Impacts of climate change on health of the Hungarian forests

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NARIC Forest Research Institute

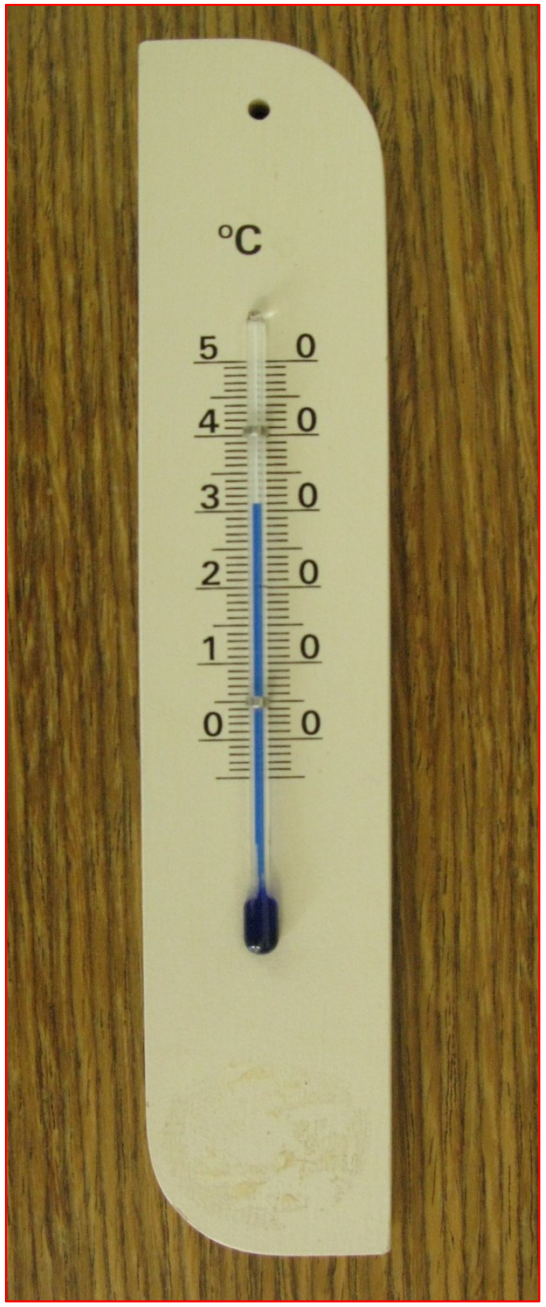
Department of Forest Protection

EFOL 2015

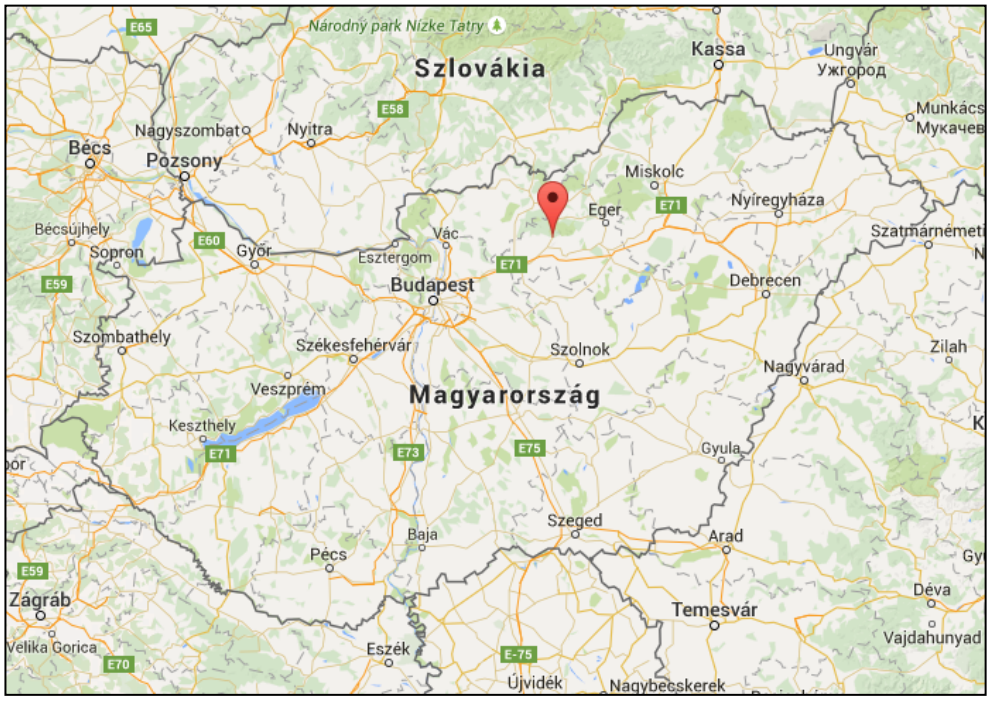
Orfű

August 12th 2015

ERTI



Let's warm up!

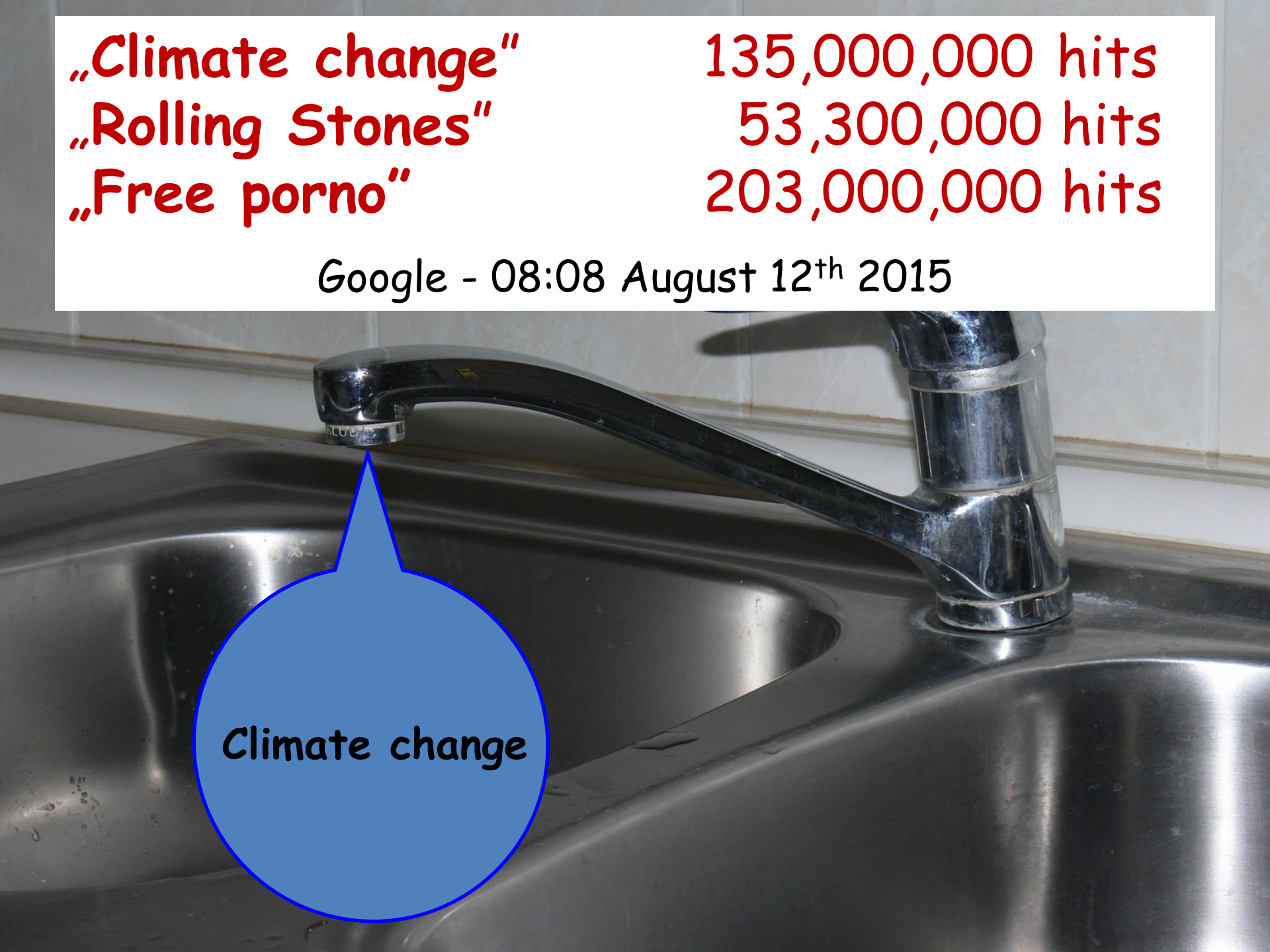


Morning temperature in my office...

07:20 AM today

„Climate change"	135,000,000 hits
„Rolling Stones"	53,300,000 hits
„Free porno"	203,000,000 hits

Google - 08:08 August 12th 2015



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In 50-49 vote, US Senate says climate change not caused by humans

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U.S. Senator James Inhofe (R-OK) (C) is greeted by a reporter as he arrives for the weekly Senate Republican caucus luncheon at the U.S. Capitol in Washington January 13, 2015.

By Sean Cockerham, McClatchy Washington Bureau

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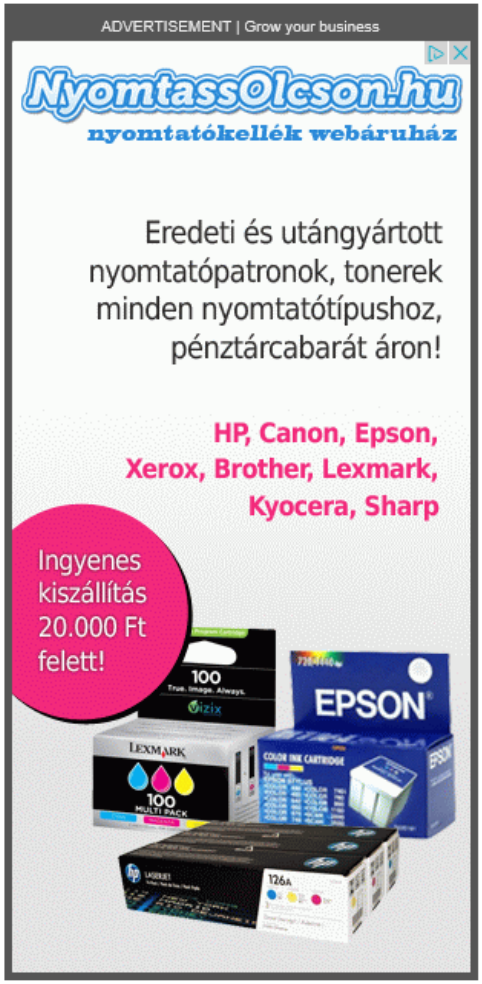

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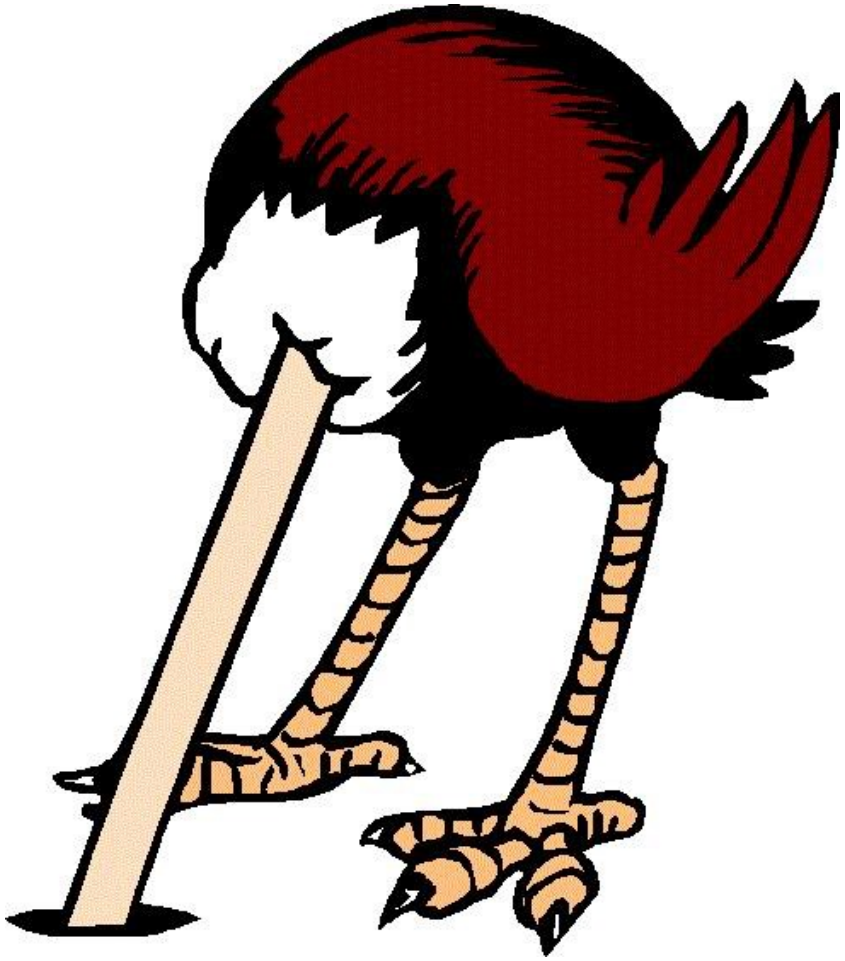
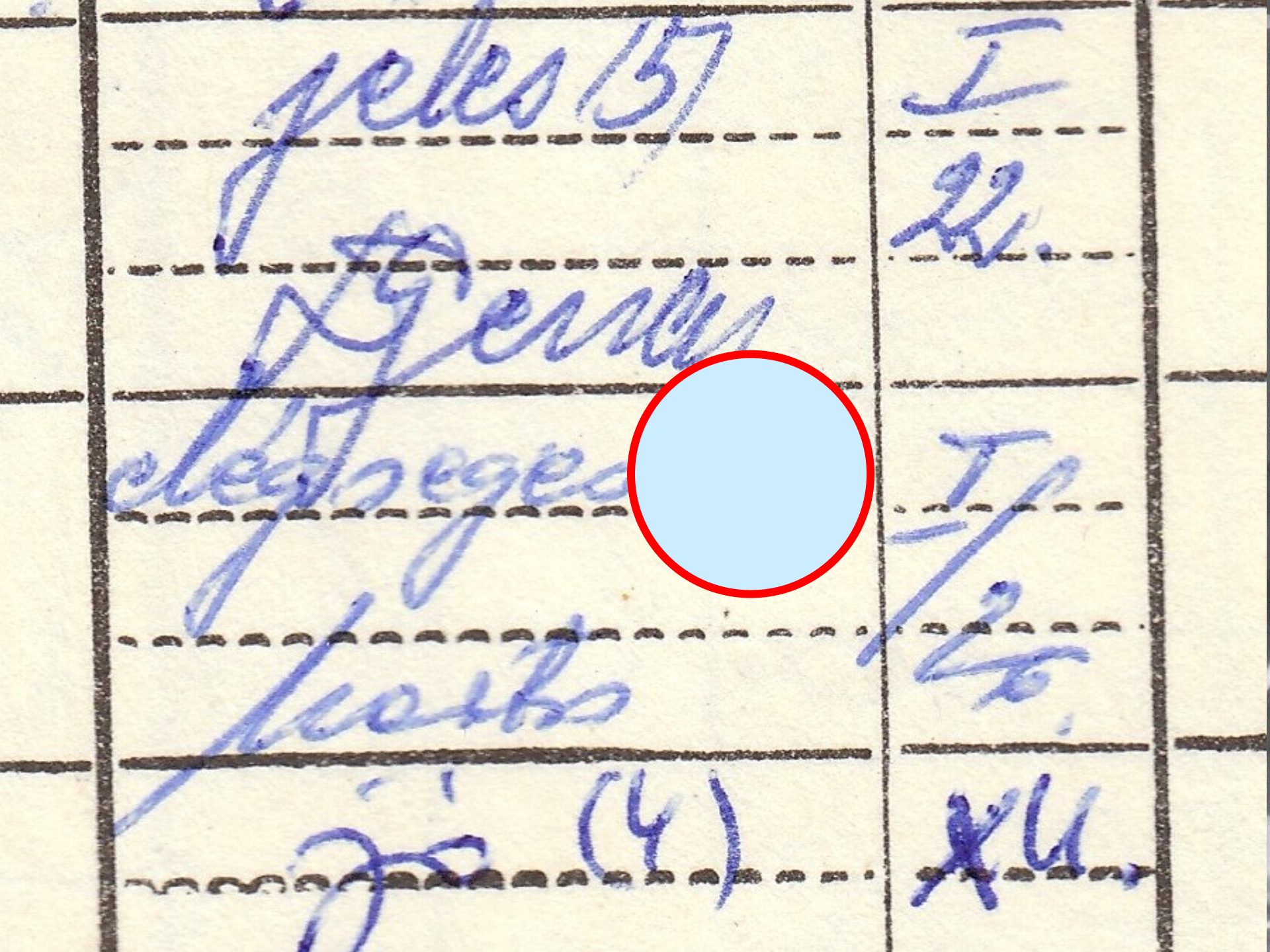
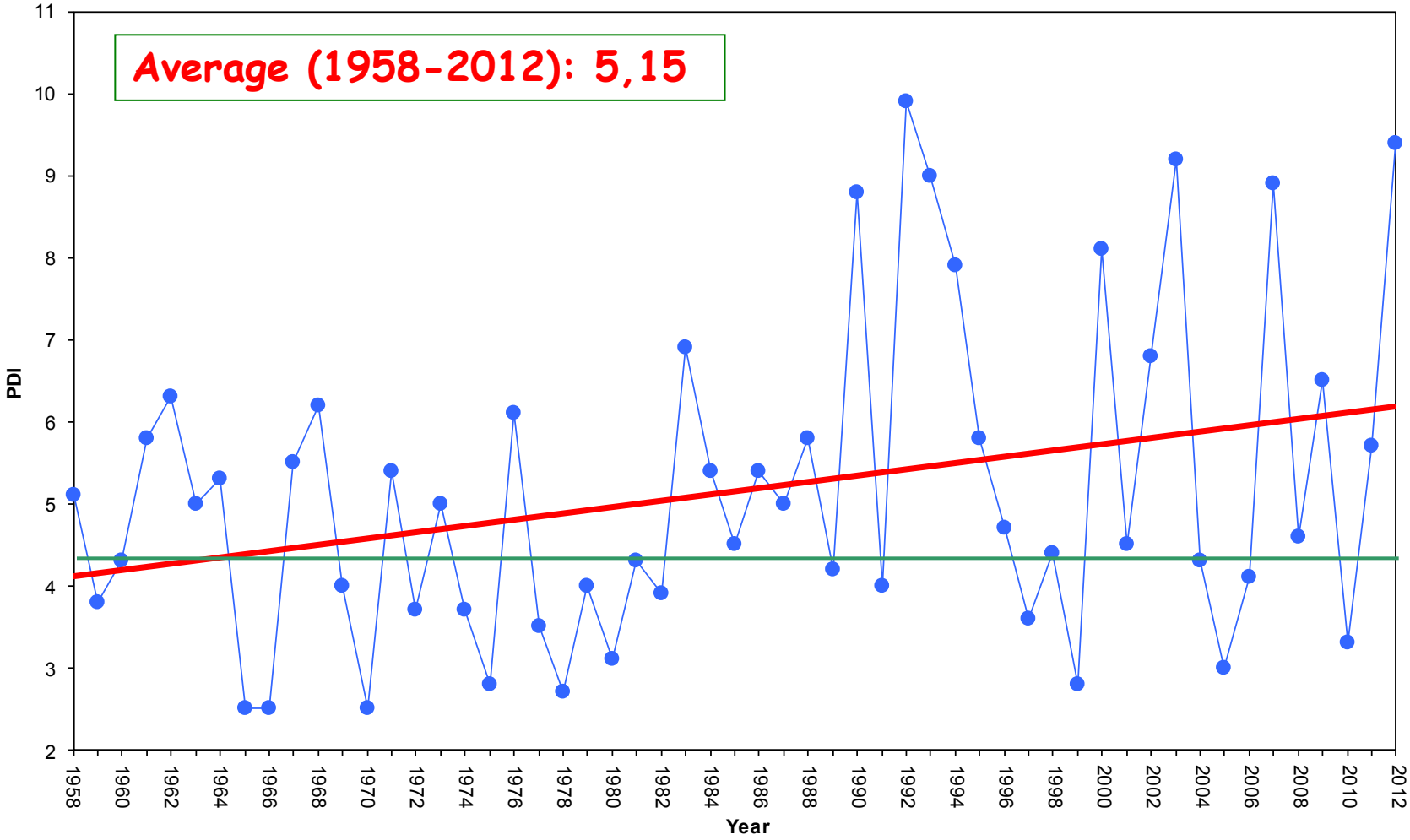
Ostrich policy….

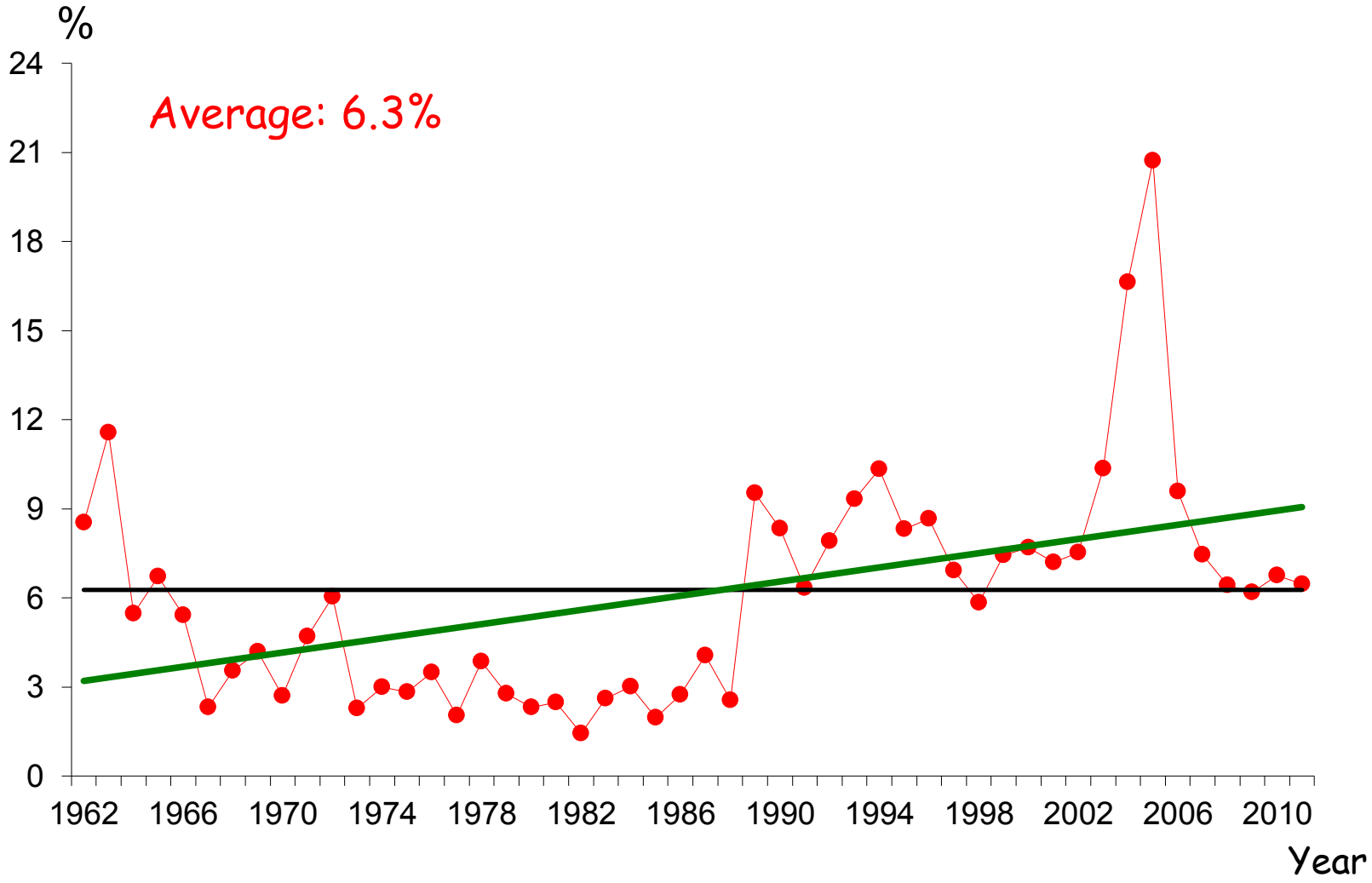




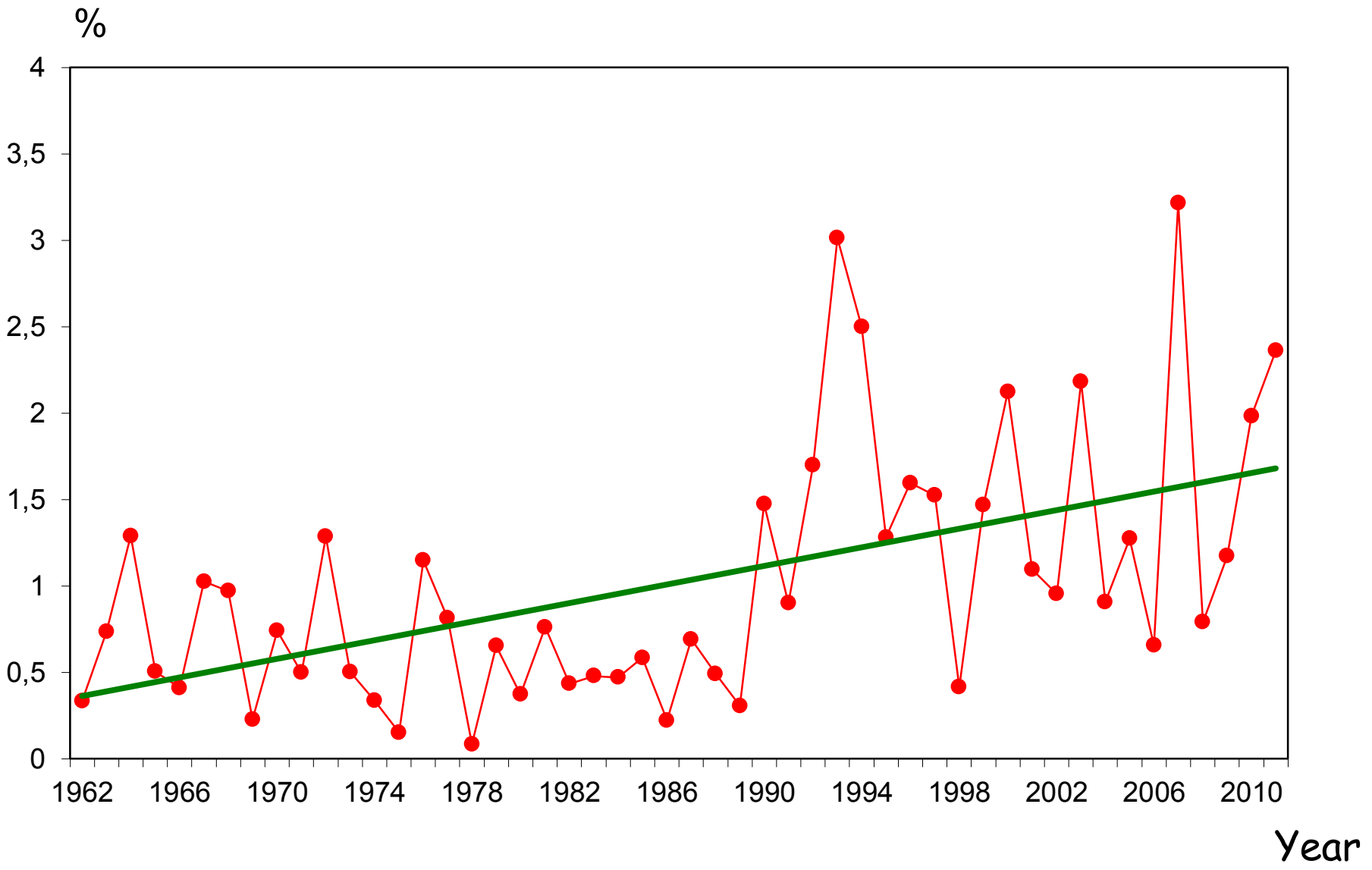


Yearly values, average and trend of the (Pálfai Drought Index) in Hungary between 1958 and 2012

Total forest damage in Hungary between 1962 and 2011 in percentage of the forested land



Area damaged by abiotic damage factors in Hungary between 1962 and 2011 in percentage of the forested land

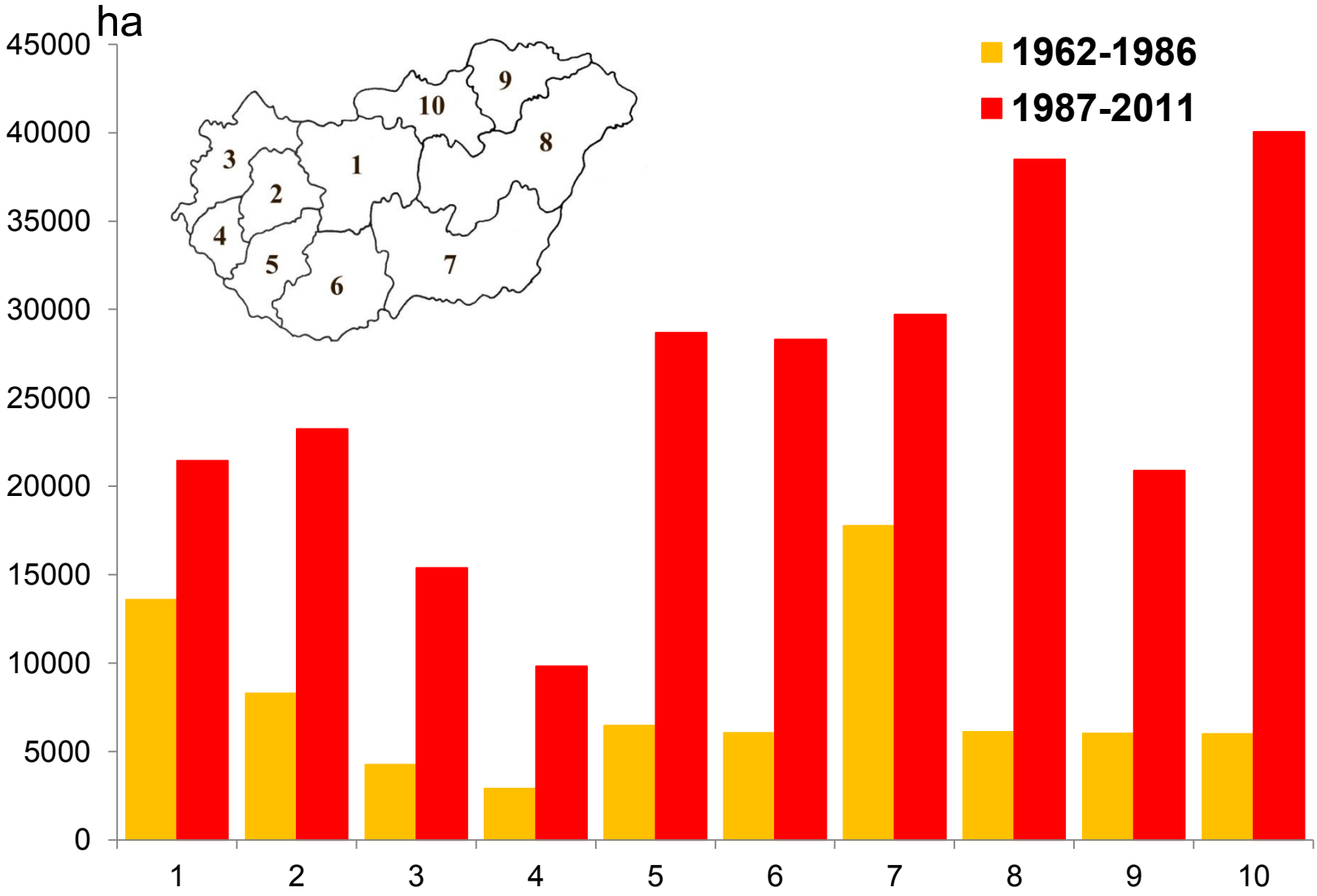


More frequent and more severe abiotic calamities

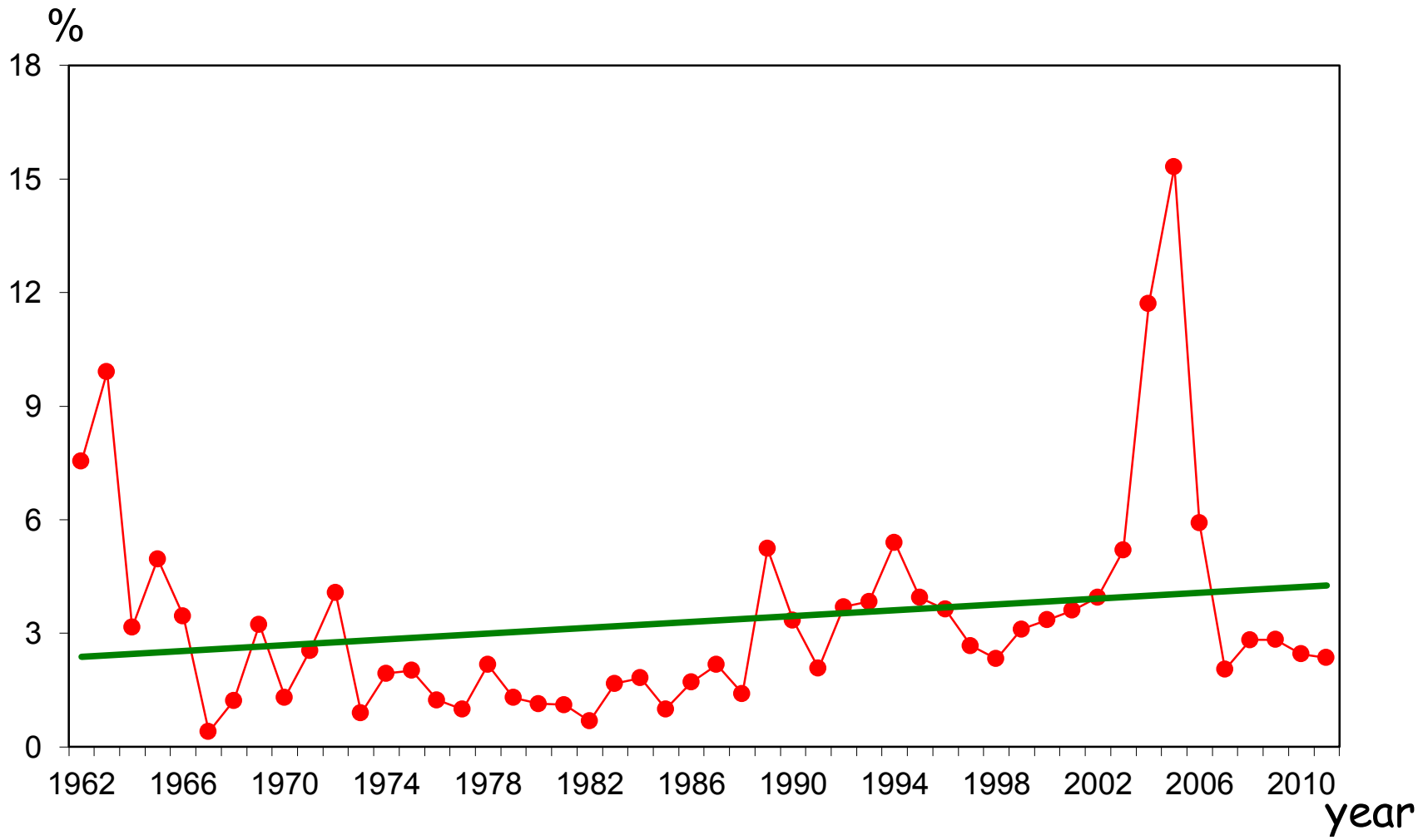
High Tatras
November 2004

Börzsöny mountains
December 2014

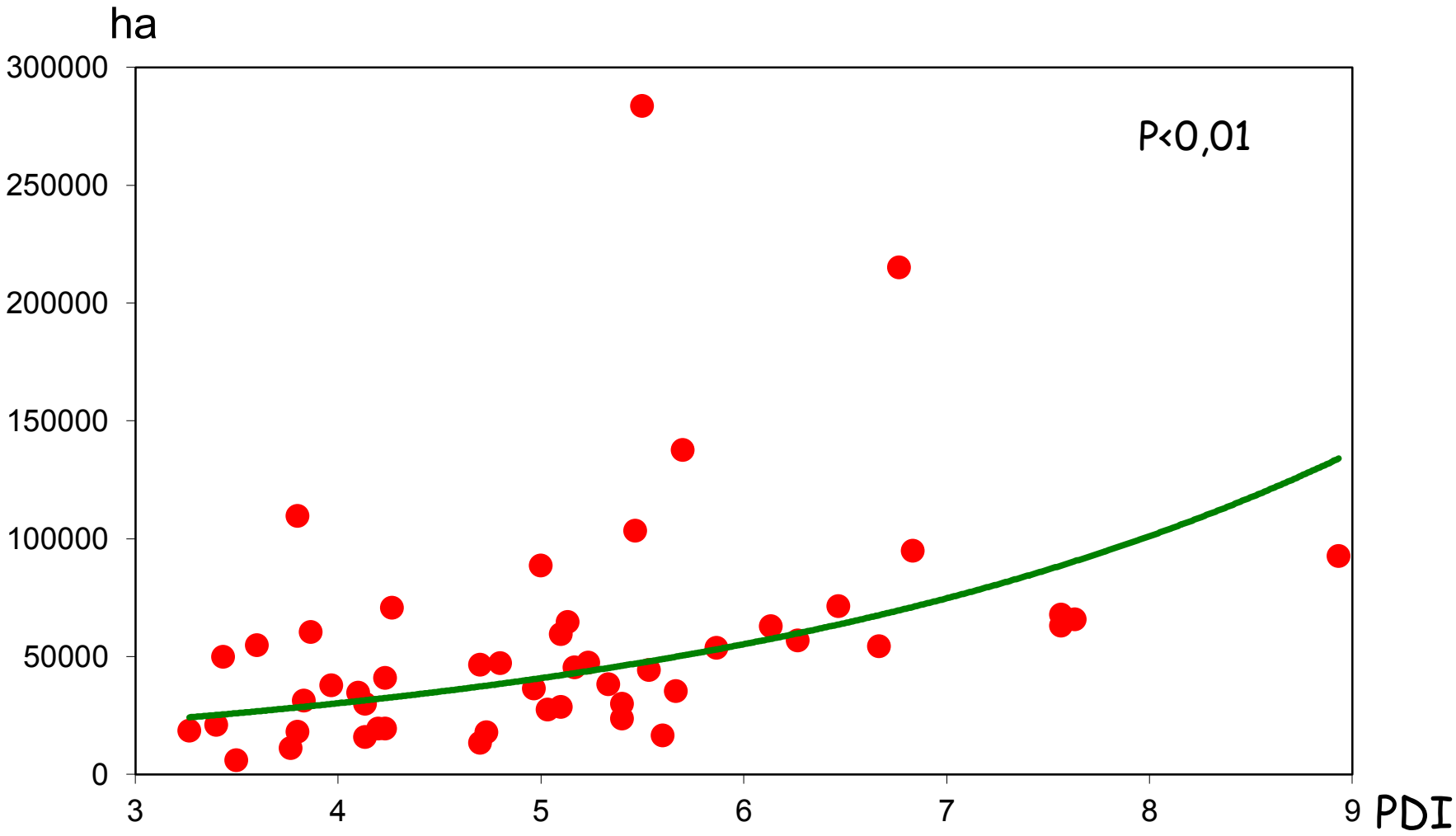
Drought damage in the Hungarian forests in the last 50 years



Area damaged by forest insects in Hungary between 1962 and 2011 in percentage of the forested land



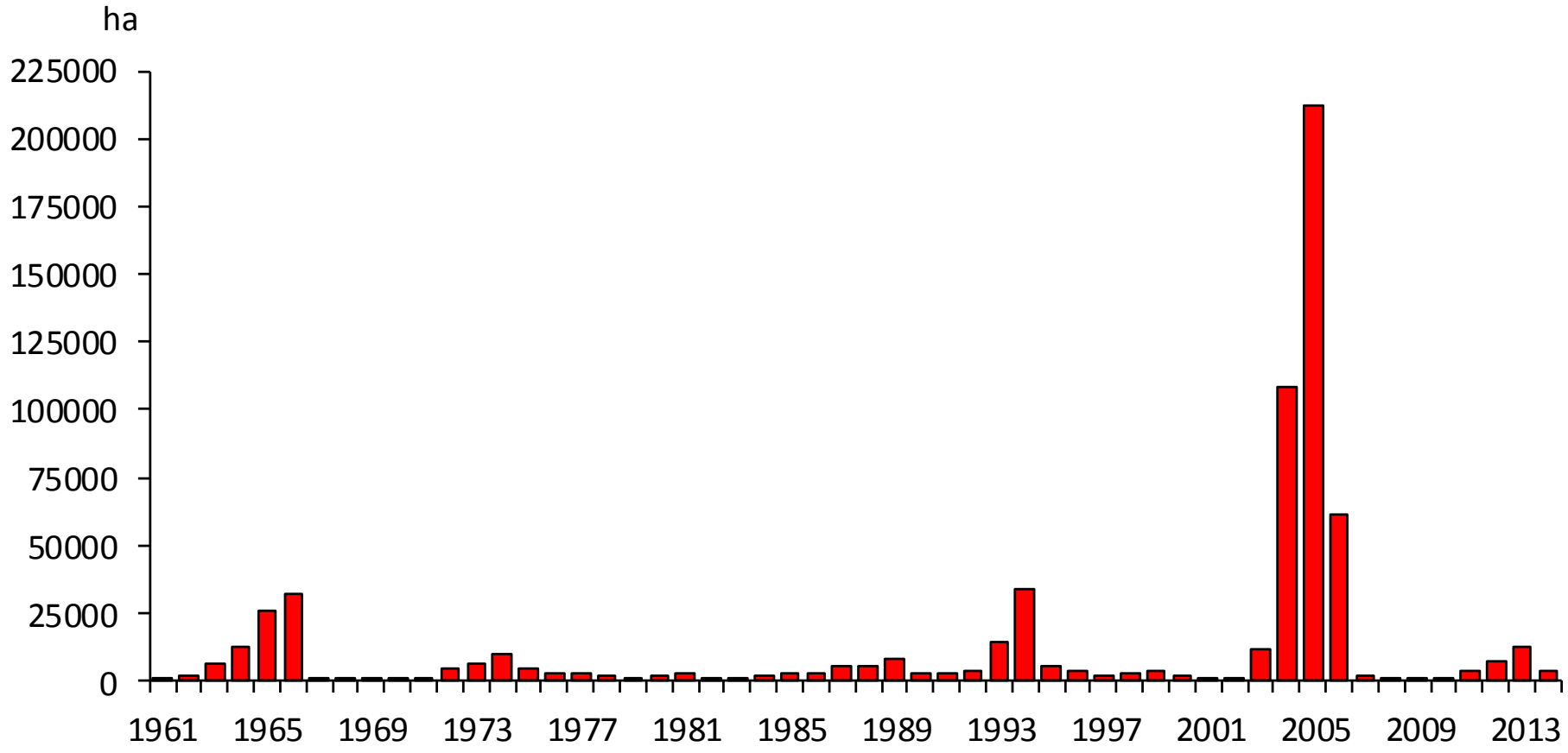
Yearly damage caused by forest insects and 3 years moving averages of PDI



Gypsy moth – a real „world star"

Predicted future distribution of gypsy moth (*Lymantria dispar*) by CLIMEX in Europe using average global temperature increase of 3.6°C.

Black circles indicate ecoclimatic indices (EI) at meteorological stations. Larger circles represent higher EI values and more favourable climatic conditions for *L. dispar*. Shaded area represents current distribution of gypsy moth (Vanhanen et al 2007)

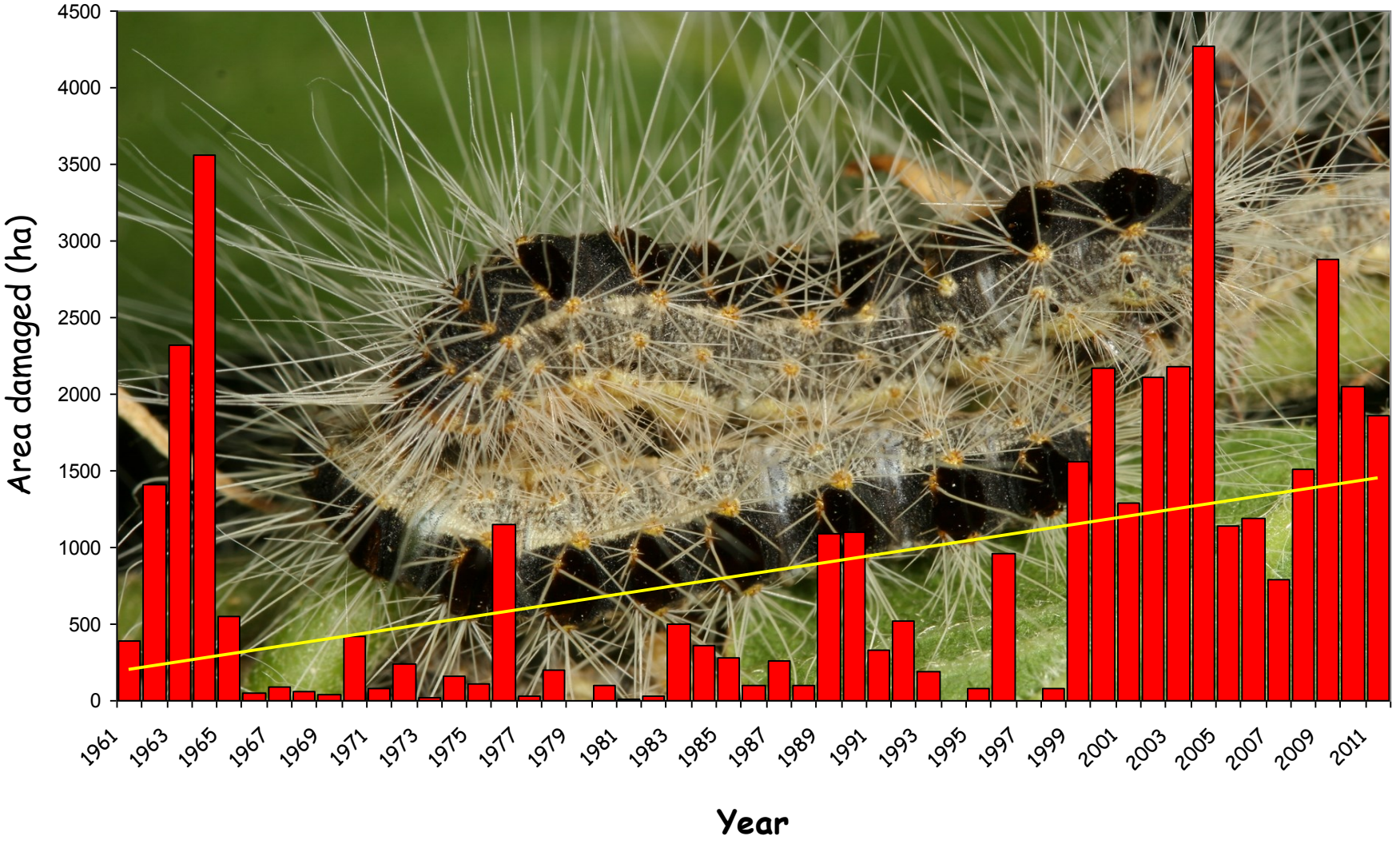


Yearly extent of damage by gypsy moth (*Lymantria dispar*) in Hungary between 1961 and 2014

Vertical expansion of Gypsy moth damage

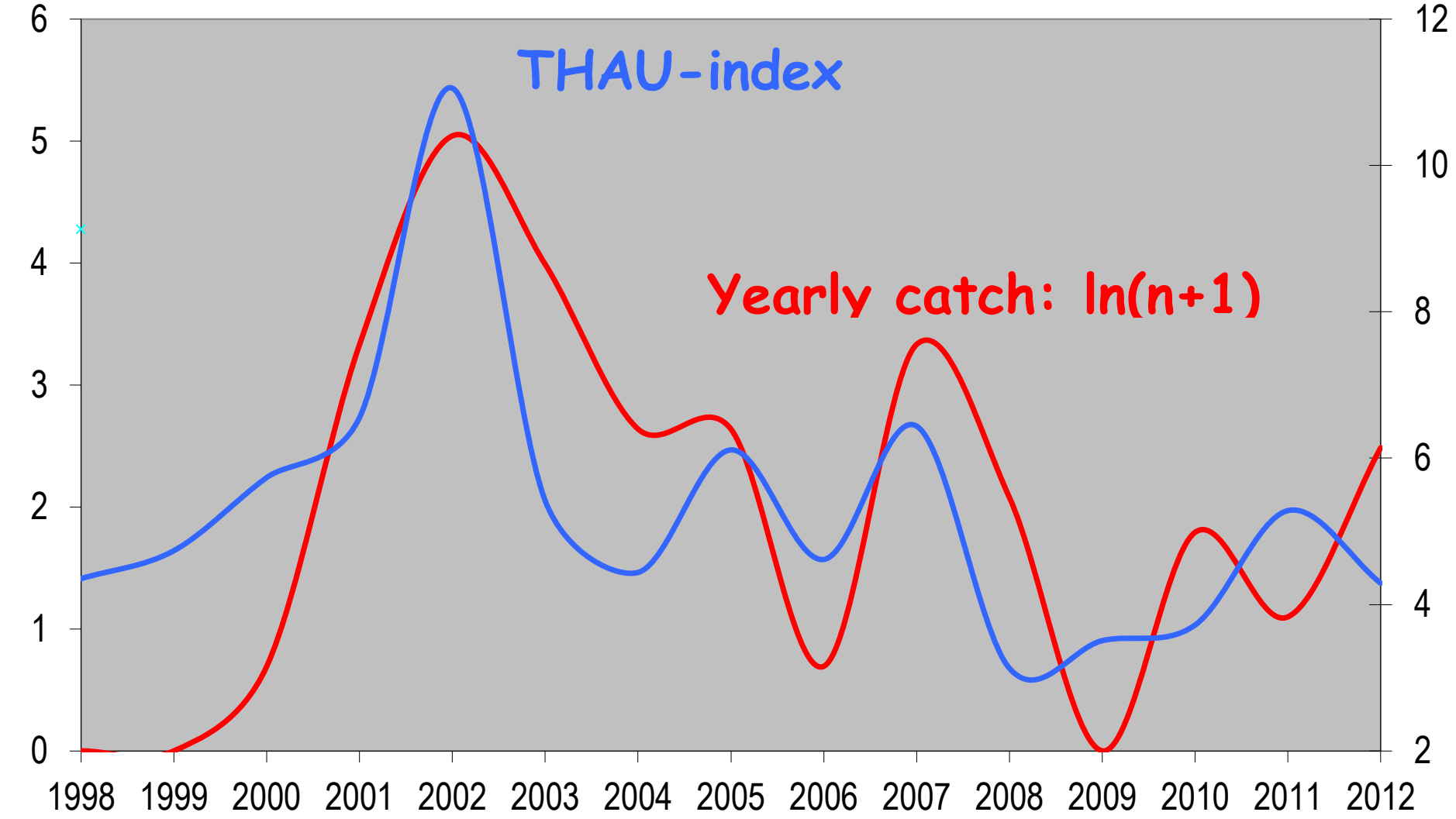
Oak Processionary Moth

(*Thaumetopoea processionea*)



Yearly values and trend of damage caused by Oak Processionary Moth in Hungary

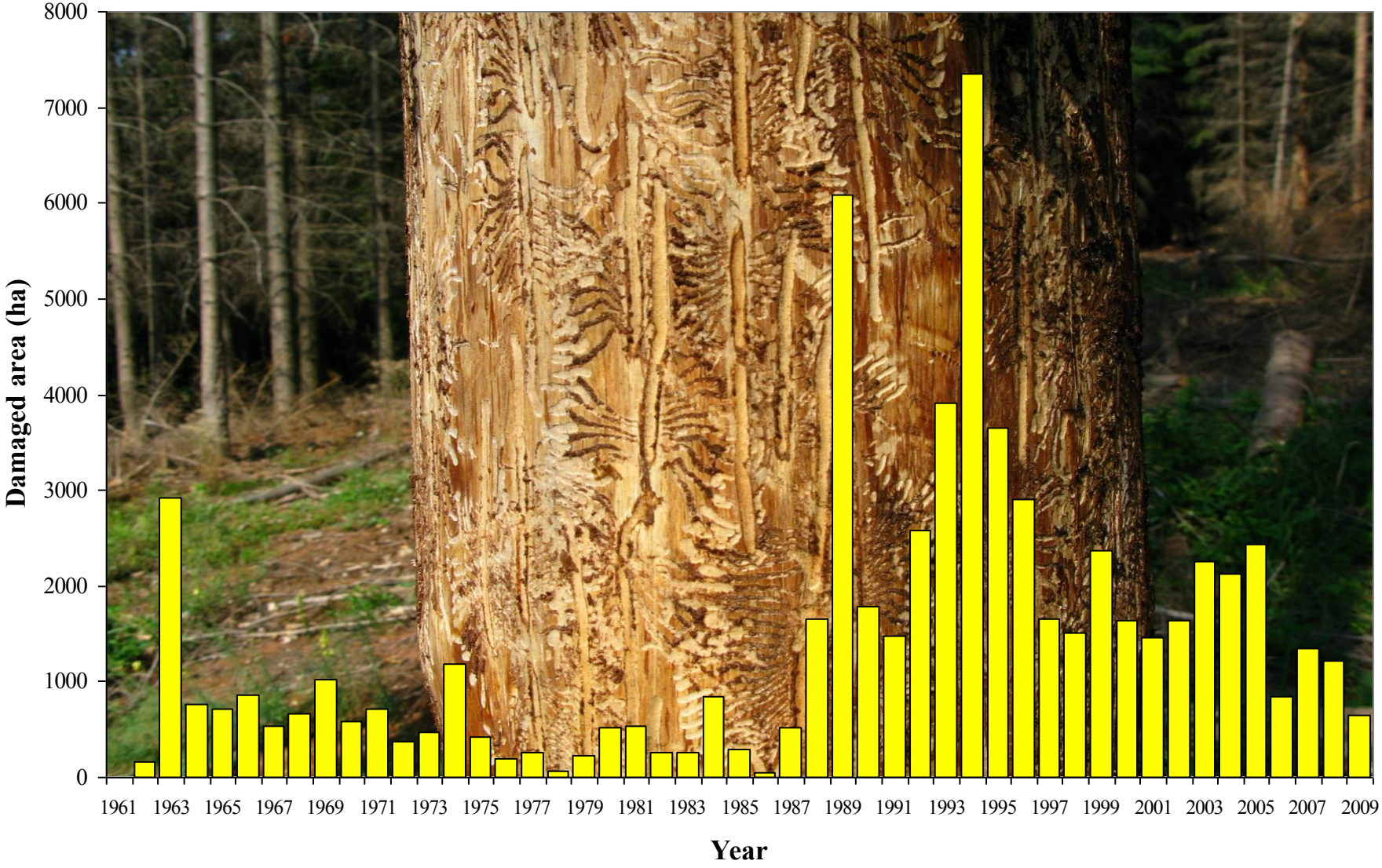
(1961-2011)



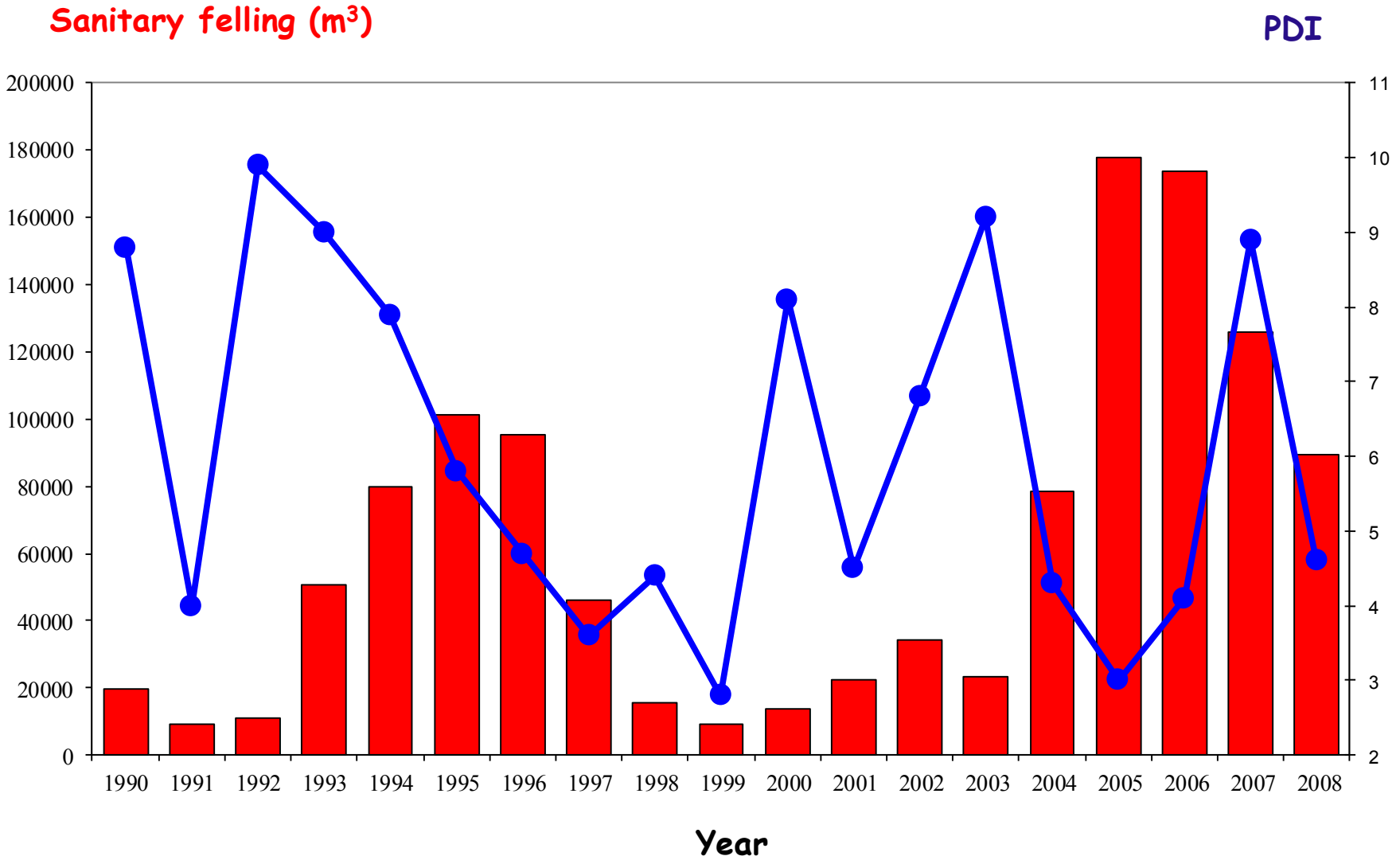
Weather model of the OPM fluctuation

(Sopron)

European spruce bark beetle
(*Ips typographus*)



Area damaged by spruce bark beetles between 1961 and 2009

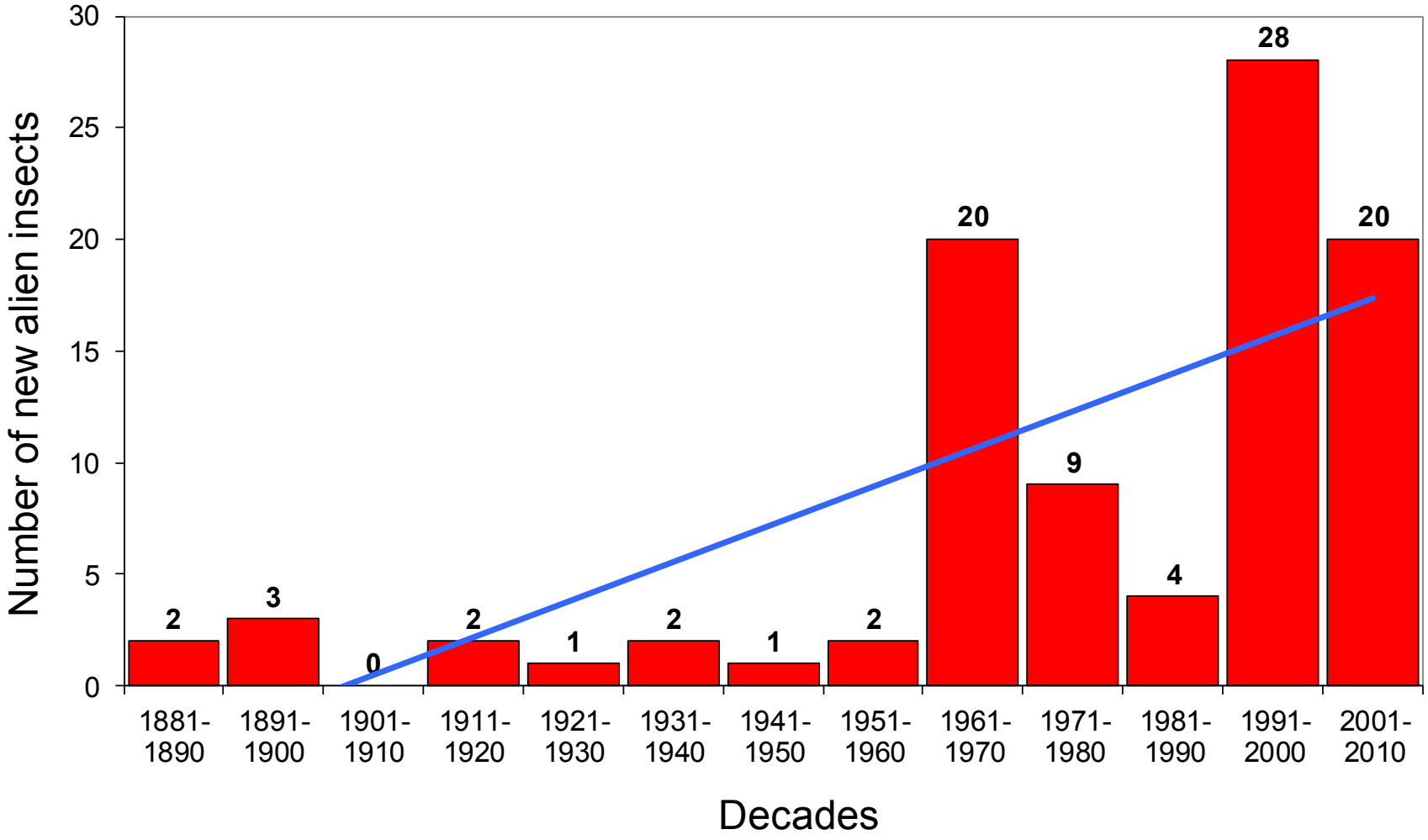


Yearly sanitary fellings in spruce stands and the yearly PDI values

Chrysomela cuprea

Pheosia tremula (Clerck, 1759)

Number of new alien insects on woody plants in Hungary by decades between 1881 and 2010



Zig-Zagging elm sawfly (*Aproceros leucopoda*)

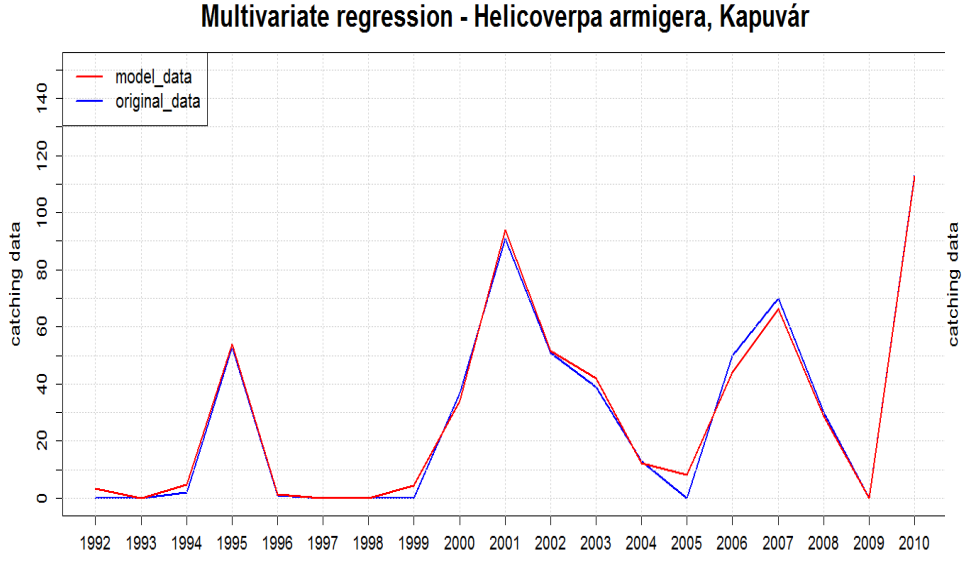
Bugac, June 2011

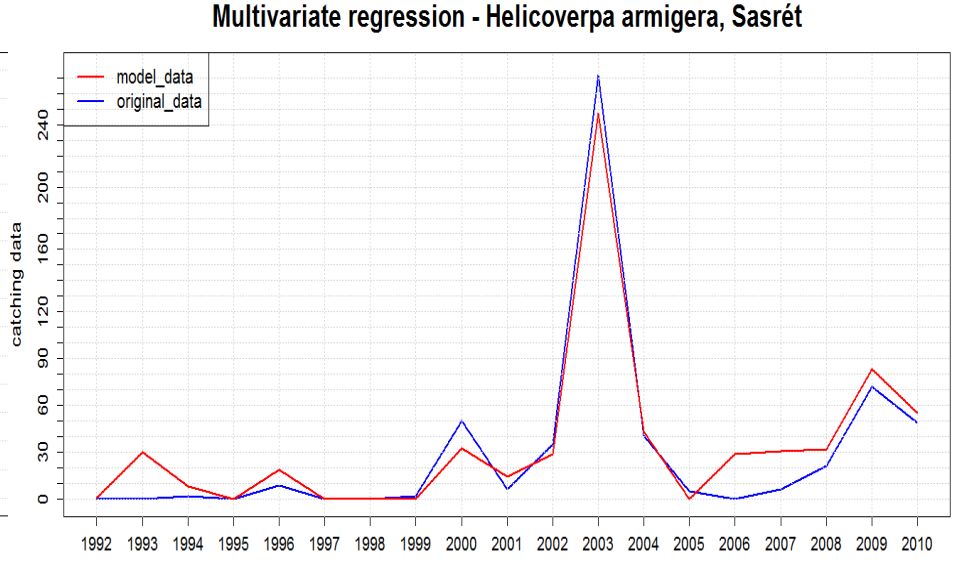
Cotton boll worm (*Helicoverpa armigera*)

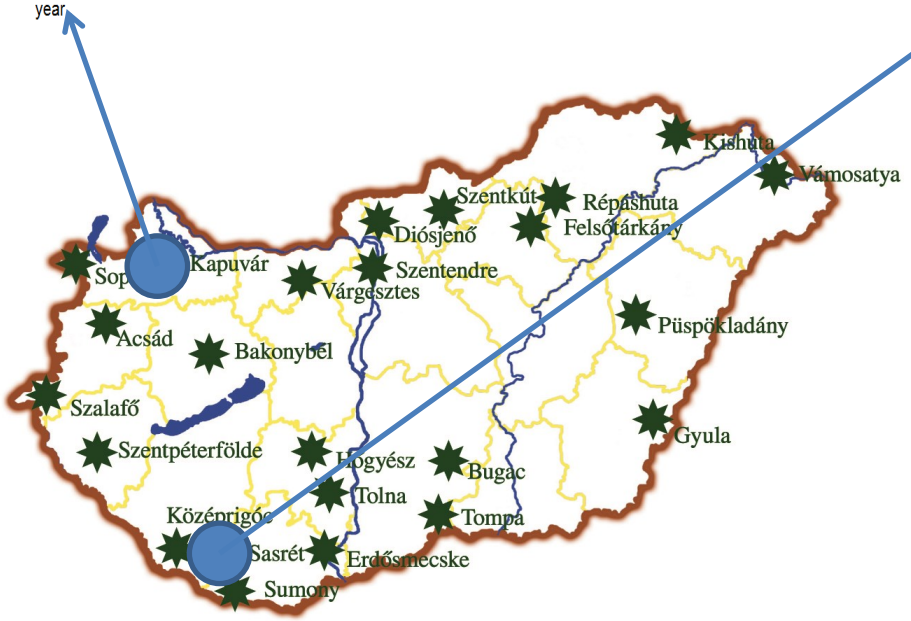
(Lepidoptera, Noctuidae)

North-African, South-European migratory species spreading to North without human assistance.

2015.09.02

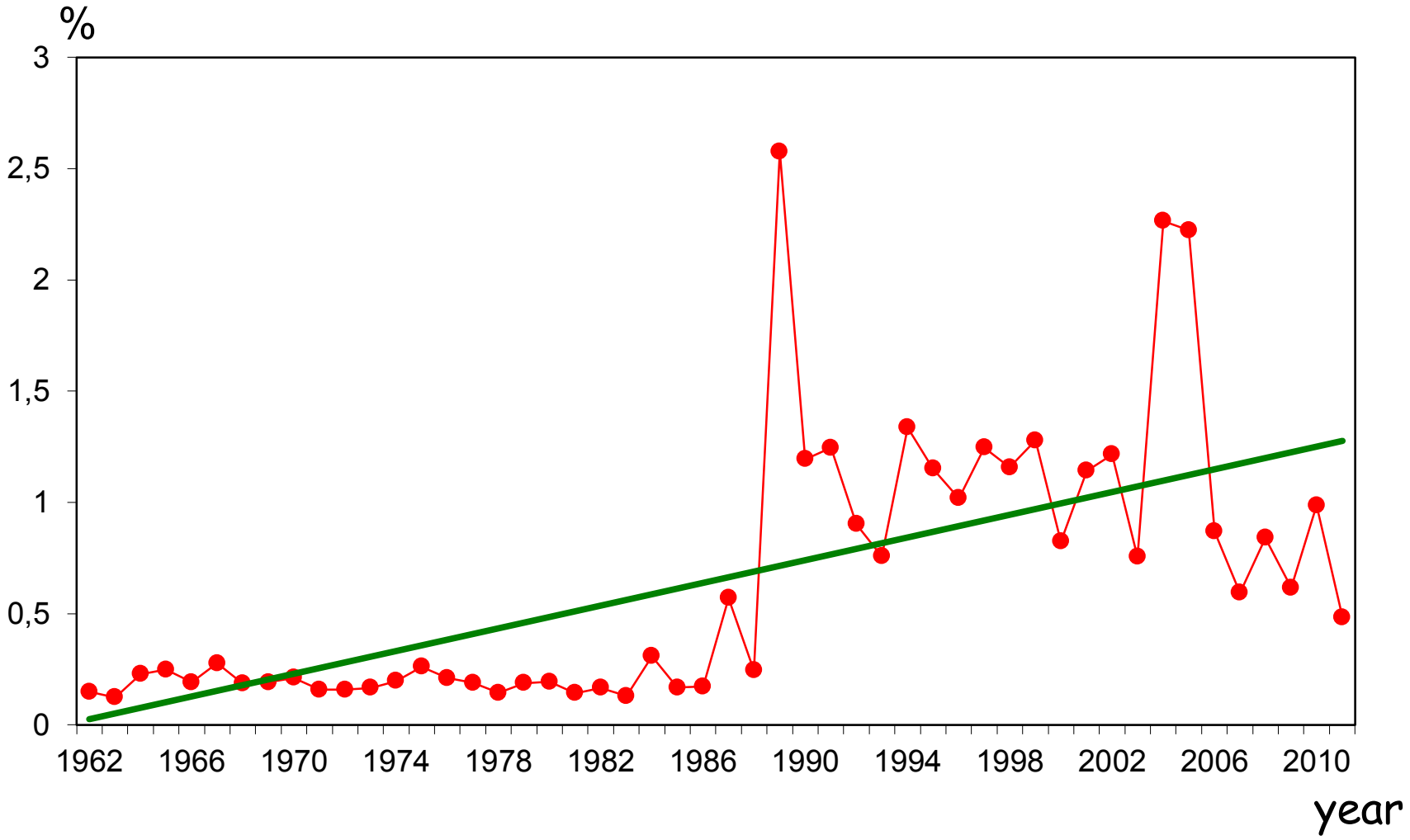




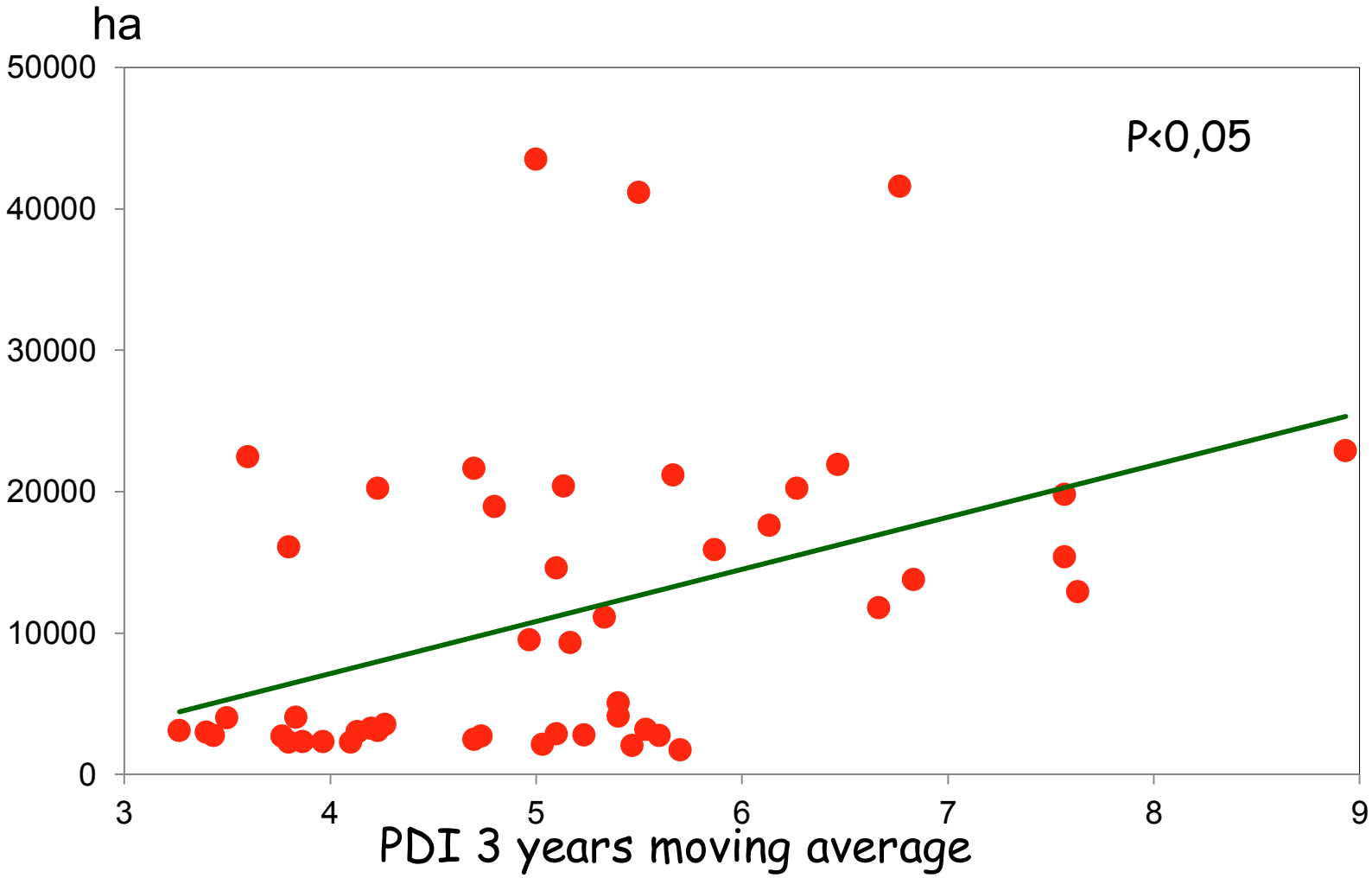


Weather-dependent fluctuation of *Helicoverpa armigera* population at 2 light trap locations

Yearly values of fungal diseases in forests in proportion of the forested land



Yearly damage caused by forest fungal pathogens and 3 years moving averages of PDI



Pine decline in the Mátra mountains caused by the endophytic fungus *Cenangium ferruginosum*

© Koltay András

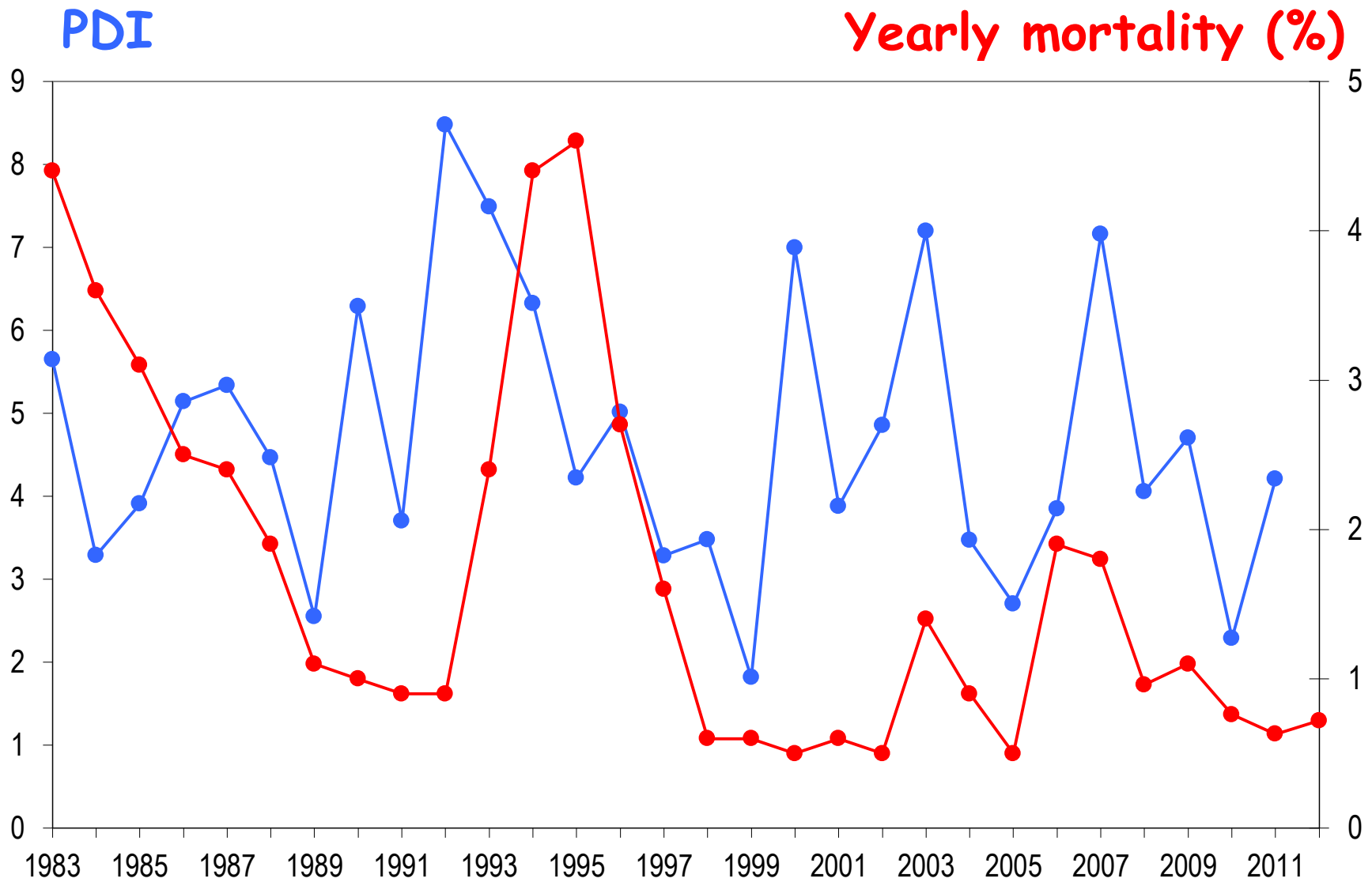
Decline of maples following severe drought

Acute decline, particularly on sycamore (*Acer pseudoplatanus*). Probably *Armillaria* and *Nectria* species play a major role in the process. Similar declines following droughts have already been reported from Slovenia and Slovakia.

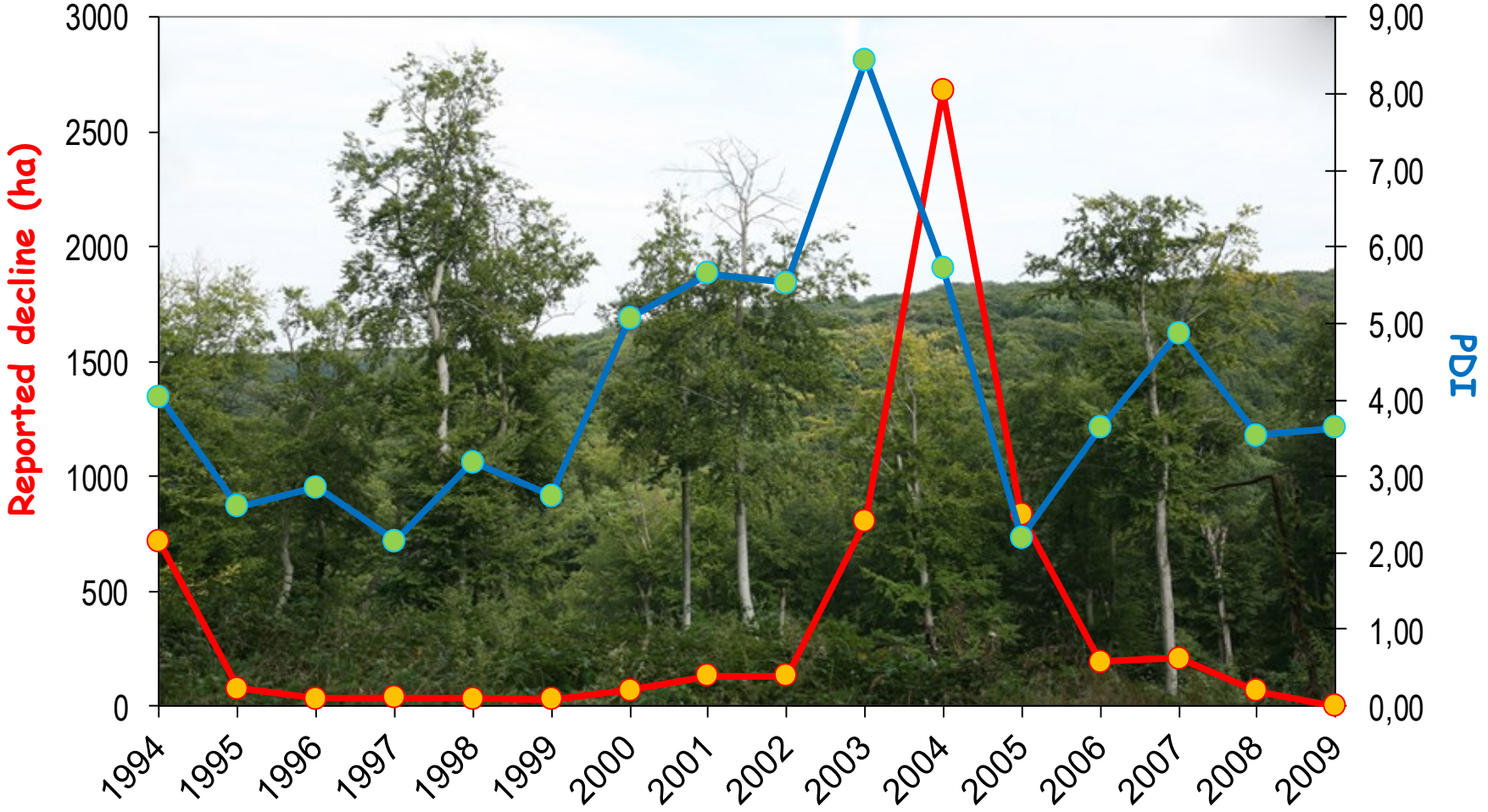
Mass decline of Turkey oak

Typical symptoms of *Biscogniauxia mediterranea* on Turkey oak stem

Ash dieback
(*Chalara fraxinea*)



Yearly mortality (%) and the PDI values in the Hungarian sessile oak (*Q. petraea*) stands between 1983 and 2012



Yearly area of reported beech decline and the yearly values of **PDI**

Early leaf abscission of beech in July due to severe drought
(at ca. 650 meters above sea level)

The health status of the Hungarian forests strongly depends on the weather conditions. The climate change scenarios therefore predict worsening situations.

The „story" is not resctricted to Hungary. Similar problems and trends are present in many European countries.

Speaking of Devil...

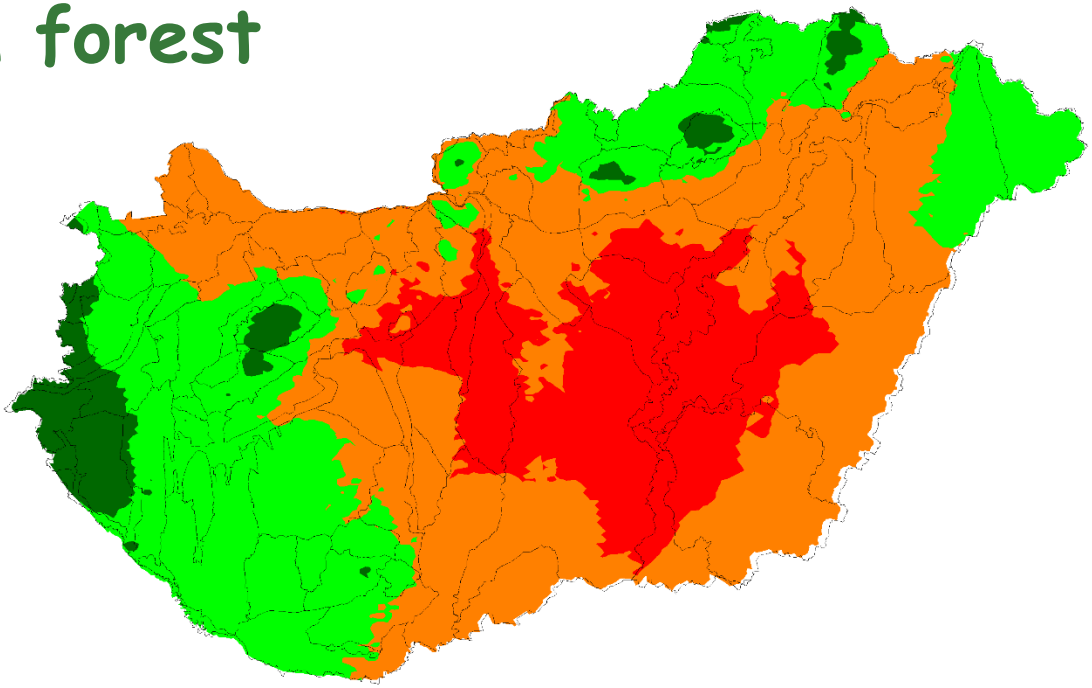
Future predictions for Hungary

- More frequent, more severe and longer lasting drought events

- More frequent and more severe extreme weather events (storms, late frost, icy rain, etc.)

Predicted changes in forest climate zones

1961–1990



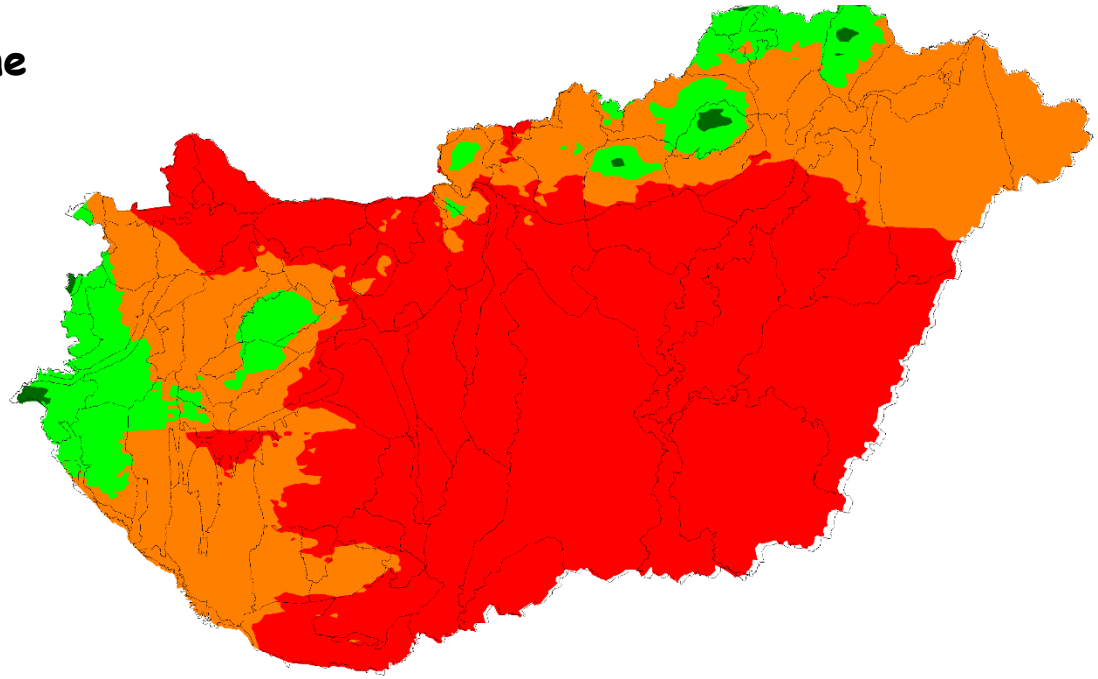
Beech zone

Hornbeam-sessile oak zone

Sessile oak-Turkey oak zone

Forest steppe zone

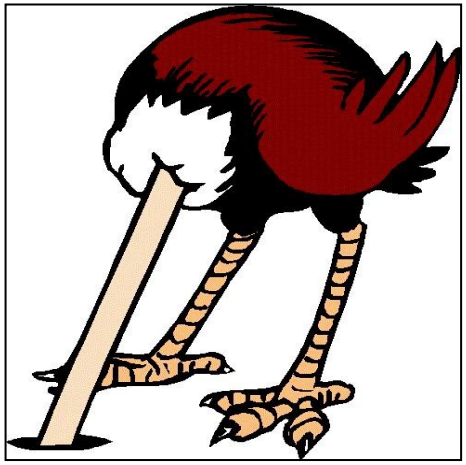
2036–2065



©E. Führer

„Cascade" effects…

© Tamás Frank



Ostriching?

Drinking more beer?

Better sunglasses?

Praying?

What can we do?

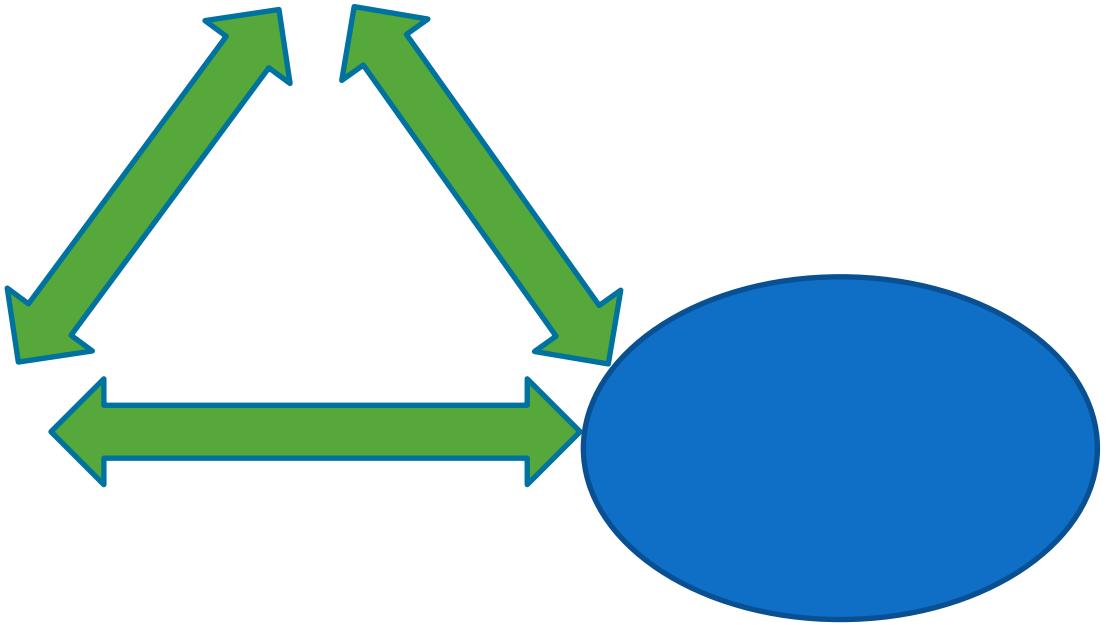
None of them will solve the problem!

Trees can't run away!

So they need help!

Unfavorable
environmental changes

Alien pests and
pathogens



Interacting factors influencing forest health

Managing the forests for resilience

Do not put all the eggs in the same basket!

(old Hungarian rural wisdom)

In more details:

More careful and higher resolution soil site/tree species choice

- The „old traditional knowledge" must often be reconsidered.

Increasing intraspecific diversity

-Natural regeneration is better than artificial.

-„Climate matching/assisted migrations": Introducing propagation material from more southern populations of beech, sessile oak, etc .

Increasing interspecific diversity

-Mixed stands instead of monocultures.

-Supporting earlier neglected native tree and shrub species, even „weed trees".

Increasing the structural diversity

-Small scale cutting areas.

-Increasing size and age diversity.

Alternative forest management systems

-Continous cover forestry instead of clearcut systems should be considered where possible.

Proactive consideration of potential future health risks

-Arising native and alien pests and pathogens.

-Extreme weather events.

-Forest fires.

Basic priorities should be reconsidered

Forest planning and legislation should be tuned accordingly

Faster if possible!

Unbeatable proof of climate change

If you are not yet convinced about climate change…

Have a good run!
It will not be too cold…

Thanks for your kind attention!