

Adaption of Protected Area Management to Climate Change -Methods and Challenges

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Outline: Guiding Questions

- How will climate (probably) change?Climate change scenarios
- How will climate change affect protected areas? Assessing Sensitivity, Potential Impacts, Vulnerability
- What can be done?

Introduction of an "Adaptive Management"

Conclusions





How will Climate Change?









PIK 2011 (Output 3.2.3)



- CNRM/Arpege-DMI/HIRHAM5
- ECHAMS-DMI/HIRHAMS
- HadCM3-ETHZ/CLM3.21
- HadCm3Q0-HC/HadRM3Q0
- HadCm3Q16-HC/HadRM3Q16
- HadCm3Q3-HC/HadRM3Q3
- ECHAM5-ICTP/REGCM3
 BCM-SMHI/RCA3

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How did climate already change? Observed climate trends







How did climate already change? How will climate probably change?

Information from scenario modelling (future)

Information from climate monitoring ______ (past and present)

Locally experienced weather and climate events

Value of information for initiation of adaptation planning and impact assessments?





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adaptive management for protected areas

How will climate change affect protected areas?

Methodical background – Potential Impact Assessment







How will climate change affect protected areas? Methodical background – Sensitivity Analysis



How sensitive are protected habitats to changing climatic conditions (temperature and moisture changes) considering their characteristics and existing pressures?

- Non-climatic pressures
 - Land use and land-use change
 - Emissions etc.
- Habitat characteristics
 - Depending on species composition and
 - Genetic disposition, indicator values for temperature and moisture
- Conservation status
 - Result of land use practices and
 - Management effectiveness





How will climate change affect protected areas? **Sensitivity Analysis**

Habitat map and Sensitivity after Peterman et al. 2007



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HABIT CHANGE Output 4.3.5



How will climate change affect protected areas? **Sensitivity Analysis**

Indicator Values for Species according to Ellenberg 1992 and Landolt and Bäumler 2010



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How will climate change affect protected areas? Methodical background – Impact Assessment



- How will protected habitats react to climate change?
- What changes are likely to happen?

- Potential impacts
 - Land use and land-use change
 - Changed abiotic conditions for protected habitats (e.g. soil moisture, water balance)
 - Species composition, invasive species
 - Increase of pests and diseases
 - Shift of vegetation zones





How will climate change affect protected areas?



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How will climate change affect protected areas? Impact Assessment - Challenges

- Lack of local data for assessments! Considerable variation in species composition of same habitat-type in different locations.
- Uncertainties in sensitivity and impact assessments!
- Lack of established and tested methods and tools for assessments!
- Sensitivity and impacts depending on climatic and non-climatic (land-use) pressures.

Time consuming process, more research needed! Local knowledge and expertise?





How will climate change affect protected areas? Impact Assessment - Solutions

Defining purpose and intended use of potential impact maps

- Identification of areas and habitats where adaptation action is urgent because severe changes of habitats are very probable
- Prioritising areas for adaptation of management
- Target group of assessment results? Protected Area Management; Policy level; Local stakeholders





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What can be done? "Adaptive Management" Why introduce Adaptive Management?

- Biodiversity is under pressure: land-use and climate change
- Uncertainties: changing climate, impacts of climate change, autonomous adaptation, sensitivity and resilience of species and habitats, effectiveness of management (adaptation) measures, modelling results
- Nature conservation has to deal with uncertainties, new impacts, continuous change and knowledge gaps
 -> many things still to be learned

-> effective management is limited by uncertainty





What can be done? "Adaptive Management"

Elements of Adaptive Management

Adaptive Management is an approach for simultaneously managing and learning about natural resources.

Components:

- Stakeholder involvement
- Definition of objectives
- Models
- Management alternatives
- Monitoring





What can be done? "Adaptive Management"

Purpose of intensified stakeholder involvement

- Raise awareness on climate change and need for planned adaptation
- Include local knowledge of problems and impacts response options
- **Facilitate information exchange** among stakeholders
- Identify win-win-solutions
- Improve the public acceptance and support for local adaptation
- Achieve a reduction of non-climatic land-use pressures
- Build trust in the management authorities of the protected area





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Conclusion 1: Stakeholder involvement

- Impacts of climate change vary locally
- Adaptation measures must be planned and implemented locally: Intensification of local stakeholder involvement required
- Local knowledge and expertise are essential for assessments: improve local knowledge base!
- Involvement allows to address climatic and nonclimatic pressures





Conclusion 2: Uncertainty

- Modelling results for exposure, sensitivity and impacts entail uncertainties; Methods are difficult to apply
- Effectiveness of management interventions needs to be monitored and evaluated
- Adaptive Management provides framework to reduce knowledge gaps, deal with uncertainties and establish monitoring of management effectiveness and climate change impacts





Conclusion 3: Objectives of adaptation process

- Clear definition of expected outcome of adaptation planning helps setting priorities
- Awareness, acceptance, improved understanding, stakeholder involvement, identification of priority areas and response options => specific requirements shaping the adaptation process
- Get started: Initiating a long-term process of adaptation to climate change
- Identify data and knowledge gaps





Conclusion 4: Monitoring

- Establishment of monitoring programmes to observe on-going climate change and its impacts on biodiversity rather than investing in climate modelling
- Land use is still the main driver of biodiversity loss. Impacts of land use (changes) and conservation management are essential monitoring tasks to enable adaptation.
- Monitoring results must be linked to management decisions.





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