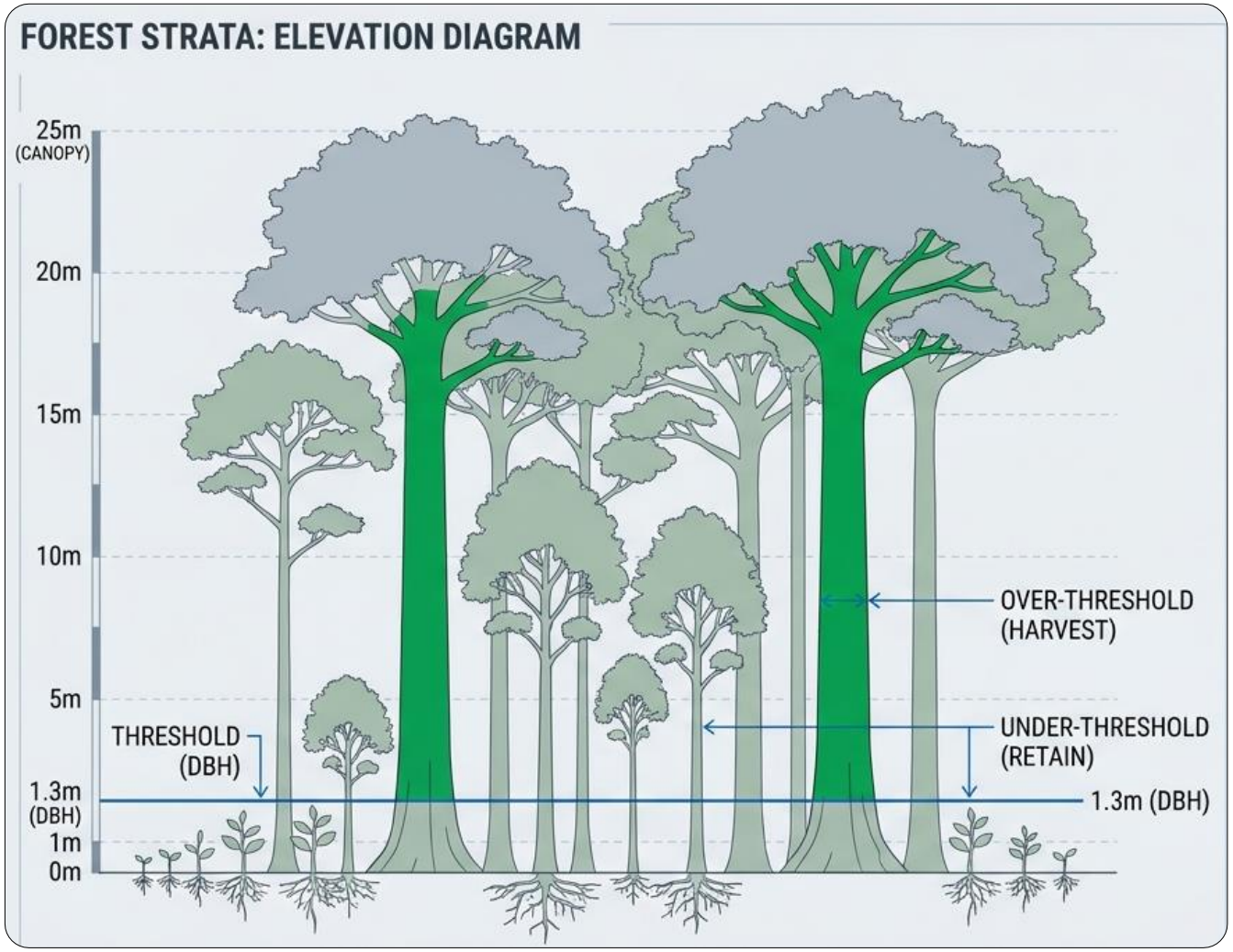
Determining Cutting Limits in Forest Manage

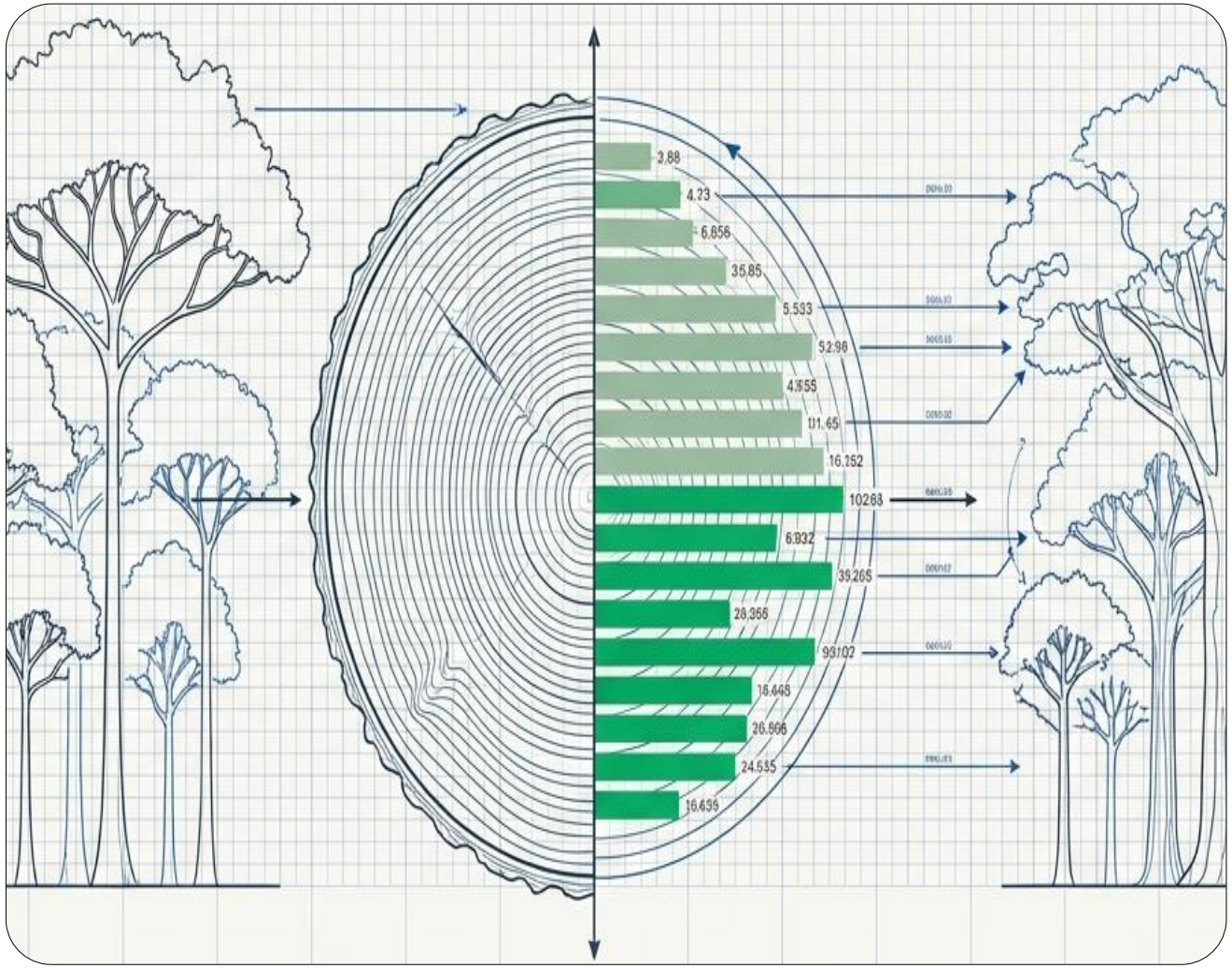
Key idea: protect future growth while harvesting.



Determining Cutting Limits in Forest Management

MODULE 3 • TOPIC 2 • 01

- Use stand conditions, growth, and productivity to set sustainable harvest limits.
- The goal is a continuous timber supply, not one large harvest.
- Apply the rules consistently at stand and operational levels.

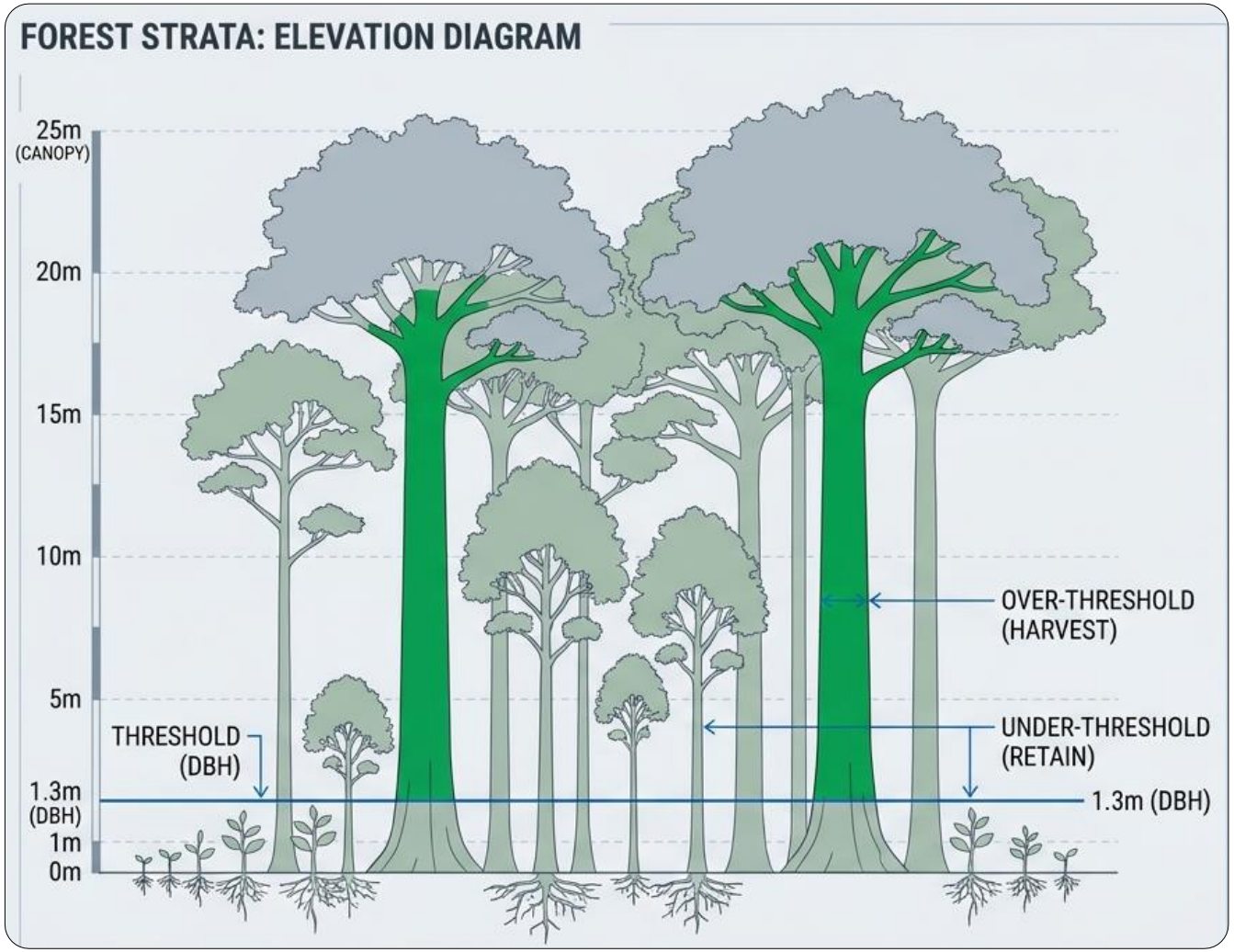


Forest Strata: Read the Stand Before Cutting

Primary silvicultural tool: A cutting limit is the precise DBH threshold above which mature commercial trees are authorised for felling.

- Identify trees across height classes and diameter classes.
- Protect the stand's structure, regeneration and growing stock.
- Cutting limits must avoid over-opening the canopy and damaging the site.

Volume Regulation: Prevents total canopy collapse and unsustainable high-grading.
Structural Integrity: Retains mature seed-producing trees to drive natural regeneration.
Site Protection: Intact middle/lower canopies mitigate soil erosion and protect hydrological functions.

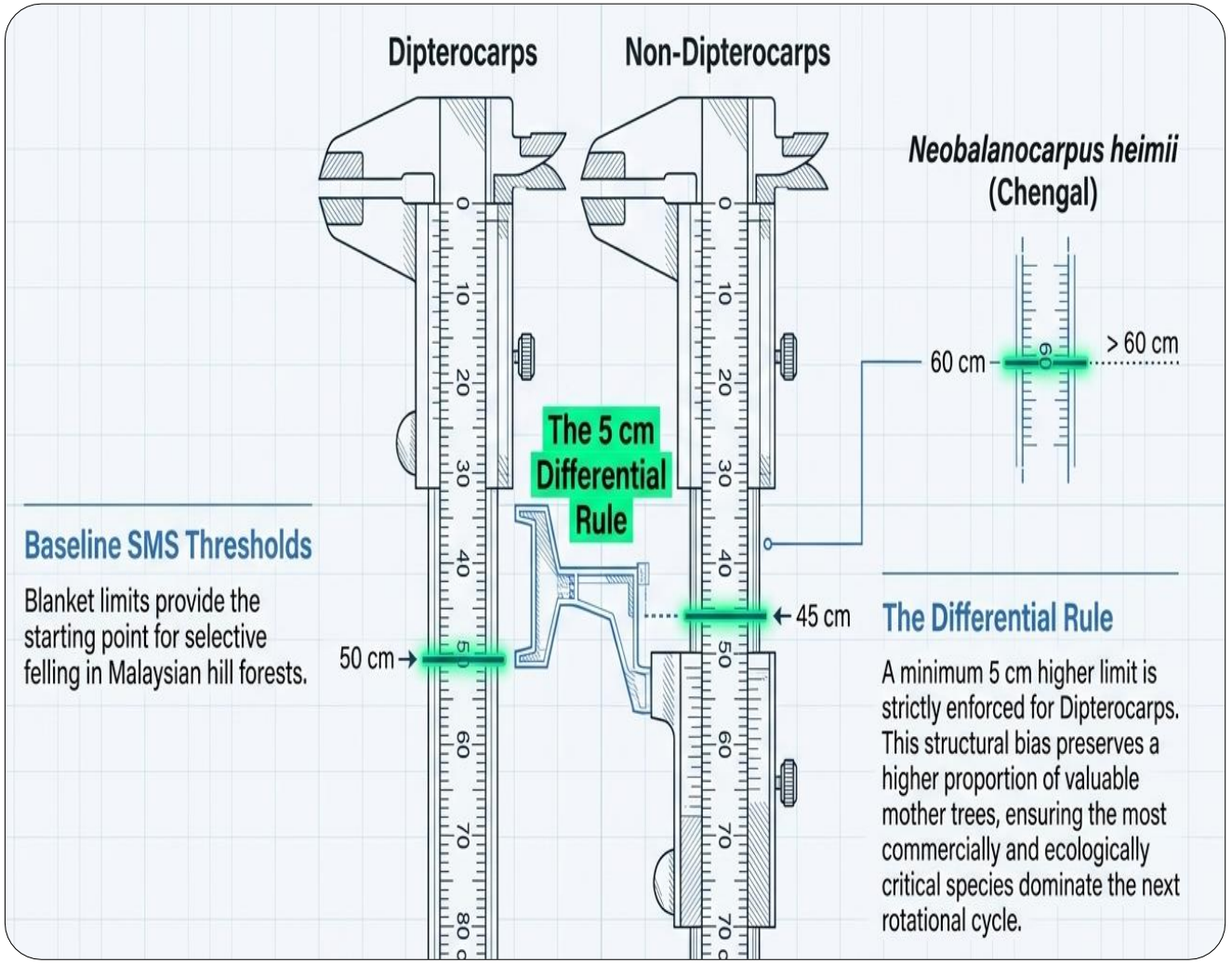


Minimum Diameter Rules

MODULE 3 • TOPIC 2 • 03

- Use minimum cutting limits (MCL) to protect immature trees.
- Differentiate rules for dipterocarps and non-dipterocarps when required.
- A diameter threshold helps retain future crop trees and seed sources.

Key idea: protect future growth while harvesting.



The Four Pillars of Sustainable Yield

Current growing stock:

- What the forest has now, based on its baseline volume, basal area, and size distribution of all living trees.

Mean annual increment (MAI):

- Long-term average growth
- The net annual volume increment per hectare.

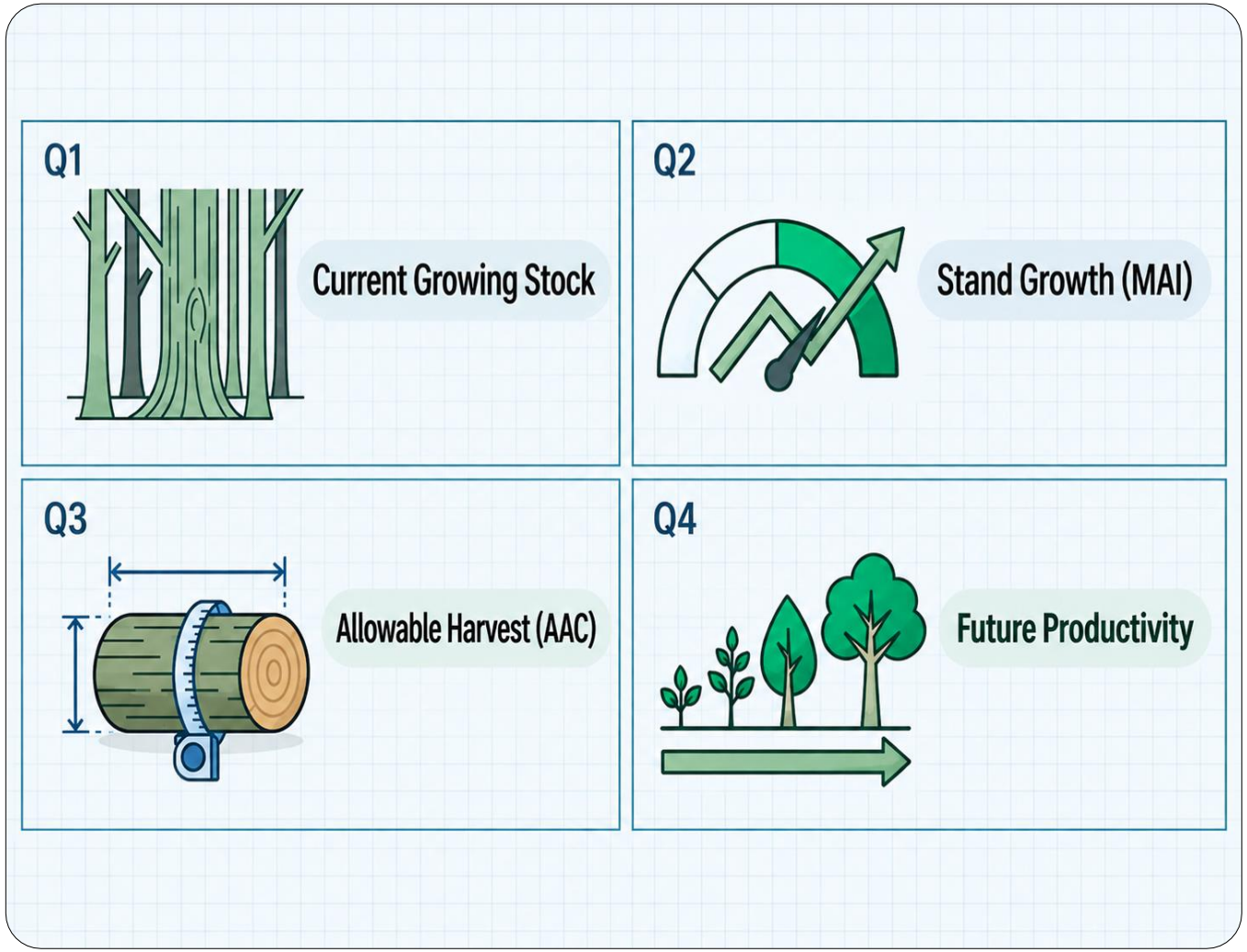
Allowable annual cut (AAC):

- The harvest limit in volume and biologically legal.

Future productivity:

- Protect the next rotation.

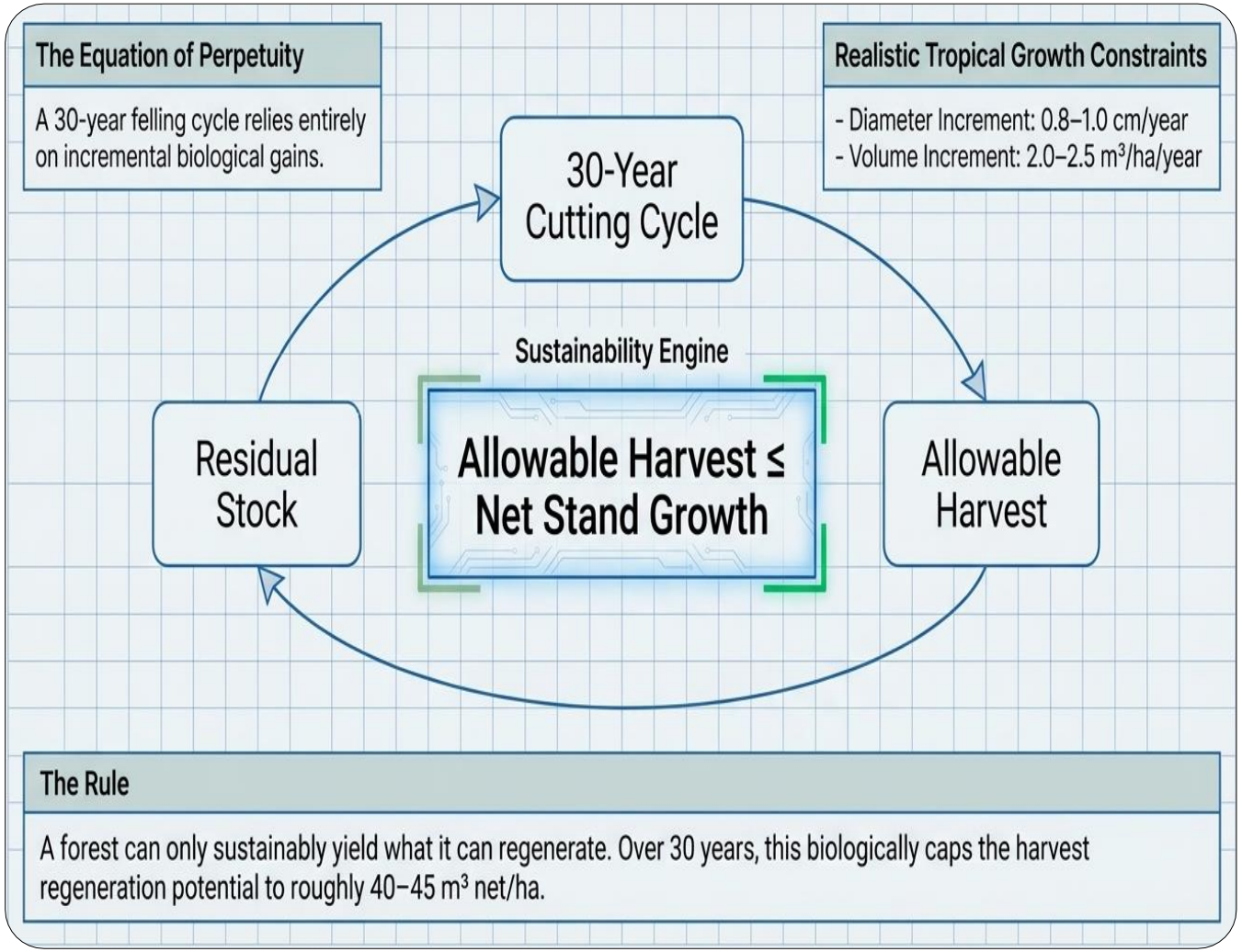
Key idea: protect future growth while harvesting.



The 30-Year Cutting Cycle

- A cutting cycle links harvest, residual stock and regeneration.
- Allowable harvest must remain within the stand's sustainable growth.
- Retain enough growing stock to support the next cycle.

Key idea: protect future growth while harvesting.

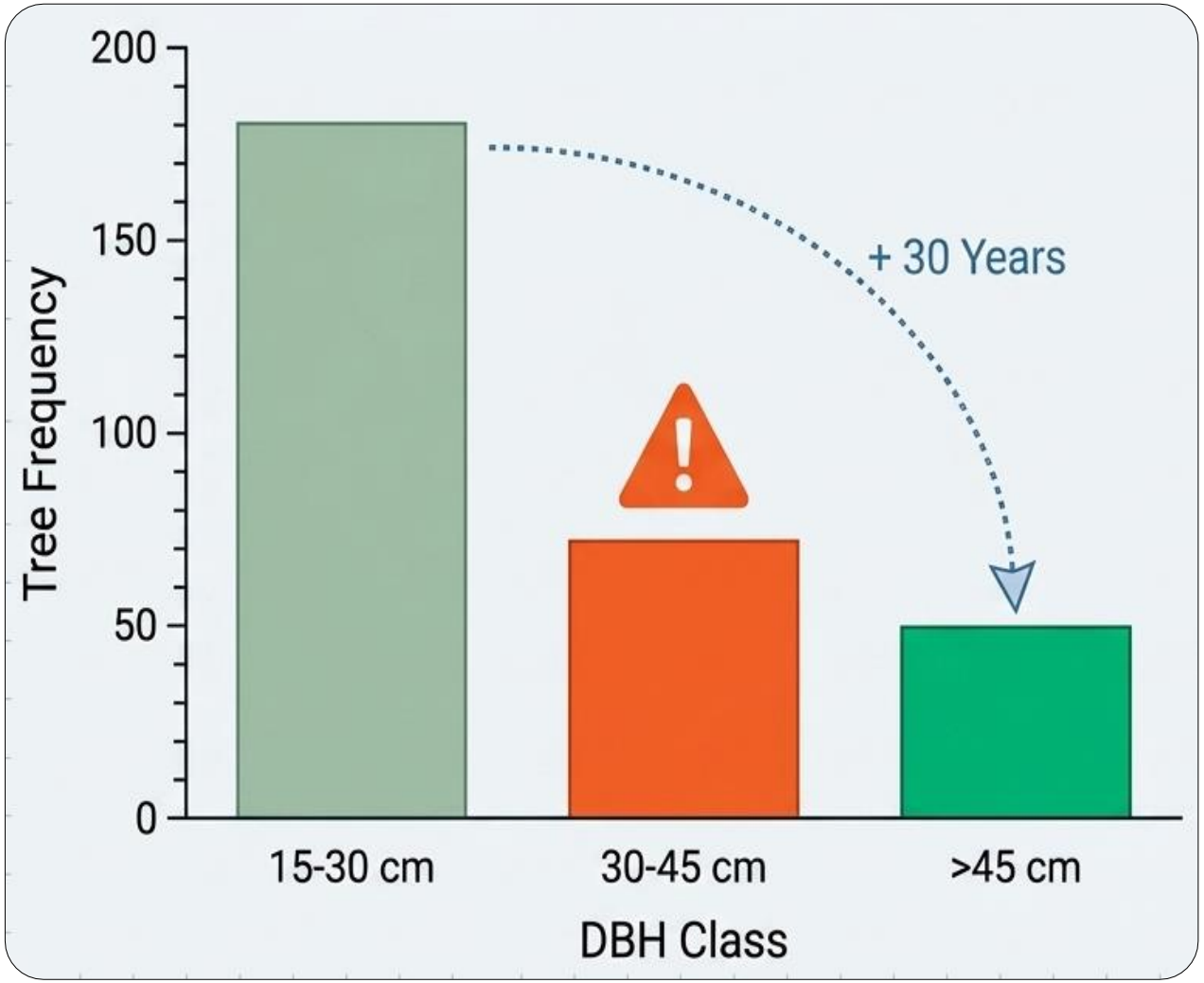


Avoid the ‘Missing Middle’

Tree Frequency by DBH Class

- Do not remove too many trees in the intermediate (30-45) DBH classes.
- These trees are often the future commercial crop.
- A balanced diameter distribution supports continuous production.
- The stand will fail to produce commercial volume in the next rotation, regardless of how many seedlings regenerate.

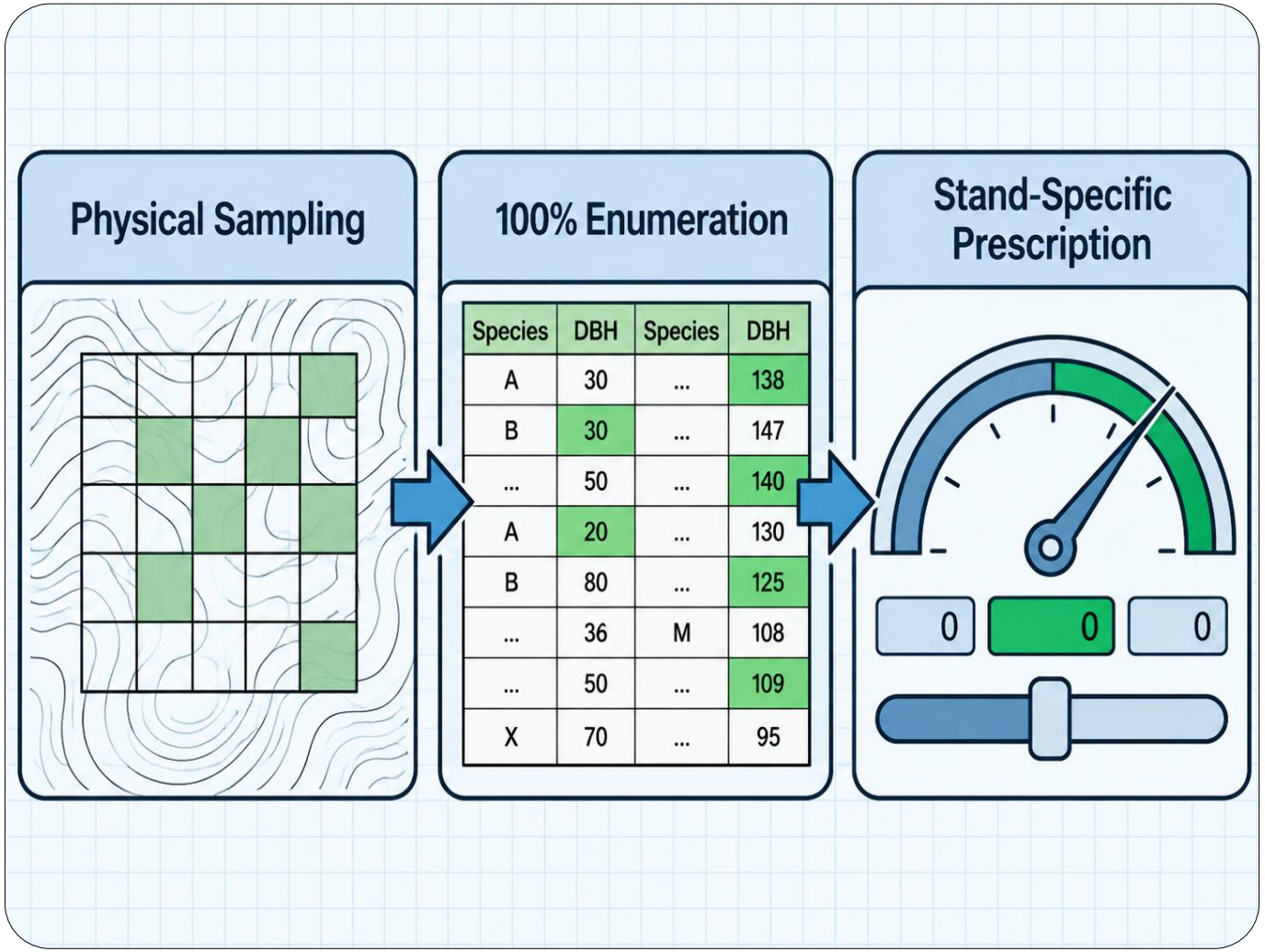
Key idea: protect future growth while harvesting.



Pre-Felling (Pre-F) Inventory: The Diagnostic Foundation

- Pre-F inventory uses physical block-specific sampling of species composition and diameter distribution and, where needed, full enumeration.
- Record diameter, species, stocking and volume.
- Baseline limits (50/45cm) are legally insufficient on their own; limits must be dynamically adjusted to the stand.
- Use the inventory to set stand-specific cutting limits.

Key idea: protect future growth while harvesting.



The Operational Shield

- Mathematical limits alone are not enough; they require RIL execution.
- Reduce residual damage, skid-trail cover and soil exposure.
- Reduced-impact logging can protect the remaining stand and lower recovery costs.

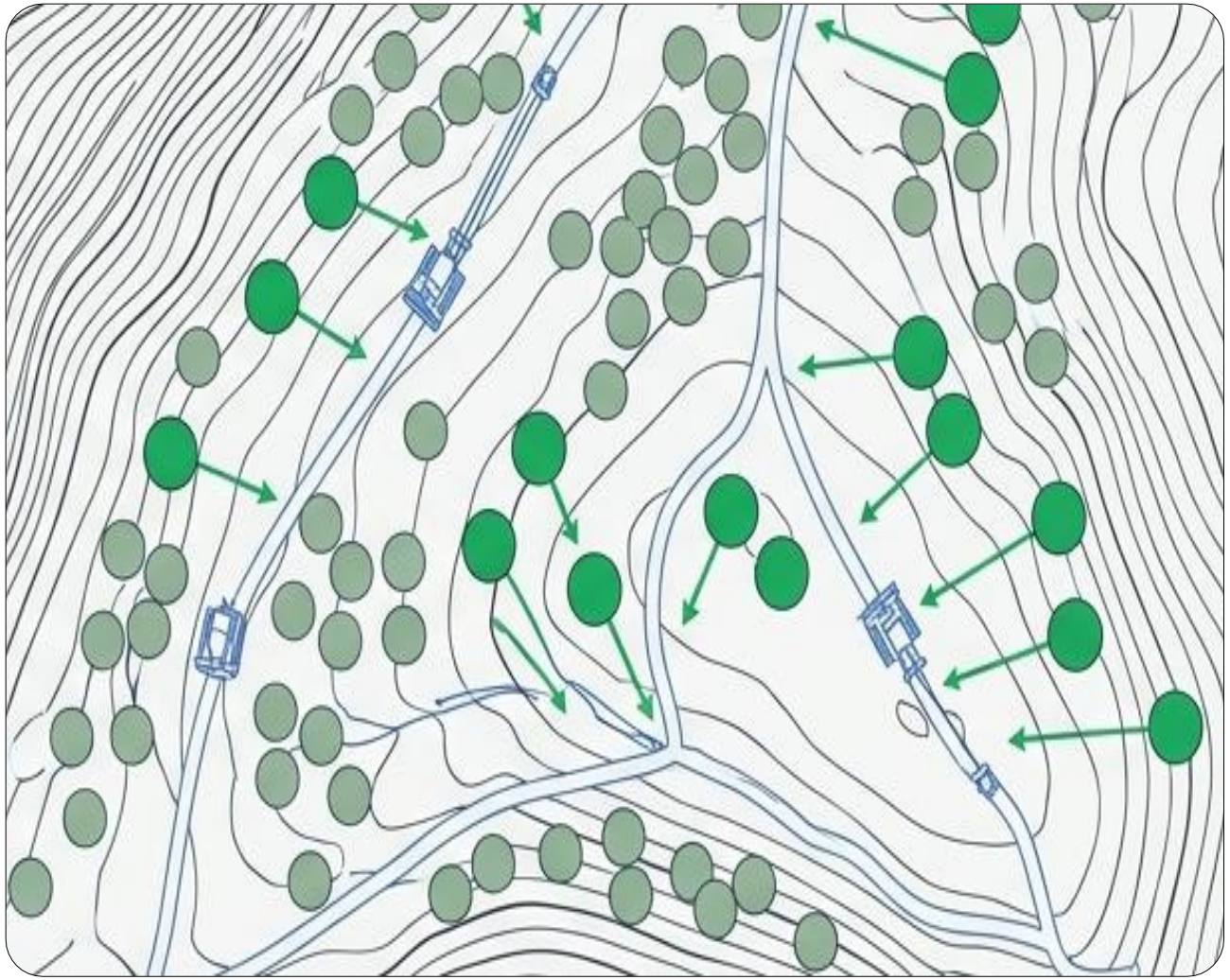
Key idea: protect future growth while harvesting.

Metric	Conventional Logging	Reduced Impact Logging (RIL)
Residual Damage	50–80% damage	<25% damage
Skid Trail Coverage	12% of area	~3.4% of area
Soil Exposure	87% of trails exposed	38% exposed
Economic Impact	High waste, higher bulldozer maintenance	Higher upfront planning costs, greater gross volume recovery

Precision Mechanics in Action

- Plan directional felling before harvesting.
- Use pre-harvest vine cutting and planned extraction routes.
- Avoid damage to retained trees, regeneration and sensitive areas.

Pre-Harvest Vine Cutting: Executed 6 months prior to felling; prevents interconnected vines from tearing down retained canopy trees.
Directional Felling: Trees dropped toward pre-planned skid trails to limit the impact zone.
Winch-Extraction: Bulldozers remain on main trails, using winches to pull logs, radically minimising the crushing footprint on the forest floor.



Step 1: Analyse Pre-Felling Data

- Determine the baseline health of the stand before applying the SMS formula.
- Check the number of trees and gross volume by DBH class.
- Identify the critical intermediate classes.
- Use the evidence to decide whether the proposed harvest is too high.

Key idea: protect future growth while harvesting.

PRE-F INVENTORY OUTPUT

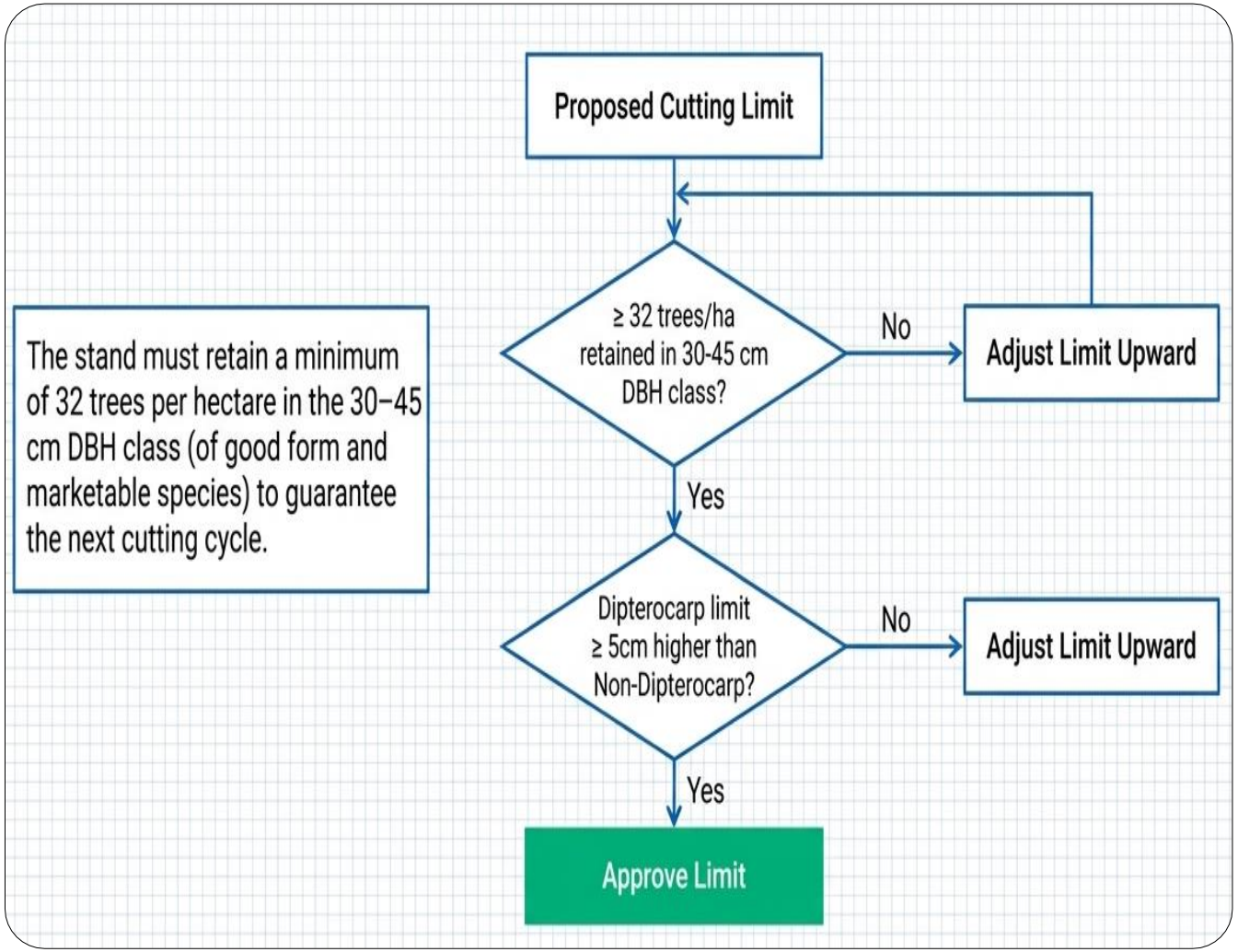
DBH Class	Trees/Ha	Gross Volume (m^3)
15-30 cm	85	12
30-45 cm	42	24
>45 cm	15	100

Identify the exact current stocking levels in the critical intermediate classes. Are there enough adolescent trees to support a harvest, or has the stand already been degraded?

Step 2: Apply SMS Retention Constraints

- Run the pre-felling data through the Selective Management System rules.
- Check minimum retained trees and diameter-class requirements.
- Adjust the cutting limit upward or downward until the rules are met.

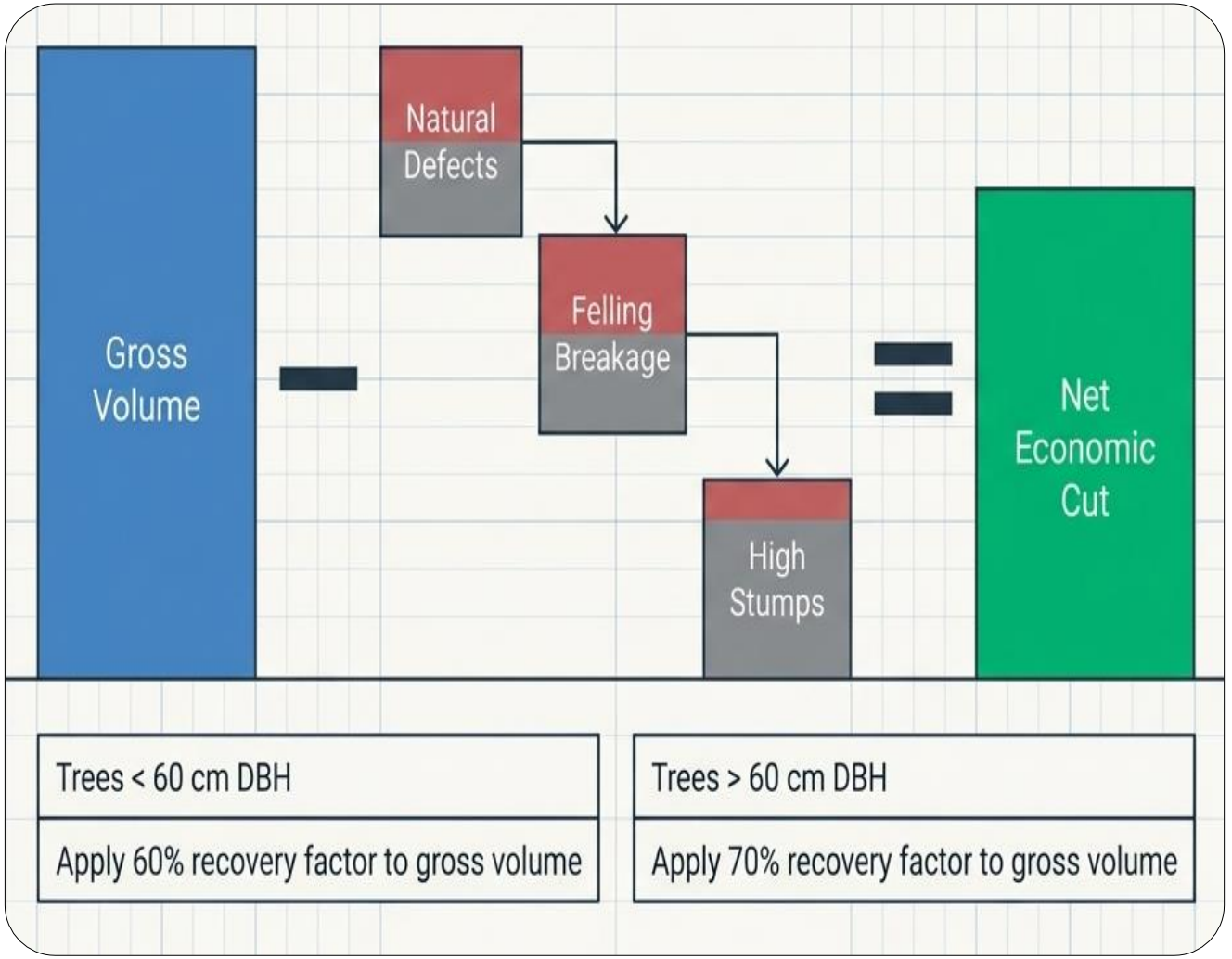
Key idea: protect future growth while harvesting.



Step 3: Calculate the Net Economic Cut

- Start with gross volume.
- Subtract felling breakage, natural defects and high stumps.
- The result is the net economic cut available for harvesting.
- The system targets a viable economic yield of 30–40 m^3/ha net.

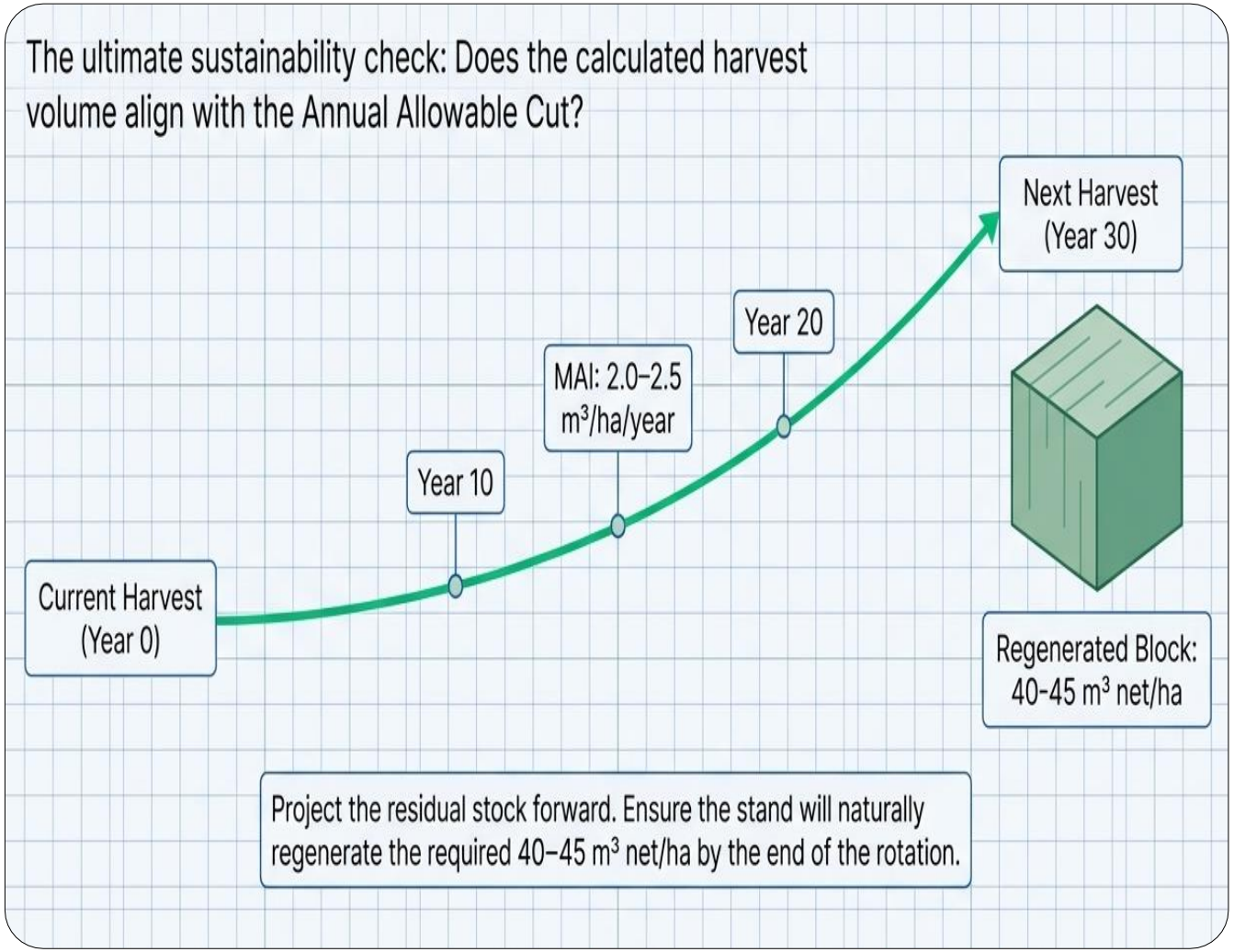
Key idea: protect future growth while harvesting.



Step 4: Verify Against MAI and AAC

- Compare the proposed harvest with MAI and the annual allowable cut.
- Project the residual stock toward the next harvest.
- Approve the limit only when growth and regeneration remain adequate.

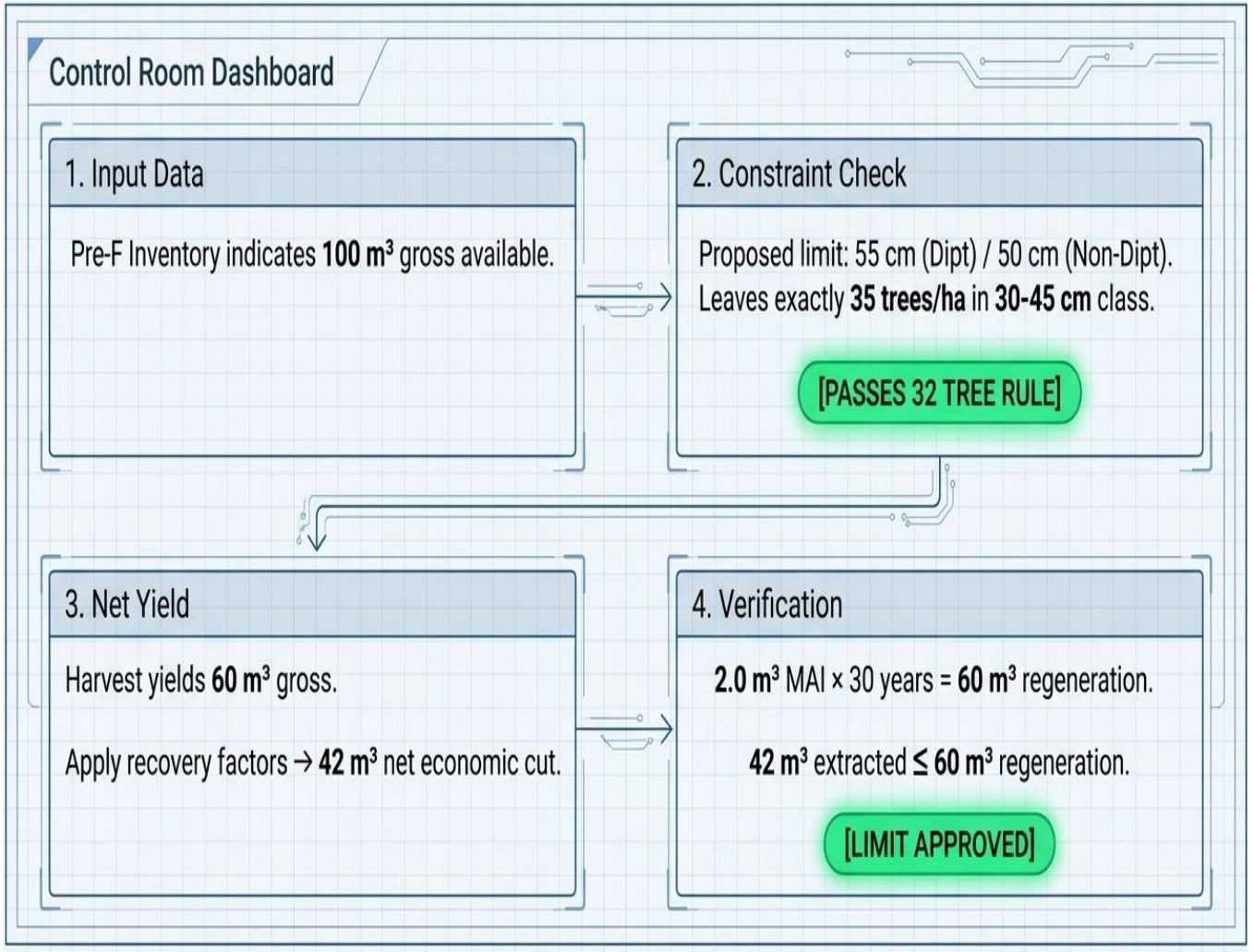
Key idea: protect future growth while harvesting.



SMS Calculation: Worked Example

- Begin with the pre-felling inventory volume.
- Apply the retention and net-yield checks.
- A harvest limit is approved only when all control checks pass.

Key idea: protect future growth while harvesting.



The Blueprint for Perpetual Yield

- Reliable data support sound cutting rules.
- Retention safeguards protect the stand's future growth.
- Careful execution turns sustainable limits into perpetual yield.

Key idea: protect future growth while harvesting.

