

# Vessertal-Thuringian Forest Biosphere Reserve & Climate Change

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## Introduction

The investigation area is situated in the middle of Germany in the Thuringian Forest. It was acknowledged under the UNESCO "men and biosphere programme / MAB" in 1979. Today the reserve has an area of about 17,090 ha, differentiated in core-area (3.3%), buffer-zones (11.4%) and transition-zones (85.3%).

The Biosphere Reserve covers mainly rural and woodland areas, only at the edge it is tangent to a densely populated area. The landscape is dominated by forests (88%) and grassland (9%). Small upland meadows are found only in stream valleys and in certain high areas. Runoff from ridge areas has led to the formation of small raised bogs and feeds a dense network of streams.

**Climate:** atlantic-influenced, moderate, cool-moist central mountain climate, heavy snowfall, 4-7°C annual temperature

**Geomorphology:** mountain range (highest peak 982m) is cut by numerous valleys (deepest 420m)

**Human influences:** forestry, tourism (hiking, horseback-riding, winter sports), settlement

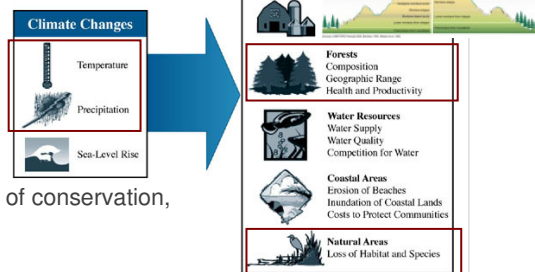
## Potential Impacts of Climate Change

| Habitattype                              | Important conflicts and problems   | Potential pressures and impacts of climate change   | Comments     |
|--|--|---|--------------|
| 6510 Lowland hay meadows                 | Abandonment of pastoral systems & consequential natural succession           | Species shifts caused by temperature increase and changes in precipitation pattern  |              |
| 6520 Mountain hay meadows                |  |   |              |
| 7110* Active raised bogs                 | Drainage & consequential natural succession                                  | Species shifts after water level changes caused by temperature increase and changes in precipitation pattern                |              |
| 7120 Degraded raised bogs...             |  |   |              |
| 7140 Transition mires & quaking bogs     |  |   |              |
| 7230 Alkaline fens                       |  |   |              |
| 9110 Luzulo-Fagetum beech forest         | Deficits in the natural regeneration because of excessive wild animal stocks | Shifts and loss of species relevant for Habitate status caused by temperature increase and changes in precipitation pattern | 165 habitats |
| 9130 Asperulo-Fagetum beech forest       |  |   | 37 habitats  |
| 9180* Tilio-Acerion forests of slopes... |  |   | 9 habitats   |
| 91D0* Bog woodlands                      | Drainage & natural succession  | Water level changes caused by temperature increase and changes in precipitation pattern                                     | 5 habitats   |
| 91E0* Alluvial forests with Alnus...     | Drainage & natural succession  | Water level changes caused by temperature increase and changes in precipitation pattern                                     | 19 habitats  |
| 9410 Acidophilous mont. Picea forests    | Deficits in the natural regeneration because of excessive wild animal stocks | Shifts and loss of species relevant for Habitate status... and damages by storm or pests                                    | 16 habitats  |

## Objectives

Especially with respect to dominant forests and forest habitat types in the Vessertal-Thuringian Forest Biosphere Reserve our objectives in the work for HABIT-CHANGE are:

- List & mapping climate change (past and future) at landscape level
- Enlighten about CC-induced risks and pressures on habitat types, state of conservation, species composition and fitness resp. vulnerability of ecosystems
- Consulting and cooperation of CC-related research
- Deriving measures of adaption and monitoring of CC and adapted management success
- Support of the Biosphere Reserve administration in terms of development and expansion of the conservation areas
- Inform land user, land owner and stakeholder about CC, HABIT-CHANGE and results



## Results and Outlook

### Facts of climate change (past & future)

Databases and maps of climate and climate scenarios are compiled, evaluated and expanded by forest specific climate aspects. According to present climate scenarios, temperature, precipitation and global radiation will change and strong affect water availability during vegetation period and length of real vegetation period.

### Overview on habitat types, species, soils, monitoring & management

Databases and maps of the investigation area on relevant status quo of nature, environment, management and so on have been reviewed.

### Indicators for forest ecosystems (Output No. 4.1.3)

Based on common indicators, specific indicators are derived for forest ecosystems in Germany. In addition to output 4.3.3 the list of indicators should be added by wind and storm indicators (speed, extremes, directions, amount of damages, relief and exposition) and by pests (type, amount, changes in life cycle).

### Vulnerability maps

Based on possible CC shifts of plant species composition, of habitat structure and of complete ecosystems were discussed.

Climatic water balance (kwb) & length of vegetation period (vp)

|  | 1971-2000 | 2041-2070 | Δ      | σ   |
|--|-----------|-----------|--------|-----|
| precipitation minus evapotranspiration (pot. grass-herm) | 6-35      | -7-+16    | -13-13 | -16 |
| ... (during) vegetation period (day's ≥ 10°C mean temp.) | 200-151   | -137-163  | +12-17 | +24 |

Legend:  
 ■ ...precipitation minus evapotranspiration (pot. grass-herm)  
 ■ ... (during) vegetation period (day's ≥ 10°C mean temp.)  
 ■ ...day-to-day calculated for available climatic stations

