



# Improving sample based KP-reporting – a challenge for countries using cyclic inventories

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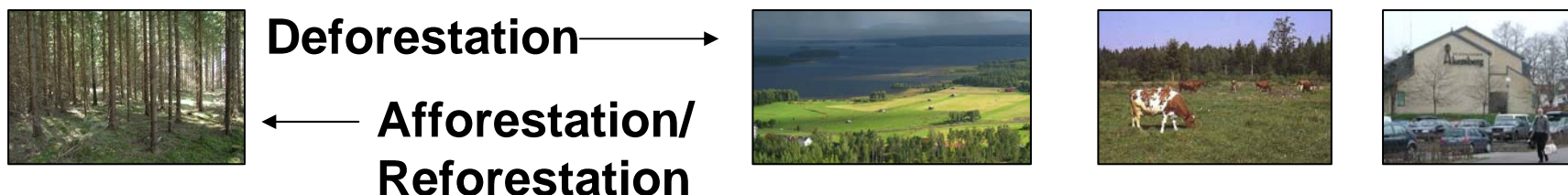
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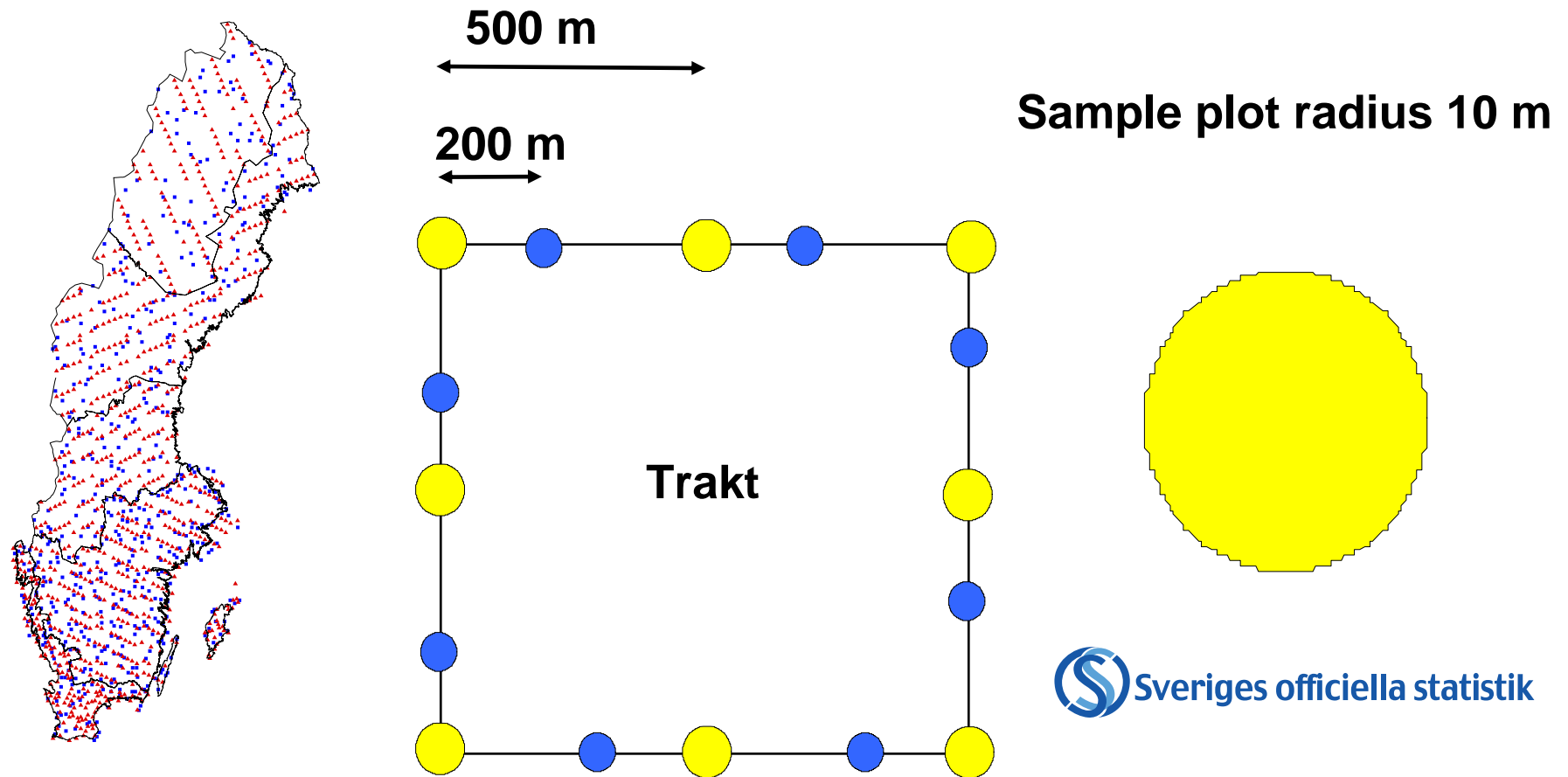


# Swedish definition of ARD



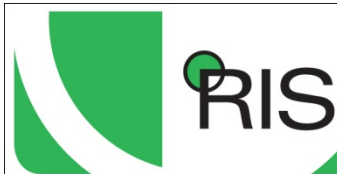
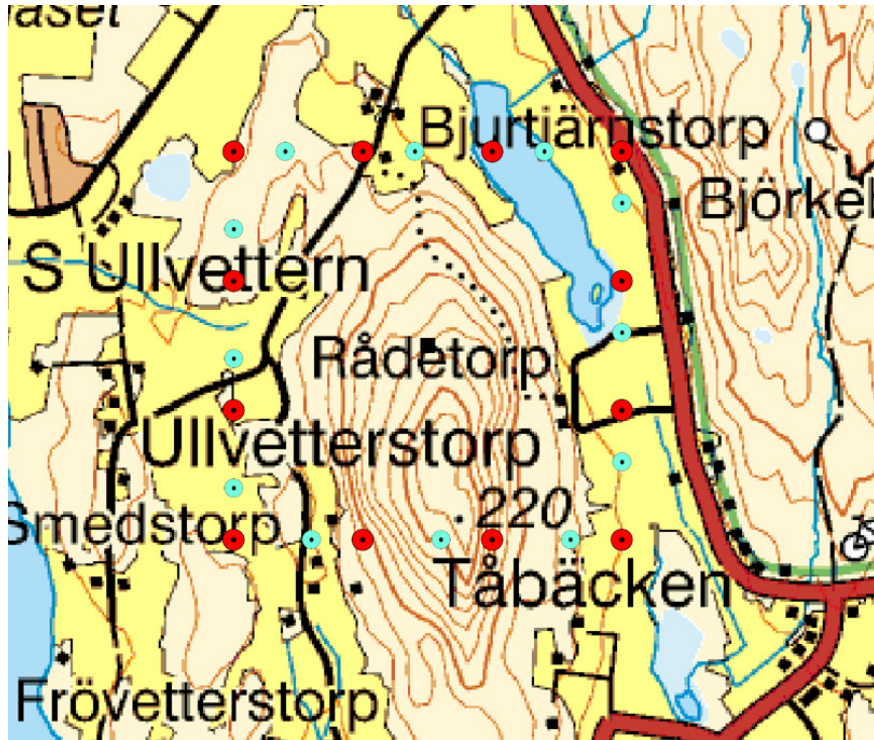
- ARD land is accumulated from 1990 and annual changes are reported 2008-2012 (Article 3.3)
- After 2007, FM could only leave this category for D
- Possible to trace all ARD, FM land and other land use from 1990 onwards using data from the Swedish NFI

**A Trakt (or cluster) system of 6000 permanent (red) sample plots are covering Sweden on annual basis**





**The Trakts are re-inventoried in a five-year cycle, covering all relevant land use and the geographical position of each tree >10 cm is known**



Riksskogstaxeringen  
The Swedish National Forest Inventory



ciences  
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## The estimator

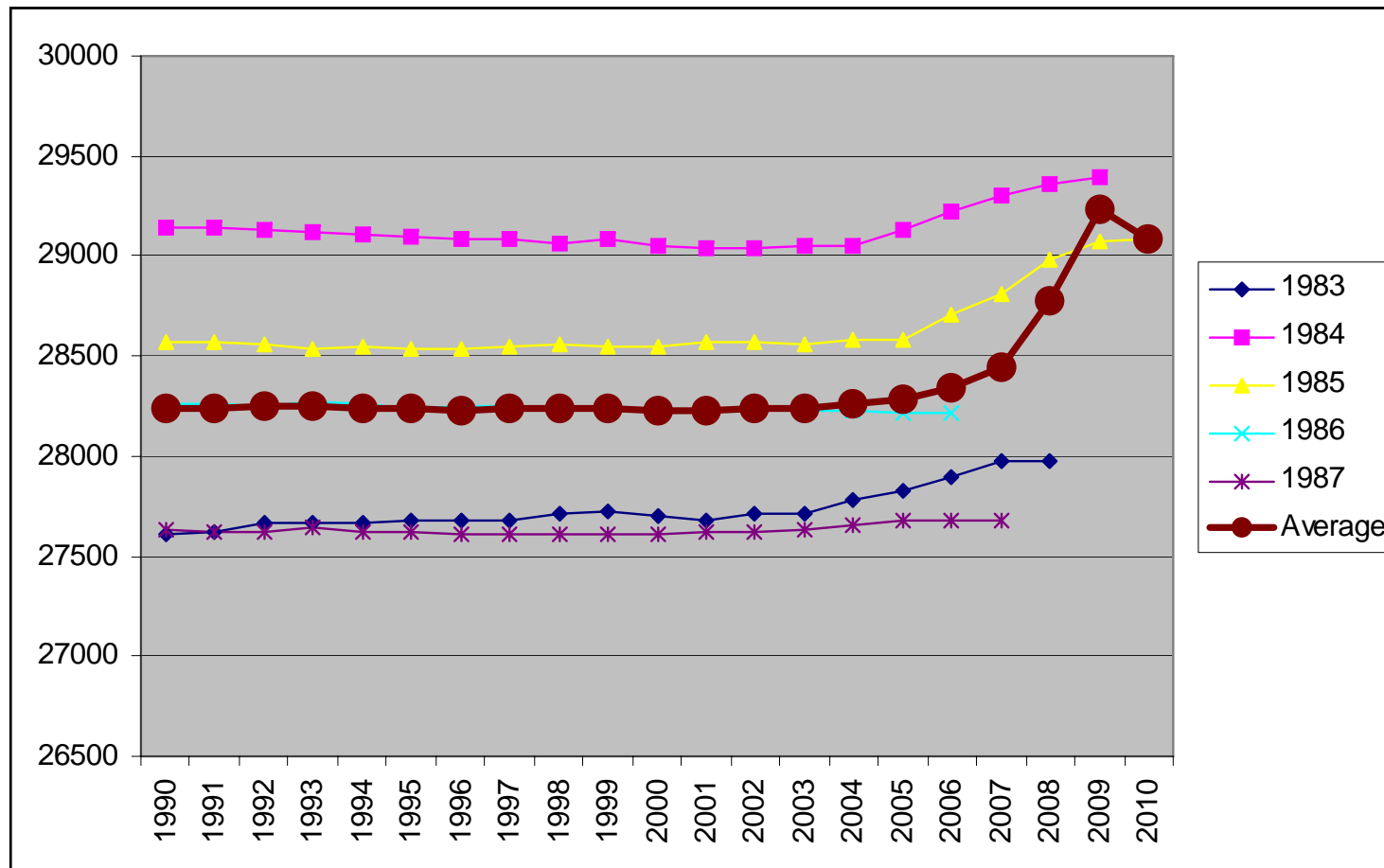
$$\Delta \hat{B}_i = A_i \cdot \frac{\sum_{j=1}^{n_i} \Delta b_{ij}}{\sum_{j=1}^{n_i} a_{ij}} = A_i \cdot R_i$$

## The variance estimator

$$\hat{Var}(\Delta \hat{B}_i) \approx \frac{A_i^2}{\left( \sum_{j=1}^{n_i} a_{ij} \right)^2} \cdot n_i \cdot S_{\Delta b_{ij} - R_i \cdot a_{ij}}^2$$

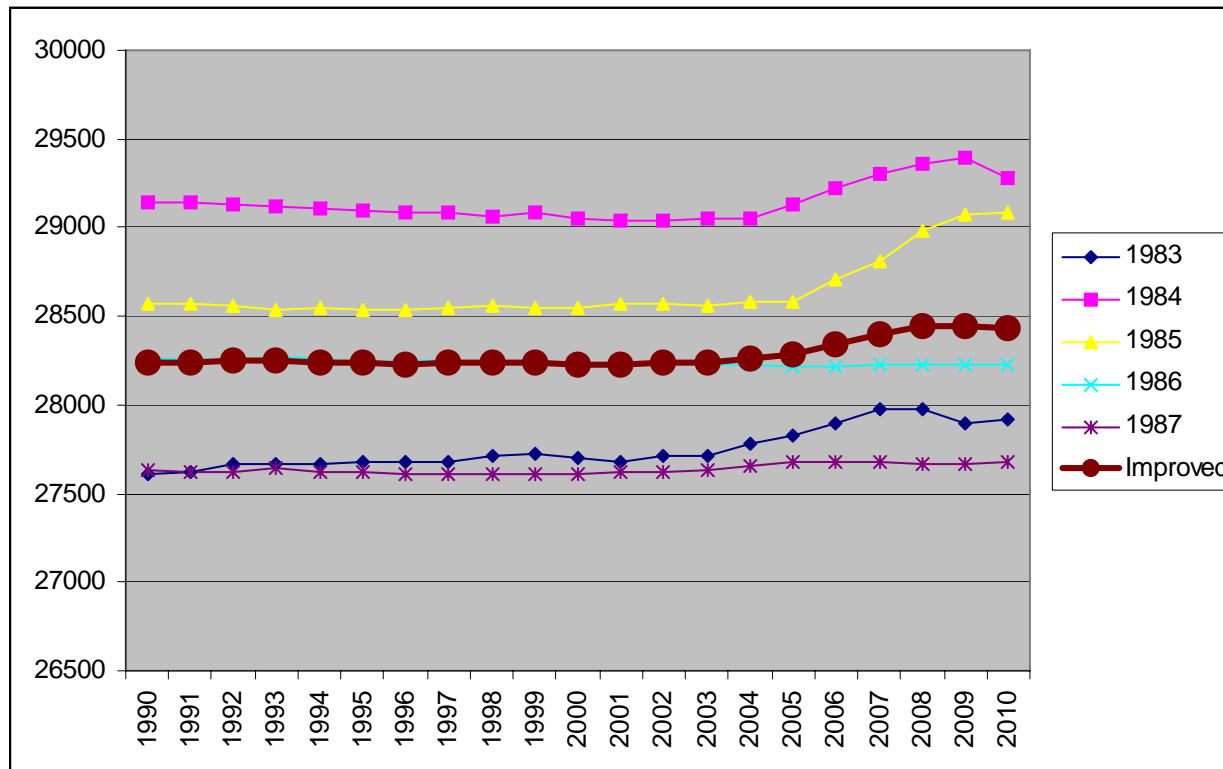
# Preliminary Estimates 2012

## Area [1000 hectare] Forest land and to Forest land estimated per inventory cycle and their average



# Preliminary Estimates 2012

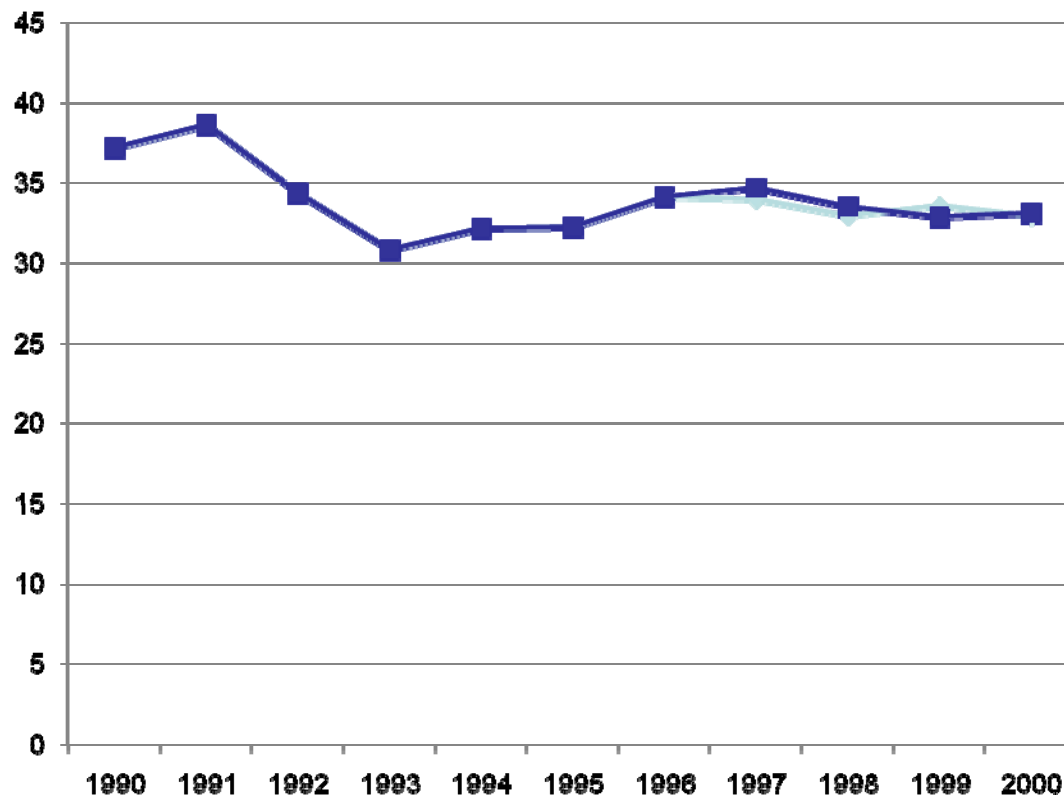
## Area [1000 hectare] Forest land and to Forest land estimated per inventory cycle and improved average



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ha]	ation	ation	to F	
2007	28398	45158	28441	45205
2008	28441	45158	28773	45167
2009	28449	45158	29231	45235
2010	28434	45158	29081	45221

## Improved and recalculated data (Forest and to Forest)

Living biomass [M tonnes CO<sub>2</sub> per yr]

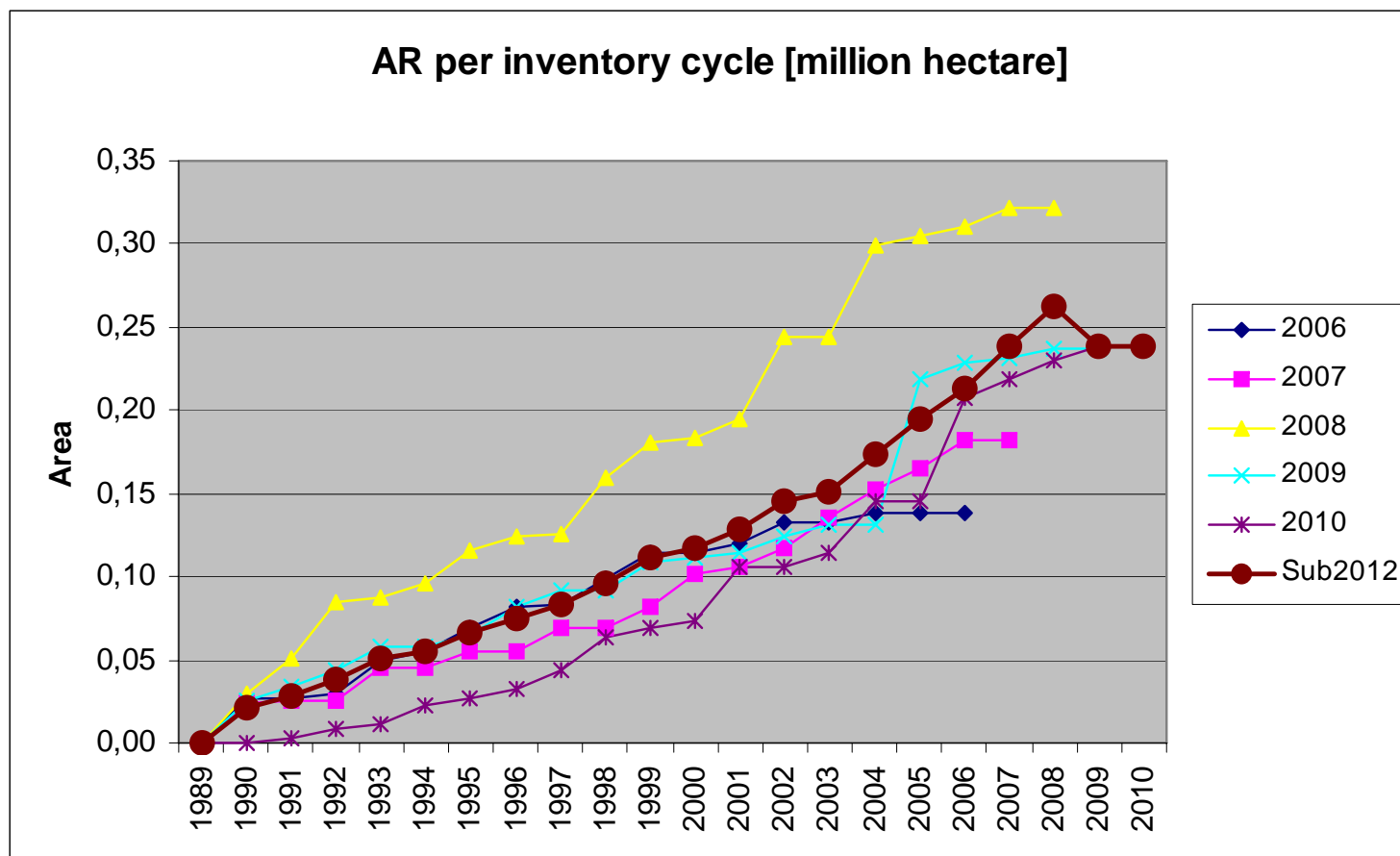


FM  
-29 (SE 2.9)



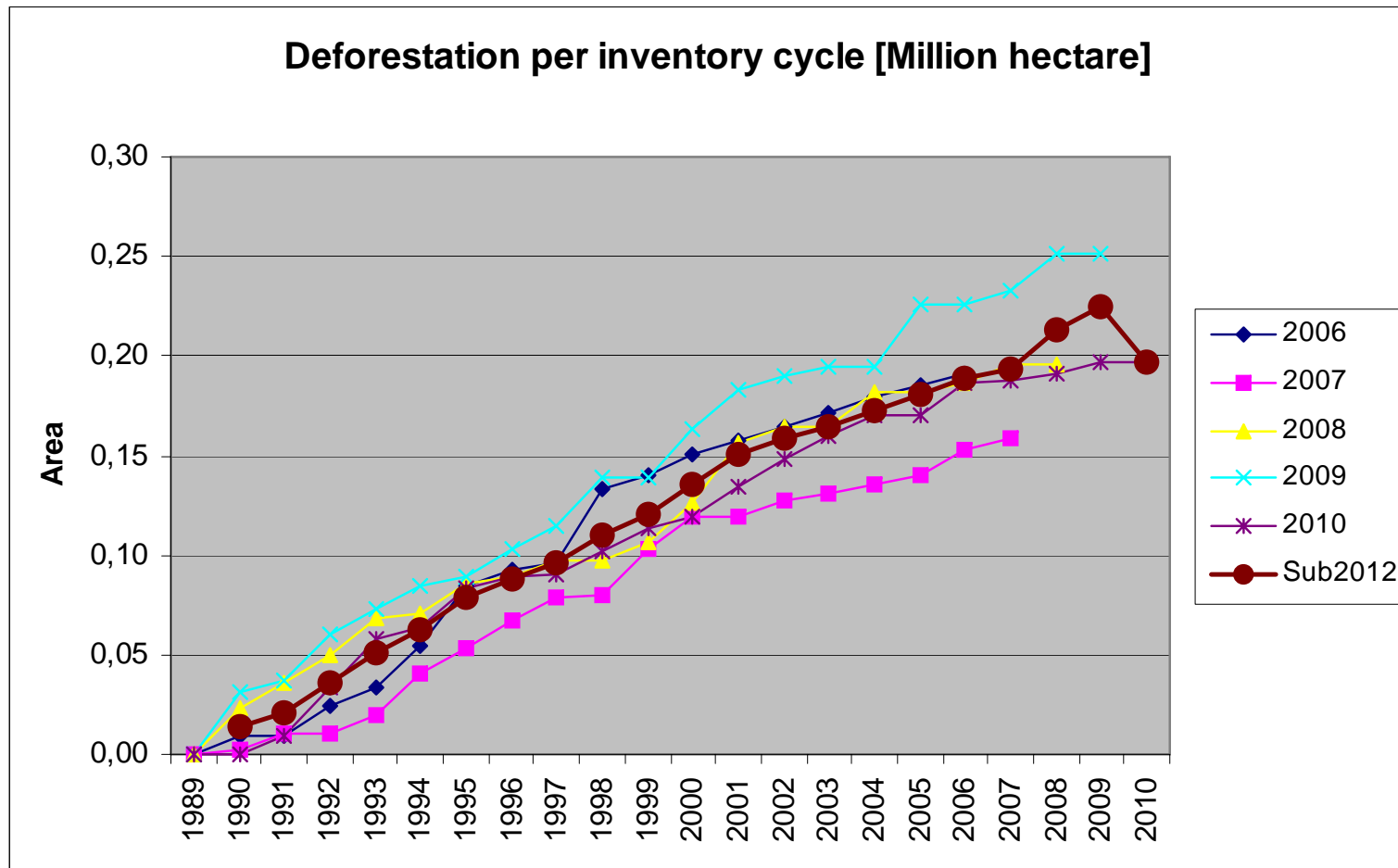
# Preliminary Estimates submission 2012

## Area [M hectare] Afforestation/ Reforestation



# Preliminary Estimates submission 2012

## Area [M hectare] Deforestation



## Area [ARD]

- Extrapolate trend not average

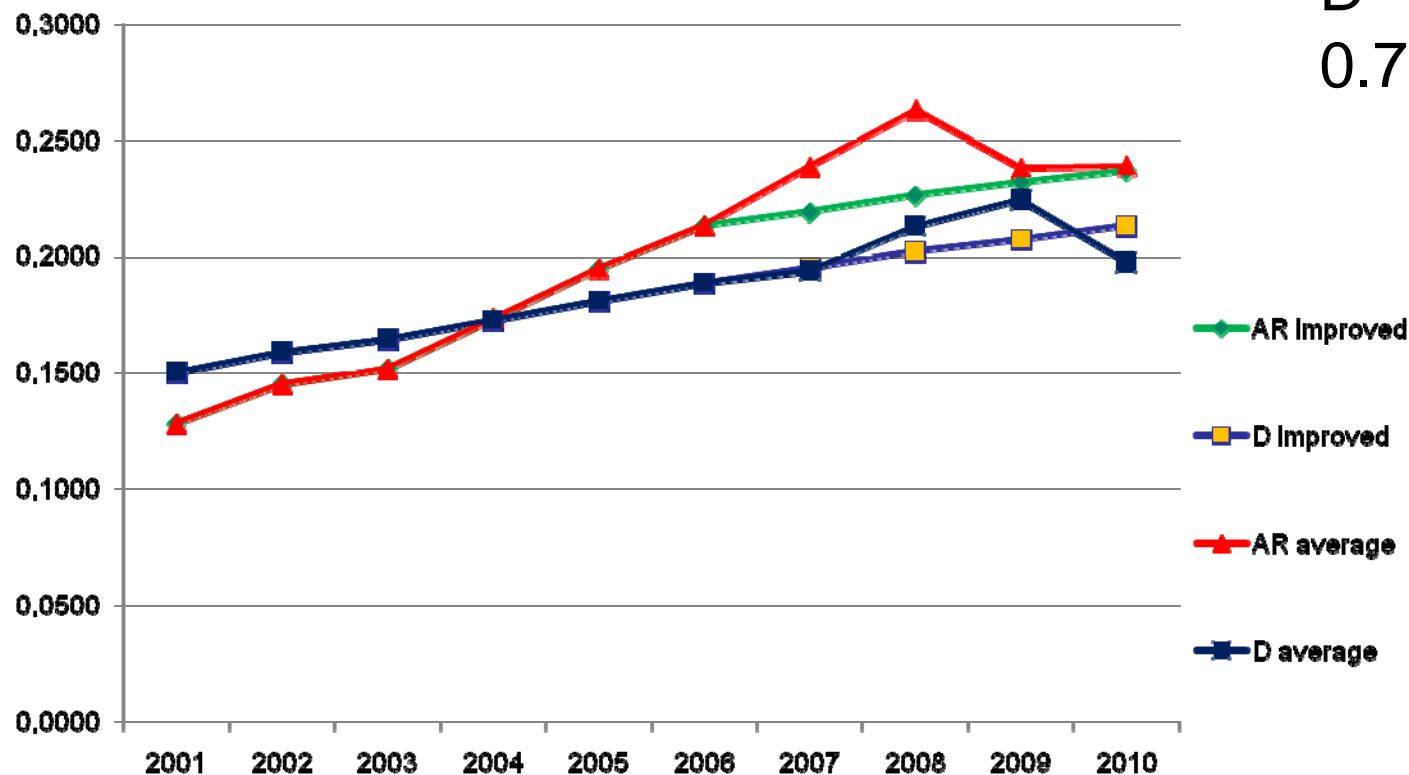
Living biomass

AR:

-0.69 (SE  
0.10)

D

0.72 (SE 0.29)



# Problem with no full record due to the five-year inventory cycle

- Uncertainty increases for the most recent years
- The estimated total land and fresh water area may vary between years
- The estimated D-area might decrease

# Possible solutions

- Extrapolate data per cycle
- Remote sensing
- Complementary field inventory 2012
- Combinations