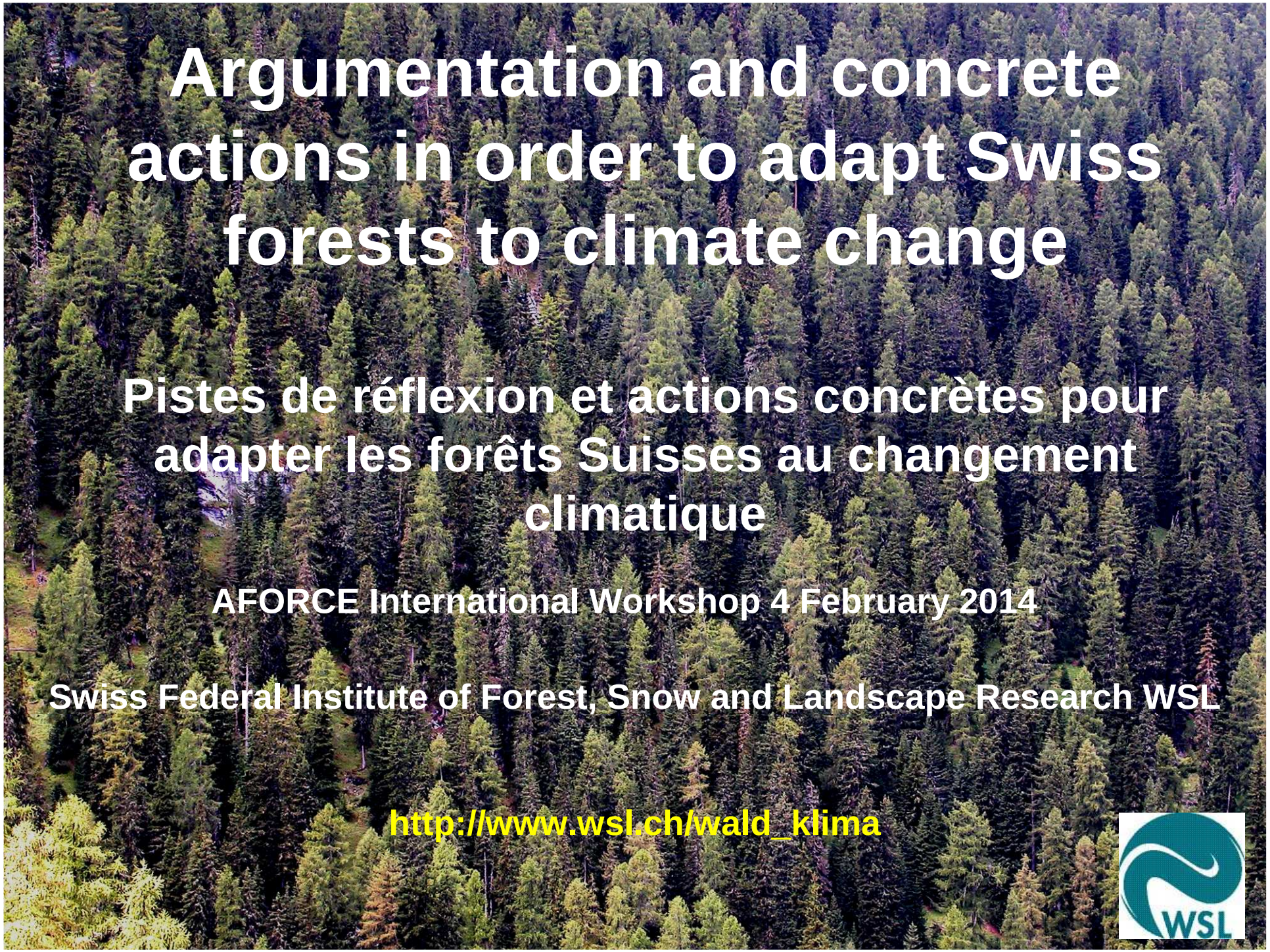


Argumentation and concrete actions in order to adapt Swiss forests to climate change

Pistes de réflexion et actions concrètes pour adapter les forêts Suisses au changement climatique

AFORCE International Workshop 4 February 2014

Swiss Federal Institute of Forest, Snow and Landscape Research WSL

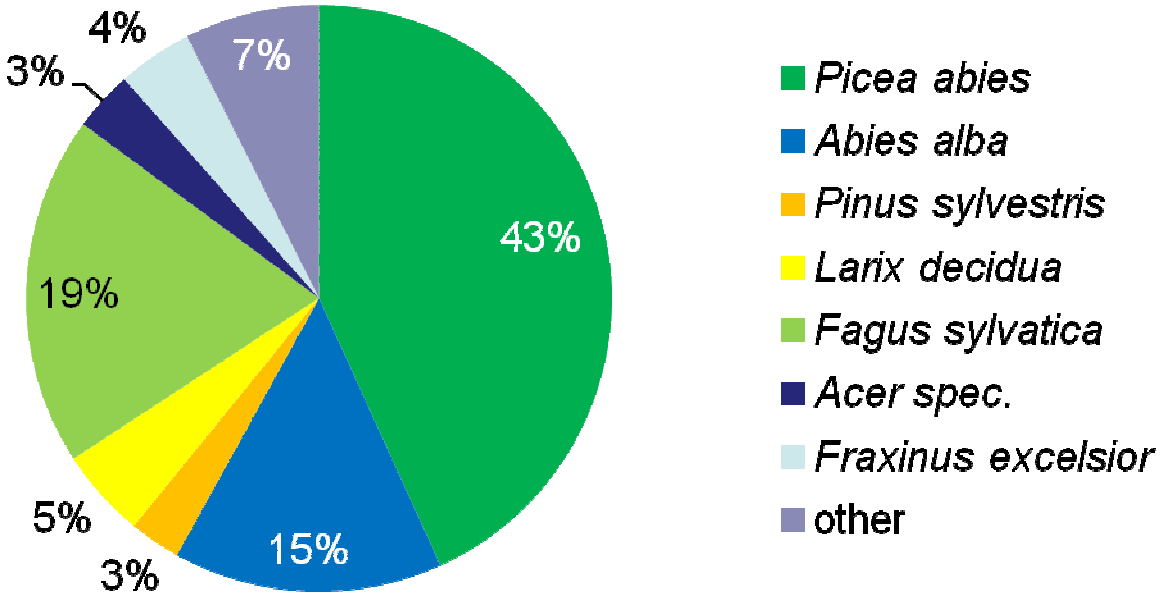
http://www.wsl.ch/wald_klima

Contents

- Background: Swiss forests & players
- CC impacts
- Adaptation strategies at national and cantonal levels
- Research on cc & forests
- Concrete actions in cc adaptation
- Conclusions

Background information on Swiss forests

- 13110 km^2 forest area
- Colline to subalpine forests, broad-leaved, mixed and coniferous
- Average growing stock 376 m^3/ha, species proportions



- 71% public, 29% private ownership; only small forest holdings
- 26 cantons with different legislation and forest organisation
- Subsidies in particular in steep-slope protection forests

Players (selected …)

Swiss government, Federal Office of the Environment
→ funds research & implementation projects, provides subsidies

Cantons → advise foresters & forest owners, provide subsidies & establish cantonal management guidelines

Swiss Federal Institute of Forest, Snow and Landscape Research WSL → does research & is active in extension

Other research and education institutions
→ do research, are partly active in extension & education

Forest owners → take management decisions

Expert groups & units (Swiss Mountain Forest Tending Group, Silvicultural Extension Unit) → organise training courses

Professional journals
→ publish research findings & practical experiences

La Forêt, Schweizerische Zeitschrift für Forstwesen, …

Impacts of climate change on Swiss forests

- Observed:
  - Drought effects: Tree mortality on driest sites (pine forests) and of *Picea abies* in relation to bark beetle attacks
  - Upward shift of tree species

Summer drought 2003

Impacts of climate change on Swiss forests

- Observed:
  - Drought effects: Tree mortality on driest sites (pine forests) and of *Picea abies* in relation to bark beetle attacks
  - Upward shift of tree species
- Anticipated:
  - Increasing drought effects on tree growth & mortality
  - Increased disturbance (drought, forest fires, insects) → gaps in protection forests, fires at urban/wildland interface
  - Increased tree growth on sites with no water limitation (many mountain forests)
  - Tree species change
  - Large uncertainty about diseases and pathogens

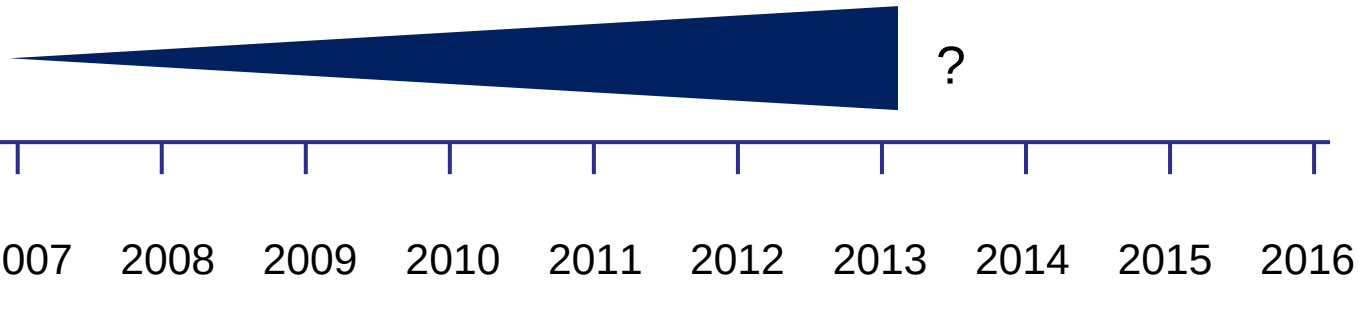
Interface policy & administration ↔ research

Research outside the program

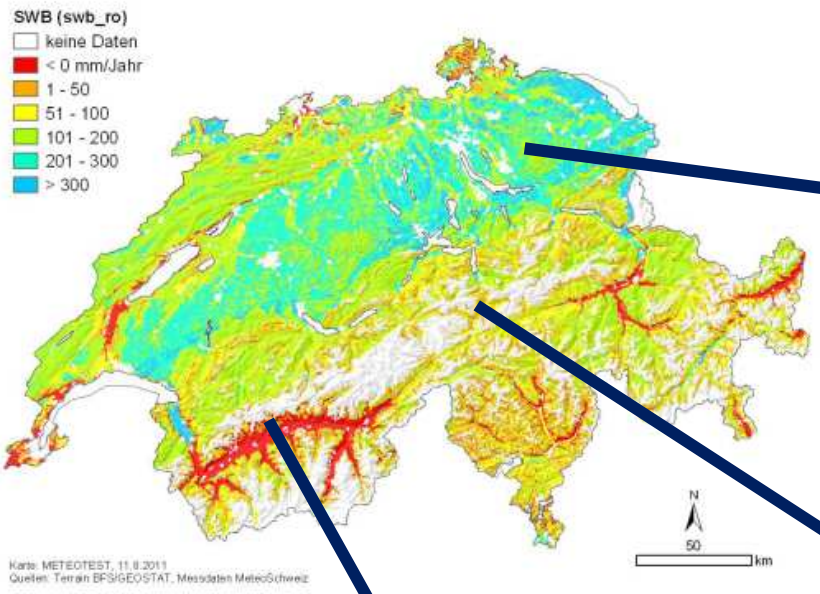
Research program ‘Forests and Climate Change’

National adaptation strategy

Cantonal forest management guidelines



Focus of the Swiss forest adaptation strategy



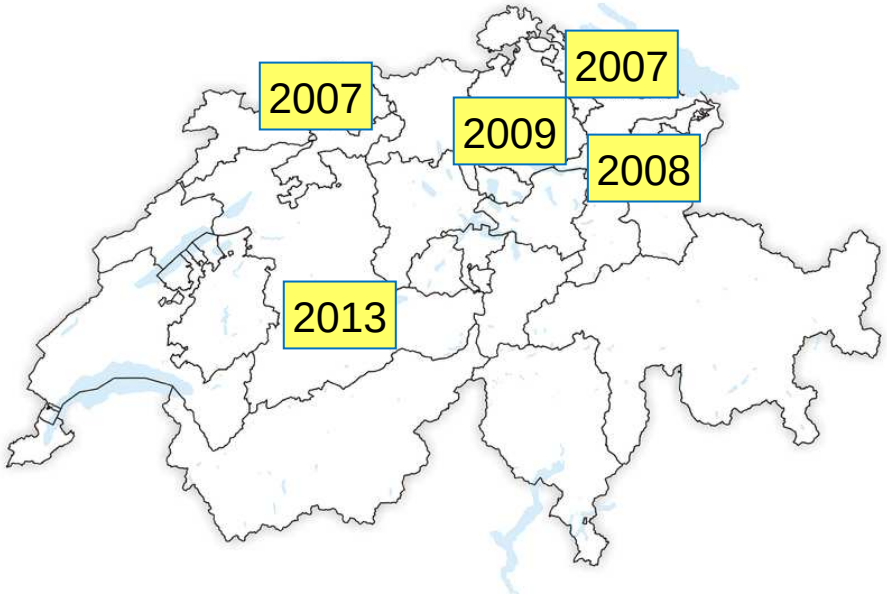
3 Coniferous lowland forests

2 Climate-sensitive sites

1 Critical protection forests

Cantonal forest management guidelines

- Have been developed in 6 out of 26 cantons
- Focus on
  - impacts: chances & risks
  - risk management (→ diversification by mixtures)
  - tree species selection (→ site-adapted species, species becoming more/less suitable)
  - silvicultural treatments (→ promotion of tree vitality by thinning)
- Based more on general forester's wisdom than on recent research



Publication year of cantonal forest management guidelines

Research program ‘Forests & Climate Change’

Research questions

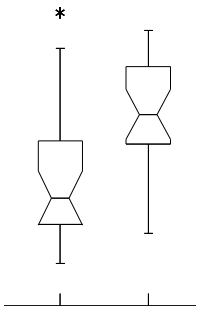
- Climate change (cc) development (down-scaled climate scenarios)
- Cc impacts on tree growth & mortaliy, forest pathogens, forest fires, genetic adaptation; identification of sensitive stands and sites
- Cc impacts on forest products and ecosystem services
- Adaptation strategies to reduce cc-induced risks

Implementation questions

- How should stakeholders adapt their decisions in the face of climate change?
- Which risks and opportunities arise?

Scientific synthesis: consolidating scientific evidence

- Review process ensures scientific rigor, but tends to neglect scope of application
- Scientists offer precise statements about little pieces, practitioners need ‘robust’ statements about everything
- Questions regarding the synthesis of scientific evidence:
  - Generalizability: In which cases is the result valid?
  - Effect size: Is a difference relevant for decision-making?



  - Certainty: How sure are we about a result?
  - Knowledge gaps: For which questions do we lack scientific evidence?

Product development & testing: implementing new findings

- Understandable, selected information, simplified
- Existing guidelines as a starting point → 'cc enrichment'
- Create acceptance by participation

Sustainability and success monitoring in protection forests

Guidelines for silvicultural interventions in forests with protective functions

Authors

Monika Frehner, consulting firm, Sargans

Brächt Wasser, consulting firm IMPULS, Thun

Raphael Schwitter, Centre for Mountain Forest Management, Maienfeld

Planned products of the research program

Science focus

- Scientific synthesis
- Papers

Outreach focus

- **Sensitivity maps**: actual/potential evapotranspiration, site water balance
- Maps of **potential tree species distribution**
- Revised **tree species portfolios** for different sites
- Revised **seed zones** for *Picea abies*, *Abies alba* and *Fagus sylvatica*
- Early warning system for **bark beetles**

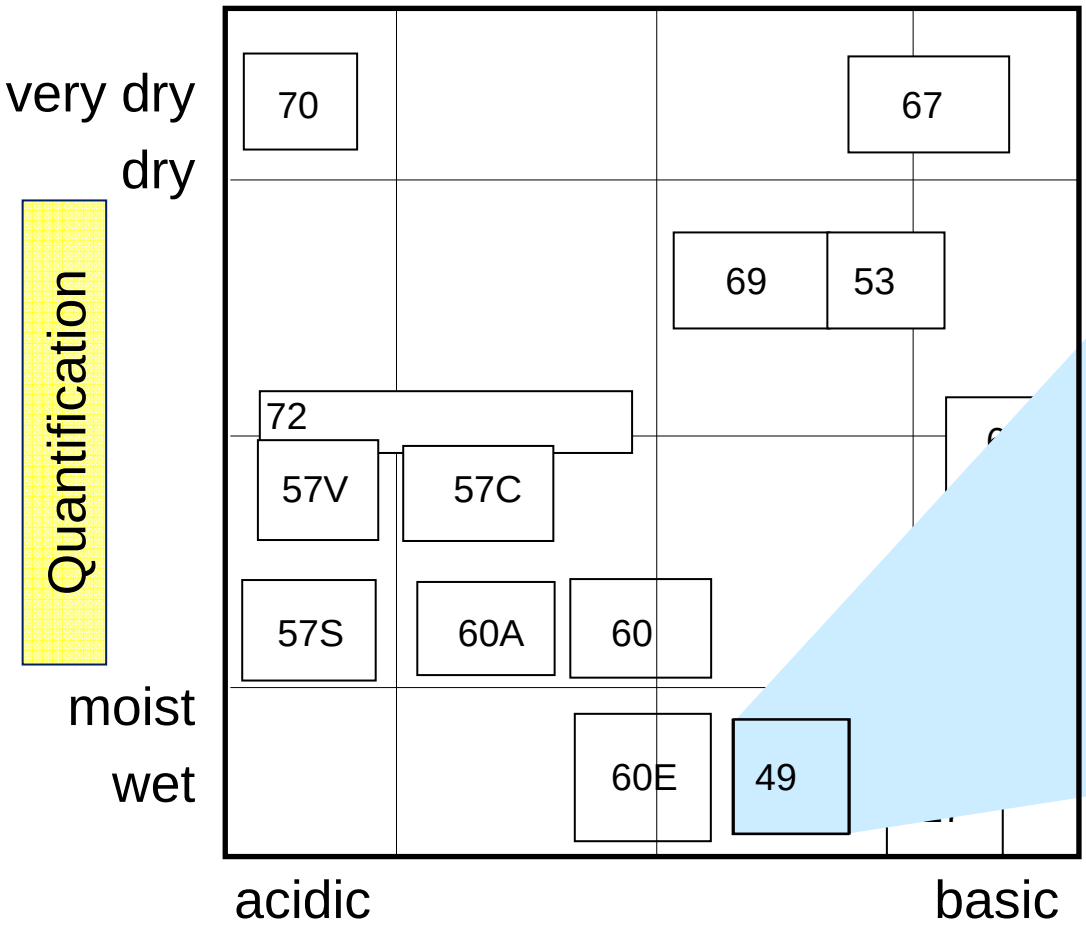
Means of communication

- Information leaflets ‘Forest & Climate Change’
- Papers in professional journals
- Training courses, possibly with a set of fix demonstration sites

Product example

1) Adapted ecograms & species recommendations

Example: subalpine forests, northern intermediate Alps



Example unit 49
Horsetail-fir-spruce-forest

Requirements for canopy tree composition

Abies alba 30 - 90 %
Picea abies 10 - 70 %
Sorbus aucuparia
seed trees present

Revision

Frehner et al. 2005


Product example 2):
Training courses

Concrete actions

- Practices are unconsolidated, uptake varies
- In the Plateau region, planting of *Picea abies* has largely been abandoned
- Recommendations

keep/promote species mixtures

promote drought-adapted species (*Quercus spec., Pseudotsuga, Tilia, Prunus avium, Castanea sativa,* …)

reduce growing stocks (in particular in stands with high risks)

Conclusions

- Much research going on
- Start of implementation phase with many players
- Focus on tree species selection
- Concrete actions: variable, unconsolidated, focus on mixed forests