

# THE CERULEAN WARBLER HABITAT IN COLOMBIA

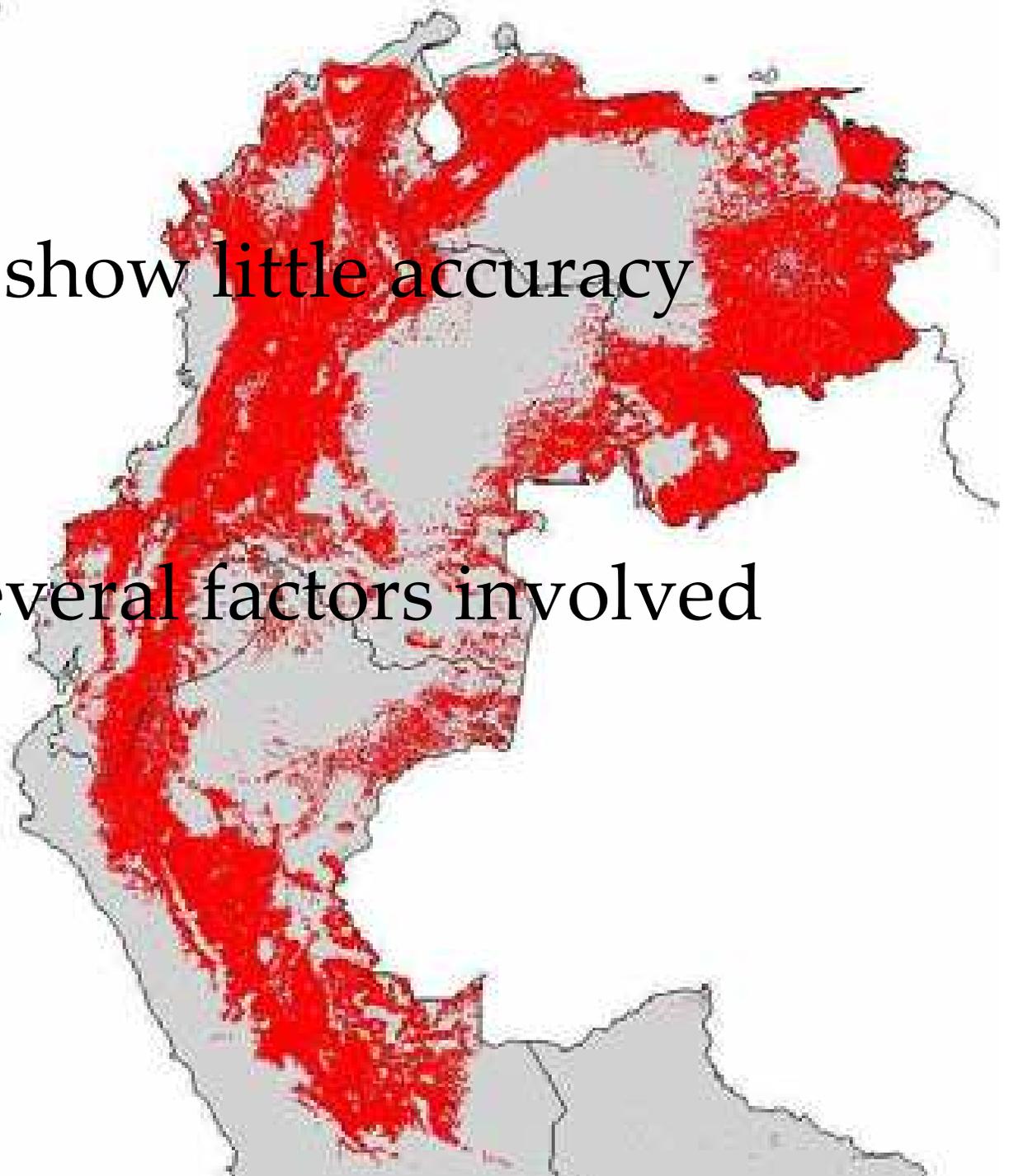
An adaptive plan of sustainable  
management to maintain the tree cover

By Tomás Cuadros



Most models show little accuracy

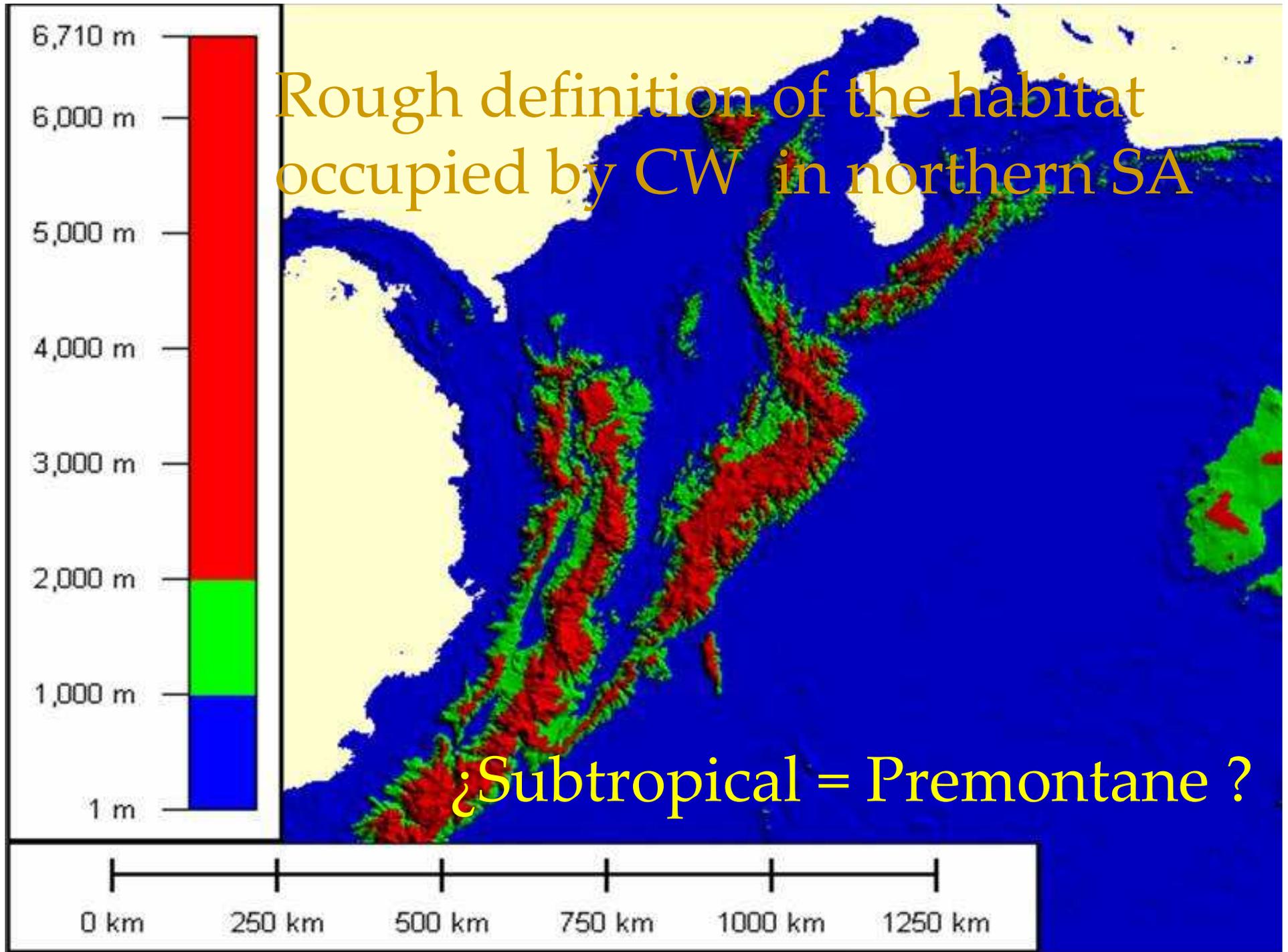
Likely several factors involved





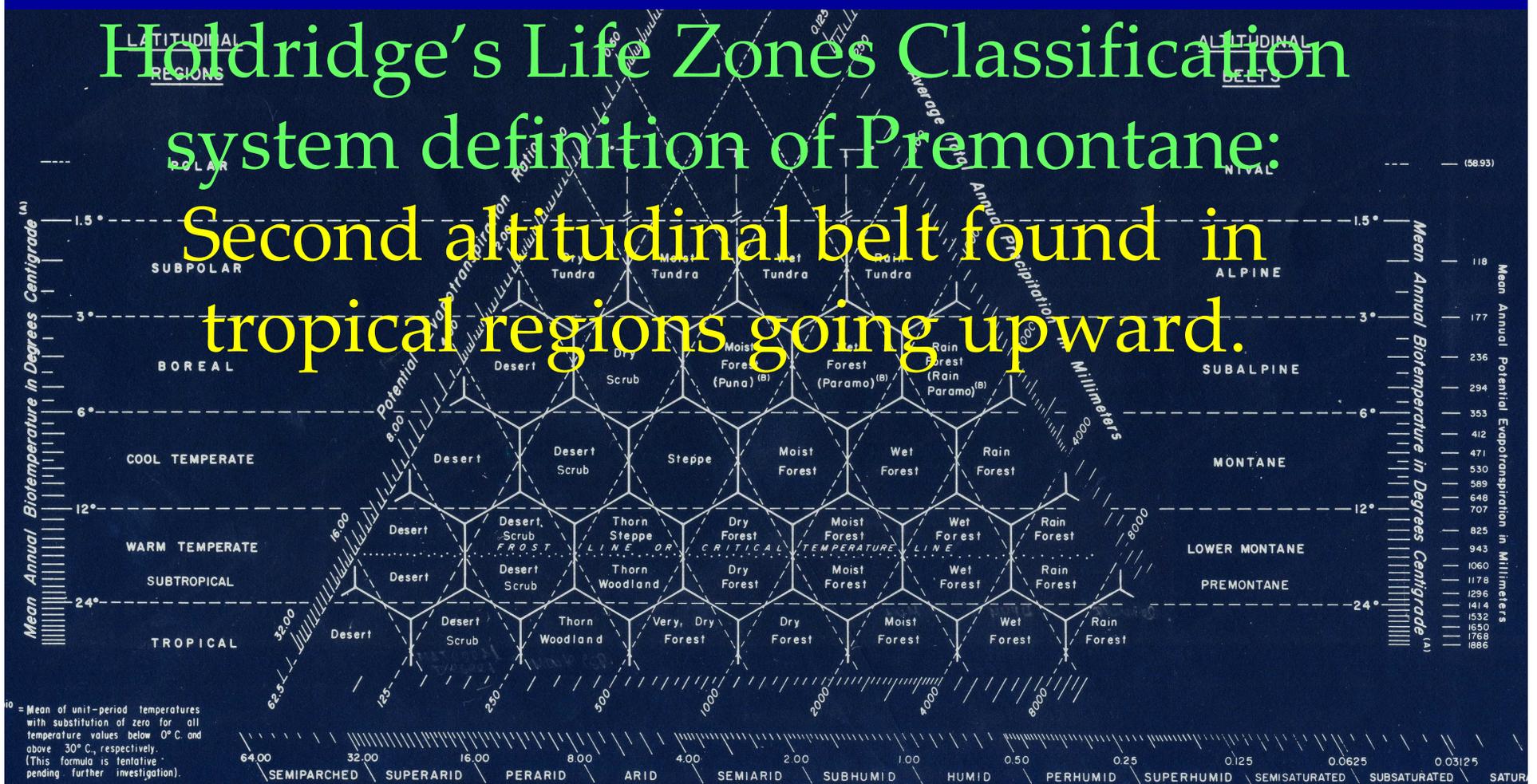
Noise by too coarse data

Rough definition of the habitat occupied by CW in northern SA



# Holdridge's Life Zones Classification

system definition of Premontane:  
 Second altitudinal belt found in  
 tropical regions going upward.

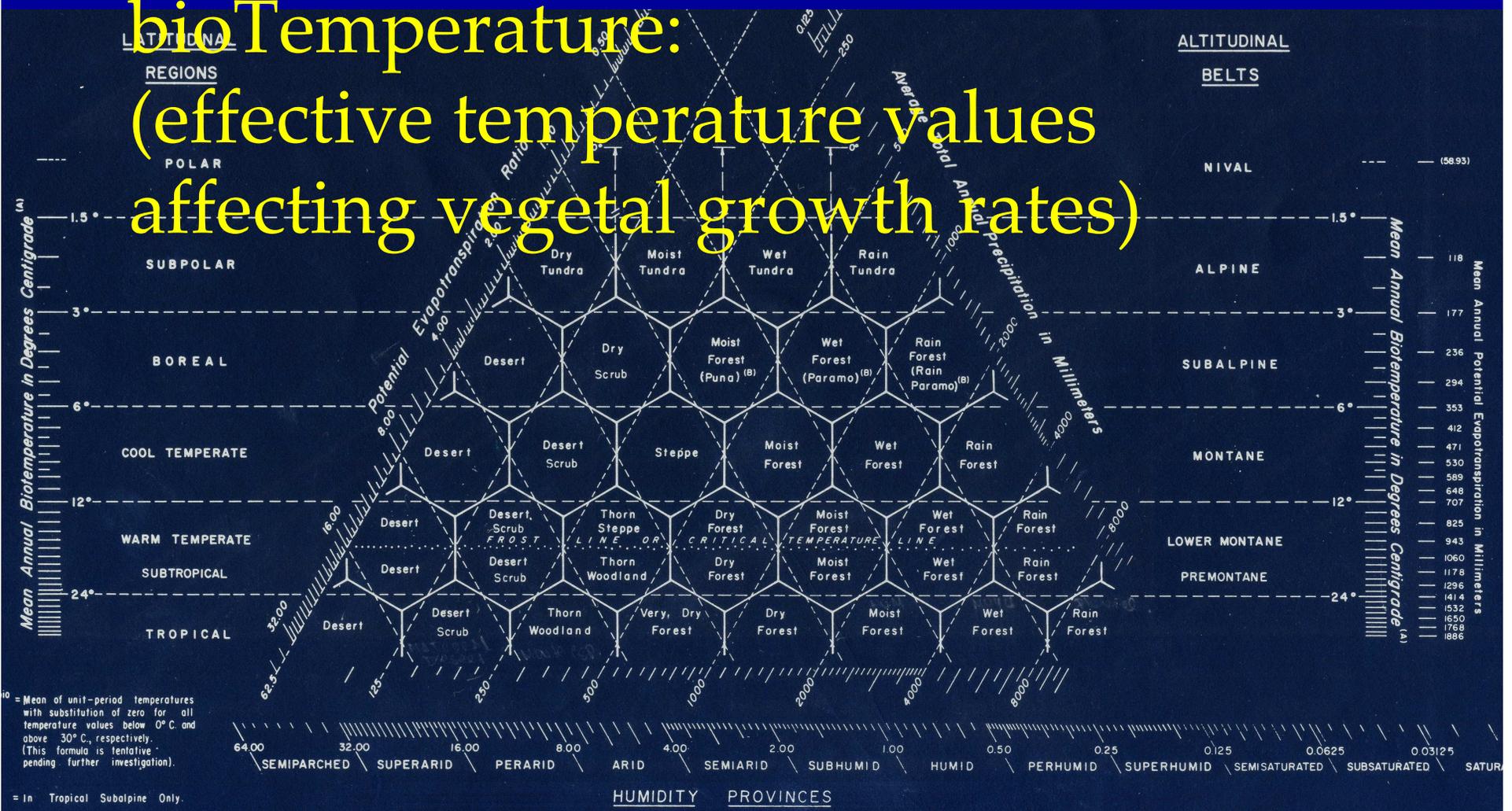


<sup>10</sup> = Mean of unit-period temperatures with substitution of zero for all temperature values below 0°C and above 30°C, respectively. (This formula is tentative pending further investigation).

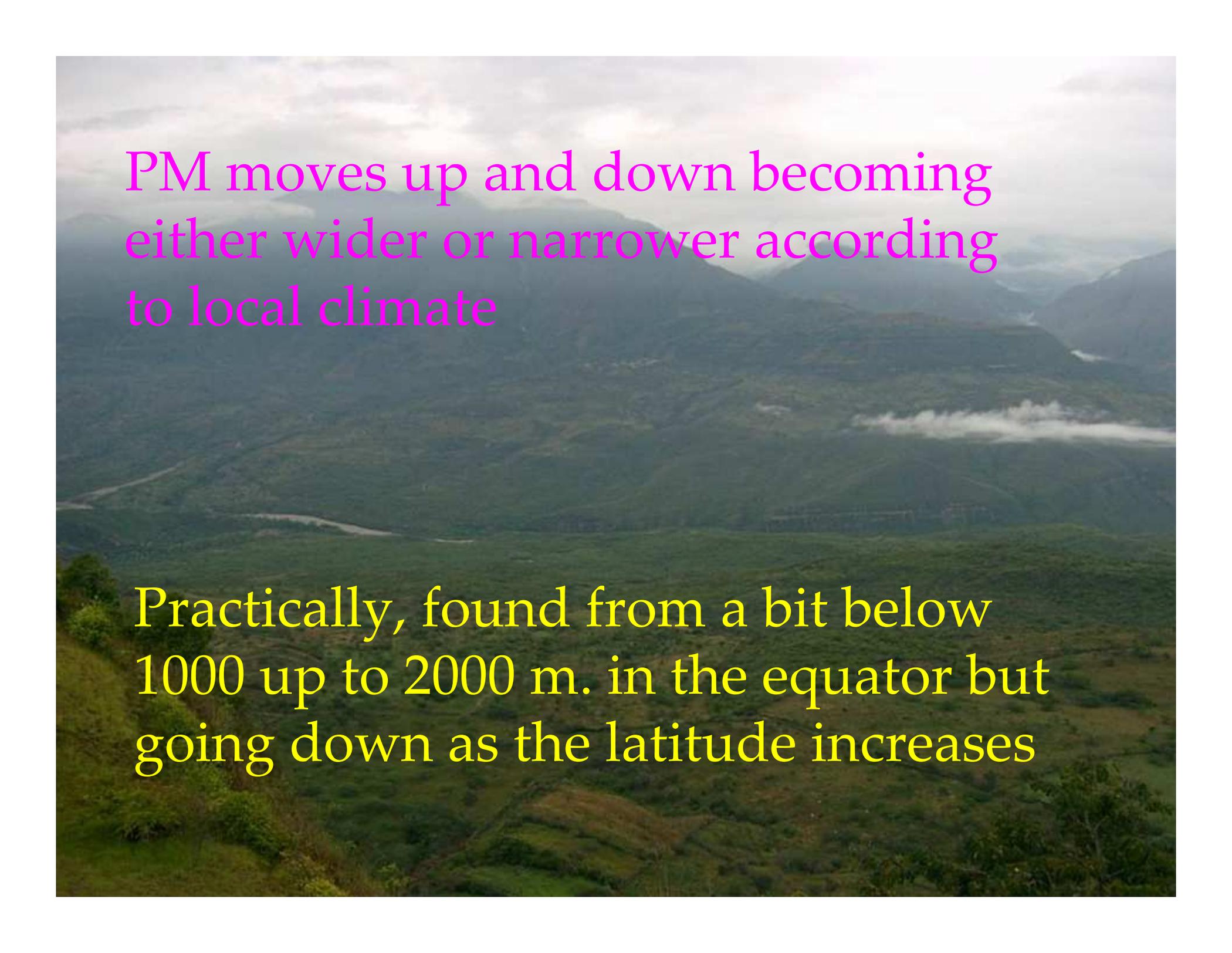
= In Tropical Subalpine Only.

Delimited not by elevation, but  
 by bioTemperature

# bioTemperature: (effective temperature values affecting vegetal growth rates)



PM: M.A. bioT° approx. 18° - 24° C.

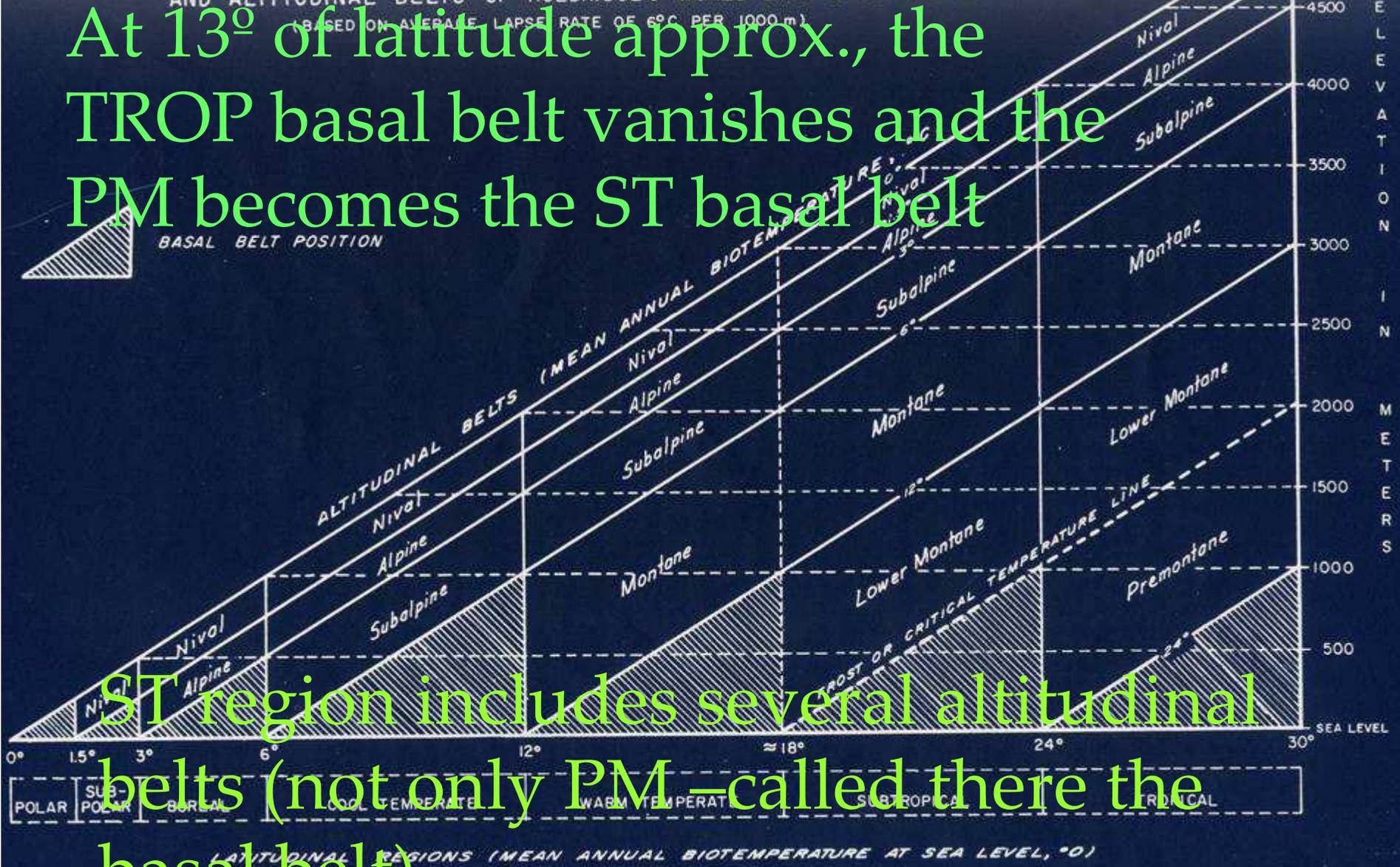
A landscape photograph showing a wide mountain valley. In the foreground, there are green, rolling hills. A river winds through the middle ground. The background features more mountain ranges under a cloudy sky. The text is overlaid on the upper part of the image.

PM moves up and down becoming  
either wider or narrower according  
to local climate

Practically, found from a bit below  
1000 up to 2000 m. in the equator but  
going down as the latitude increases

FIGURE 2 APPROXIMATE GUIDE LINE POSITIONS OF LATITUDINAL REGIONS AND ALTITUDINAL BELTS OF HOLDRIDGE'S WORLD LIFE ZONE SYSTEM.

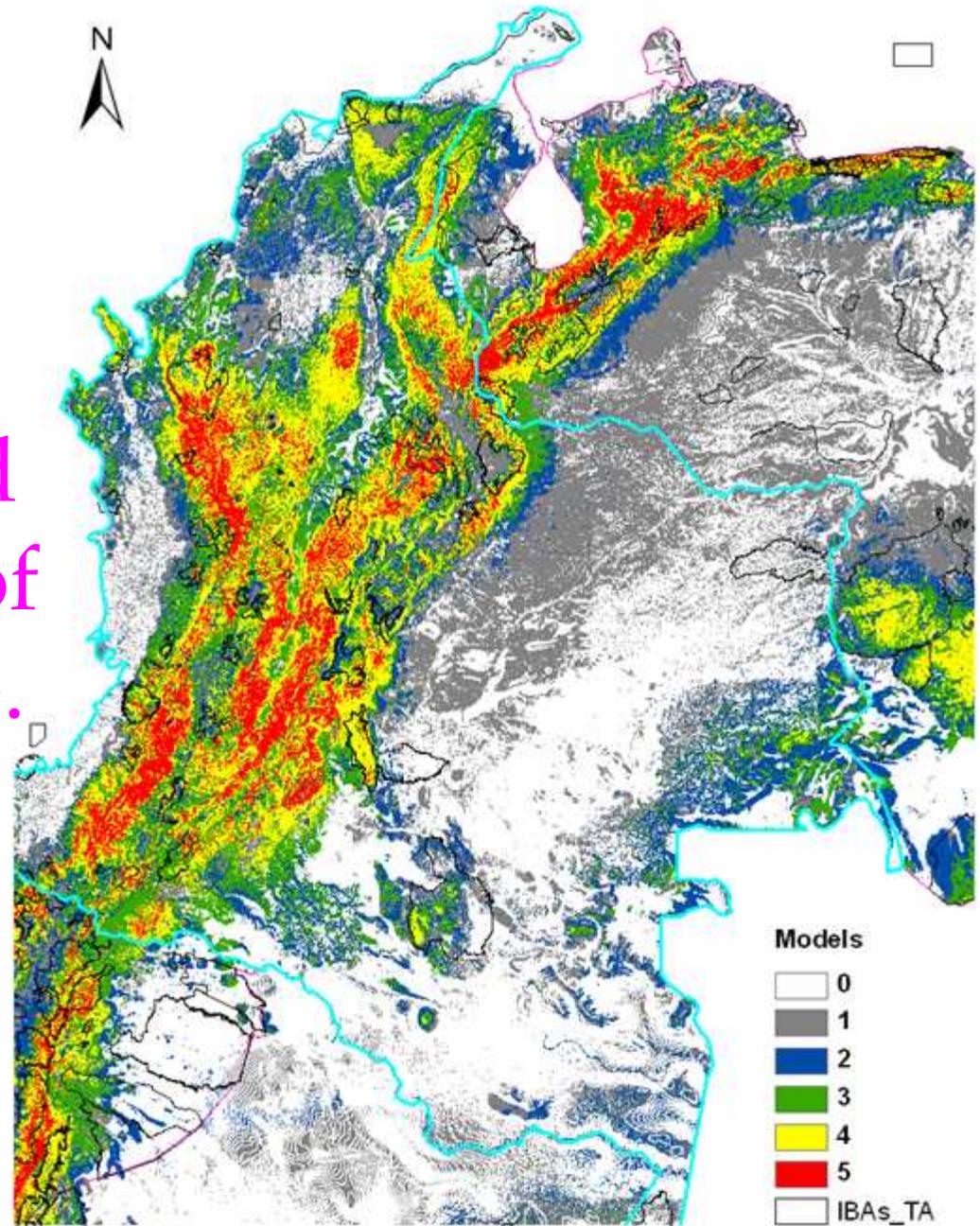
(BASED ON AVERAGE LAPSE RATE OF 6°C PER 1000 m)



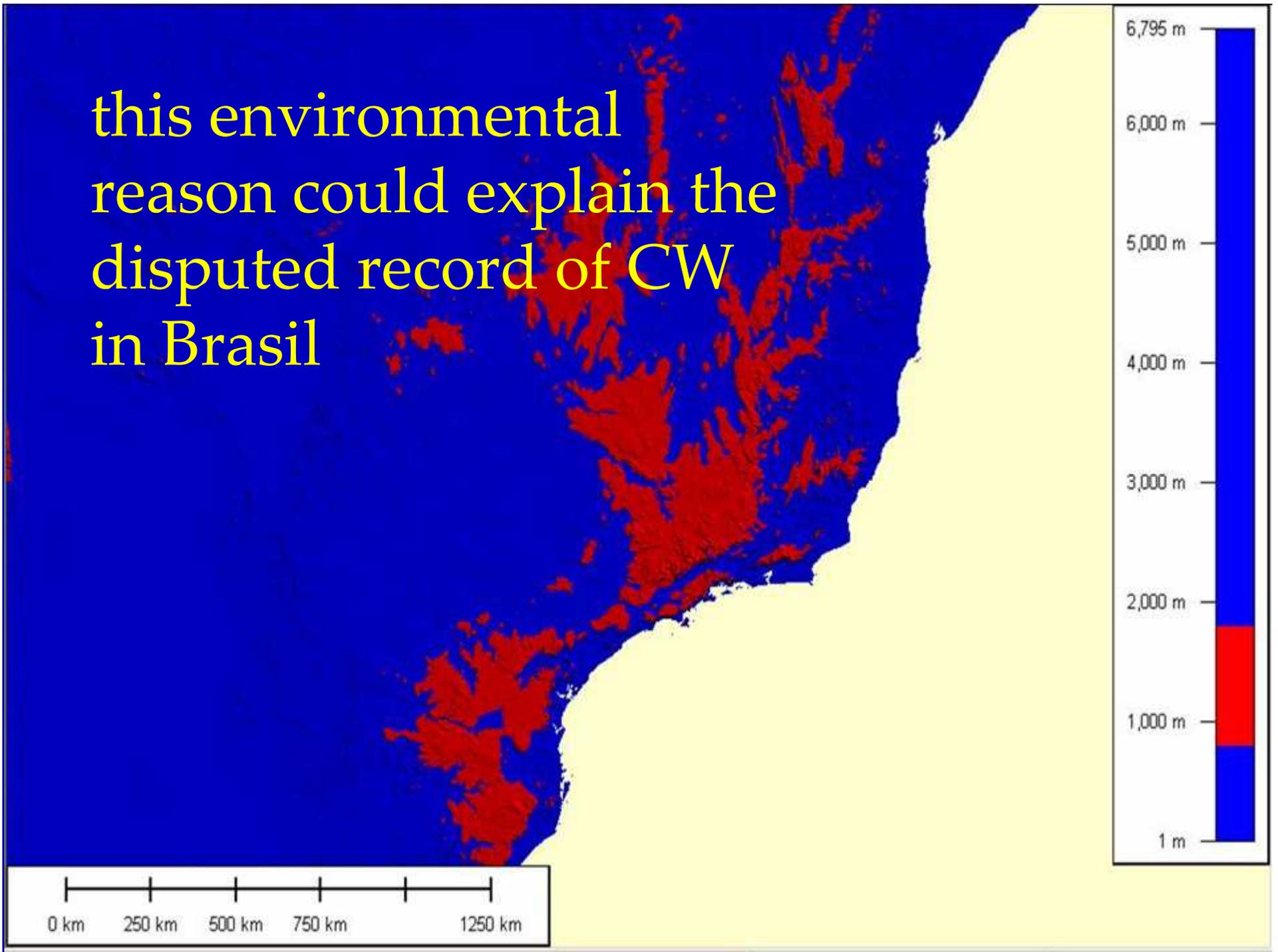
At 13° of latitude approx., the TROP basal belt vanishes and the PM becomes the ST basal belt

ST region includes several altitudinal belts (not only PM – called there the basal belt)

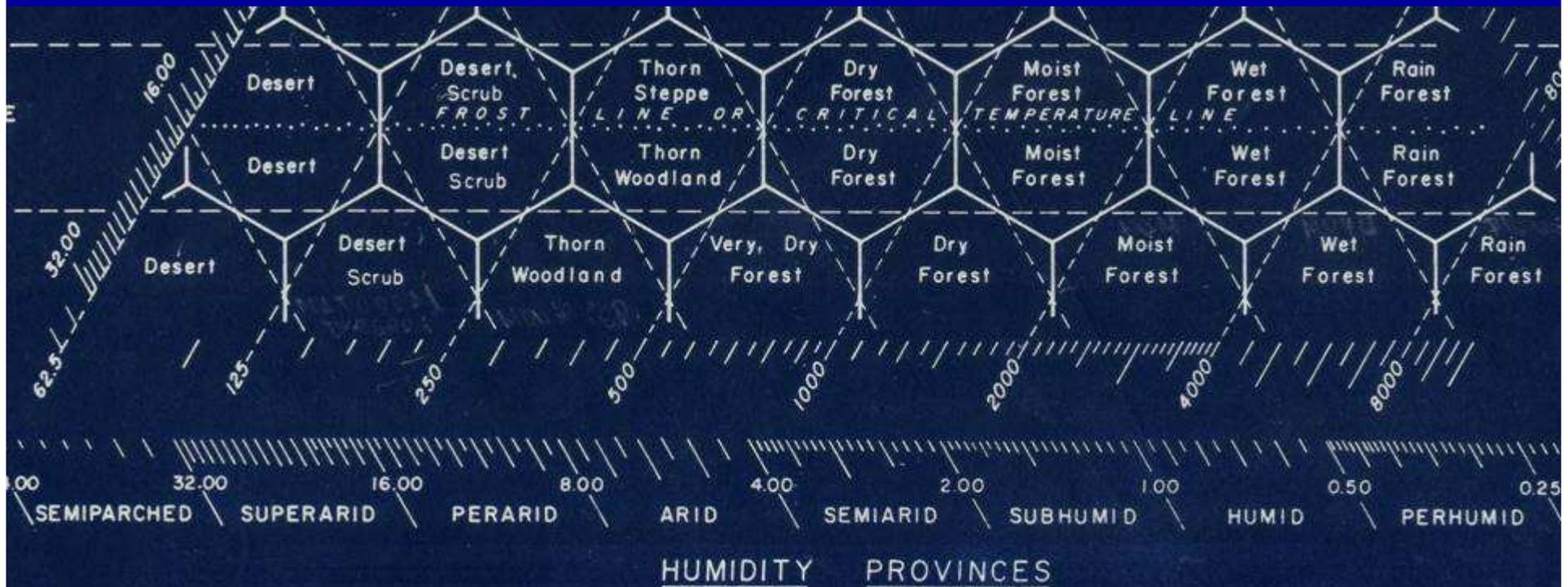
Overlooking this temperature-altitude-latitude relationship could produce models of poor practical use.



this environmental  
reason could explain the  
disputed record of CW  
in Brasil

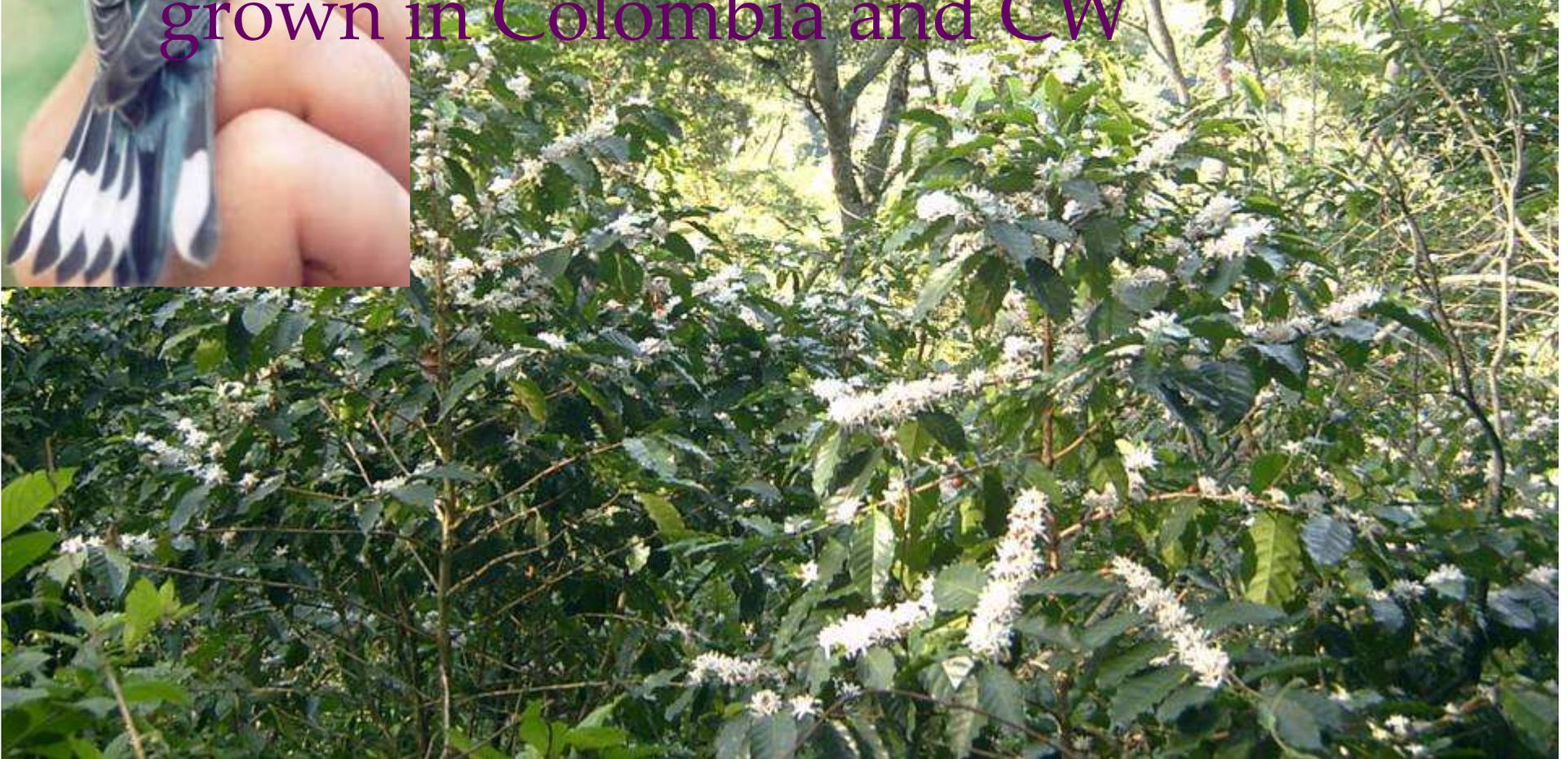


# Humidity provinces and Life Zones



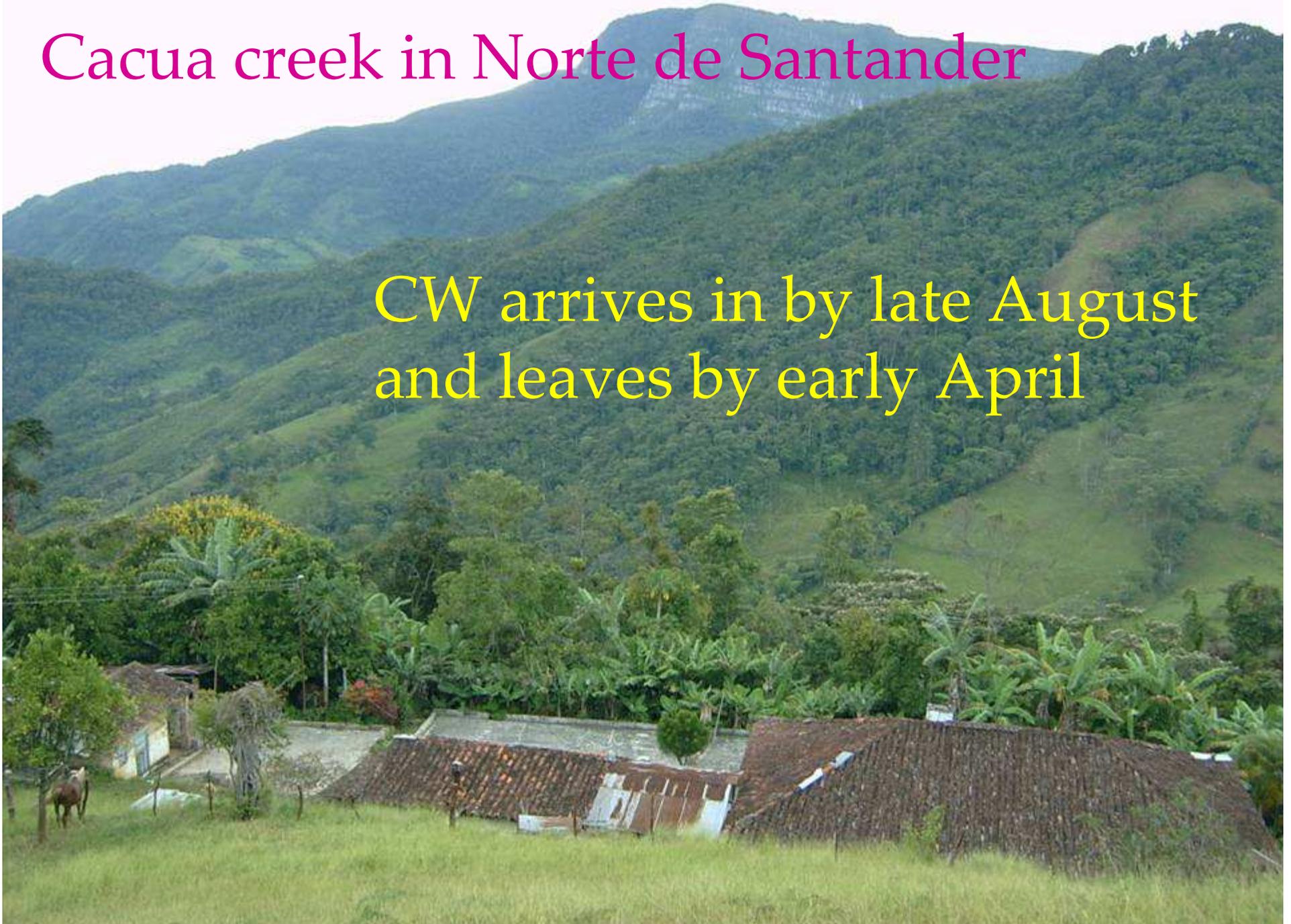


Two very interesting species confined  
in the PM: Arabica coffee varieties  
grown in Colombia and CW



# Cacua creek in Norte de Santander

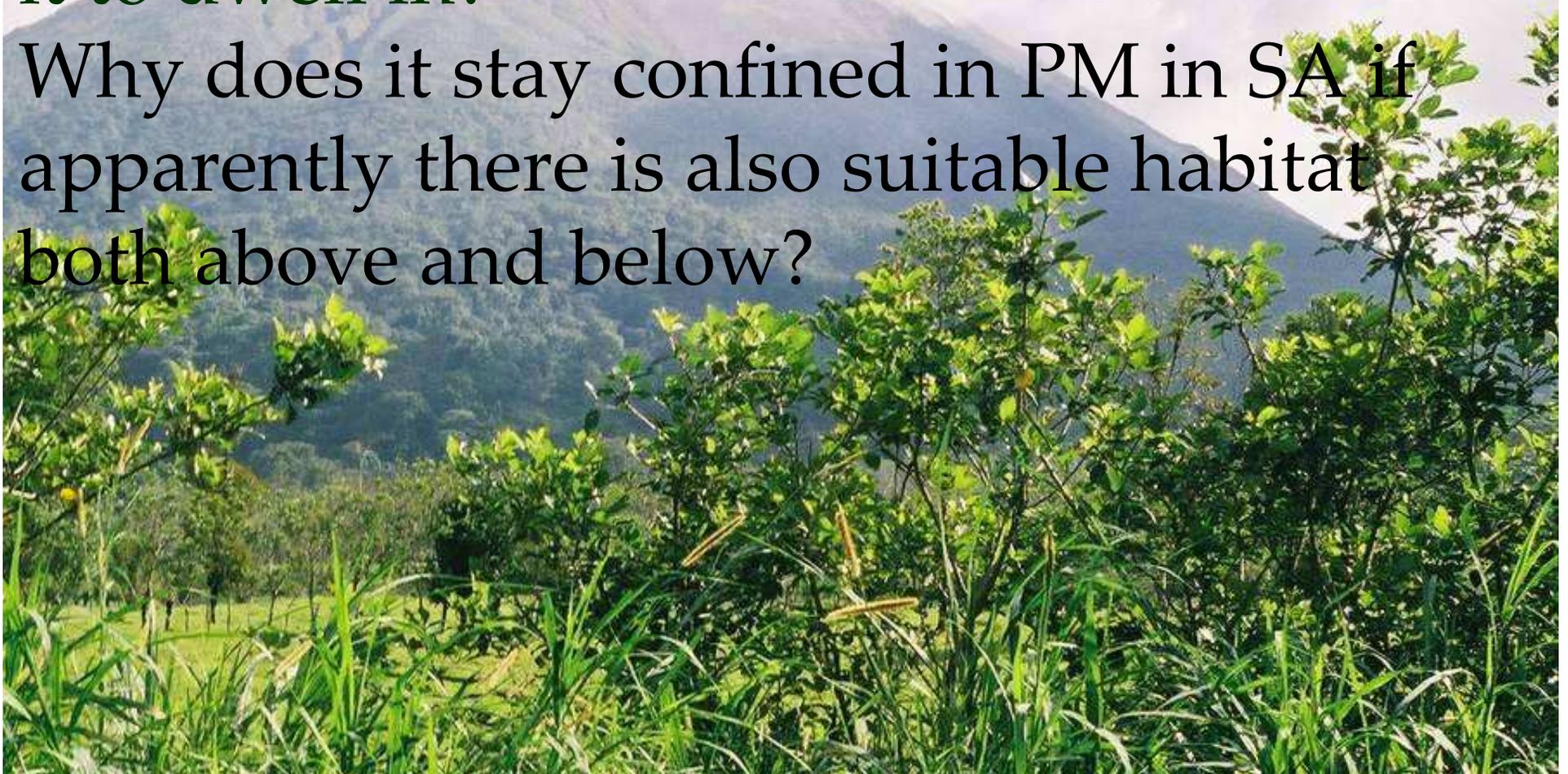
CW arrives in by late August  
and leaves by early April

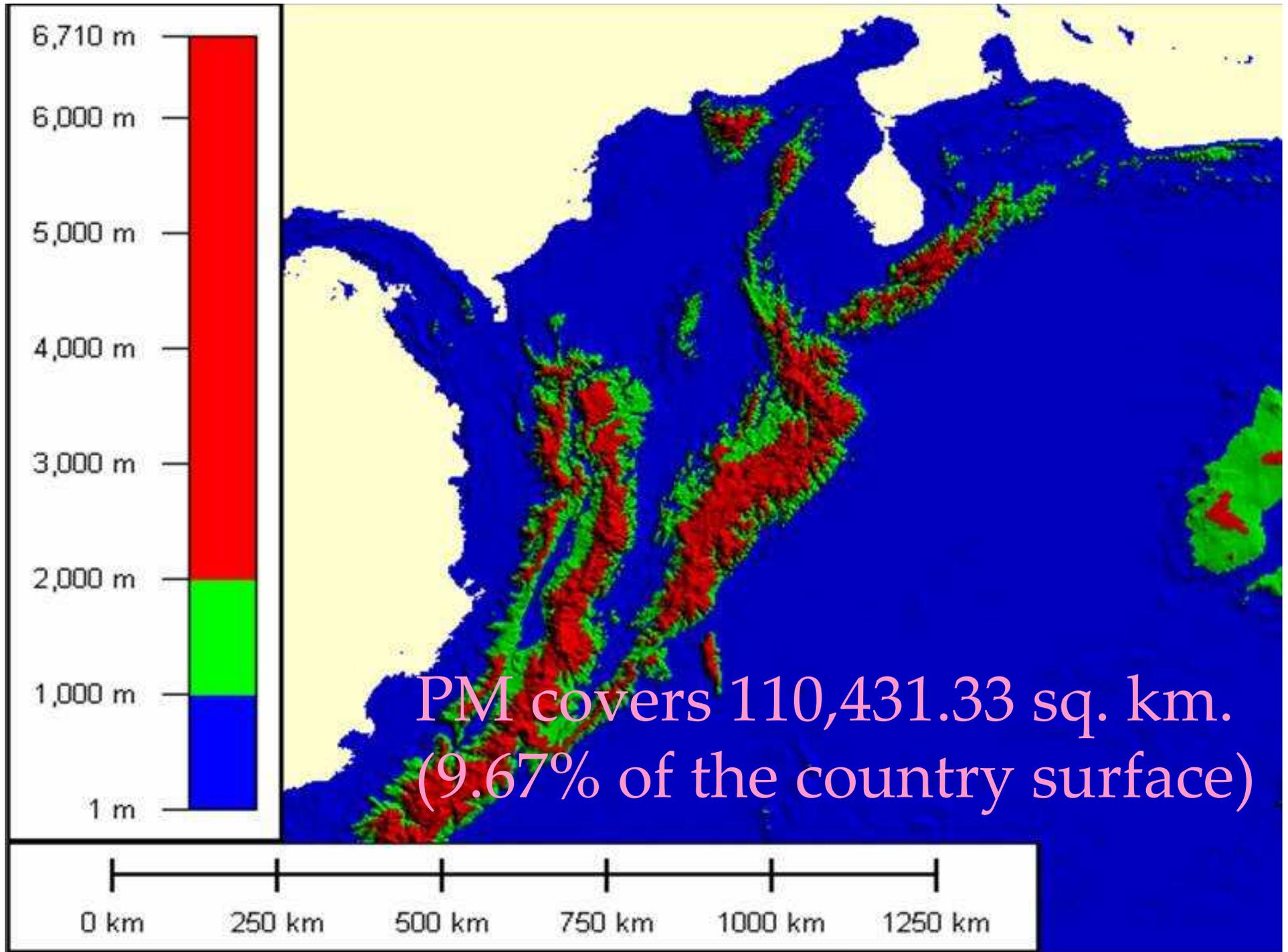


## Two academic questions:

Why doesn't CW stay in Central America if there appears to be suitable habitat for it to dwell in?

Why does it stay confined in PM in SA if apparently there is also suitable habitat both above and below?





PM covers 43,068.21 sq miles (9.67% of C.s.)

With coffee: 3,389.71 sq miles (7.87% of PM)

Shade coffee: 1,016.91 sq miles (2.36% of PM).

Pop.: some 12 mi. people (28% of Col. Pop.)

PM rain forest life zone: 11899.53 sq miles

2340 sq miles of suitable habitat for CW if at least one-fifth of this area remains forest covered (about twice the shade coffee area).

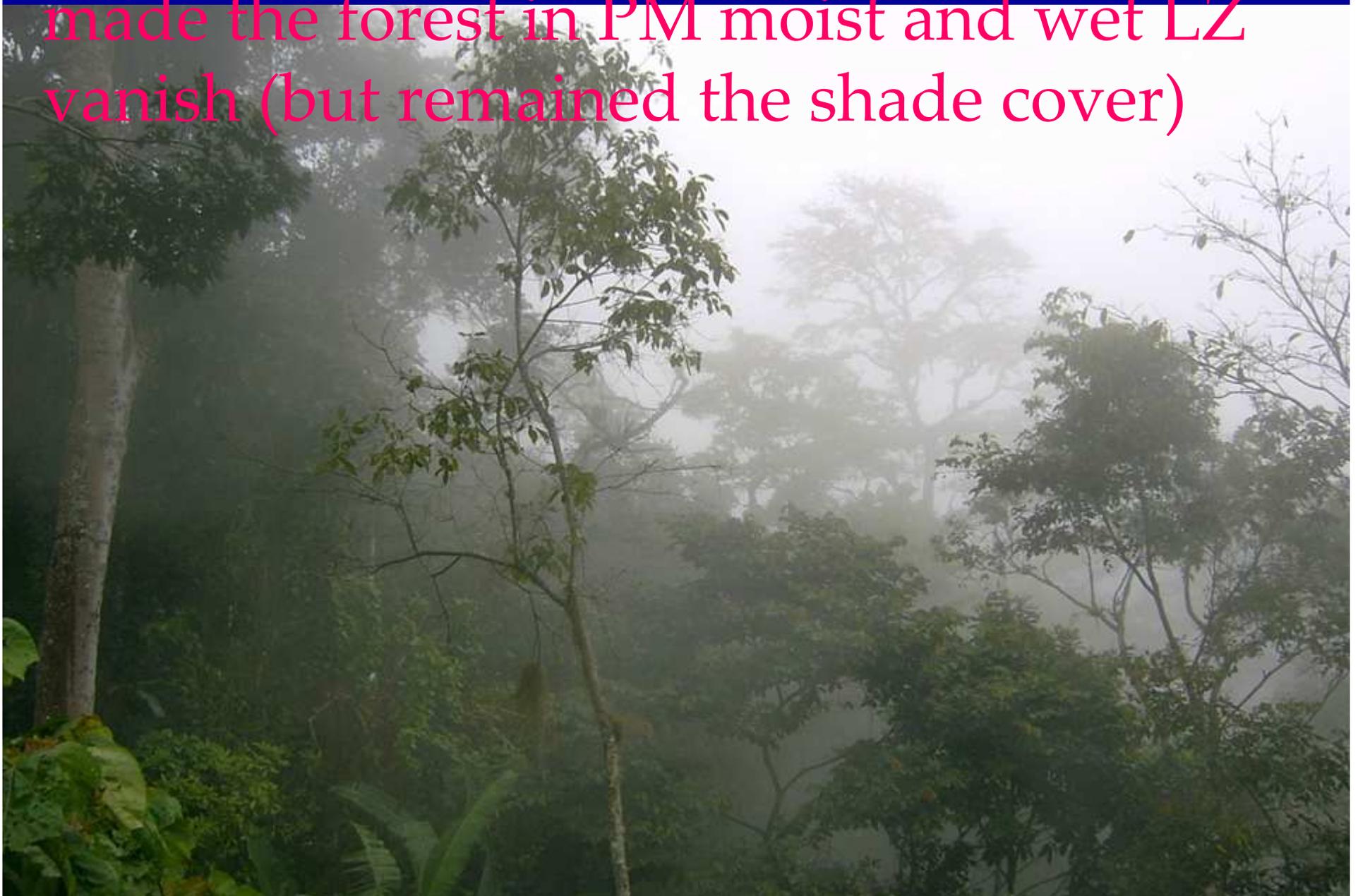
# Threats for the CW in Colombia

as cumulative effects

shrinking and impoverishing its habitat



First, the prosperity of the coffee business made the forest in PM moist and wet LZ vanish (but remained the shade cover)





During this golden era more than  
11.000 sq. km. were planted  
with the traditional coffee system



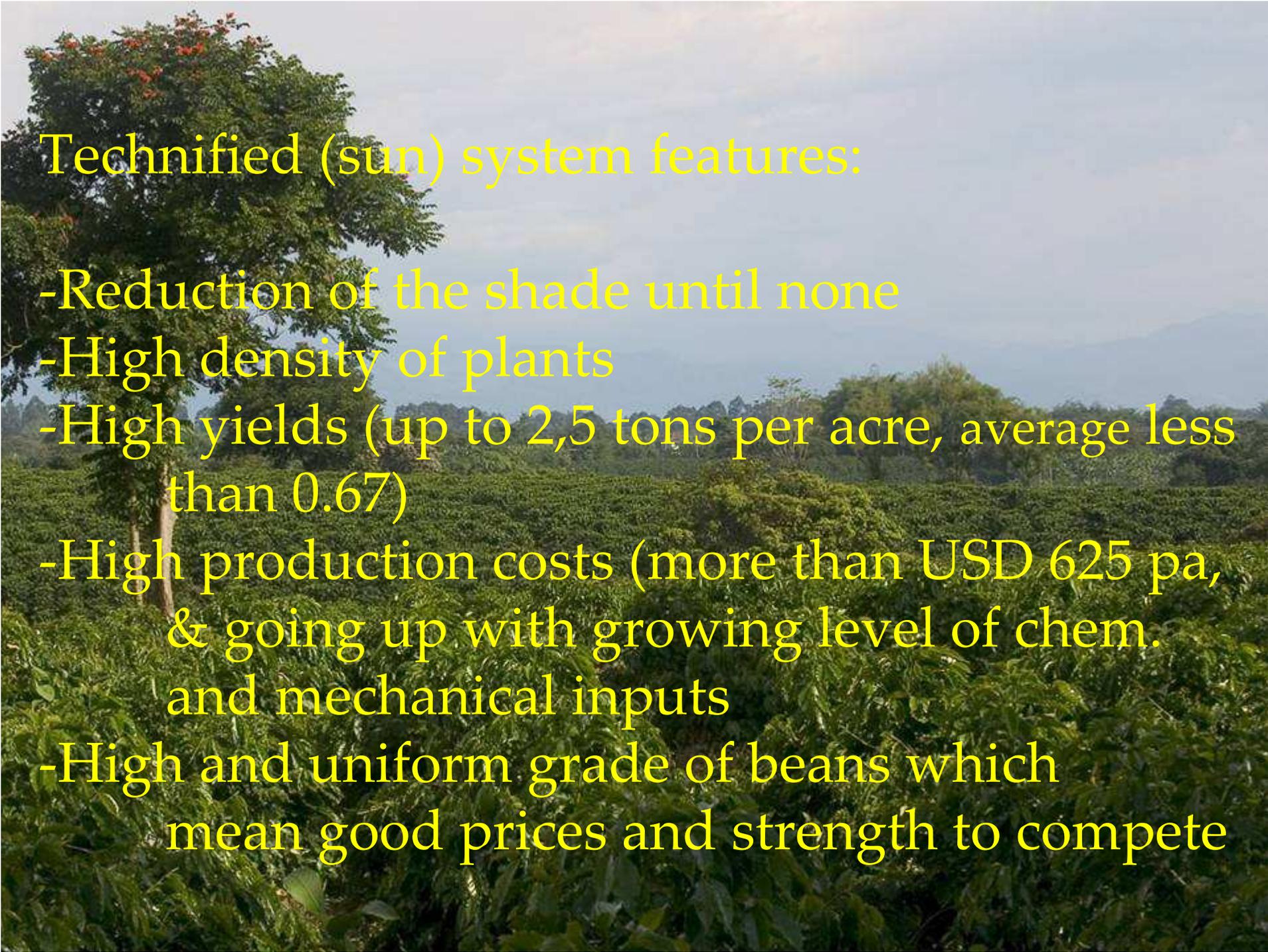
### Traditional system features:

- Low coffee plants density due to space occupied by the shade trees
- Low yields (less than 460 pounds per acre)
- Low production costs (less than USD 125 per ac)
- irregular quality of beans
- steep thin soils

Since the 70's fast replacement of traditional system for modern one was driven by:

- Growing market demands of high quality grade coffees
- Competition between producer countries
- Search of varieties resistant to diseases



A photograph of a coffee plantation. On the left, a large, leafy tree with some red flowers stands prominently. The rest of the image is filled with rows of coffee bushes. In the background, there are rolling hills or mountains under a cloudy, overcast sky. The text is overlaid on the image in a yellow, sans-serif font.

## Technified (sun) system features:

- Reduction of the shade until none
- High density of plants
- High yields (up to 2,5 tons per acre, average less than 0.67)
- High production costs (more than USD 625 pa, & going up with growing level of chem. and mechanical inputs)
- High and uniform grade of beans which mean good prices and strength to compete

An aerial photograph of a coffee plantation. The landscape is characterized by numerous small, irregularly shaped terraced fields, likely for coffee cultivation, which are separated by thin, light-colored paths or roads. The terrain appears to be hilly or mountainous, with the terraces following the contours of the land. The overall color palette is dominated by various shades of green, from dark forest green to lighter, more yellowish-green, suggesting different stages of coffee growth or different types of vegetation. The lighting is somewhat dim, giving the image a slightly somber or historical feel.

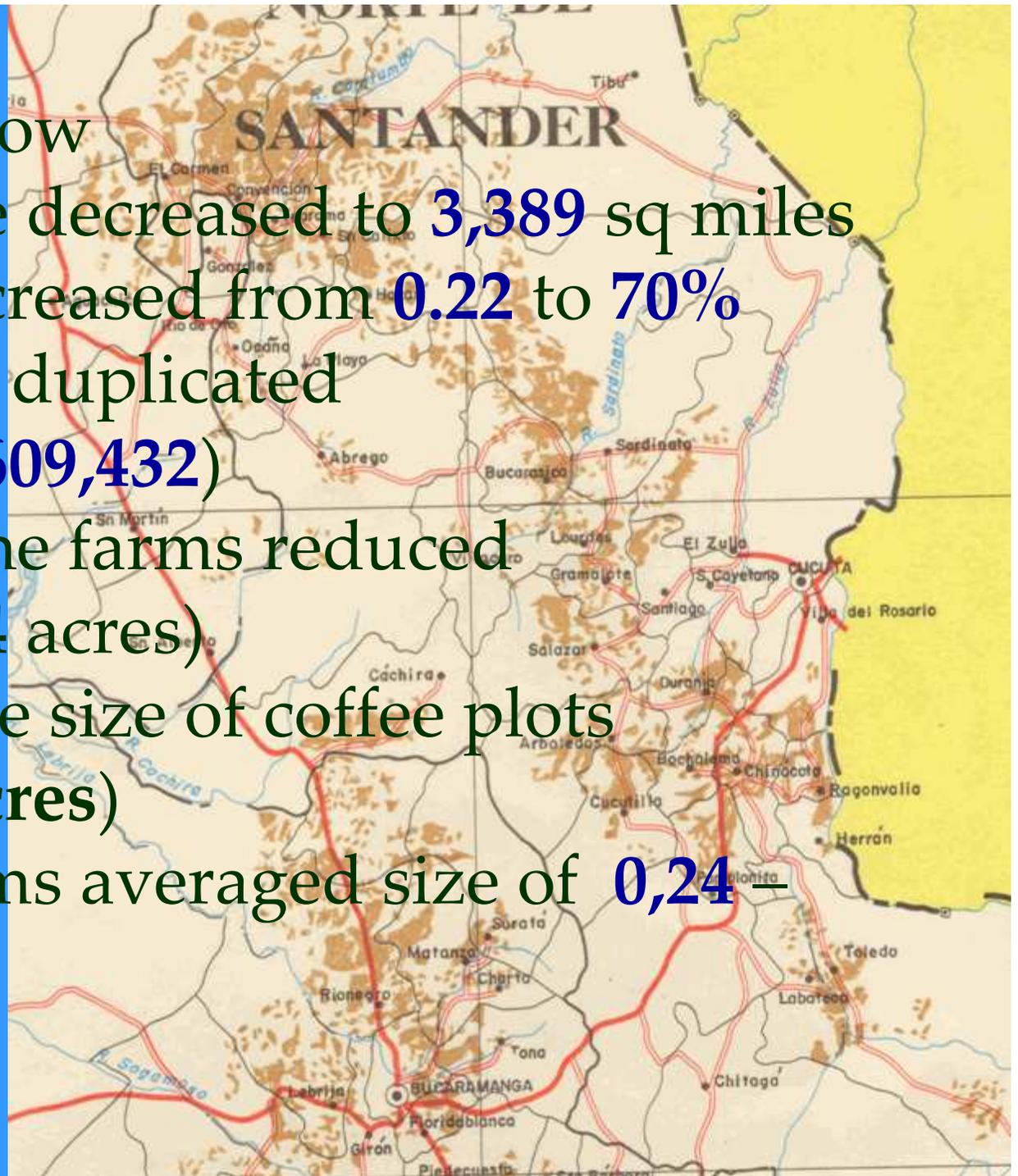
## Current trends in coffee business:

- Technification

- High grade production to export

- Decrease of the cultivated surface

Since 70's up to now  
cultivated surface decreased to **3,389** sq miles  
But sun coffee increased from **0.22** to **70%**  
Number of farms duplicated  
(from **301,708** to **609,432**)  
Average size of the farms reduced  
(from **36,5** to **12,4** acres)  
So did the average size of coffee plots  
(from **8,6** to **3,2** acres)  
**73.71%** of the farms averaged size of **0,24** –  
**12,3 acres**

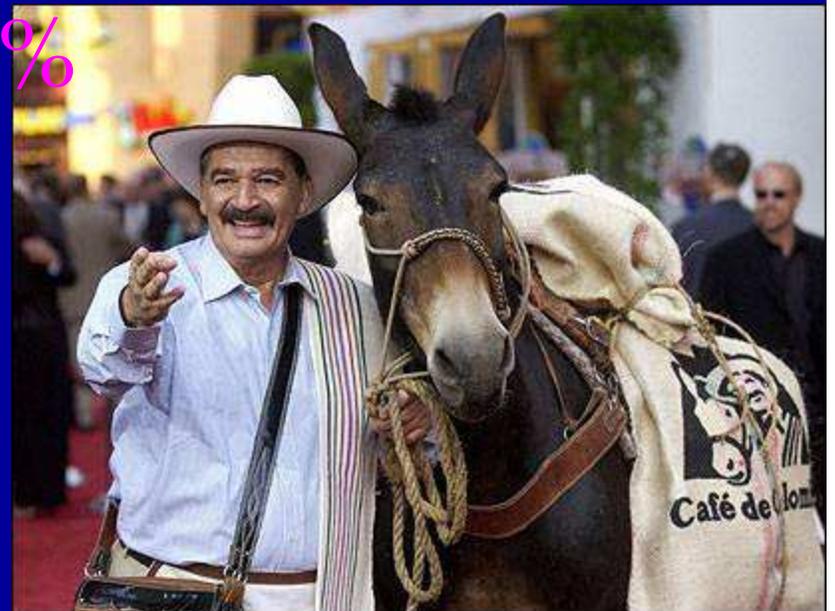


Finishing the picture of the coffee  
business in Colombia:

Coffee went from meaning 9.7% GDP  
in 50's to less than 1% in 2001

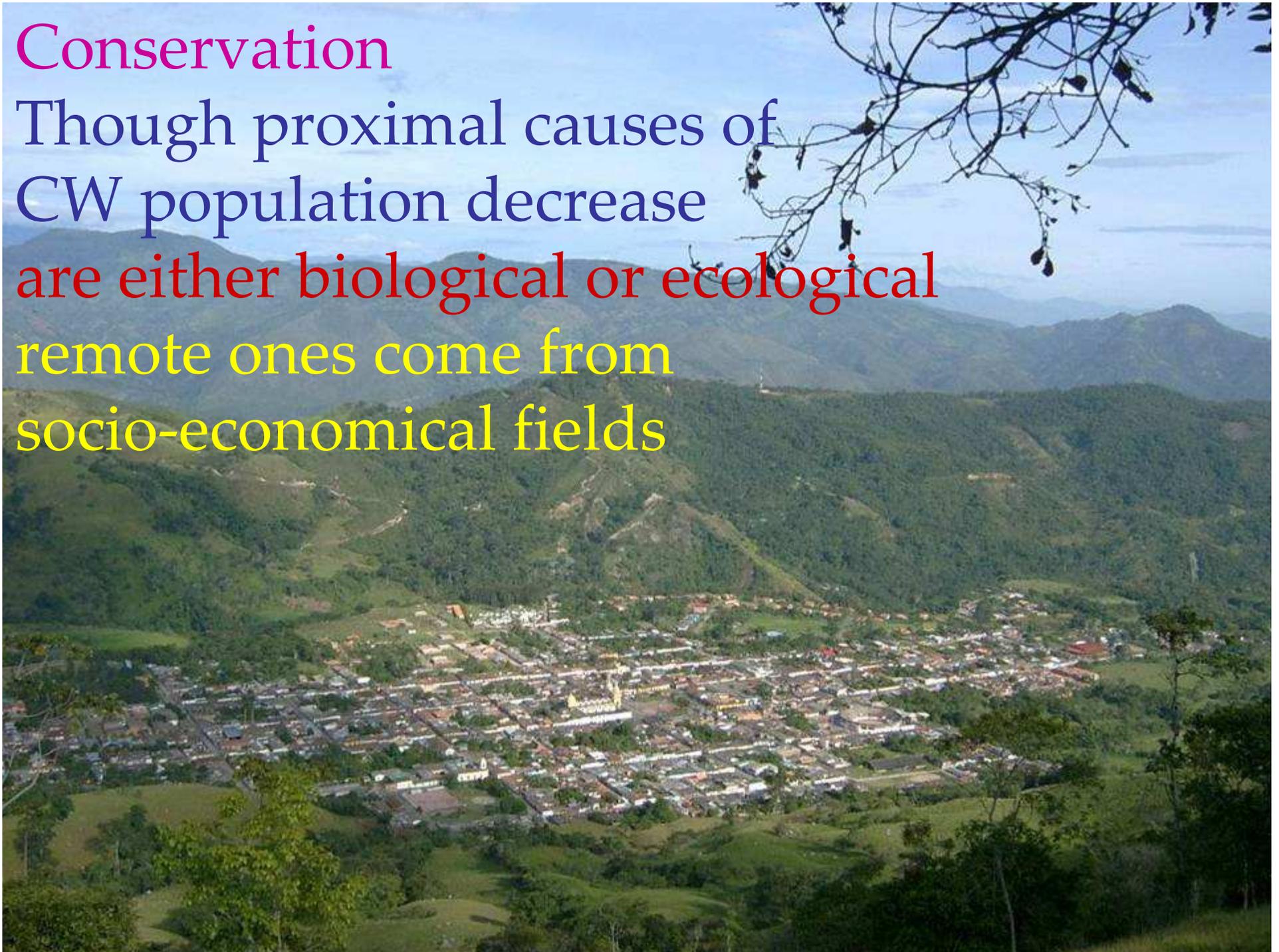
2001 : the worst external price in the  
last 180 years

In 70's it was 60% of exports but in  
2000 dropped to 9.9%



# Conservation

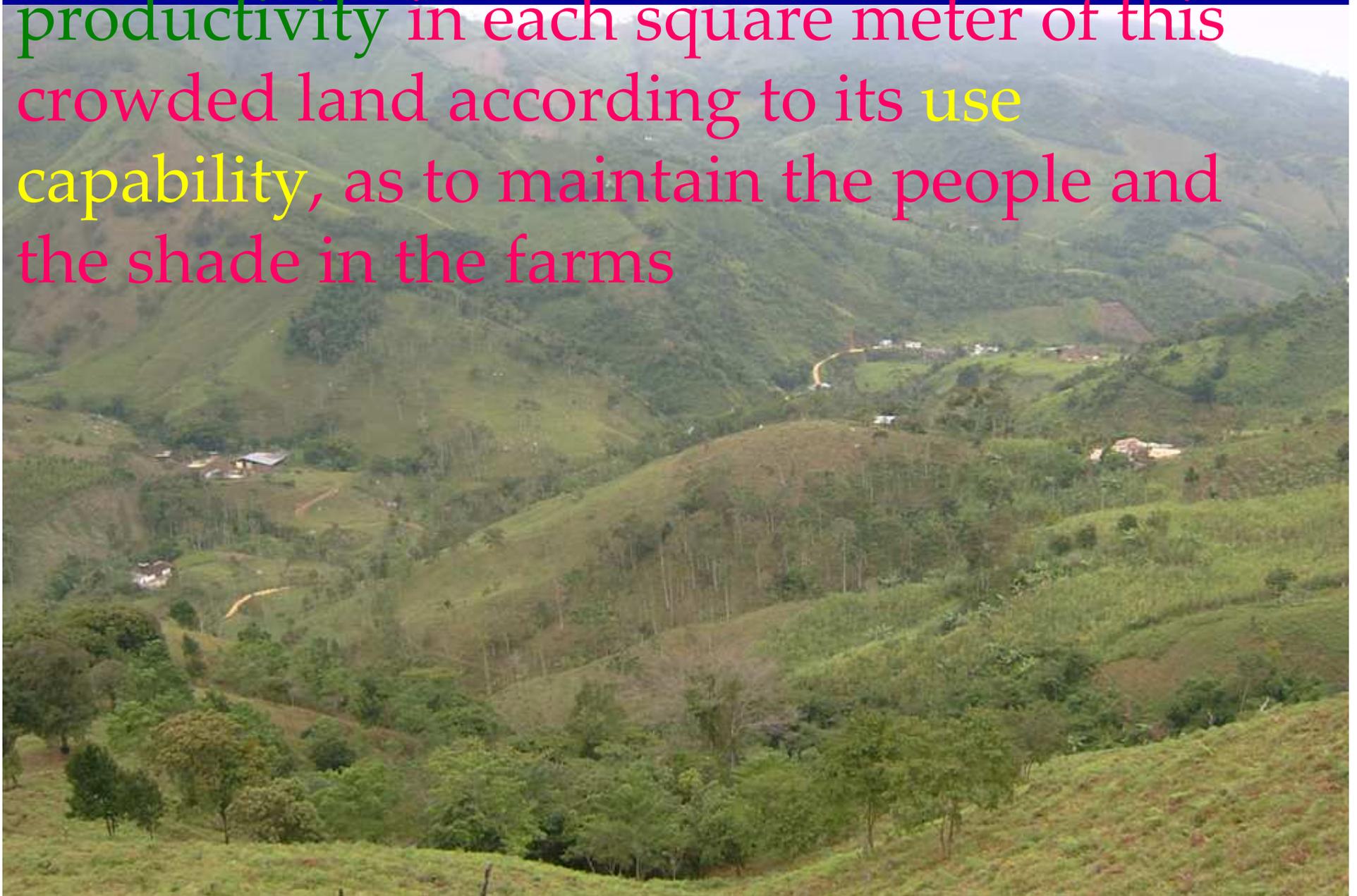
Though proximal causes of  
CW population decrease  
are either biological or ecological  
remote ones come from  
socio-economical fields



To at least maintain the shade cover in a sustainable way, a strategic **adaptive plan** must be designed to implement ecological practices within a socio-economical context



The key issue: to achieve the **maximum** productivity in each square meter of this crowded land according to its **use** capability, as to maintain the people and the shade in the farms





The easiest solution would seem to be buying a big extension of land from all of those who want to leave



This way has two main inconvenient aspects:

First, it would be needed to buy an area as big as half Costa Rica to keep stable populations of migrant birds, and most important, where do this crowd move to?



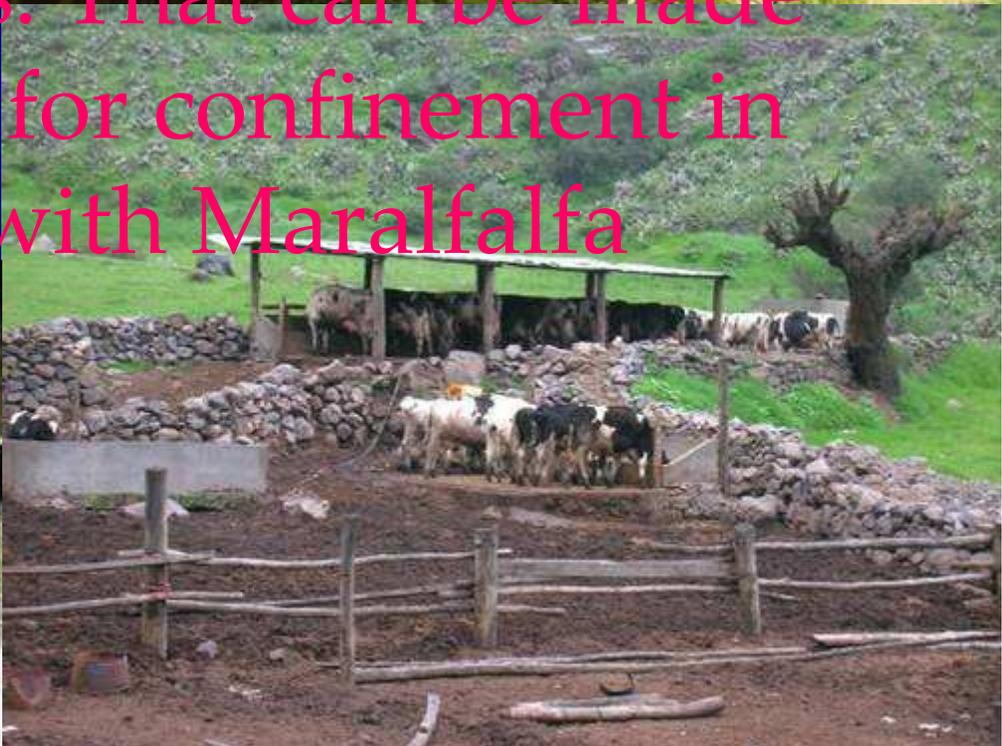


## The adaptive plan:

Practices among many more to improve the farmers' profits on a lesser area releasing a part for shade, either maintaining the coffee plantation or not



To feed cattle with yields ten-fold larger than the present ones. That can be made by replacing grazing for confinement in stables, and feeding with Maralfalfa





To grow mushrooms to make the most of the farm crop wastes before turning them into manure





To produce biogas from organic wastes before turning them into manure



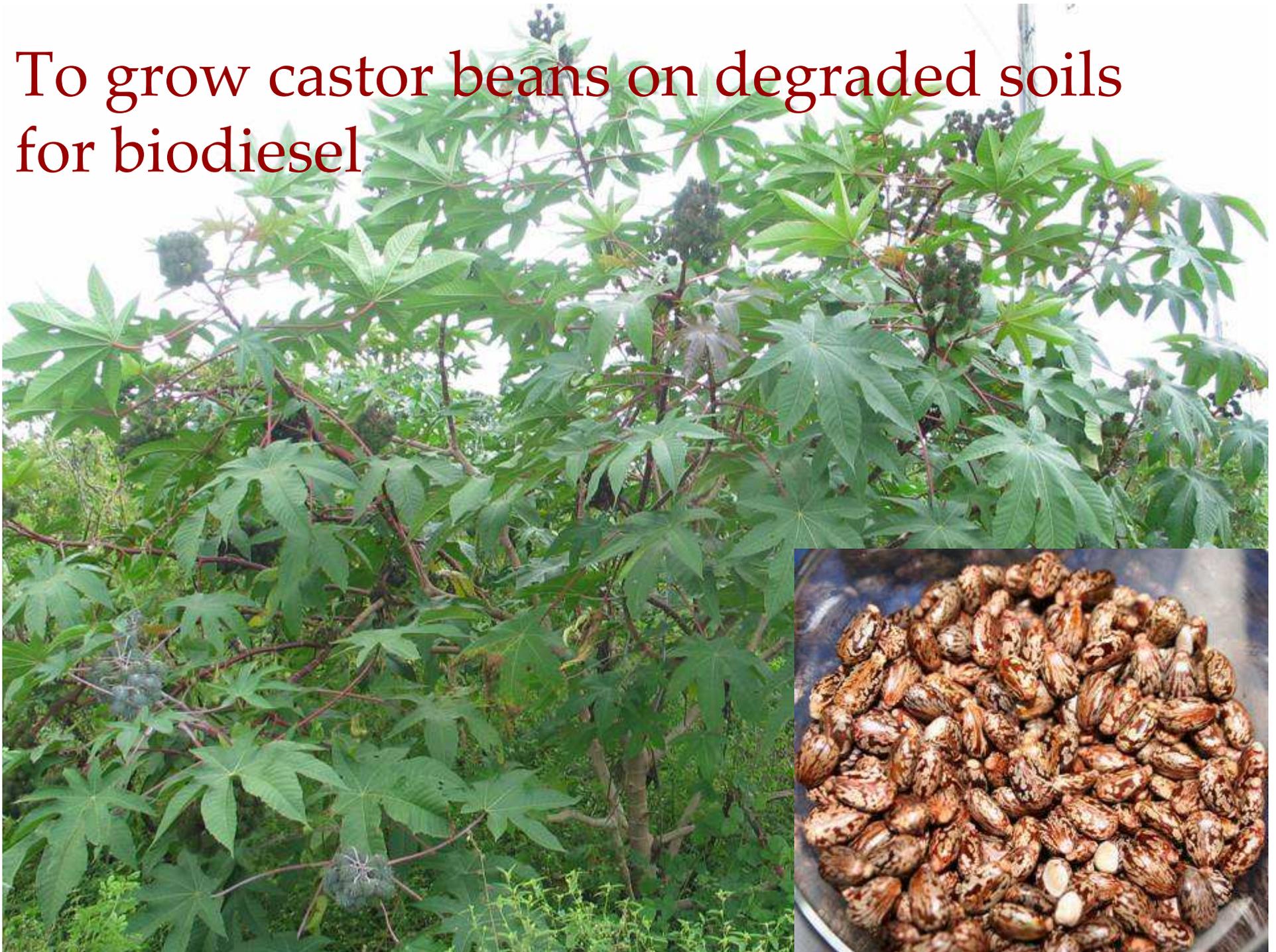
# To grow vegetables in light greenhouses

## Advantages:

- rise in the yields
- preventing of climatic risks (hailing, freeze)
- reducing manure losses and erosion
- controlling of pests and diseases with lesser use of agrochemicals



To grow castor beans on degraded soils  
for biodiesel





The shade may be improved to get more profits

The farmers use the shade trees in three ways:

1st. for fuel. Trees used in that way are seldom planted successional pioneer species that grow spontaneously and fast. In this group are Inga and Silk trees

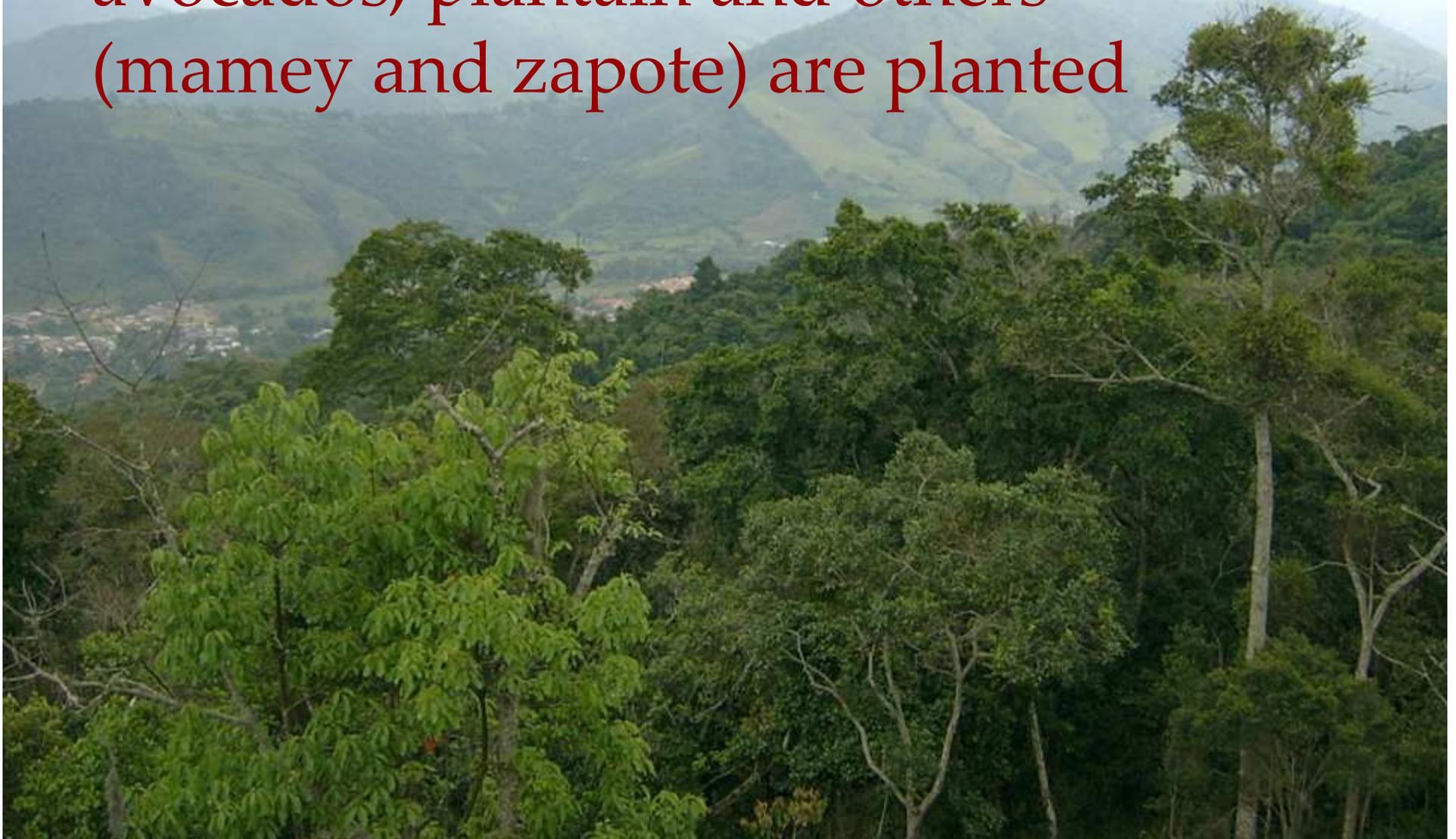


2nd. for timber. Most used species are Laurel and Trumpet trees



This group may be improved with species such as Mahogany and Cedar that yield better wood

For fruits: usually citrics, mangoes, avocados, plantain and others (mamey and zapote) are planted





In low-laying or wet areas  
Heliconias and bamboo  
thickets may be planted

The plan must include assistance for value added and marketing to avoid intermediaries

To ensure the farmers will keep the shade:  
They do not have neither the means to carry out these practices nor the know-how-to.

So, They will need assistance and loans to achieve it and tax reductions and grants to encourage them to do it

The partnership of governmental institutions is needed to guarantee the keeping of the agreements:  
not keeping the agreement would mean losing the benefits

# Acknowledgments

I am grateful to all who encourage, accompany and help me in many ways during the past years in this amazing quest to know the life and times of the CW in northern Colombia: Gabriel, Paul, Dave, Walter, J.Guillermo, Dn. Guillermo, Dn. Antonio, Federico, Leonor, Manuel, Modesta, Carlos, José, the farmers of Manzanares and Guayabal in the Cacua creek, and the institutions: The Nature Conservancy, USDA Forest Service, Universidad Nacional de Colombia, Sociedad Antioqueña de Ornitología, Cultivares S.A.