access terms

https://open-meteo.com/en/pricing Free/Open Access table; FAQ Free API is non-commercial: 600/minute, 5,000/hour, 10,000/day, 300,000/month. Paid customer access differs; historical APIs require Professional or higher. Data is CC BY 4.0 with attribution; this differs from API-service terms. Version: Official live documentation. Checked: 2026-11-02. Status: Researched documentation

ARC-S22 NASA POWER Hourly API

https://power.larc.nasa.gov/docs/services/api/temporal/hourly/ Formats; Time Standards; Limitations; Point examples Hourlyfrom2001; at most15parameters/request; UTC or defaultLocalSolarTime. FormatsJSON/CSV/NetCDF. Nativeparameter/community units. LST is not Sri Lankan civil time. Version: Official live documentation. Checked: 2026-11-02. Status: Researched documentation

ARC-S23 NASA POWER data sources

https://power.larc.nasa.gov/docs/faqs/data/ Sources; Units; Latency Solar is satellite-informed modeled data; meteorology derives fromMERRA-2/GEOS-ITassimilation. Preserve source grid/resolution. Not station observations. Version: Official live documentation. Checked: 2026-11-02. Status: Researched documentation

ARC-S24 Sri Lanka Irrigation Department

https://www.irrigation.gov.lk/web/index.php?lang=en Water Management; Hydrology; Publications; Flood Warning Official water/irrigation source discovery. Homepage does not establish public observation API, automated reuse rights or update SLA. Version: Official live documentation. Checked: 2026-11-02. Status: Researched documentation

ARC-S25 Sri Lanka NSDI Geoportal

https://www.nsdi.gov.lk/geoportal Geoportal description Official spatial metadata/service discovery; per-layer authority, scale, rights and versions remain necessary. Version: Official live documentation. Checked: 2026-11-02. Status: Researched documentation

ARC-S26 Sri Lanka NSDI FAQ

https://www.nsdi.gov.lk/faq Availability; publishing prerequisites Free and commercial datasets coexist; publishing links requires registration/institutionalMOU. Discovery is not blanket redistribution permission. Version: Official live documentation. Checked: 2026-11-02. Status: Researched documentation

ARC-S27 DCS Paddy Statistics

https://www.statistics.gov.lk/Agriculture/%20StaticalInformation/PaddyStatistics Paddy Statistics definitions; tables; revision note MahaSep–Marfollowingyear; YalaApr–Aug. Asweddumized, sown, harvested differ. Production uses harvestedarea×crop-cuttingyield.

Preserve revised releases; district totals do not imply variety breakdown. Version: Official live documentation. Checked: 2026-11-02. Status: Researched documentation

ARC-S28 DOA SEPC downloads

https://doa.gov.lk/sepc-downloads_en/ Agstat, cost-of-cultivation, crop-forecast categories Official periodic agriculture/weather/paddy publications. Preserve edition, page/table, units/periods. Public API and redistribution licence not established. Version: Official live documentation. Checked: 2026-11-02. Status: Researched documentation

ARC-S29 DMC flood warnings

https://www.dmc.gov.lk/index.php?Itemid=279&lang=en&option=com_dmcreports&report_type_id=8&view=reports Flood Warning and withdrawal notices Official bulletins/withdrawals. Preserve issuer, issue/validity, area and replacements; prototype thresholds cannot issue official warnings. Version: Official live documentation. Checked: 2026-11-02. Status: Researched documentation

ARC-S30 OGC SensorThings Sensing1.1

https://docs.ogc.org/is/18-088/18-088.html Sections8.2.1–8.2.8; conformance Thing, Location/HistoricalLocation, Sensor, ObservedProperty, Datastream, Observation, FeatureOfInterest. A datastream has one sensor/property and units. Conceptual alignment is not certified conformance. Version: OGC18-088Version1.1; published2021-08-04. Checked: 2026-11-02. Status: Researched documentation

ARC-S31 Kimball declared grain

https://www.kimballgroup.com/data-warehouse-business-intelligence-resources/kimball-techniques/dimensional-modeling-techniques/grain/ Grain Declare what one fact row represents before choosing dimensions and facts. Grain is a binding design choice. Independent source aggregation before joining is the proposed architecture's application of this principle. Version: Author guidance. Checked: 2026-11-02. Status: Researched documentation

ARC-S32 Kimball stars and OLAP

https://www.kimballgroup.com/data-warehouse-business-intelligence-resources/kimball-techniques/dimensional-modeling-techniques/star-schema-olap-cube/ Star schemas and OLAP cubes Dimensional stars and multidimensional OLAP are analytical representations; retain grain and aggregation meaning. Version: Author guidance. Checked: 2026-11-02. Status: Researched documentation

ARC-S33 Open Data Cube

https://opendatacube.readthedocs.io/en/latest/ Overview; metadata; analysis; masking Gridded Earth-observation data/metadata across space, time, variable. CRS, mask, resolution and product definitions matter. Not a business approval ledger. Version: Latestdevelopmentdocsobserved1.9.23.dev65; pin chosen release. Checked: 2026-11-02. Status: Researched documentation

ARC-S34 OpenAI file inputs

https://developers.openai.com/api/docs/guides/file-inputs Input mechanisms; file-specific processing; spreadsheet augmentation; usage FileID, Base64 or URL inputs. PDFs include text/page images. Non-PDF embedded charts/images are not extracted. Spreadsheet processing uses first1000rows/sheet. Each file and combined request under50MB. Parse complete tables deterministically. Version: Official live documentation. Checked: 2026-11-02. Status: Researched documentation

ARC-S35 OpenAI Structured Outputs

https://developers.openai.com/api/docs/guides/structured-outputs Supported schemas; edge cases; text.format JSON-Schema subset constrains shape. Responses text.format can usejson_schema/strict. Handle incomplete/refusal responses; schema conformity is not factual correctness. Version: Official live documentation. Checked: 2026-11-02. Status: Researched documentation

ARC-S36 OpenAI File Search

https://developers.openai.com/api/docs/guides/tools-file-search File Search; results inclusion; metadata filtering Hosted vector-store retrieval with metadata filters/citations/results. Re-authorise current rights and versions before model context or result delivery. Search is not numerical authority. Version: Official live documentation. Checked: 2026-11-02. Status: Researched documentation

ARC-S37 OpenAI data controls

https://developers.openai.com/api/docs/guides/your-data Endpoint retention; Responses; Files; residency Default abuse logs may retain content up to30days with exceptions. Response state, Files/vectorstores have distinct retention/deletion. Special retention/residency needs eligibility/configuration. No automatic zero-retention or Sri Lanka residency. Version: Official live documentation. Checked: 2026-11-02. Status: Researched documentation

ARC-S38 NSDI Location WMS documentation

https://nsdi.gov.lk/location WMS GetCapabilities link ExactWMS1.3.0capabilityURL documented; no feature licence, completeness or service-availability inference. Version: Official live documentation. Checked: 2026-11-02. Status: Researched documentation

ARC-S39 WeatherLink current and historic endpoint tutorial

https://weatherlink.github.io/v2-api/tutorial Steps 2–4; archive interval explanation Current endpoint and secret header verified. Historic records timestamp the interval end, with selection (start, end]; midnight can close the preceding day. Version: API v2 live documentation. Checked: 2026-11-02. Status: Researched documentation

ARC-S40 WXT530 interfaces and option bundles

https://docs.vaisala.com/r/M211840EN-G/en-US/GUID-6B30C4BA-CEF6-40DF-9F60-41935D25AB9D Tables 1–2: features and available options Power-up 5–32 V DC; SDI-12, ASCII, NMEA 0183 and Modbus RTU protocols; RS-232/485/422 and SDI-12 interfaces.

Heating and auxiliary inputs are configuration options. Version: M211840EN-G. Checked: 2026-11-02. Status: Researched documentation

ARC-S41 CEA laboratory services and surface-water source discovery

https://cea.lk/web/en/2013-05-07-07-51-07/environmental-pollution-contorl-division/water-quality-unit Water Quality Monitoring Unit; services; downloads Official laboratory services include inland water monitoring, analytical reports and a surface-water data download section. Some sample/project services are commercial. No public observation API is established here. Version: Official live documentation. Checked: 2026-11-02. Status: Researched documentation

ARC-S42 CEA selected inland water bodies

https://www.cea.lk/web/en/component/content/article?id=1801&layout=edit Ambient Water Quality Monitoring of Selected Major Inland Surface Water Bodies Lists Kelani River, Diyawanna Oya, Maha Oya, Bolgoda Lake and Benthara Ganga. This programme list does not establish local project coverage or an automated feed. Version: Page last updated 2025-01-09. Checked: 2026-11-02. Status: Researched documentation

ARC-S43 ClimaVue 50 G2 manual, specification discrepancy

https://s.campbellsci.com/documents/us/manuals/climavue50g2.pdf Section 6, specifications Search-indexed manual reports typical RH ±3% and pressure ±5 hPa at 25°C, differing from current product page/brochure specifications. Resolve hardware/revision-specific specification with supplier. Version: Official manual; indexed copy predates current product-page check. Checked: 2026-11-02. Status: Researched official indexed manual; revision confirmation required

ARC-S44 ClimaVue 50 G2 manufacturer brochure

https://s.campbellsci.com/documents/us/product-brochures/b_climavue50-g2-a4-branded.pdf Specification headings: pressure, wind, solar, precipitation, tilt and lightning Current indexed brochure supports product-page pressure, wind, solar and precipitation values. Reconcile delivered hardware and calibration certificate with the older manual. Version: Official product brochure; revision date unconfirmed. Checked: 2026-11-02. Status: Researched official indexed brochure

6 2 Land Use Change Decision Rules

DEC-DP01-001 uses method LAND-CHANGE-1. Help a land-use planner find important changes inside the project area, assess the evidence and choose the next investigation.

Inputs. Use a fixed analysis boundary inside each division. Keep the project portion separate from the full administrative division. The three prototype areas and their shapes are fictional.

Group	Required information
Source and observation	Publisher, original URL or file, dataset release, observation year and season where relevant. Creation or revision years do not automatically identify the observation period.
Area and classification	Division code, fixed analysis boundary and area in hectares, boundary version, native class/code, proposed class and mapping version, physical land area versus seasonal crop extent.
Values and quality	Original area and unit, explicit missing value/reason, unclassified area, coverage, area method, representation, coordinate system, raster resolution and local quality reference.

Formulas and units

Calculation	Definition	Unit
Net change	Later area minus earlier area	ha
Percentage change	100 times net change divided by earlier area; unavailable when earlier area is zero	%
Annual change	Net change divided by elapsed years; interval average, not a forecast	ha/year
Gross loss and gain	Loss sums matched areas leaving a class. Gain sums matched areas entering it. Net equals gain minus loss	ha
Converted extent	Sum matched areas whose from and to classes differ. Count each area once, rather than adding all class gains to losses	ha
Unit conversion	One hectare is 10000 square metres. Retain the original value and unit alongside the converted value	ha

Comparison and input rules

1. Compare matching analysis boundaries, class definitions, measure types, methods, seasons and source series. Both endpoints must cover the complete selected area; otherwise withhold whole-area change and transitions.

2. Class totals plus unclassified area must equal the fixed analysis area. A blank stays missing and zero stays a known zero. Do not invent a balancing value or join chart lines across missing points.

3. Keep native source categories and codes. A conflicting proposed category is rejected. An ambiguous native class stays unresolved with a mapping note and is excluded from analysis until its mapping is resolved.

4. Order divisions by the largest absolute net class-area change, or by the largest absolute percentage change. Show both metrics and the class used. Allow any change, decreases or increases. Exclude zero-baseline percentages from percentage sorting. Sorting does not set an action threshold.

5. Real gross losses, gains and conversions require matched spatial observations. Net area totals cannot establish where conversion occurred. The prototype constructs fictional parcel histories to demonstrate the rule; its generator is not a real conversion-estimation method.

6. Example annual inputs may update the in-page dataset only after structural and area-total checks. The charts, map images, transitions and exports use the same revised dataset. Official-source records and file selections remain previews and do not enter the example charts.

7. A decision example records the selected division, analysis scope, years, class, sorting rule, comparison, coverage, reason, next action, proposed responsible role, follow-up and dataset/boundary/class/method versions. Incompatible evidence forces a source-data check. Nothing is assigned or sent by the prototype.

Worked example using fictional data

Scope and period	Earlier forest ha	Later forest ha	Loss ha	Gain ha	Net ha
Laggala Pallegama 2015 to 2019	6800	6782	26	8	-18
All three examples 2015 to 2019	14900	14868	56	24	-32

For Laggala Pallegama, net change is 6782 minus 6800 = -18 ha. Percentage change is 100 times -18 / 6800 = -0.2647%. Average annual change is -18 / 4 = -4.5 ha/year. Gross loss of 26 ha and gain of 8 ha reproduce the same -18 ha net change. These values do not establish actual project results.

The map images use fictional parcel histories with those same totals. Real transition areas must come from compatible dated spatial observations. The example generator is not a reconstruction procedure for real conversions.

Sources and method categories

Government publication - Sri Lanka National Spatial Data Infrastructure. Planning Cadastre Landuse and Forest Boundary service metadata. Landuse layer 4 native classifications; Forest Boundary layer 1 forest_type domain and coordinate system. Native labels, codes and spatial metadata. The inspected metadata does not establish a comparable annual project series.

Source:Open reference

Supporting reference:Open reference

Institution publication - Copernicus Global Land Service. CGLS LC100 Collection 3 version 3.0.1. 2015 to 2019 product and discrete classification definitions. Annual broad cover classes at nominal 100 m. Woody crops can enter tree or shrub classes; this source alone cannot split every detailed local land use.

Source:Open reference

Supporting reference:Open reference

Government publication - Department of Census and Statistics Sri Lanka. Paddy Statistics. District and Maha or Yala seasonal extent definitions. Seasonal crop context. Sown, harvested and asweddumized extents are not interchangeable with a physical land-cover map.

Source:Open reference

Institution publication - Intergovernmental Panel on Climate Change. 2006 Guidelines Volume 4 Chapter 3. Sections 3.3 and 3.5 consistent land representation, net versus gross change and uncertainty. Methodological context for matched land representation and transition accounting. This prototype is not a greenhouse-gas inventory.

Source:Open reference

Institution publication - UN Handbook on Remote Sensing for Agricultural Statistics. Chapter 8 Map Validation and Use of Maps for Area Estimation. Sections 8.1, 8.3 and 8.5; Gilberto Camara and Lorenzo De Simone. Reference sampling, accuracy assessment and area uncertainty. A global accuracy figure does not replace local validation.

Source:Open reference

Validation required - SHARED project proposal. LAND-CHANGE-1 local comparison and screening specification. This decision specification and its fictional worked example. Local class grouping, scope, sorting choices and intended use require confirmation in Institution review. Arithmetic, conversion, consistency and input handling are developer checks.

Source:Open reference

Published definitions and methodological guidance retain their publisher and locator. Local grouping, scope, sorting criteria and intended use remain project proposals. Record client and expert confirmation in Institution review only. Developer checks cover arithmetic, units, class conflicts, area closure, missing values and consistent output.

Acceptance. Apply scenarios LU A1 to LU A6 in SRS section 5 6. The 22 retained calculation/input checks and 14 purpose checks are prototype software evidence, not independent scientific or stakeholder acceptance.

6 3 Domain Decision Rules

Published formula verification. “Verified published formula” means its formula and transcription match the cited recognised publication. “Verified published component” covers only the named part. Source categories, publisher and exact locator remain visible. Local adaptations stay “Validation required”. Confirm local inputs, settings and intended use through Institution review.

DOMAIN-1 provides the remaining 819 decision contracts. LAND-CHANGE-1 retains the completed DEC-DP01-001 case. All 820 IDs, 57 family IDs and existing institution routes remain. The 101 domain variants below separate materially different meanings while reusing one concise interface.

For each decision, the controlled CSV and web register contain the question, required wider evidence, actual typed fields, units, method, published component or project rule, limits, responsible role and Institution review link. The review page and prototype example are generated from the same pure calculation component. They are illustrative records, not project findings.

Use a published method as published only for the supported component and stated input convention. Local source matching, thresholds, weights, safeguards, intended use and operational authority require confirmation where applicable. Missing source data is not scientific acceptance. Keep every existing client and expert decision pending in Institution review.

Common checks

Retain the actual observation period and analysis area. Validate finite numbers, counts, ranges and calendar dates. Keep missing and censored values explicit. Use compatible definitions, units and versions. Reconcile balances and cohort components. Do not invent a zero-denominator result, gap-filling value, balancing area, confidence interval, causal conclusion or legal/health determination.

Realistic examples and published observations

Use meaningful labels such as Bg 300, pepper exports, water-service zones and Laggala Pallegama. The rice grouped-count fixture remains 586 plots with a separate 804 ha area denominator. Its counts and variety allocation are illustrative. DCS and DOA publications support the crop/variety context, not those counts or institutional adoption.

DCS publishes paddy yields for the whole districts, not a Knuckles project baseline. In the all-schemes kg per net hectare column, Kandy is 2859 in 2024 Yala and 3761 in 2025 Yala; Matale is 4500 and 4302; Nuwara Eliya is 3905 and 3941. Retain each period and the net-hectare basis. Rounded production/area totals must not be used to reconstruct those published yield estimates. Seasonal differences do not establish a cause.

Sources: Department of Census and Statistics Sri Lanka, Paddy Statistics metric district tables for 2024 Yala and 2025 Yala, page 1, all-schemes average yield column. Government publication.

https://www.statistics.gov.lk/Resource/en/Agriculture/paddystatistics/PaddyStatsPages/Yala2024Metric.pdf

https://www.statistics.gov.lk/Resource/en/Agriculture/paddystatistics/PaddyStatsPages/Yala2025Metric.pdf

Explicit domain variants

Fragmentation

Total holding area / parcel count, alongside count and documented separation. This is a descriptive summary, not a validated fragmentation index or coordination decision. Result units: ha/parcel, parcels. Categories must be mutually exclusive and cover the stated frame. Do not mix values, quantities, plots or hectares, or treat an HHI competition threshold as an institutional policy.

Decision bindings: DEC-DP01-012. Sources: DD-LOCAL. Exact per-decision inputs and evidence remain in the controlled decision register.

Land change

Net=later−earlier; percentage=100×net/earlier when earlier>0. Matched transitions must reproduce net=gain−loss. Net totals alone do not establish conversion. Result units: ha, %. Same boundary, definitions, observation basis and adequate map quality are required. Coverage changes and classification error are not proven land-use change. Example boundaries and transitions are fictional.

Decision bindings: DEC-DP01-013, DEC-DP07-001, DEC-DP12-001. Sources: DD-LOCAL. Exact per-decision inputs and evidence remain in the controlled decision register.

Erosion area

Category share = 100 × category amount / total compatible category amounts. HHI = sum of squared fractional shares, displayed on a 0–1 scale. Result units: ha, %. Categories must be mutually exclusive and cover the stated frame. Do not mix values, quantities, plots or hectares, or treat an HHI competition threshold as an institutional policy.

Decision bindings: DEC-DP02-003. Sources: DD-LOCAL. Exact per-decision inputs and evidence remain in the controlled decision register.

Water productivity

Saleable crop output / Matching irrigation water input, for the same product, process and period. Result units: kg/m³.

Decision bindings: DEC-DP02-010, DEC-DP05-013, DEC-DP06-011, DEC-DP10-014. Sources: DD-LOCAL. Exact per-decision inputs and evidence remain in the controlled decision register.

Cost ha

Sum non-overlapping costs, then divide by the matching verified quantity for the same currency and accounting period. Result units: LKR/ha, LKR. An absent or zero denominator has no unit-cost result. Keep fixed, variable and opportunity costs identifiable.

Decision bindings: DEC-DP02-017, DEC-DP03-002, DEC-DP10-003, DEC-DP33-006. Sources: DD-LOCAL. Exact per-decision inputs and evidence remain in the controlled decision register.

Rice plots
Plot share =100 × distinct eligible plots in category / eligible plots in all categories. Sown-area shares use a separate hectare denominator; grouped inputs do not verify plot identity. Result units: plots, %. Categories must be mutually exclusive and cover the stated frame. Do not mix values, quantities, plots or hectares, or treat an HHI competition threshold as an institutional policy.

Decision bindings: DEC-DP03-001. Sources: DD-LOCAL. Exact per-decision inputs and evidence remain in the controlled decision register.

Dated variance
Observed date minus planned date in calendar days. Missing actual dates are pending, not zero delay. Approved working-day rules require a defined calendar. Result units: days.

Decision bindings: DEC-DP03-004, DEC-DP05-018, DEC-DP11-008, DEC-DP16-015, DEC-DP29-001, DEC-DP33-004. Sources: DD-LOCAL. Exact per-decision inputs and evidence remain in the controlled decision register.

Crop yield
Harvested crop output / Matching harvested crop area, for the same product, process and period. Result units: kg/ha.

Decision bindings: DEC-DP03-006, DEC-DP09-004. Sources: DD-LOCAL. Exact per-decision inputs and evidence remain in the controlled decision register.

Cash balance
Opening + receipts/additions − payments/reductions − other documented adjustments. Compare with independently recorded closing. A negative cash scenario is a shortfall, not an invalid water volume. Result units: LKR. Use the same physical boundary, period and units. A residual is a reconciliation issue, not automatically a measured loss.

Decision bindings: DEC-DP04-010, DEC-DP24-007, DEC-DP28-011, DEC-DP32-011, DEC-DP33-007, DEC-DP35-018, DEC-DP36-011, DEC-DP37-016, DEC-DP38-018, DEC-DP41-013. Sources: DD-LOCAL. Exact per-decision inputs and evidence remain in the controlled decision register.

Pump energy
Electric energy consumed / Water pumped, for the same product, process and period. Result units: kWh/m³.

Decision bindings: DEC-DP05-016, DEC-DP22-009. Sources: DD-LOCAL. Exact per-decision inputs and evidence remain in the controlled decision register.

Probability forecast
Brier score = mean((event probability−observed0/1)²). Skill=1−Brier/reference Brier when the same-case reference score is positive. Result units: 0–1. Define one event, lead, observation category thresholds and an independent reference. Do not apply rainfall RMSE to probabilities or interpret one score as complete calibration.

Decision bindings: DEC-DP08-008. Sources: DD-BRIER, DD-LOCAL. Exact per-decision inputs and evidence remain in the controlled decision register.

Series mismatch
Compare original definitions, identifiers, units and versions against documented equivalence evidence. Preserve conflicts and unresolved mappings; do not subtract category labels or silently merge records. Result units: items.

Decision bindings: DEC-DP08-011. Sources: DD-LOCAL. Exact per-decision inputs and evidence remain in the controlled decision register.

Point overlay
100×distinct spatially matched receptors / receptors in the same frame. Count a receptor once across overlapping areas; do not invent hectare areas from points. Result units: %, units. Geometry preparation must use matching coordinate systems, dated boundary editions and valid spatial predicates. Overlap supports referral; it does not determine ownership, permission or site safety.

Decision bindings: DEC-DP08-016, DEC-DP16-012, DEC-DP17-003, DEC-DP31-015. Sources: DD-LOCAL. Exact per-decision inputs and evidence remain in the controlled decision register.

Numeric mismatch
Later/comparison value minus Earlier/source value. Relative change = 100 × difference / Earlier/source value when the earlier value is positive. Result units: mm, %. Keep both originals, units, scope, method, calibration and correction history. A difference does not identify which source is correct; no automatic averaging or overwrite.

Decision bindings: DEC-DP08-018, DEC-DP10-019, DEC-DP14-002, DEC-DP17-010, DEC-DP23-014, DEC-DP23-017, DEC-DP24-006, DEC-DP25-017, DEC-DP40-009. Sources: DD-LOCAL. Exact per-decision inputs and evidence remain in the controlled decision register.

Lineage
Follow recorded upstream→downstream links within the same scope and period. Flag missing links; a confirmed defect identifies downstream linked candidates for authorized investigation. Result units: items. Recorded lineage is not proof of product identity or recall authority. Preserve multi-source batches, transfers and versions; do not clear unlinked lots as safe.

Decision bindings: DEC-DP09-013, DEC-DP18-012, DEC-DP34-017, DEC-DP36-016. Sources: DD-LOCAL. Exact per-decision inputs and evidence remain in the controlled decision register.

Variety area
Category share = 100 × category amount / total compatible category amounts. HHI = sum of squared fractional shares, displayed on a 0–1 scale. Result units: ha, %. Categories must be mutually exclusive and cover the stated frame. Do not mix values, quantities, plots or hectares, or treat an HHI competition threshold as an institutional policy.

Decision bindings: DEC-DP10-001. Sources: DD-LOCAL. Exact per-decision inputs and evidence remain in the controlled decision register.

Cost progress
100 × spending/phased budget, and verified−planned physical progress. Do not subtract LKR from physical progress, infer earned value or equate expenditure with outcomes. Result units: %, percentage points.

Decision bindings: DEC-DP11-002. Sources: DD-LOCAL. Exact per-decision inputs and evidence remain in the controlled decision register.

Study design
Check whether the question has a defined outcome, appropriate study design, comparison, baseline/follow-up, sampling, confounding and attrition evidence. Do not manufacture an effect estimate from missing design information. Result units: items. The arithmetic alone does not establish causation. Design, parallel trends, confounding, attrition, uncertainty and adverse effects need appropriate evidence.

Decision bindings: DEC-DP12-007, DEC-DP35-004, DEC-DP40-012. Sources: S92, DD-LOCAL. Exact per-decision inputs and evidence remain in the controlled decision register.

Location mismatch
Display supplied location separation with the two reported accuracies and coordinate-reference evidence. Do not treat a matched name or boundary overlap as confirmed identity. Result units: m.

Decision bindings: DEC-DP13-004, DEC-DP31-004. Sources: DD-LOCAL. Exact per-decision inputs and evidence remain in the controlled decision register.

Survey cost
Sum non-overlapping costs, then divide by the matching verified quantity for the same currency and accounting period. Result units: LKR/survey unit, LKR. An absent or zero denominator has no unit-cost result. Keep fixed, variable and opportunity costs identifiable.

Decision bindings: DEC-DP14-018. Sources: DD-LOCAL. Exact per-decision inputs and evidence remain in the controlled decision register.

Schema mismatch
Compare original definitions, identifiers, units and versions against documented equivalence evidence. Preserve conflicts and unresolved mappings; do not subtract category labels or silently merge records. Result units: items.

Decision bindings: DEC-DP15-010. Sources: DD-LOCAL. Exact per-decision inputs and evidence remain in the controlled decision register.

Damage loss
Asset quantity × replacement/repair unit cost. Show interrupted economic flows separately; no automatic damage+flow total or double counting. Result units: LKR, LKR/period. An absent or zero denominator has no unit-cost result. Keep fixed, variable and opportunity costs identifiable.

Decision bindings: DEC-DP16-002. Sources: DD-LOCAL. Exact per-decision inputs and evidence remain in the controlled decision register.

Weighted proportion
Weighted proportion = sum(weight×indicator0/1)/sum(weight). Report the classification and eligible population; use design information for uncertainty. Result units: 0 or1. Retain sampling frame, strata, clusters, nonresponse and calibration. The prototype does not invent complex-design variance, confidence intervals or small-area precision.

Decision bindings: DEC-DP20-001, DEC-DP20-015. Sources: S91, DD-LOCAL. Exact per-decision inputs and evidence remain in the controlled decision register.

Survey precision
Relative standard error=100×design-based SE/abs(estimate), only for a nonzero estimate and an actually supplied design-based SE. Sample count alone does not determine geographic precision. Result units: %. Retain sampling frame, strata, clusters, nonresponse and calibration. The prototype does not invent complex-design variance, confidence intervals or small-area precision.

Decision bindings: DEC-DP20-003. Sources: S91, DD-LOCAL. Exact per-decision inputs and evidence remain in the controlled decision register.

Weighted area production
Estimated production=sum(weight×production); estimated harvested area=sum(weight×area); aggregate yield=estimated production/estimated area. Do not average individual yields without the matching denominator. Result units: kg/ha. Retain sampling frame, strata, clusters, nonresponse and calibration. The prototype does not invent complex-design variance, confidence intervals or small-area precision.

Decision bindings: DEC-DP20-013. Sources: S91, DD-LOCAL. Exact per-decision inputs and evidence remain in the controlled decision register.

Groundwater trend
Display observations in dated order. Sample SD uses n−1; coefficient of variation = 100 × SD / positive mean. Result units: m. Groundwater head and depth below ground have opposite directional meanings. Match datum, pumping state and seasonal context; observed drawdown is not itself a safe-yield estimate.

Decision bindings: DEC-DP21-001. Sources: DD-LOCAL. Exact per-decision inputs and evidence remain in the controlled decision register.

Aquifer balance
Calculated closing = opening + inflows − releases/transfers − other outflows. Residual = independently observed closing − calculated closing. Result units: m³. A storage-change calculation needs a defined aquifer boundary and compatible volume estimates. Groundwater head in metres is not a storage volume; uncertainty and safe-abstraction review remain separate.

Decision bindings: DEC-DP21-007. Sources: DD-LOCAL. Exact per-decision inputs and evidence remain in the controlled decision register.

Well proximity
Display measured separation with hydrogeological direction, source type and the reviewed protection criterion. Distance alone cannot determine contamination, safety or a statutory protection area. Result units: m. Geometry preparation must use matching coordinate systems, dated boundary editions and valid spatial predicates. Overlap supports referral; it does not determine ownership, permission or site safety.

Decision bindings: DEC-DP21-008. Sources: DD-LOCAL. Exact per-decision inputs and evidence remain in the controlled decision register.

Drilling
Drilling cost / completed depth. Display tested yield and the stated success definition separately; cost per metre does not determine safe abstraction. Result units: LKR/m, L/s.

Decision bindings: DEC-DP21-016. Sources: DD-LOCAL. Exact per-decision inputs and evidence remain in the controlled decision register.

Billed water
NRW=input−billed authorized use. Water losses=NRW−unbilled authorized use. Residual real loss=water losses−estimated apparent losses, only when all components are available. Result units: m³, %. NRW is not all leakage. An unknown apparent-loss estimate keeps residual real loss unavailable. Meter uncertainty and matching time/zone boundaries matter.

Decision bindings: DEC-DP22-001. Sources: DD-NRW, DD-LOCAL. Exact per-decision inputs and evidence remain in the controlled decision register.

Leakage evidence
NRW=input−billed authorized use. Water losses=NRW−unbilled authorized use. Residual real loss=water losses−estimated apparent losses, only when all components are available. Result units: m³, %. NRW is not all leakage. An unknown apparent-loss estimate keeps residual real loss unavailable. Meter uncertainty and matching time/zone boundaries matter.

Decision bindings: DEC-DP22-002. Sources: DD-NRW, DD-LOCAL. Exact per-decision inputs and evidence remain in the controlled decision register.

Basket cost
Specified quantity × comparable unit price. Sum only non-overlapping items from the same basket specification, location and price period. Result units: LKR. An absent or zero denominator has no unit-cost result. Keep fixed, variable and opportunity costs identifiable.

Decision bindings: DEC-DP25-006. Sources: DD-LOCAL. Exact per-decision inputs and evidence remain in the controlled decision register.

Input expenditure
Specified quantity × comparable unit price. Sum only non-overlapping items from the same basket specification, location and price period. Result units: LKR. An absent or zero denominator has no unit-cost result. Keep fixed, variable and opportunity costs identifiable.

Decision bindings: DEC-DP25-011. Sources: DD-LOCAL. Exact per-decision inputs and evidence remain in the controlled decision register.

Labour
Cash cost/ha = hired days×cash wage/area. Total effort/ha=(hired+unpaid family days)/area. Do not value unpaid labour as zero opportunity cost. Result units: LKR/ha, person-days/ha.

Decision bindings: DEC-DP25-013. Sources: DD-LOCAL. Exact per-decision inputs and evidence remain in the controlled decision register.

Export composition
Compute export-value and quantity shares independently within compatible product and reporting frames; never add currency and kilograms. Result units: LKR, %. Categories must be

mutually exclusive and cover the stated frame. Do not mix values, quantities, plots or hectares, or treat an HHI competition threshold as an institutional policy.

Decision bindings: DEC-DP26-001. Sources: DD-LOCAL. Exact per-decision inputs and evidence remain in the controlled decision register.

Export unit value
Recorded export value / Export quantity on matching product basis, for the same product, process and period. Result units: LKR/kg. A unit value mixes prices and product composition. It is not automatically a like-for-like market price. Match grade, product code, currency and period.

Decision bindings: DEC-DP26-004, DEC-DP37-004. Sources: DD-LOCAL. Exact per-decision inputs and evidence remain in the controlled decision register.

Human match
Match documented expertise, available effort, date windows and required conflict/clearance evidence. A match suggests a candidate; it appoints nobody. Result units: hours. A candidate match does not reserve stock, appoint a person, authorize waste reuse or form a contract.

Decision bindings: DEC-DP27-007, DEC-DP40-011, DEC-DP41-012. Sources: DD-LOCAL. Exact per-decision inputs and evidence remain in the controlled decision register.

Business retention
Lower =100 × known survivors / original cohort. Upper =100 × (known survivors + unknown) / original cohort. Survivors + known failures + unknown = original cohort; replacements do not enter it. Result units: %, enterprises. These bounds account for unknown status; they are not statistical confidence intervals. Use actual follow-up dates and distinguish cohort membership from repeated visits.

Decision bindings: DEC-DP27-009. Sources: DD-LOCAL. Exact per-decision inputs and evidence remain in the controlled decision register.

Plot match
Compare the same specification and unit, uncommitted quantity and overlapping delivery windows. Keep mandatory quality and use conditions explicit. Result units: m². A candidate match does not reserve stock, appoint a person, authorize waste reuse or form a contract.

Decision bindings: DEC-DP28-001. Sources: DD-LOCAL. Exact per-decision inputs and evidence remain in the controlled decision register.

Resource efficiency
Energy/output; water/output; and 100 × output/material input. Separate denominators and units; do not sum these efficiencies. Result units: kWh/kg, m³/kg, %.

Decision bindings: DEC-DP28-006, DEC-DP34-011. Sources: DD-LOCAL. Exact per-decision inputs and evidence remain in the controlled decision register.

Feedback
Category share = 100 × category amount / total compatible category amounts. HHI = sum of squared fractional shares, displayed on a 0–1 scale. Result units: cases, %. Categories must be

mutually exclusive and cover the stated frame. Do not mix values, quantities, plots or hectares, or treat an HHI competition threshold as an institutional policy.

Decision bindings: DEC-DP31-020. Sources: DD-LOCAL. Exact per-decision inputs and evidence remain in the controlled decision register.

Cost output
Sum non-overlapping costs, then divide by the matching verified quantity for the same currency and accounting period. Result units: LKR/kg, LKR. An absent or zero denominator has no unit-cost result. Keep fixed, variable and opportunity costs identifiable.

Decision bindings: DEC-DP34-001. Sources: DD-LOCAL. Exact per-decision inputs and evidence remain in the controlled decision register.

Mass conversion
100 × saleable output / matching input mass. Keep by-products, transfers, moisture change and losses separately identified. Result units: %.

Decision bindings: DEC-DP34-010, DEC-DP37-001. Sources: DD-LOCAL. Exact per-decision inputs and evidence remain in the controlled decision register.

Tonne km
Shipment cost / (actual load tonnes × verified route kilometres). Match empty-return treatment and cost allocation. Result units: LKR/(t km). An absent or zero denominator has no unit-cost result. Keep fixed, variable and opportunity costs identifiable.

Decision bindings: DEC-DP37-002. Sources: DD-LOCAL. Exact per-decision inputs and evidence remain in the controlled decision register.

Affected lots
Follow recorded upstream→downstream links within the same scope and period. Flag missing links; a confirmed defect identifies downstream linked candidates for authorized investigation. Result units: items. Recorded lineage is not proof of product identity or recall authority. Preserve multi-source batches, transfers and versions; do not clear unlinked lots as safe.

Decision bindings: DEC-DP37-009. Sources: DD-LOCAL. Exact per-decision inputs and evidence remain in the controlled decision register.

Process energy
Energy consumed / Saleable product output, for the same product, process and period. Result units: kWh/kg.

Decision bindings: DEC-DP37-011. Sources: DD-LOCAL. Exact per-decision inputs and evidence remain in the controlled decision register.

Verification cost
Sum non-overlapping costs, then divide by the matching verified quantity for the same currency and accounting period. Result units: LKR/accepted service unit, LKR. An absent or zero denominator has no unit-cost result. Keep fixed, variable and opportunity costs identifiable.

Decision bindings: DEC-DP39-004. Sources: DD-LOCAL. Exact per-decision inputs and evidence remain in the controlled decision register.

Followup retention
Lower =100 × known survivors / original cohort. Upper =100 × (known survivors + unknown) / original cohort. Survivors + known failures + unknown = original cohort; replacements do not enter it. Result units: %, participants. These bounds account for unknown status; they are not statistical confidence intervals. Use actual follow-up dates and distinguish cohort membership from repeated visits.

Decision bindings: DEC-DP40-016, DEC-DP41-017. Sources: DD-LOCAL. Exact per-decision inputs and evidence remain in the controlled decision register.

Additional source locators
DD-WATER — FAO56 root-zone water balance — Institution publication

Chapter8 equation85 and ETc = Kc ETo. Daily water balance components; local coefficients and operating assumptions still need review.

https://www.fao.org/4/X0490E/x0490e0e.htm

DD-PESTICIDES — Sri Lanka Registrar of Pesticides — Government publication

Current registration lists, restrictions and label guidance. Registration and label evidence; no treatment recommendation or automatic permission.

https://doa.gov.lk/rop-downloads/

DD-CEA — CEA ambient water regulations — Government publication

Gazette2148/20, Schedule of use-specific categories. Published ambient water categories and limits; do not substitute them for drinking-water, effluent, air or noise rules.

https://www.cea.lk/web/images/pdf/epc/2148-20_E-1.pdf

DD-BRIER — JMA numerical weather prediction outline — Government publication

AppendixA.3, equationsA.3.1 and A.3.3. Brier score and reference skill for binary probability forecasts; the prototype uses one specified event, not an undifferentiated seasonal score.

https://www.jma.go.jp/jma/jma-eng/jma-center/nwp/outline2022-nwp/pdf/outline2022_all.pdf

DD-NRW — JICA non-revenue water training materials — Institution publication

Training materials, section1.1, IWA water-balance table. NRW, unbilled authorized use, apparent and real losses are distinct components.

https://openjicareport.jica.go.jp/pdf/12364485_03.pdf

DD-ILO — ILO controlling occupational risks — Institution publication

Controlling risks; hierarchy of controls. Evidence-led control review; no universal numeric risk score or clearance.

https://www.ilo.org/topics-and-sectors/occupational-safety-and-health-guide-labour-inspectors-and-other/how-can-occupational-safety-and-health-be-managed/controlling-risks

DD-GBIF — GBIF biological survey publishing guide — Institution publication

Version1.0.2, sections5.4 to5.7 and7.3. Survey event, effort, protocol, sampling scope and non-detection context; not a population estimator.

https://docs.gbif.org/guide-publishing-survey-data/en/

DD-LOCAL — SHARED domain decision contracts — Validation required

Domain decision rules and matching fictional examples. Local comparisons, constraints, source matching, sorting and follow-up proposals; developer checks do not establish scientific or client approval.

https://sharedproto.wkslabs.com/reviews/dashboard-portfolio-20261027/srs-document/Calculations_and_Rules.html#domain-decisions

Published ecosystem accounting context: United Nations DESA, System of Environmental-Economic Accounting Ecosystem Accounting, December 2024, publication entry and SEEA account definitions. Extent, condition, physical service flows and monetary accounts remain separate. The publication entry is available; direct PDF retrieval returned access denied during checking. Obtain the full current method before operational account compilation.

https://desapublications.un.org/publications/system-environmental-economic-accounting-ecosystem-accounting-seea-ea

Checked source USLE — USLE factor product. United States Department of Agriculture Forest Service. A Guide for Predicting Sheet and Rill Erosion on Forest Land. 1980 technical publication SA-TP 11; Universal Soil Loss Equation, printed page 2; metric conversion appendix, printed page 40. https://www.ars.usda.gov/ARSUserFiles/60600505/RUSLE/A%20guide%20for%20predicting%20sheet%20and%20rill%20erosion%20on%20forest%20land.pdf

Checked source MARGIN — Enterprise gross margin. Food and Agriculture Organization of the United Nations. Farm Management for Asia A Systems Approach. Chapter 4, Gross margin and section 4.7.1. https://www.fao.org/4/W7365E/w7365e07.htm

Checked source NPV — Discounted cash-flow NPV. Food and Agriculture Organization of the United Nations. Guidelines for defining financial economic environmental and social information. Sections 2.2.2 and 2.2.3, discounting and Net Present Value. https://www.fao.org/4/w8212e/w8212e06.htm

Checked source STOCK — Carbon stock-difference component. Intergovernmental Panel on Climate Change. 2006 IPCC Guidelines Volume 4 Chapter 2. Section 2.3.1.1, equation 2.8, stock-difference method. https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/4_Volume4/V4_02_Ch2_Generic.pdf

Checked source SOC — Soil-carbon stock with volume correction. Intergovernmental Panel on Climate Change. Good Practice Guidance for LULUCF. Section 4.3.3.5.4, equation 4.3.3, printed page 4.106, PDF page 18. https://www.ipcc-nggip.iges.or.jp/public/gpglulucf/gpglulucf_files/Chp4/Chp4_3_Projects.pdf

Checked source DID — Difference-in-differences arithmetic. World Bank. Impact Evaluation in Practice Second Edition. Chapter 7, table 7.2, printed page 140, PDF page 170.

https://documents1.worldbank.org/curated/en/698441474029568469/pdf/Impact-evaluation-in-practice.pdf

Checked source CV — Sample coefficient of variation. National Institute of Standards and Technology United States. Dataplot Coefficient of Variation. Description, sample coefficient of variation and ratio-scale restrictions. https://www.itl.nist.gov/div898/software/dataplot/refman2/auxillar/coefvari.htm

Checked source HHI — HHI concentration component. United States Department of Justice. Herfindahl Hirschman Index. Definition and four-firm worked example. https://www.justice.gov/atr/herfindahl-hirschman-index

Checked source RMSE — Matched-pair RMSE. Environment and Climate Change Canada. What is Root Mean Square Error. Displayed RMSE equation and definitions of forecast, observation and verification count. https://weather.gc.ca/verification/scores/rmse_e.html

Checked source BRIER — Binary Brier score and skill component. Japan Meteorological Agency. Outline of Operational Numerical Weather Prediction Appendix A Verification Indices 2024. Sections A.3.1 and A.3.2, equations A.3.1 and A.3.3, printed page 239, PDF page 7. https://www.jma.go.jp/jma/jma-eng/jma-center/nwp/outline2024-nwp/pdf/outline2024_Appendix_A.pdf

Checked source ETC — Crop evapotranspiration ETc component. Food and Agriculture Organization of the United Nations. FAO Irrigation and Drainage Paper 56 Crop Evapotranspiration. Chapter 5, Crop coefficient approach, equation 56. https://www.fao.org/4/X0490E/x0490e0a.htm

Checked source WEIGHTED — Weighted estimation component. United Nations Statistics Division. Handbook of Surveys on Households and Individuals Final Draft. Chapter 9, paragraphs 38 and 39, printed page 9-9, PDF page 417; Chapter 8 weighting. https://unstats.un.org/UNSDWebsite/statcom/session_57/documents/BG-3k-Handbook_on_Surveys_of_Household_and_Individuals-E.pdf

Checked source NRW — IWA water-balance components. Asian Development Bank. The Issues and Challenges of Reducing Non-Revenue Water. Figure 4, printed page 15; Annex 1 Water Balance Definitions, printed pages 39–41, PDF pages 47–49. https://www.adb.org/sites/default/files/publication/27473/reducing-nonrevenue-water.pdf

6 4 Payments for Ecosystem Services

PES means payments for ecosystem services. In this fictional example, upstream farmer groups maintain riverbank vegetation and soil cover. An illustrative downstream water-user fund pays under an annual agreement. The intermediary keeps the agreement and evidence together; an independent checker checks the work.

Follow the example: agree the work and conditions; check the field record; calculate a proposal; then record separate authorisation and actual payment evidence.

Annual work record	Example
Agreed area	24 ha
Checked area	22 ha = 20 ha meeting conditions + 2 ha needing correction
Area still to visit	2 ha; checked 22 ha + unvisited 2 ha = agreed 24 ha
Annual payment proposal	min(20 ha × LKR 12,500 per ha/year, LKR 300,000) = LKR 250,000
Funding and payment	LKR 200,000 available; funding confirmation missing. No amount ready for authorisation. Authorised = 0; paid = 0.

These hectares show work compliance only. They do not prove cleaner water, additional environmental benefits or a monetary value of the ecosystem. Annual rates and caps are fictional agreement settings.

Checking possible displacement of land clearing

DEC-DP39-008 compares two fixed 200 ha observation areas using the same clearing definition, season and observation window. New clearing near the agreement increases from 0.6 ha to 1.4 ha; clearing in a separate comparison area increases from 0.4 ha to 0.5 ha. The two increases are 0.8 ha and 0.1 ha. Their difference is 0.7 ha. Investigate this signal; it does not prove that the agreement caused clearing.

DEC-DP39-007 uses the same published difference-of-changes arithmetic for ground cover: (85 − 60) − (67 − 62) = 20 percentage points. Comparable sites, baseline conditions and a defensible study design must be assessed before making a causal or additionality claim.

The 20 PES questions

Decision	Question
001	Which field checks are due?
002	How much agreed work passed the check?
003	What was checked, proposed and paid?
004	How much does a field check cost?
005	Is the scheme ready to start?
006	Can this group join the scheme?

Decision	Question
007	Did the scheme add an environmental improvement?
008	Did land clearing move outside the agreement area?
009	Could the agreed work be lost or damaged?
010	Which service agreement is practical?
011	What payment can we propose?
012	How would the payment be shared?
013	Is the same work being claimed twice?
014	How should we measure the work and its benefits?
015	Is there enough money for the full agreement?
016	Could participation harm a household or its rights?
017	Which complaints need a response?
018	Is the checker independent?
019	Should the agreement continue, change or close?
020	Do the service name, unit and agreement match?

Data needed

Obtain the versioned scheme and service agreement from its owner, the mapped area and rights/consent records from authorised custodians, field observations and signed protocol from the checker, and the rate schedule, funding commitment, authorisation and transaction references from the responsible payer. Record the original source, year, units, definitions, quality and permitted use. No approved Knuckles PES agreement or tariff is supplied by these examples.

Source basis

FAO, Payments for environmental services: what role in sustainable agricultural development?, ESA Working Paper 11-20, December 2011, section 2, printed pages 3–6: conditional agreements, additionality, displacement risks, durability and monitoring. Published institutional guidance; not a payment formula or a local rate.

https://www.fao.org/docrep/015/an456e/an456e00.pdf

World Bank, Impact Evaluation in Practice, second edition, chapter 7, Table 7.2, printed page 140: difference in differences = (treated after − before) − (comparison after − before). Verified published formula for the arithmetic used in DEC-DP39-007 and DEC-DP39-008. The publication does not verify these fictional data, the comparison design or a causal conclusion.

https://documents1.worldbank.org/curated/en/698441474029568469/pdf/Impact-evaluation-in-practice.pdf

The other PES rules are project checks or illustrative agreement arithmetic. Their status is Validation required. Use Institution review for local scheme authority, service definition, rights, safeguards, rate, funding, checking design and payment responsibility.