

# Expertise on Drought and Heat effects on Forests

## Summarizing conclusions

*Guy Landmann, ECOFOR*

# Expertise: **terms of reference**

- F-D joined initiative & organisation (core group)
- Chairpersons: F-D-CH
- Expert groups: international
- Further enlargement (Freiburg + review process)
- Scientific and technical
- User oriented but no strong commitment: review of knowledge and research proposals
- state of knowledge and 2003 drought/heat

*“Correct approach?” Realistic? Successful?*

# Some highlights: **climate**

*Intensity/extension of drought/heat? Exceptional in recent history? More frequent with Global Change?*

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Exceptional heat: length + spatial extension. June, August. LT increase of hot days.

Unusual long-term drought

Link with Global Change: drying trend (?) + increased frequency of Heat Waves (Meehl and Tabaldi, 2004, Science)

? *Integrated P+T+radiation Indices*

? *Link between research and meteo. Offices  
(via GMES? EU projets)*

# Some highlights: **monitoring**

*Ground-based monitoring system: efficient / drought & heat?  
Any new site-matching problems which should be taken over in the  
afforestation policy? Remote sensing approaches: new possibilities? ...*

*\* \* (data, not pub.)*

*Field surveys: plots-based: much available info. Off-  
plots: abundant but heterogeneous*

*Early drought detection... (or predisposing factors)?*

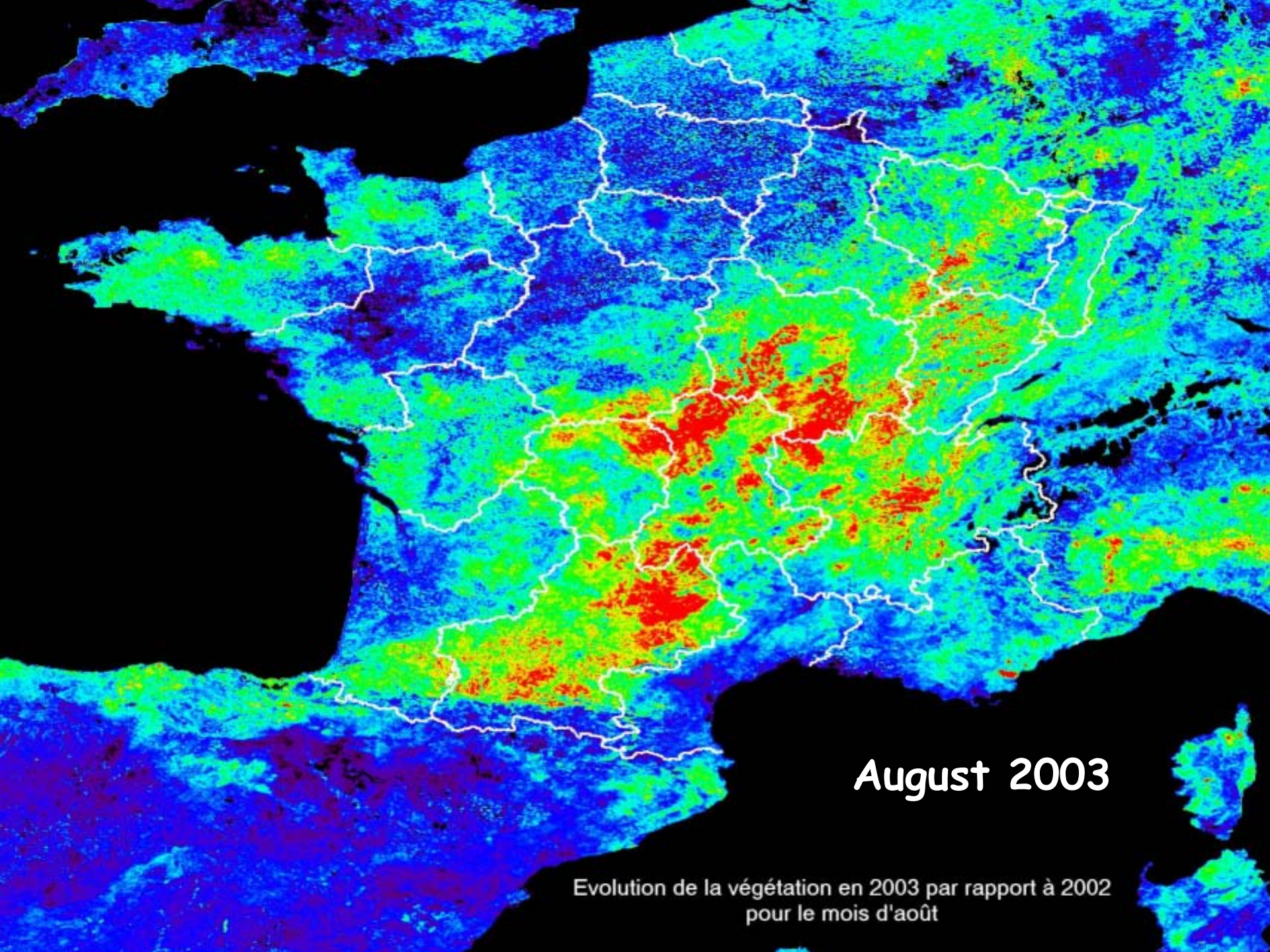
*Remote sensing : new sensors ( limitations), function.  
(pheno., surface T), detection dieback by satel.?*

*? Ground: reactivity & concertation / 2003 event, intern.  
coordination?*

*? Link: remote sensing & ground-based measurements*

*? Availability of satellites in 2010*





August 2003

Evolution de la végétation en 2003 par rapport à 2002  
pour le mois d'août

# Some highlights: **pests and diseases**

*What are the most harmful pests and diseases? When and how should control measures be implemented*

*\*(\*)*

Pests (bark beetle, defoliators, Buprestids) (BP)

Diseases: can be very harmful

Mechanisms: known in some cases (predisposition & multiple stress)

Research: Heat effects. Plant populations and communities

Management: avoid spreading infected seeds/plants

Field data difficult to gather & synthesise : system. networks not very efficient, field surveys heterog..

*? priority in the field of monitoring*

# Some highlights: **water balance** **and physiology**

*How severe was the drought stress? Available tools for evaluating chances of weakened trees to recover? Interactions with air pollution? Any objective tools / criteria to predict the vulnerability of forest stands to drought and heat?*

\* \* \* \*

Extensive theoretical background, knowledge of mechanisms and expertise (field measurements)

Heat 2003: 40-45°C Drought 2003: *much more avail.*

? *Link to foliar loss and growth*

? *Spatio-temporal changes in water supply*

? *Water stress x (O<sub>3</sub>, soil acidification, eutrophication)*



# Some highlights: **growth**

*Cf. "monitoring": site and stand effects, short and medium effects, etc.*

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Low growth in 2003 (spruce > beech)

Role of elevation on growth, length of growing yr

Role of aspect, stand density, crown class

? *Case studies or network of plots*

? *Link to economic evaluation*

? *Short term information (NFI): useful*

? *Long Term growth decline preceding dieback*

? *Historical comparison with 1980s*



# Some highlights: **soils**

*Any serious interaction with mineral nutrition?  
Interaction with soil acidification / remediation?*

**\*\***

Leaching NO<sub>3</sub>: weak, in 2004

Tree nutrition: K / drought

Dynamics of soil water storage: link to physiol.

Regionalization water budget (inc. site mapping info) / forest planning

*? K deficiency (LT trend) Mg deficiency (symptoms)*

*? regionalisation water budget: validation*

# Some highlights: **biodiversity**

*Impact on biodiversity? Relatively to other major factors?*

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Little known - was not an issue until now!

Species level

Immigration + emigration + extinction

Hypotheses for species loss:

Certain stages (seedlings) and species (mechanisms unclear) are more sensitive

Strong response expected for forests (?)

*? How diversity affects the resistance of forests*

*? Use of existing monitoring tools & designing new ones*

# Some highlights: **socio-economics**

*What are the local and regional effects on markets, wood quality, (landscape quality, biodiversity, fire, tourism, carbon)?*

★

No specific « drought/heat » economics (hazards)

General frame: need to distinguish all aspects of impact on forests & on social functions/activities: growth deficit / harvesting costs /.../.../ wood processing/...../ non wood activities

Important: ↻ growth and ↻ sensitivity to future hazards

Mitigation (tech. & econ. measures, subsidies) versus prevention (planning, crisis plans, insurance)

*? Few studies because too « little » damage until now*

*? Subsidising prevention*

*? Lack of reliable field data > field....remote sensing*

# Some highlights: **forest management**

*What can we learn from the past drought events with regard to the influence of silviculture: stand density, structure, stand composition? Any serious basis for local advice: stop cuttings, revise management plans?*

\* \*

need for local assessment! Expert = forest manager

short term measures (harvesting/restocking) : limited

long term actions: more effective, more difficult to implement (but ↻ drought/heat frequency!)

site matching (old, long-lasting issue) and the importance of prevention (cf. 1980s, 1990s) : maps of drought risks

*R: various contexts: extensive / intensive management (ex. emphasis on plantations or introduced species, genetics)*

# Some highlights: **forest management** (cont.)

*? Increasing knowledge of species sensitivity*

*? Role of remote sensing*

*? Can we spatialise soil water capacity at stand level*

*? How to make a brake through on the "vulnerability issue"*



*Thank you for your attention*

*your input is most  
welcome!*

