



**University of Natural Resources
and Life Sciences - Vienna**
Department of Forest and Soil
Sciences

Adapting forest management to climate change in Austria

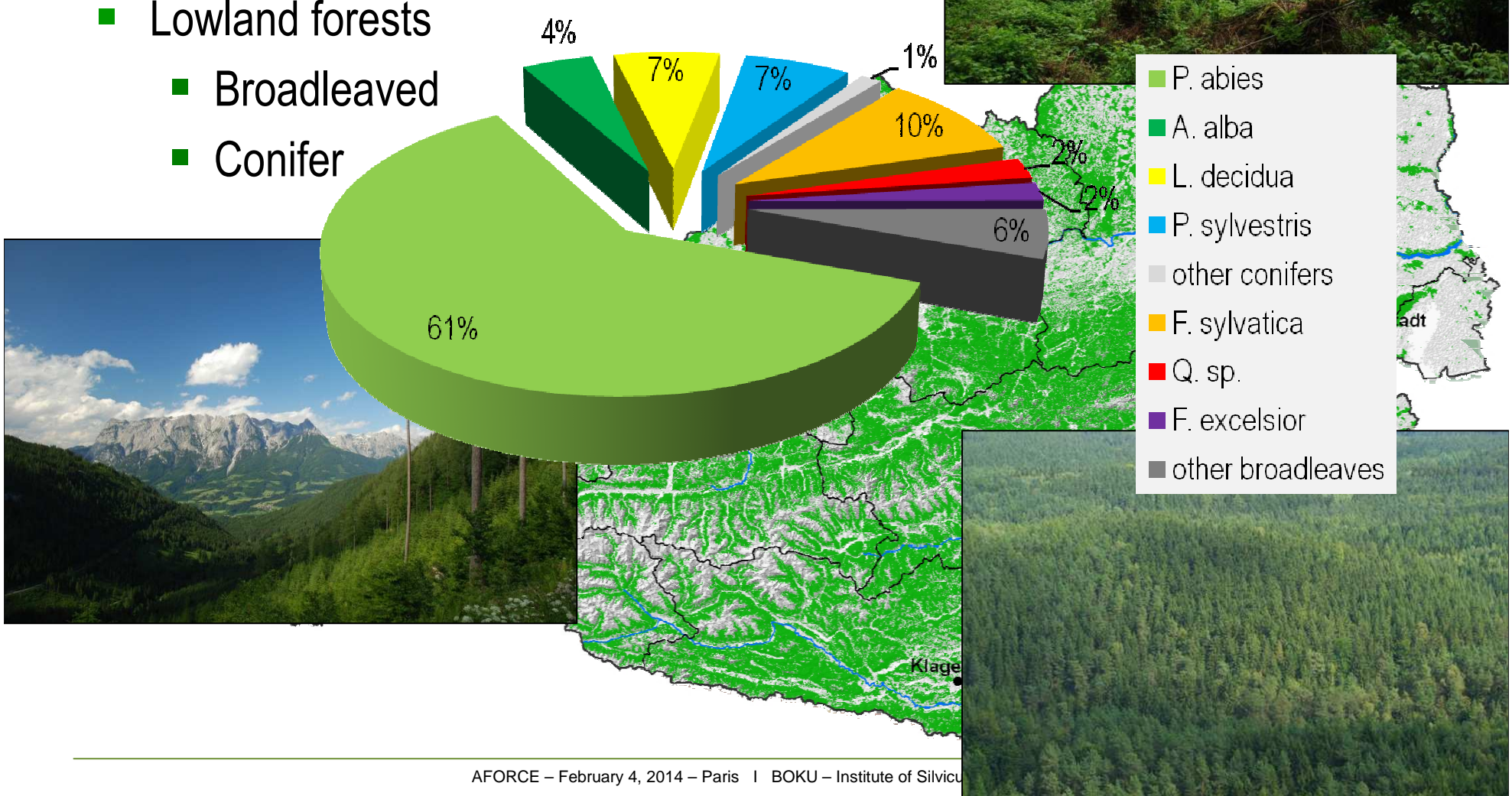
Michael Maroschek & Manfred J. Lexer
Institute of Silviculture
University of Natural Resources and Life Sciences, Vienna

Paris, 4 February 2014



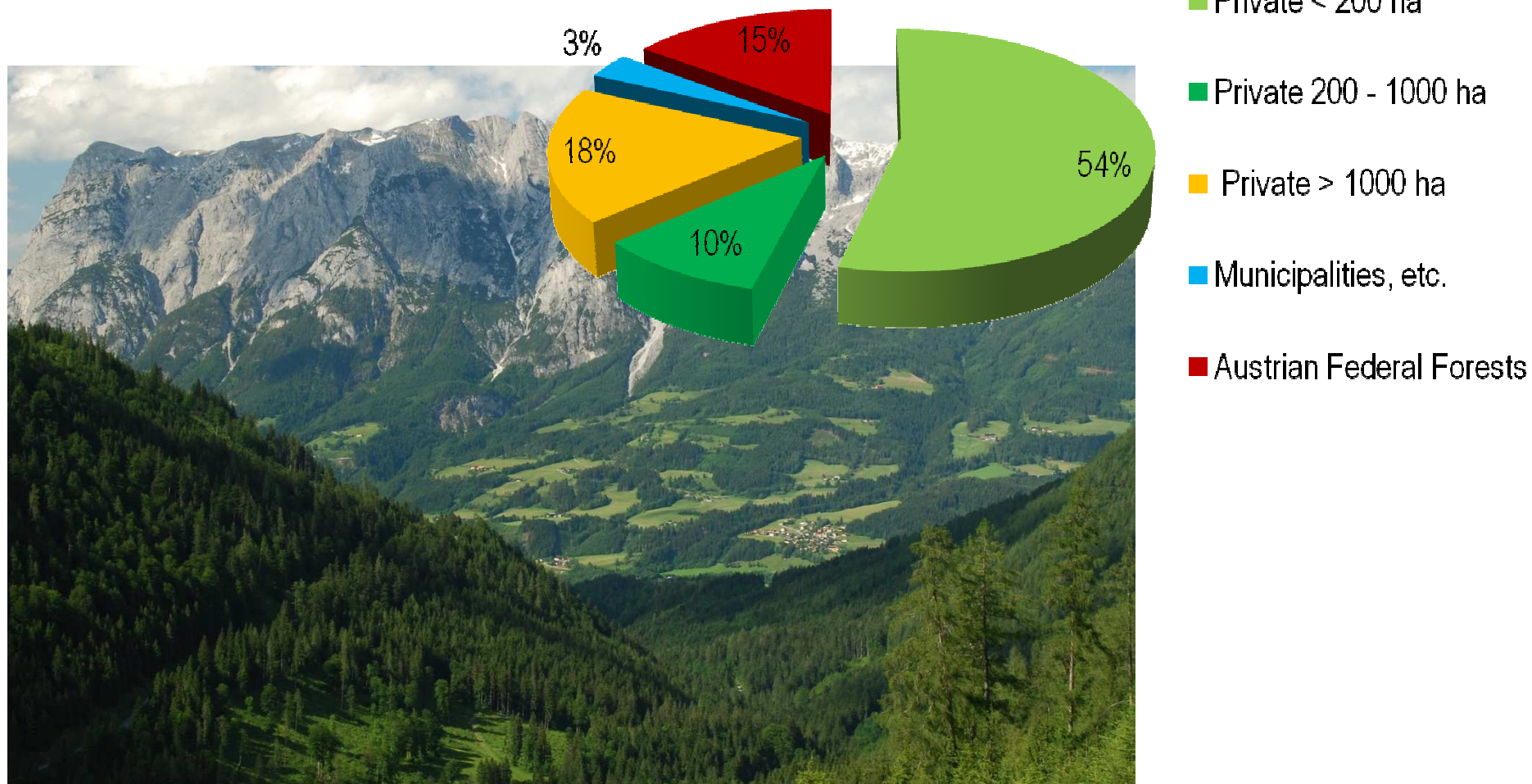
Austrian forests

- 47.6% of Austria is covered by forests
- Mountain forests
- Lowland forests
 - Broadleaved
 - Conifer



Forest ownership

- Dominated by small scale forest owners (<200 ha)
- Dominated by private forest owners



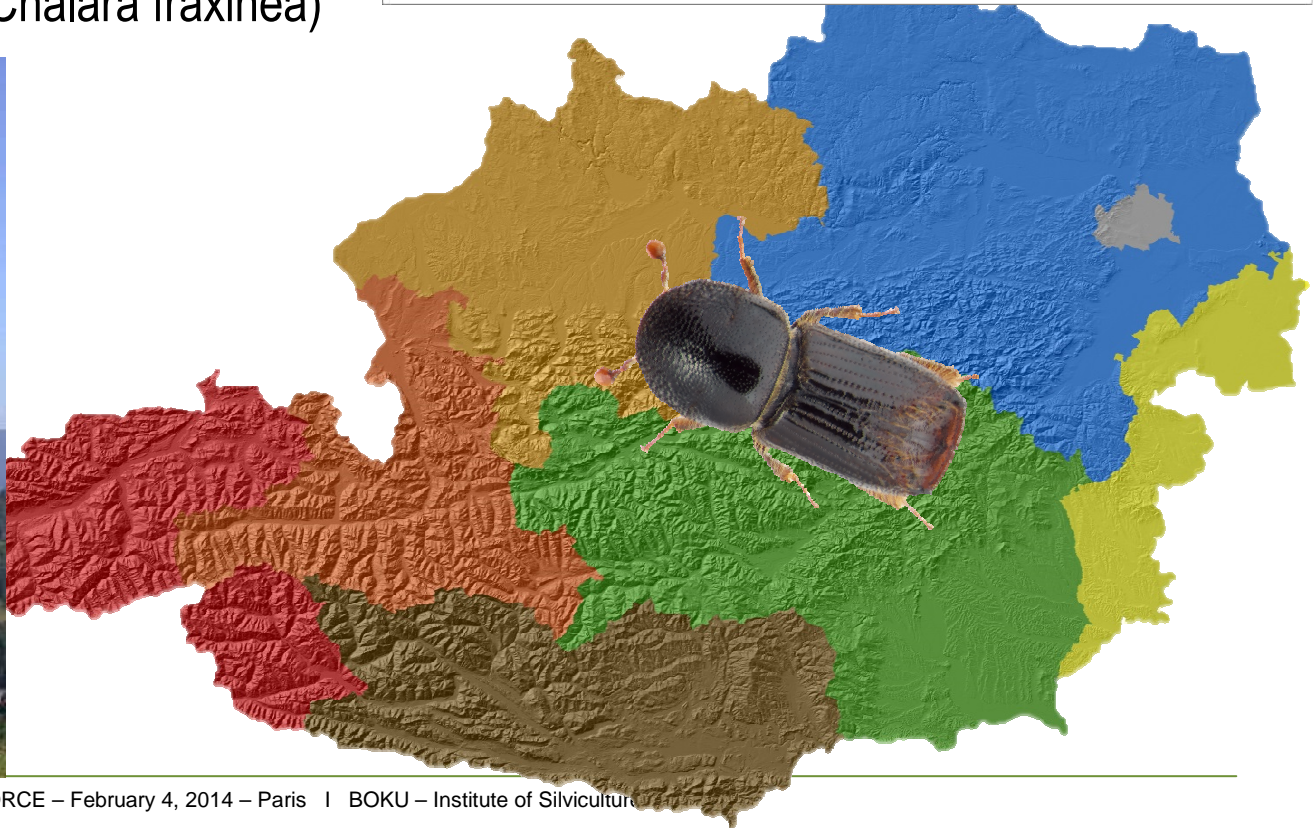
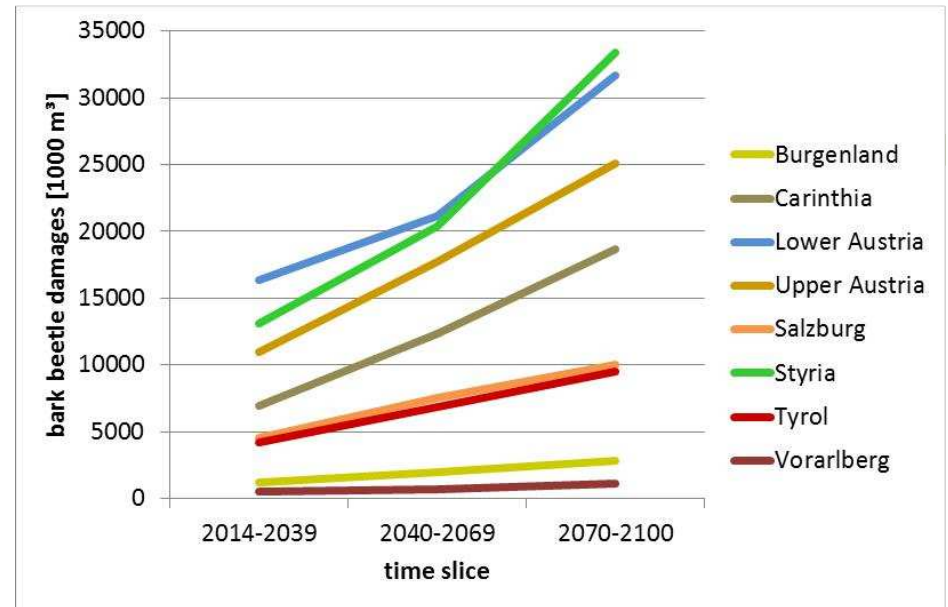
Stakeholders

- Legal enforcement (forest administration)
- Extension and advisory services
- Biomass consumers
 - Sawmills
 - Pulp & paper
 - Panels
 - Energy
- Research
 - BOKU
 - BFW
- Owner associations



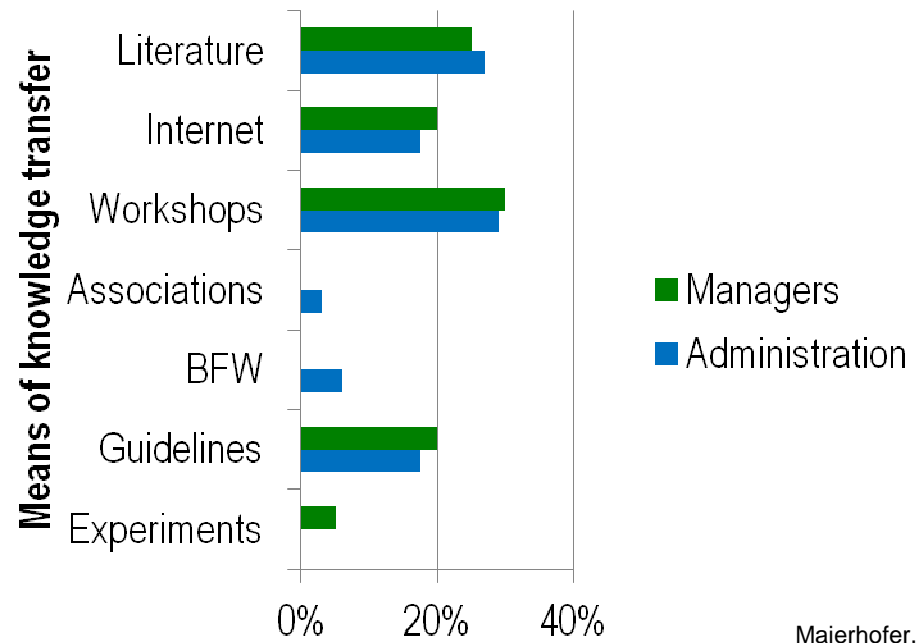
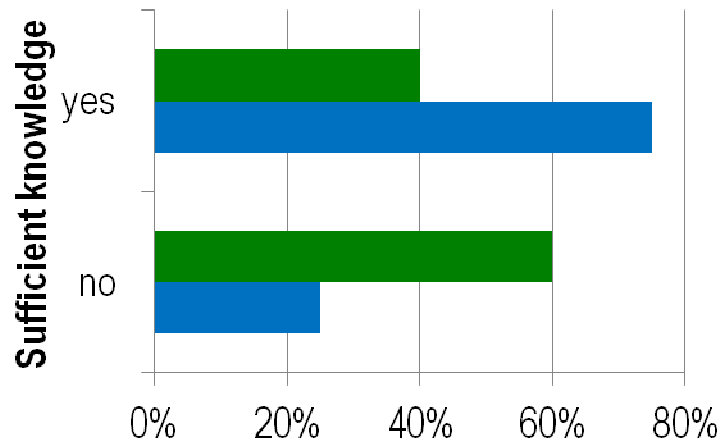
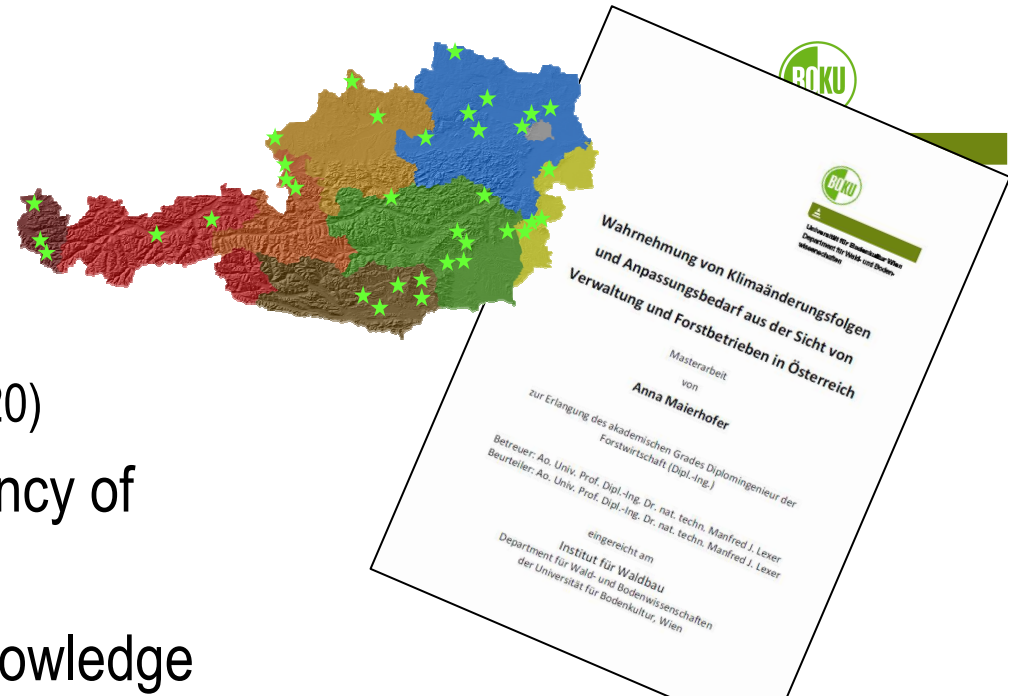
Climate change impacts

- Projected based on model runs under CC scenario A1B (+4°C, -10% precipitation)
- Growth
- Disturbances
 - Well known pests
 - New diseases (e.g. *Chalara fraxinea*)



Climate change perception

- Interviews
 - forest managers (n=20)
 - administrative forest personnel (n=20)
- contrasting perception on sufficiency of available knowledge
- similar preferences in terms of knowledge transfer (+/-)



Maierhofer, 2009

National Adaptation Strategy

- Overview
- General approach
 - Agriculture
 - Forestry
 - Water management
 - Etc...

■ Recommendations

- Species choice
- Soil protection
- Game damage
- Advisory concept for foresters
- Crisis and calamity mgmt.
- Forest fires
- Pollution
- Wood processing



Forestry

Nr.	Title	Objective	Key Actors
3.2.4.1	Modification in the selection of tree species and provenance, including targeted promotion of diversity through appropriate silvicultural management and rejuvenation of over aged stock	Increase of stability and reduction of vulnerability of forest ecosystems to pests and diseases; Increase in diversity at all levels (genetic, species-specific, structural, diversity of habitat, etc.) adapted to the respective site-specific conditions; Increase of stability and reduction of susceptibility to disturbances, e.g., through the timely introduction of rejuvenation measures.	Forest owners, interest groups, academic and non-academic research institutions, federal and state governments, EU (responsibility lies with all listed)
3.2.4.2	Soil-protective cultivation	Preservation of the physical functions of the soil, in particular in terms of water retention and nutrient supply.	Forest owners, felling companies, authorities, interest groups, research institutions, federal and state governments, EU, water management, foresters, municipalities, forest leaseholders
3.2.4.3	Reduction of damage caused by game animals	Reduced damages caused by game animals for safeguarding rejuvenation and stock stability.	Hunters, forest owners, state governments (hunting legislation), federal government, interest groups
3.2.4.4	Development of an advisory concept for foresters with regard to adaptation of forests to climate change	Improvements in consulting, training, and further education of forest owners taking into account latest research results.	Federal government, forest authorities, Chamber of Agriculture and other advisory institutions, academic and non-academic research institutions
3.2.4.5	Adjustment and improvement of crisis and calamity management	Mitigation of damage from harmful events such as windfalls or bark beetle calamities.	Federal and state governments, forest authorities, further authorities (e.g., water authorities), interest groups, forest owners, forestry unions (forest management collaborations (WWGs), forest associations), transport industry, wood and paper industries, EU
3.2.4.6	Establishment of preventative measures with regard to the potential increase in forest fires	Development of preventative measures and systems for forest-fire monitoring and early-warning in order to minimize the risk of forest fires; Elaboration or revision of emergency plans to combat forest fires.	Federal and state governments, municipalities, interest groups, forest owners, forest management collaborations (WWGs), forest associations, academic and non-academic research institutions, EU
3.2.4.7	Forest pollution control - Integrated forest inventory and pollutant monitoring	Nationwide inventory of Austrian forests through improving the forest inventory with remote sensing methods (laser scanning, multi-spectral satellite imagery) for enhanced system knowledge, and the establishment of a pollution monitoring system.	EU, federal and state governments, Federal Research and Training Centre for Forests, Natural Hazards, and Landscape (BFW), Environment Agency Austria
3.2.4.8	Development of modified and innovative techniques for wood processing taking into account potential changes in wood quality and tree species	Development of efficient, innovative techniques for wood processing in order to increase the value added in the wood use chain.	Researchers, wood-working and -processing industry, interest groups, Cooperation Platform Forestry-Wood-Paper (FHP), federal government, EU (Forest Technology Platform)

Tools to support adaptation

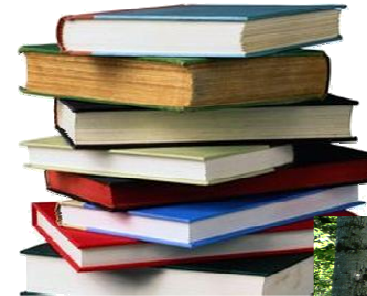
- **Bilateral advice by extension services**

- Specific to individual situation
- Requires well-trained staff



- **Guidelines**

- Generalized (one-fits-all solutions)
- Owner needs to translate to own situation



- **Workshops**

- Interactive group situation
- Mutual learning among participants



- **Decision support tools**

- Became technically feasible recently
- Difficult to handle complex problems
- Not much experience available



Guidelines

- Regional level (require identification of site types...)
- Species choice
- Management recommendations
- (small scale) forest owners and consultants
- implicit consideration of CC



Tiefanlagen

Seehöhe unter 600 m



seichtgründig

mittelgründig

tiefgründig

Baumart für diesen Standort
■ gut geeignet
■ bedingt geeignet

	Anmoor			Ebene			Unterhang			Mittelhang			Oberhang / Kuppe		
	nass/schwer	mäßig frisch	trocken	nass/schwer	mäßig frisch	trocken	nass/schwer	mäßig frisch	trocken	nass/schwer	mäßig frisch	trocken	nass/schwer	mäßig frisch	trocken
seichtgründig				Stieleiche Traubeneiche Lärche Douglasie Roteiche Kiefer Bergahorn Rotbuche			Fichte > 400 m/max. 20% Fichte < 400 m/max. 10% Tanne Stieleiche Traubeneiche Lärche Douglasie Kiefer Rotbuche Bergahorn Tanne			Fichte > 400 m/max. 10% Stieleiche Traubeneiche Lärche Roteiche Douglasie Kiefer Rotbuche Bergahorn Tanne			Rotbuche Traubeneiche Lärche Roteiche Douglasie Kiefer		
mittelgründig	Schwarzerle Fichte max. 70% Birke Stieleiche Kiefer	Schwarzerle Fichte > 400 m/max. 20% Fichte < 400 m/max. 10% Tanne Stieleiche Bergahorn Traubeneiche Rotbuche Lärche Roteiche Douglasie Esche	Schwarzerle Fichte > 400 m/max. 30% Fichte < 400 m/max. 10% Bergahorn Spitzahorn Tanne Stieleiche Rotbuche Kirsche Lärche Esche	Schwarzerle Fichte > 400 m/max. 20% Fichte < 400 m/max. 10% Bergahorn Spitzahorn Tanne Stieleiche Rotbuche Kirsche Lärche Walnuss Kirsche Douglasie Roteiche			Fichte > 400 m/max. 20% Fichte < 400 m/max. 10% Tanne Bergahorn Stieleiche Traubeneiche Lärche Rotbuche Walnuss Kirsche Douglasie Roteiche			Schwarzerle Fichte max. 70% Birke Stieleiche Kiefer	Schwarzerle Fichte > 400 m/max. 30% Fichte < 400 m/max. 20% Walnuss Schwarznuß Bergahorn Tanne Stieleiche Kirsche Lärche Rotbuche Douglasie Roteiche Esche	Schwarzerle Fichte > 400 m/max. 40% Fichte < 400 m/max. 20% Walnuss Schwarznuß Bergahorn Tanne Kirsche Stieleiche Lärche Rotbuche Douglasie Roteiche Esche			Traubeneiche Rotbuche Lärche Kirsche Roteiche Douglasie Kiefer Walnuss
tiefgründig	Schwarzerle Fichte max. 70% Birke Stieleiche Kiefer	Schwarzerle Fichte > 400 m/max. 20% Fichte < 400 m/max. 30% Schwarznuß Bergahorn Spitzahorn Tanne Stieleiche Kirsche Lärche Rotbuche Douglasie Roteiche	Schwarzerle Fichte > 400 m/max. 40% Fichte < 400 m/max. 20% Walnuss Schwarznuß Bergahorn Tanne Stieleiche Kirsche Lärche Rotbuche Douglasie Roteiche Esche	Fichte > 400 m/max. 30% Fichte < 400 m/max. 20% Walnuss Schwarznuß Bergahorn Tanne Kirsche Stieleiche Lärche Rotbuche Douglasie Roteiche Esche			Schwarzerle Fichte max. 70% Birke Stieleiche Kiefer	Schwarzerle Fichte > 400 m/max. 20% Fichte < 400 m/max. 30% Walnuss Schwarznuß Bergahorn Tanne Kirsche Stieleiche Lärche Rotbuche Douglasie Roteiche Esche			Schwarzerle Fichte max. 70% Birke Stieleiche Kiefer	Schwarzerle Fichte > 400 m/max. 20% Fichte < 400 m/max. 30% Walnuss Schwarznuß Bergahorn Tanne Kirsche Stieleiche Lärche Rotbuche Douglasie Roteiche Esche			Stieleiche Traubeneiche Kirsche Rotbuche Walnuss Lärche Roteiche Douglasie Kiefer

IV. Laubwaldbewirtschaftung

WALDBAULICHE EMPFEHLUNGEN

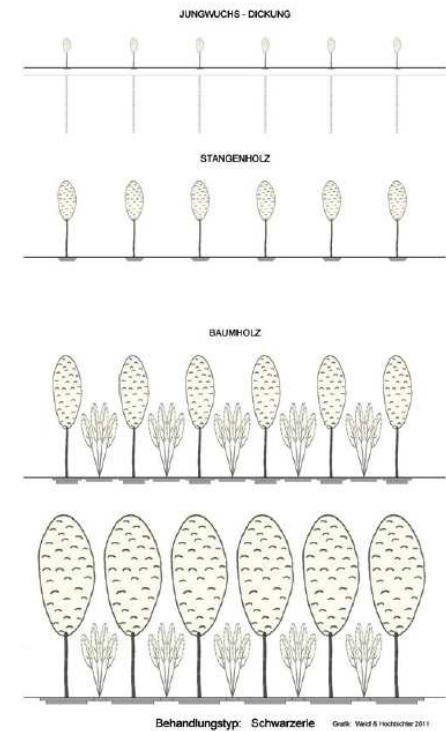
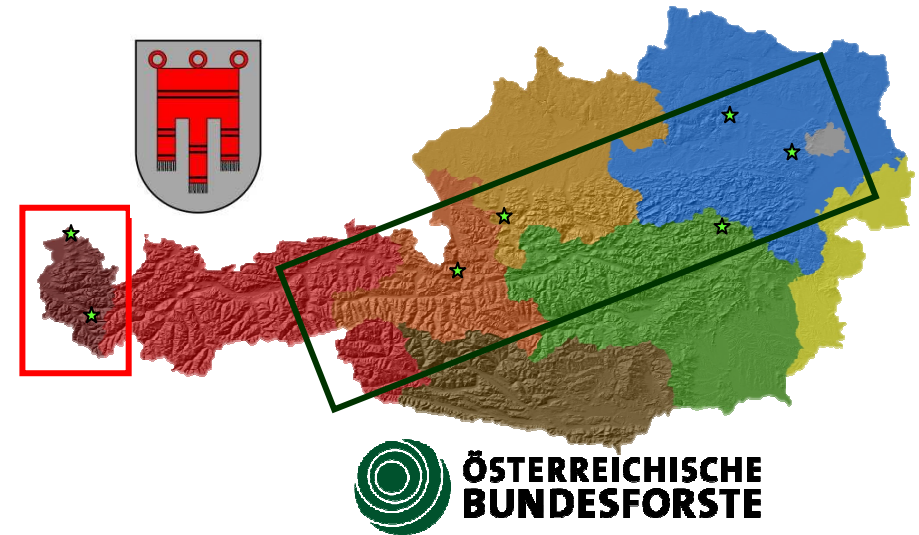


Abbildung 4-13: Schematischer Überblick über die Bestandesebenen des Behandlungstyps Schwarzerle

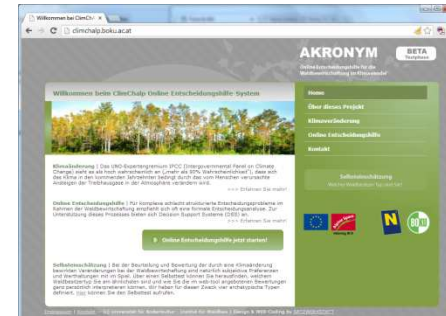
Workshops

- Province of Vorarlberg (2 day workshops)
- Austrian Federal Forests (11 one day workshops)
- Indoor & outdoor component
- In total 15 events
- Ca. 375 participants from operational foresters to forest managers



Decision support tools (i)

- ClimChalp DSS
 - Developed within the INTERREG funding framework
 - Geographically referenced (3 districts in Lower Austria)
 - For internal use with administrative authorities (intranet)
 - Guides through a decision making process
 - Local, stand level
 - No preference information for ES is used
 - Data-driven, limited number of options available



Demo – Identifying site and stand characteristics

Entscheidungshilfe - Schritt 1/5 - Standortauswahl

Bitte wählen Sie Ihren Waldstandort durch Eingabe einer Adresse (beliebig: Nur Ort, ORT, mit/ohne Straße, etc.) oder durch Verschieben der Markierung in der Karte. Sie können die Markierung in der Karte jederzeit mit der Maus verschieben und genau zu bestimmen.

Wenn Sie mit der Standortlokalisierung fertig sind, drücken Sie bitte auf den Button, um zusätzlich lokale Merkmale Ihres Standortes zu spezifizieren.

weistrach

Karte Satellit

Bestandestyp
Indikatorenübersicht
Alternativenauswahl
Beurteilung der Alternativen
Vergleich der Alternativen

Kontakt

searching a location, linking climate data

Entscheidungshilfe - Schritt 1/5 - Standortauswahl

Zusammenfassung Ihrer Angaben

Lon:14.610271
Lat:48.036085
Mittelhang mit <10° Neigung
Exposition: Nord
Gründigkeit: < 30cm
Grobskelett: 6-15%
Temperatur: 7.82 °C
Niederschlag: 1087 mm
Seehöhe: 370 m

Vorschlag der Online Entscheidungshilfe für Ihren Waldstandort
Parabraunerde/Braunerde, trocken bis mäßig frisch

Der Bodentyp ist Parabraunerde/Braunerde. Der Standort ist wegen geringerer Gründigkeit, höherem Grobskelettanteil, groberer Textur eher trocken (Wasserversorgung ist mäßig trocken bis trocken).

A 0-10cm
Ae 10-20cm
Bt >20cm

specifying site information

Entscheidungshilfe - Schritt 2/5 - Bestandestyp

Bitte machen Sie die folgenden Angaben zur Bestimmung des Bestandestyps.

Entwicklungsphase

Durch die Angabe der leicht anzusprechenden Bestandesentwicklungsphase wird wesentlich der Handlungsspielraum für die Bestandesbehandlung bestimmt. U.a. wird der Zeitraum bis zur Erzielung marktfähiger Sortimente und zur nächstfolgenden Bestandenserneuerung dadurch bestimmt.

Entwicklungsphase: schwaches Baumholz

Naturverjüngung

Durch Seitenlicht in kleinparzelliertem Wald kann bereits früh Naturverjüngung durch Fichte vorhanden sein. Ist diese Vorausverjüngung bereits mit entwickelt wird sie im vorliegenden Waldbaukonzept übernommen und 3 Zehntel Anteile Mischbaumarten eingebracht.

gewählten Standorttyps eine genauere Standortbeurteilung vorgenommen werden.

Alter (Jahre): 80

Bonität: 5.3

characterising current stand conditions

Demo – selecting treatment alternatives



Entscheidungshilfe - Schritt 3/5 - Indikatorenübersicht

Auf dieser Seite können Sie über die Indikatoren für die verschiedenen Alternativen informiert werden.

- ✓ **Baumarteneignung** Details ein/ausblenden!
- ✓ **Produktivität** Details ein/ausblenden!
- ✓ **Vorrat** [Vf] Details ein/ausblenden!
- ✓ **Kostenintensivität** Details ein/ausblenden!
- ✓ **Kohlenstoffbindung** Details ein/ausblenden!
- ✓ **Biodiversität** Details ein/ausblenden!
- ✓ **Grundwasser** Details ein/ausblenden!
- ✓ **Schäden (Wildverbiss)** Details ein/ausblenden!
- ✓ **Schäden (Sturm)** Details ein/ausblenden!

Entscheidungshilfe - Schritt 4/5 - Alternativen

Bitte wählen Sie die für Sie interessanten Alternativen. Details zu jeder Alternative können Sie über die Details-Schaltfläche einblenden.

- ✓ **Fichten-Altersklassenwald (business as usual)**
Details ein/ausblenden!
Fichten-Reinbestandsbewirtschaftung, Altersklassensystem, Aufforstung - Auslesedurchforstung (3X) - Kahlschlag
- Umbau Stieleiche/Hainbuche**
Details ein/ausblenden!
- Umbau Bergahorn/Esche**
Details ein/ausblenden!
- Umbau Lärche/Buche**
Details ein/ausblenden!
- ✓ **Umbau Stieleiche mit Bergahorn/Esche**
Details ein/ausblenden!
In dieser Variante erfolgt der Umbau eines Fichtenreinbestandes (business as usual) zu einem Stieleichenbestand mit Bergahorn/Esche nach Abtrieb der Fichte im geplanten Umtriebsalter 80.
Zielbestockung: 5 StEi 2,5 Bah 2,5 Es.
Aufforstung StEi/BAh/Es im Reihenverband (2 x 1m) - Schutz gegen Wildverbiss - Auslesedurchforstung - Produktionszeitraum 90/120 Jahre

Zurück! Weiter

viewing indicators for comparison

selecting appropriate alternatives

verbal description of stand treatment programs (measures, species, time horizon)

Home

Über dieses Projekt

Klimaveränderung

Online Entscheidungshilfe

- ✓ **Standortauswahl**
Parabraunerde/Braunerde, trocken bis mäßig frisch
- ✓ **Bestandestyp**
mittleres Baumholz
- ✓ **Indikatorenübersicht**
Baumarteneignung, Produktivität, Vorrat, Kostenintensivität, Biodiversität, Grundwasser

Kontakt

Selbsteinschätzung
Welcher Waldbesitzer-Typ sind Sie?

Logo: European Union, Alpine Space Interreg III B, N, BOKU

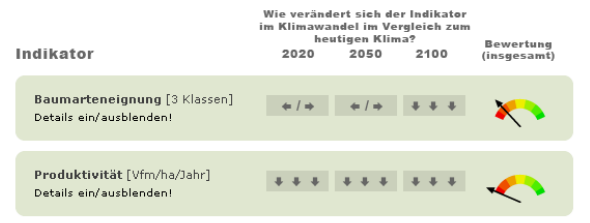
Demo – performance of indicator values

Entscheidungshilfe - Ergebnisse - Beurteilung der Alternativen
 Bitte wählen Sie die gewünschte Alternative: **Fichten-Altersklassenwald (business as usual)**

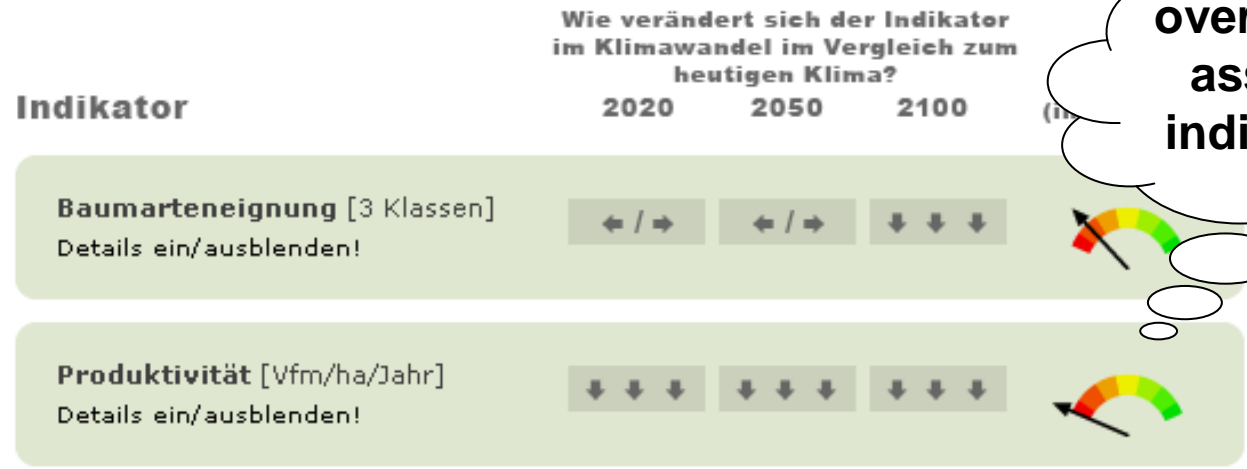
Hilfe - Was erfahre ich auf dieser Seite?
 Hilfestellung ein/ausblenden!

Indikatorenentwicklung für Alternative
 "Fichten-Altersklassenwald (business as usual)"

Die Abschätzung der künftigen Eignung des gewählten Bewirtschaftungsszenarios "Fichten-Altersklassenwald (business as usual)" für den vorliegenden Standort ergibt folgendes Bild. Klicken Sie auf ein Bewertungsfeld (z.B. **☹☹☹**), um eine Detailgrafik aufzurufen.



- Vorrat** [Vfm/ha]
Details ein/ausblenden!
- Kostenintensität** [3 Klassen]
Details ein/ausblenden!
- Kohlenstoffspeicherung**
Details ein/ausblenden!
- Biodiversität** [3 Klassen]
Details ein/ausblenden!
- Grundwasserneubildung** [mm/Jahr]

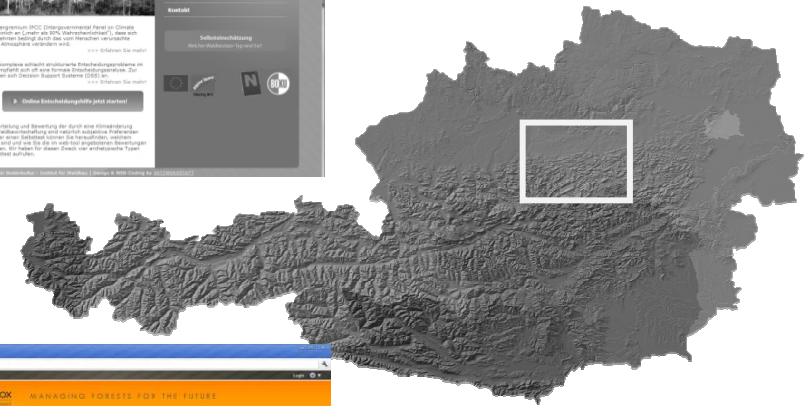
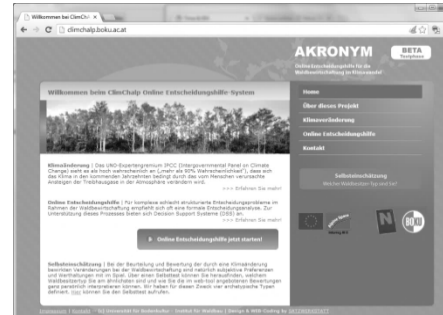


overall qualitative assessment of indicator change over time

Decision support tools (ii)

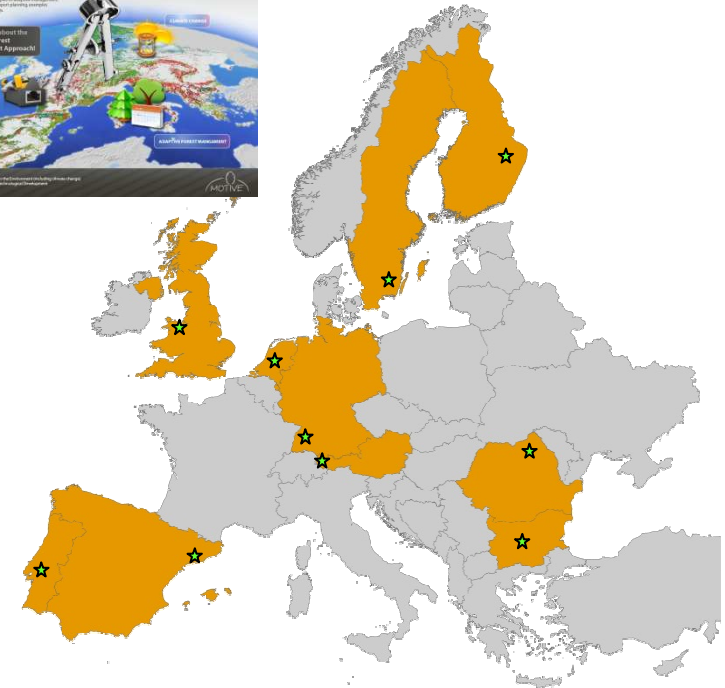


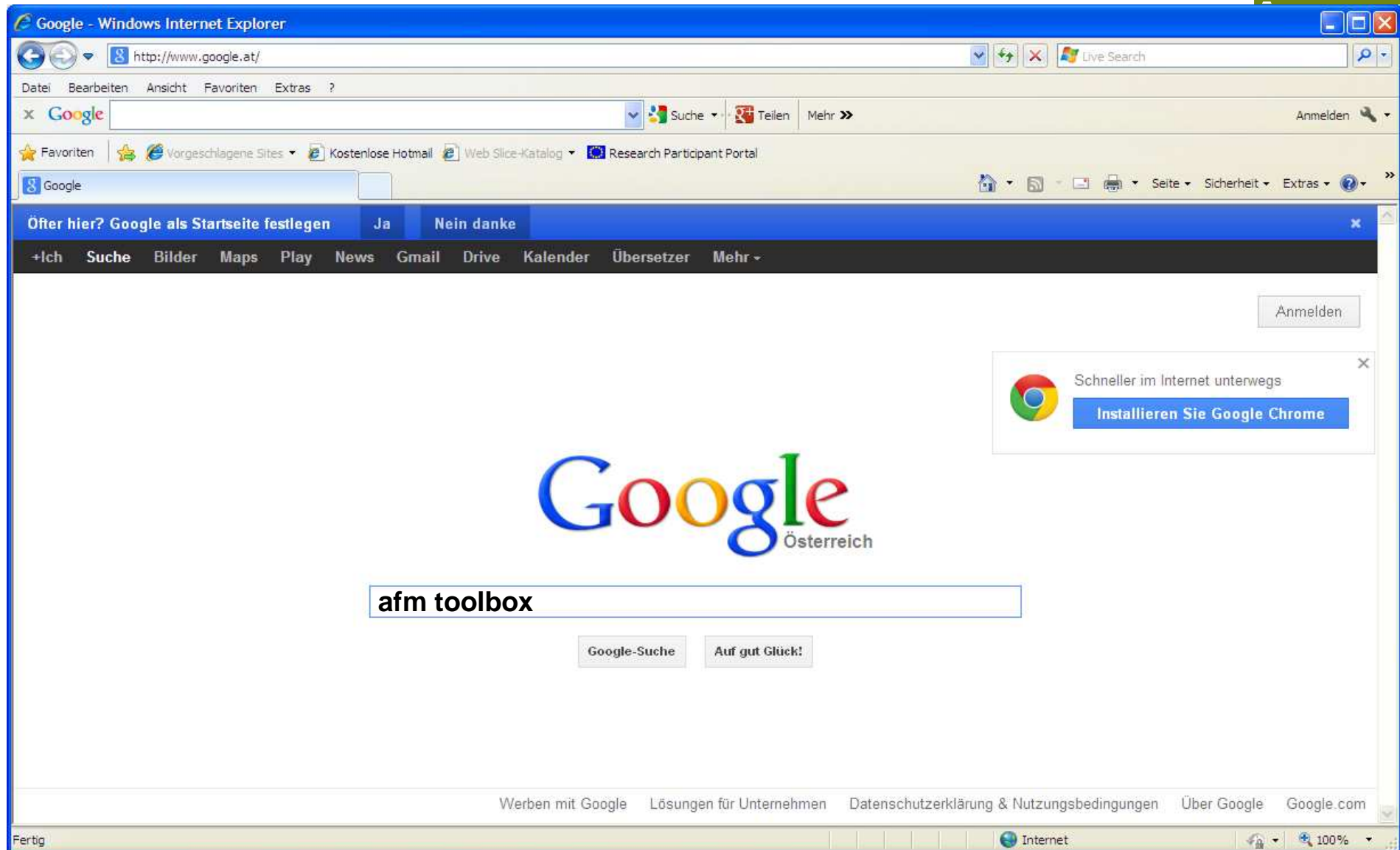
- **ClimChalp DSS**
 - Developed within the INTERREG framework
 - Geographically referenced
 - For internal use with administrative authorities
 - Guides through a decision making process
 - Local, stand level
 - No preference information is used
 - Data-driven, limited number of options available



- **MOTIVE AFMToolBox**

- developed within FP7
- Web based, public (no specified user)
- Collection of tools, info, examples, data, ...
- Manager/analyst
- Soft process as guidance
- Individual preferences for ES
- Group mode tools
- Make your own





Google

← → ↻ 🔍

Login ⚙️ ▼

AFM-ToolBox
adaptive forest management

MANAGING FORESTS FOR THE FUTURE

home

getting started

adaptive forest management

tools

FAQ

examples

make your own

WELCOME TO THE ADAPTIVE FOREST MANAGEMENT TOOL BOX!

To assist in forest management under climate change this site provides background information, approaches and principles to adaptive management, interactive tools to support planning, examples across Europe and FAQs.

Learn more about the Adaptive Forest Management Approach!

TOOLS

CLIMATE CHANGE

ADAPTIVE FOREST MANGAMENT

search

This project is supported by the European Commission under the Environment (including climate change) Theme of the 7th Framework Programme for Research and Technological Development

©

Google

← → ↻ 🔍

Login ⚙️

AFM-ToolBox

adaptive forest management

MANAGING FORESTS FOR THE FUTURE

You are here: HOME > Adaptive Forest Management Cycle

THE ADAPTIVE FOREST MANAGEMENT CYCLE

Adaptive management is a structured, iterative management process to cope with uncertainty. The idea is that management actions are taken in a way (PLAN, ACT) that an eventual failure to meet the objectives is not irreversible, that the reasons of failure can be detected in periodic evaluations (MONITOR, EVALUATE) through monitoring of the managed system and that corrective measures can then be set accordingly. To learn more choose a adaptive forest management step below.

[Learn more!](#)

[Manager View](#) [Analyst View](#)

[Learn more about the AFM Step "MONITOR" here](#)

- + CONCEPTS - MONITOR
- + TOOLS - MONITOR
- + FAQ - MONITOR

home

getting started

adaptive forest management

tools

FAQ

examples

make your own

search

This project is supported by the European Commission under the Environment (including climate change) Theme of the 7th Framework Programme for Research and Technological Development

Google

← → ↻ 🔍

Login ⚙️ ▼

AFM-ToolBox

adaptive forest management

MANAGING FORESTS FOR THE FUTURE

You are here: HOME > Adaptive Forest Management Cycle

THE ADAPTIVE FOREST MANAGEMENT CYCLE

Adaptive management is a structured, iterative management process to cope with uncertainty. The idea is that management actions are taken in a way (PLAN, ACT) that an eventual failure to meet the objectives is not irreversible, that the reasons of failure can be detected in periodic evaluations (MONITOR, EVALUATE) through monitoring of the managed system and that corrective measures can then be set accordingly. To learn more choose a adaptive forest management step below.

[Learn more!](#)

[Manager View](#) [Analyst View](#)

[Learn more about the AFM Step "PLAN" here](#)

- + CONCEPTS - PLAN
- + TOOLS - PLAN
- + **FAQ - PLAN**

home

getting started

adaptive forest management

tools

FAQ

examples

make your own

search

This project is supported by the European Commission under the Environment (including climate change) Theme of the 7th Framework Programme for Research and Technological Development

Google

AFM-ToolBox
adaptive forest management

MANAGING FORESTS FOR THE FUTURE

Manager-View **Analyst-View**

home
getting started
adaptive forest management
tools
FAQ
examples
make your own

Learn more about the AFM Step "PLAN" here

- + CONCEPTS - PLAN
- + TOOLS - PLAN
- FAQ - PLAN
 - WHICH QUANTITATIVE APPROACHES TO ASSESS CLIMATE CHNAGE IMPACTS ARE AVAILABLE?

Planning approaches and tools developed by research teams are often not fully utilized in practice. Reasons are: (a) knowledge transfer processes are not well developed; (b) tools and approaches developed by science are not useful for practice, and (c) there are few – if any – climate change adaptation governance guidelines available by the concerned authorities at national and regional levels which are essential pre-requisites for the quick uptake of new knowledge by practice. In both cases more participative interaction at the user-science interface is required to improve the practice of assessment and planning procedures.

$$N^* = \int_0^{T_q} R^*(t) dt,$$

$$N = N^* \cdot f_p \cdot n_e \cdot f_t \cdot f_i \cdot f_c \cdot L/T_q$$

A vulnerability index over time, N^* , could be calculated as shown in Eq. (1). R^* describes the additional vulnerability at time t . The

Firefox - AFM ToolBox

www.afm-toolbox.net

logged in as Demo User306@MotiveOnlineData

HOME Dashboard

SELECT CASES 528 cases selected!

DEFINE PREFERENCES Preference "mm test" selected!

ANALYZE RESULTS Do some Multi- and Single Case Analysis!

Help

- What is a caseselection?
- How to start a caseselection?

Climatechange

- Filter by Climate Scenario

Location and current climate

- Filter by countries
- Filter by casestudy
- FDI: N Boreal case (3a)
- GG01: Continental Bulgaria case (3a)
- HL01: Atlantic Veluwe case (2b)
- HL01: Central Black forest case (3a1 and 3a2)
- AT01: Central aas Alpine case (3D1 and 3D2)
- Filter by current climate

Site type

- Filter by satellite
- Filter by soiltype
- Filter by soiltexture
- Filter by waterinfluence
- Filter by watersupply
- Filter by nutrienstupply
- Filter by stoniness
- Filter by WHC

Stand type

- Filter by standtitle
- Filter by dominant species
- Filter by phase of the initial state

Geospace-Localization: Showing selected cases in geospace. Learn more! Hide Options

Fit viewport to show all cases Terrain Satellite Hybrid

Fennoscandia (Fennoscandia)

Norge (Norway)

Sverige (Sweden)

Suomi (Finland)



AFM ToolBox

www.afm-toolbox.net

logged in as Demo User306@MotiveOnlineData

HOME Dashboard

SELECT CASES 628 cases selected!

DEFINE PREFERENCES Preference "mm test" selected!

ANALYZE RESULTS Do some Multi- and Single Case Analysis!

Help

- My Preferences

Close all panels Open all panels

Stored Preference Patterns

PREFERENCE EDITOR

- Edit a Preference
- Learn more!

Login

Firefox - AFM ToolBox

www.afm-toolbox.net

logged in as Demo User306@MotiveOnlineData

HOME Dashboard

SELECT CASES 628 cases selected!

DEFINE PREFERENCES Preference "mm test" selected!

ANALYZE RESULTS Do some Multi- and Single Case Analysis!

Help

- My Preferences

Close all panels Open all panels

Stored Preference Patterns

PREFERENCE EDITOR

- Edit a Preference
- Learn more!

Login

Firefox - AFM ToolBox

www.afm-toolbox.net

logged in as Demo User306@MotiveOnlineData

HOME Dashboard

SELECT CASES 53 cases selected!

DEFINE PREFERENCES Preference "mm test" selected!

ANALYZE RESULTS Do some Multi- and Single Case Analysis!

ANALYSIS HOME SHOW CASES IMPACT ANALYSIS

MULTI-CASE IMPACT ANALYSIS Learn more! Show Options

What is the predicted impact of climate change when applying alternative forest management?

Choose a period: by 2020 by 2050 by 2100 Scenarios: all available alternate managements Climate Change: A1B Ecosystem-Service: Timber Production

Zoom-in using the slider:

Mgmt: AM3 (53)

Mgmt: AM4 (53)

Mgmt: AM5 (53)

Mgmt: BAU2 (53)

TOTAL PERCEIVED IMPACT (full scale view)

-1.00 0.00 1.00

VA-Tool (BASIC MODE) HOME

AFM-ToolBox
adaptive forest management

MANAGE

You are here: HOME

TOOLS
Learn more about Tool-Button.

home

getting started

adaptive forest management

tools

FAQ

examples

make your own

VULNERABILITY-ASSESSMENT (GROUPMODE)

The vulnerability assessment tool utilizes a multi-criteria technique to assess the effects of climate change and alternative management regimes on a variety of vulnerability indicators. In a group setting, a group of users can together elicit preference and interactively analyze the consequences of the groups' preference patterns.

[Learn more!](#) [Start the Tool!](#)

OPTIMIZED MANAGEMENT PLAN

The Optimization Tool searches for an optimal management plan for a forest management unit. The Tool produces an optimized plan that assigns a treatment plan to each of the stands in a unit.

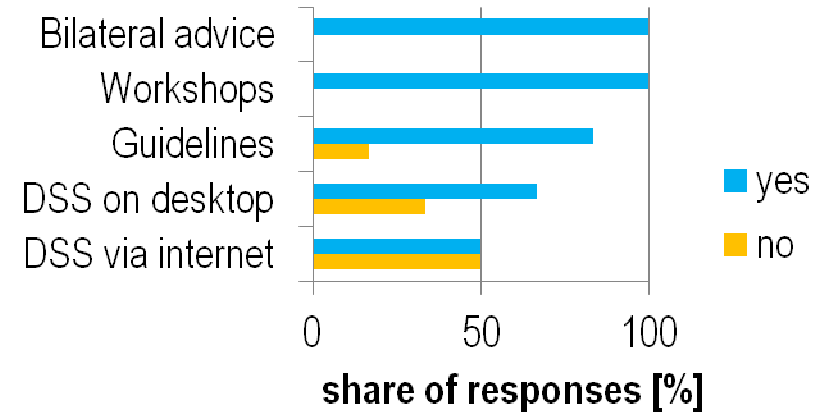
[Learn more!](#) [Start the Tool!](#)

The screenshot displays the AFM Toolbox website interface. On the left is a navigation menu with the following items: home, getting started, adaptive forest management, tools, FAQ, examples, and a highlighted 'make your own' button. The main content area features a large diagram titled 'own local context'. This diagram shows four input categories: 'silviculture' (with a photo of a logger), 'soil data' (with a soil profile image), 'forest data' (with a forest photo), and 'climate data' (with a line graph). These inputs feed into a funnel that leads to two model boxes: 'Model A' (green) and 'Model B' (yellow). Below the models is a simulation interface with a timeline from 2020 to 2100. It includes dropdown menus for 'Scenarios: all available alternate managements', 'Climate Change: A1B', and 'Ecosystem-Service: Timber Production'. The simulation shows four management scenarios: Mgmt. AM3 (53), Mgmt. AM4 (53), Mgmt. AM5 (53), and Mgmt. BAU2 (53). Each scenario is represented by a horizontal bar with colored dots indicating values over time. A color scale at the bottom ranges from -1.00 (red) to 1.00 (green).

Comparative evaluation of tools

- SH acceptance of some tools depends on age and education level
- Different tools may serve different purposes
- No one fits all solution

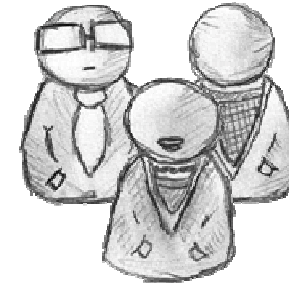
Which tools would you consider to plan/ implement AM? (MOTIVE CS Montafon)



Tool	User	Guidance	Complexity handling	Acceptance by SH	Development costs	Maintenance effort	Up to date (CC, AM, ...)	
Bilateral advice	Single/group	Y	+++	+++	+	+++	+++	
Workshops	Group	Y	+++	+++	++	++	+++	
Guidelines	Single	N	+	+++	++	++	+	
ClimChalp DSS	Single	Y	+	+ / +++	+++	++	++	+ low ++ medium +++ high
MOTIVE AFMToolBox	Single/group	N	+++	+ / +++	+++	+++	+++	<div style="display: flex; flex-direction: column; align-items: flex-start;"> <div style="display: flex; align-items: center; margin-bottom: 5px;"> beneficial </div> <div style="display: flex; align-items: center; margin-bottom: 5px;"> intermediate </div> <div style="display: flex; align-items: center;"> not beneficial </div> </div>

Conclusions/ lessons learned

- **Knowledge transfer needs to target the right users**
 - different interests and background
 - different expertise in forest management
 - relatively easy for workshops/seminars and brochures
 - but difficult for web-based DSS tools
- **Hard to handle complexity of adaptive management in a changing climate**
 - „useful“ solutions will depend on owner’s preferences, initial conditions and timing
 - may be best to handle in workshop environment
 - huge challenge for web-based DSS tools (must be self-explanatory)
- **Each of the presented knowledge transfer means has benefits and limitations**
 - there is no single best solution for effective knowledge transfer
- **A combination of workshops and do-it-yourself via a web-based knowledge transfer platform** (including planning and decision making tools) appears as a promising approach





**University of Natural Resources
and Life Sciences - Vienna**
Department of Forest and Soil
Sciences

Thank you

