

AN OPERATIONAL APPROACH TO FOREST DEGRADATION

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Meeting on Forest Degradation

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Why the interest on Forest degradation?

- Is defined as “changes within the forest which negatively affect the structure or function of the stand or site, and thereby lower the capacity to supply products and/or services” FAO-FRA 2005.
- Or “forest degradation is a long-term reduction of tree crown cover towards but not exceeding the **minimum accepted `forest' threshold.**”. IPCC.
- Notice the definition itself is an issue.
- Forest degradation:
- Is related to REDD+ in Climate Change.
- Is related to Deforestation, because is actually a precursor of Deforestation.
- We may be very effective in avoiding deforestation, but, we may not realize the leakage our actions are producing ,i.e., degradation.
- Degradation and deforestation are strongly related and should be treated together.
- Example of this in Chile we have no deforestation, but we have degradation (leakage effect?, which is the reference we are using to arrive to such a conclusion, ancient information may answer this 1944 vs 2000.)

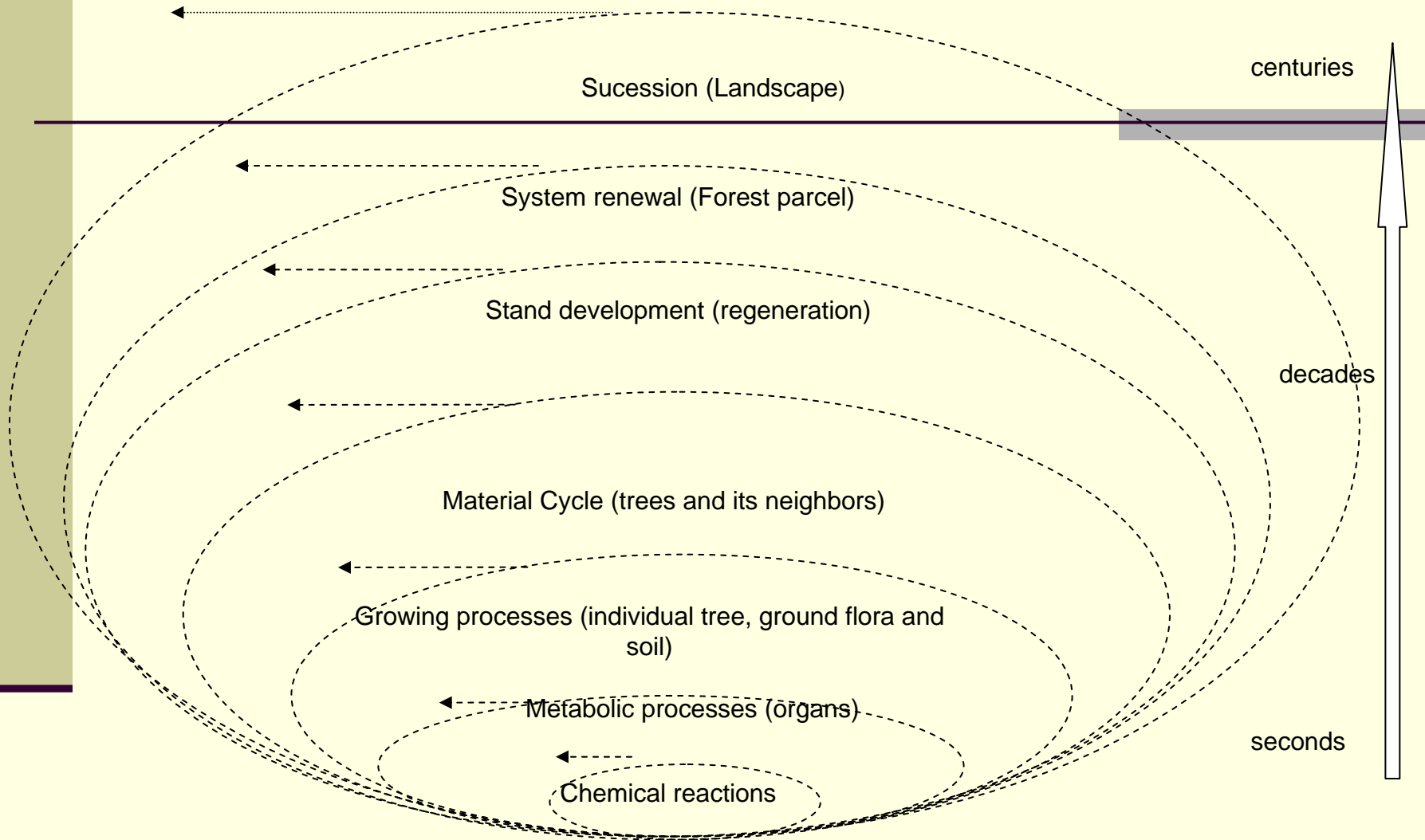
The issue of Forest Degradation

- Forest degradation is a complex term to define, i.e., imply operational difficulties.
- Complexity lies on the presence of several levels of analysis i.e., the subject is the forest ecosystem.

How to face forest degradation measurement?

- One option: giving up
- Or, searching for good scientific solutions like:
 - Taking advantage of “system thinking” to organize the scope of analysis.
 - i.e., Considering the forest ecosystem from a hierarchical point of view (Hierarchical theory, Prigogine I.1990) (Allen T. F. H. and T. Hoekstra. 1992. ***Toward a unified ecology***).

Hierarchical organization of forest ecosystem processes



Arrows indicates a signal to the superior hierarchic level.
Dotted lines indicates the hierarchical level of control
(adapted from Puhe J. & B.Ulrich).

- Given this approach, forest degradation may be observed at different levels from the:

- **Landscape level** (genetic implications, fragmentation, reproductive capacity of forest, connectivity, among others)

 - to even,

- **chemical reactions level** (organism cells, soil minerals)

 - Given our limitations we face with data and resources, we always use to have at most information related to the interval of ***landscape level*** to ***stand development level***.

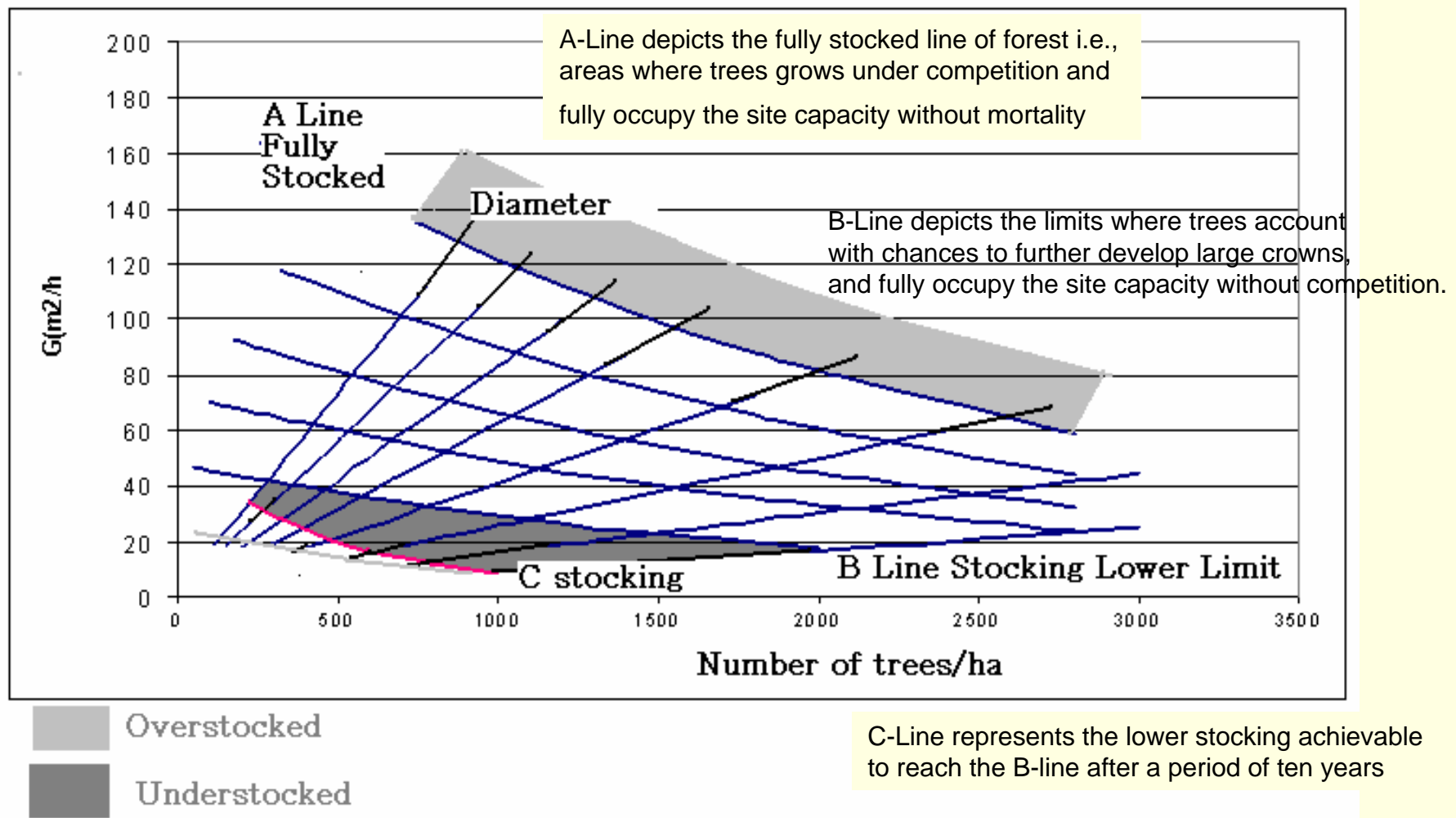
The Chile's study case

- **Level of analysis:** Stand development
- **Objective:** test an operational approach to identify areas of forest degradation based on stock definition.
- **Measurement tool:** Density, approached by the stocking chart (Gingrich S.F., 1967)
- **The forest:** one the most important forest type in southern forest in Chile: Roble-Rauli-Coihue forest types (MM ha 1,4.)
- **The data:** 290 permanent sampling plots from National Forest Inventory (systematically located in a grid of 5 km by 7 km., since 2000)

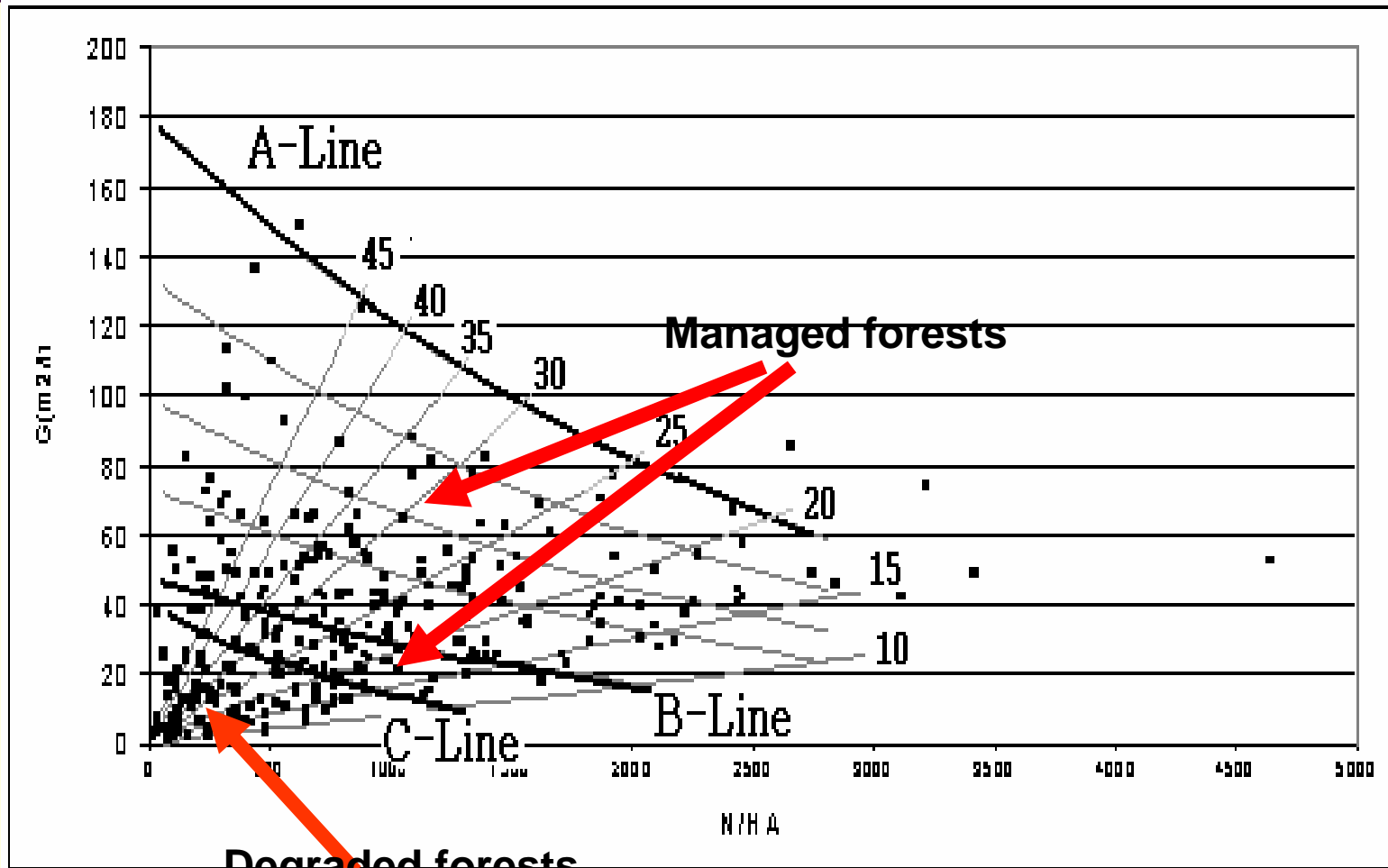
The Stocking chart

- Stock is defined as the “Volume of all living trees more than ‘X’ cm in diameter at breast height (or above buttress if these are higher) measured over bark from ground or stump height to a top stem diameter of ‘Y’ cm, excluding or including branches to a minimum diameter of ‘Z’ cm. Excludes: smaller branches, twigs, foliage, flowers, seeds, stump and roots” (FRA 2005).
- Forest stock is a common term used by forest managers for describing the **optimal combination** of tree size, growth, and numbers of trees in relation to a particular **management objective**.
- The stock is closely related to stand density which implies how the **growing space** is occupied by trees in the forests.
- Forest stocking varies according to company or owner management goals.
- However stocking is flexible enough to include even small trees, (national forest inventory in Chile include from 4 cm DBH trees)

The stocking chart represents the state of the forest by relating, Numbers of trees/ha, Basal Area/ha and, Site space occupation (%)



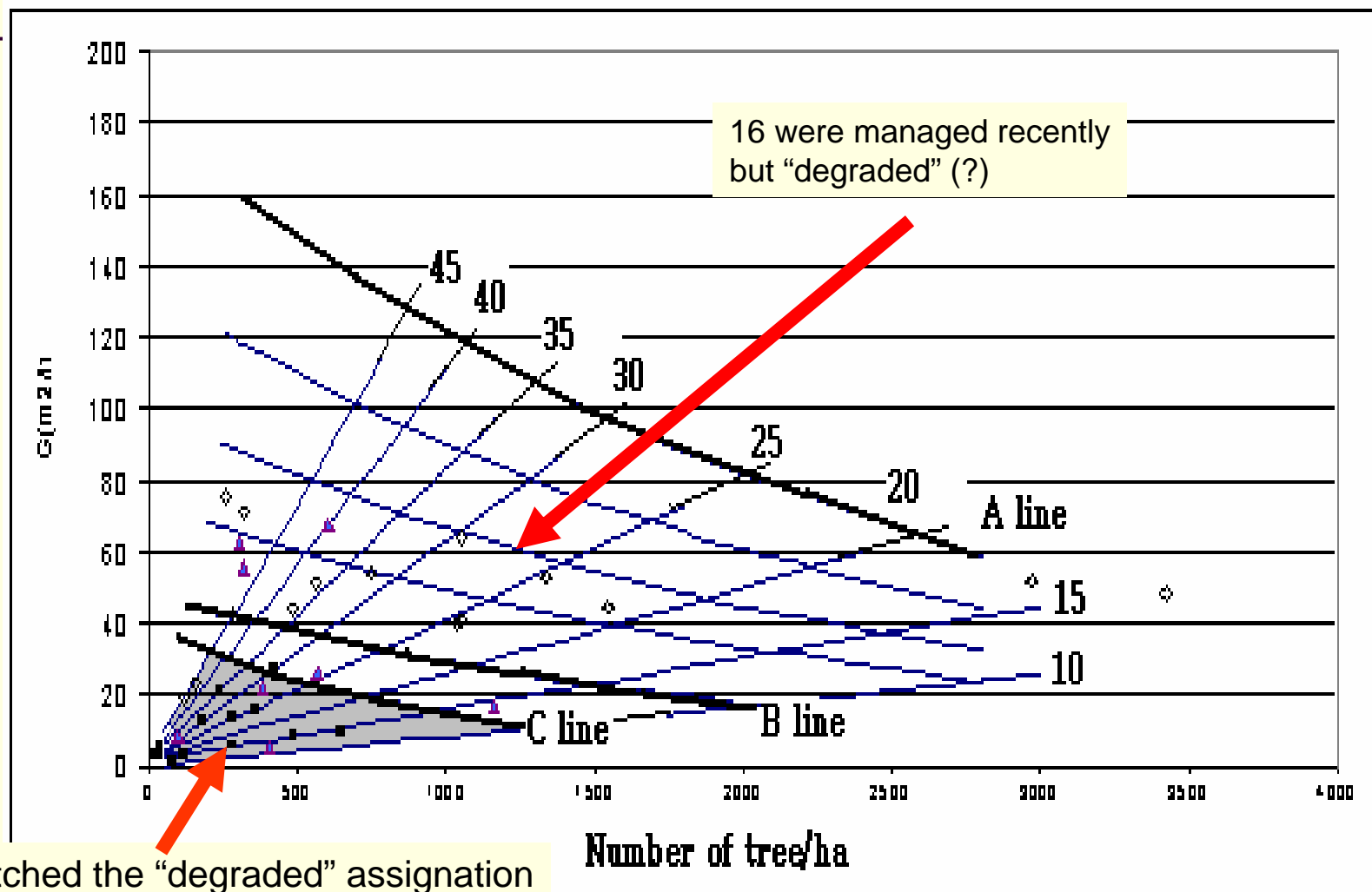
How does this work for identifying degraded forest? The case of Roble-Rauli-Coihue forest type



**Degraded forests
Under the C-Line
61 plots!**

Testing against reality

37 sample plots were reported as “degraded” by field brigades



Confusing results?

- The stocking chart is not able to say about 'quality of management', but field observation does.
- Field observations are not able to see stock of forest directly (trees does not let us see the forest)
- Let's recall the 61 sample plots located under the C-Line, field observation only detected 21 of those, 40 were missed !!.

Conclusion & recommendations

- The stocking chart is an useful tool for aiding recognizing degraded forests.
- The stocking chart assume good management practices.
- The field observations and stocking chart acting together improve the identification of degraded forest.
- It is necessary and required the presence of a national forest inventory under permanent bases.
- The stocking chart allows for objetive comparison in time, i.e., monitoring.
- This practice is Tier 3.
- The degradation involves more than stocking, as such hierarchical theory help us to devise suitable tools for measure it.

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- Capacitation & training is a key issue in recognizing forest degradation from field.
 - Operationalizing imply a practical method for checking degradation from the productive perspective.
 - We are trying now a quick method for defining in field the degradation status, by using Variable sampling plots (Bitterlich) and Prodan samples.
 - We are also trying approaches for the other hierarchical levels of observations, moving toward Landscape level (remote sensing material, spatial analysis-fragmentation).

Muchas gracias

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