

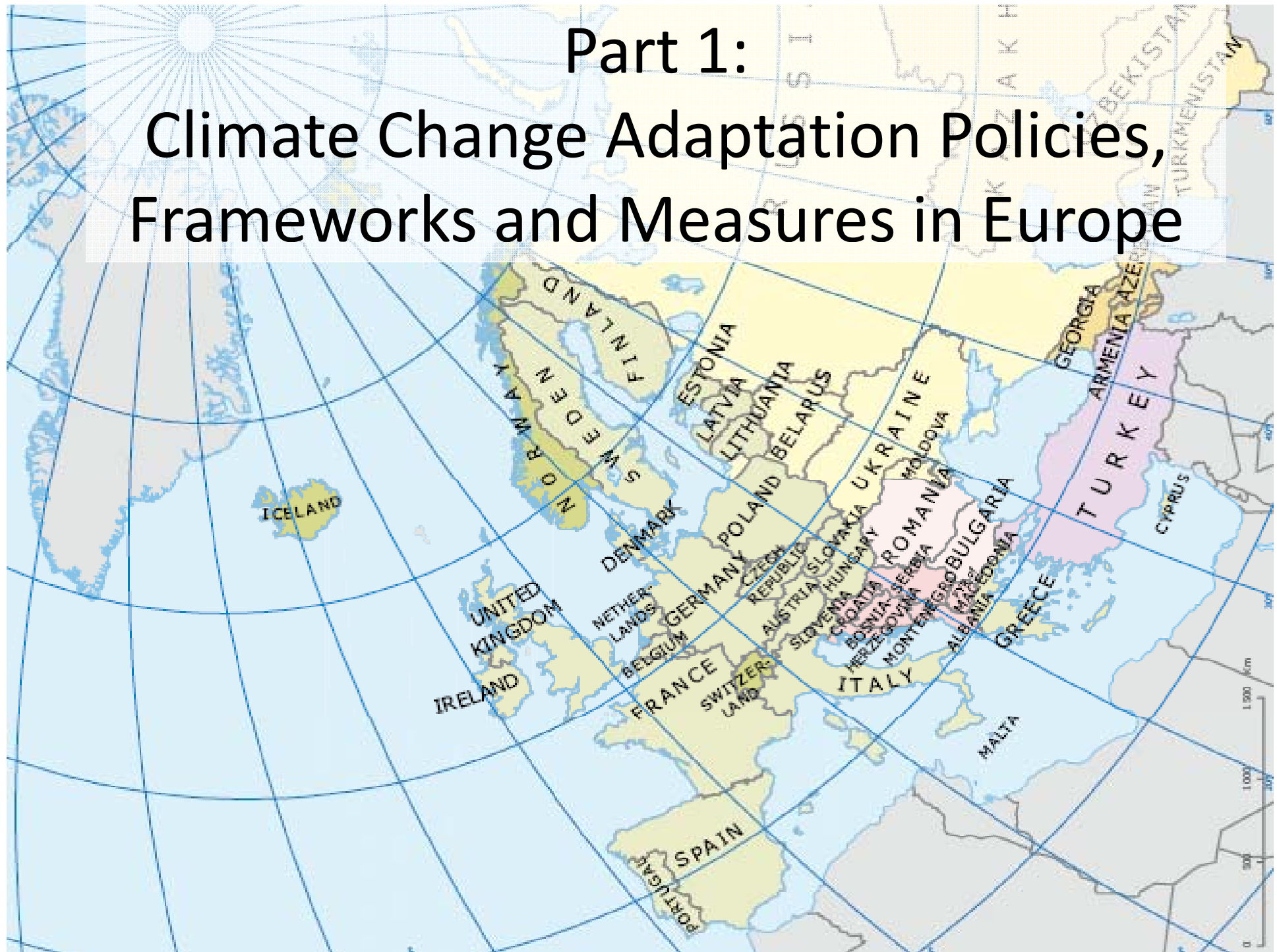
Land Use Practices and Climate Change Adaptation: The European Experiences

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Climate Adaptation in Development Planning
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Overview

- Presentation will be divided into two parts
- Part 1: Land Use Practices & Climate Change Adaptation Policies, Frameworks and Measures in Europe
 - Gives the overview of what is happening in Europe
- Part 2: National Land Use Practices and Climate Change Adaptation (Austria, Malta, Moldova)
 - Provides
 - a more detailed case study of Austria
 - Flashlight Malta
 - Flashlight Moldova

Part 1: Climate Change Adaptation Policies, Frameworks and Measures in Europe



The Case of Europe

- Land Use Planning in Europe needs prognosis of climate change directions
 - IPCC 4th assessment report gives evidence that climate change is going on
 - A general trend of changes in temperature, precipitation and other climate parameters according to regions
 - An anticipation of the occurrence of future extreme events is needed
 - Climate variability either remains stable or may follow a different path

Mitigation

- Some 20% of climate change are related to land use and changes of land use
 - depletion of sinks by converting forests to agricultural land
 - In most European countries we have today an increase in forest areas and sinks
 - emissions of GHG from agricultural production
 - Rice and methane emissions play only a minor role in Europe
 - Inputs to agricultural production are a main problem

Mitigation and Kyoto

- Kyoto aims of 1997 will not be reached
 - All EU countries signed the Kyoto protocol
 - Only former communist countries with system switch and economic decline or countries previously in war will reach the target
 - Stopping of adverse climate change impacts cannot be reached
 - Even if there would be no emissions, complex atmospheric reactions will go on for several decades
- New post 2012 goals will be negotiated in Copenhagen in December 2009
 - Aim to stop CC at 2°C as compared to 0.8°C warming today
 - Major changes have to be expected with this warming rate
 - Even more drastic changes become likely if targets cannot be achieved

Mitigation versus Adaptation

- Until 2007 and the 4th assessment report of the IPCC
 - Mitigation was favoured by policy
 - More easy to apply by general laws and standards
 - Targeted to new innovative technologies
 - Climate change was not “certain”
 - Despite many signs and records from observations and monitoring
 - The end of the Kyoto process was more distant, now 2012 and the failure of the Kyoto aims is approaching
 - Change of policy needed
 - from mitigation with adaptation to
 - Adaptation with mitigation

Adaptation

- Is needed everywhere in Europe and the world
 - To make local adjustments to accelerating change
 - We cannot stop or even stabilize climate change
 - The impacts of today to which we adapt are emissions from years ago
 - The emissions of today are impacts of the coming decades
 - Climate change induced disruptions are likely to increase
 - Development planning needs to consider currently unknown and unexpected surprises
- Targets every location or economic activity
 - Is not straight forward
 - Some stakeholders profit from climate change
 - Depends on the degree of change

White Paper on CC-Adaptation in Europe

- April 1st, 2009: WHITE PAPER ON CC-ADAPTATION issued
 - Adapting to climate change: Towards a European framework for action
 - Why Europe needs an adaptation strategy
 - Objectives and Action of the proposed EU framework
 - Instruments and Financing
 - Working in Partnership
 - External dimension and cooperation under UNFCCC
 - Download at http://ec.europa.eu/environment/climat/adaptation/pdf/com_2009_147_en.pdf

Adaptation in urban areas

- Damage can be most distinct in case of extreme events
 - Floods
 - Droughts
 - Integrated planning with surrounding rural areas is needed
- Urban areas have little problem with permanent increase of temperature
 - adapt to more comfortable situations by climate conditioning systems
 - Consist to a high degree of artificial environment
 - Indoor and excluded from outdoor natural environment
 - Can be regulated
 - At the expense of increased resource use and higher greenhouse gas emissions
 - Adaptation in particular easy for rich communities
 - Europe did not yet experience major urban resource scarcity
 - This however is expected for the next decades
 - Most citizens do not know the connections
 - Here in particular information work is needed

Adaptation in rural areas

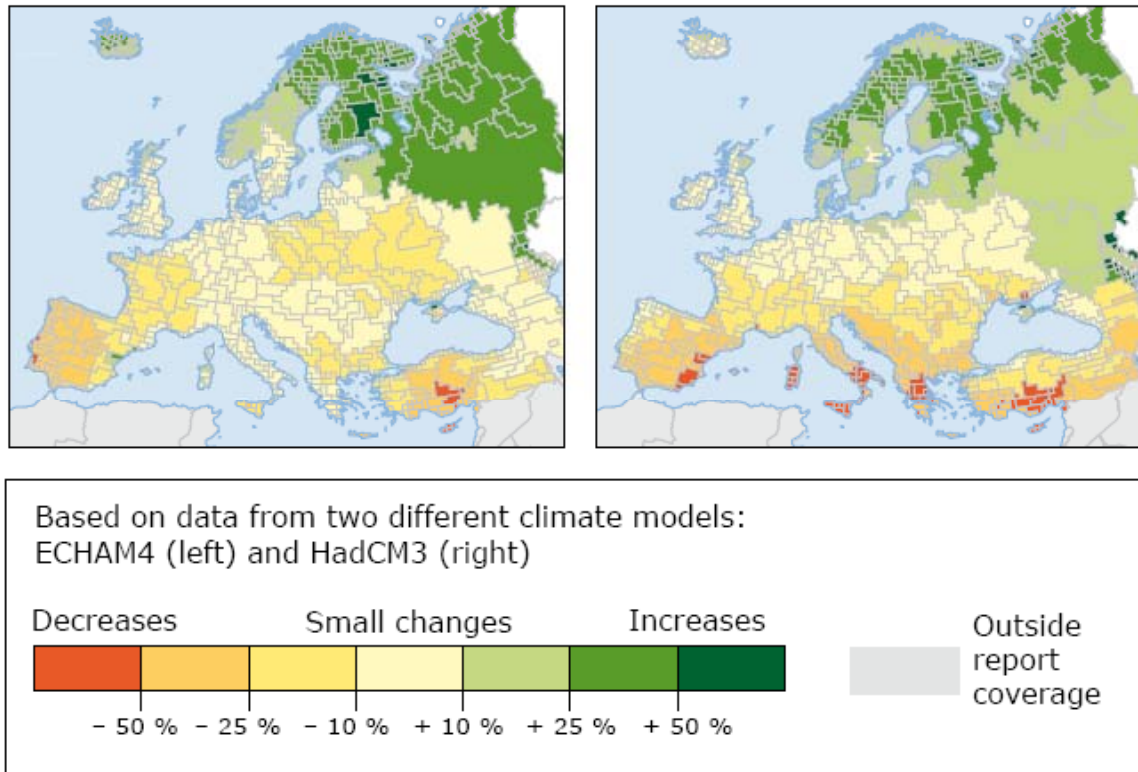
- Adaptation to climate change is mainly targeted to rural areas
 - Usually over 95% of land area
 - Still dependent on natural environment
 - Technical adjustments only on particular locations
 - Planning for new situations is needed
 - Assuming a stop at 2°C warming
 - Major activities in rural areas
 - Agriculture & Forestry
 - Tourism

Winners and losers of climate change

- So far, some European countries or sectors rather profited from changed climate patterns
 - warmer conditions in agriculture and forestry
 - Latitudes $> 50^\circ$ countries in general, e.g. Scandinavia
 - Mountainous countries with altitudes above 2000m sea level with regard to increase of vegetation period
 - Producers for climate change adaptation technologies
 - In agriculture, energy and tourism sectors
 - Other European countries are endangered, in particular due increased risks of water availability and droughts
 - Mediterranean countries with latitudes $< 40^\circ$
 - Dry lowlands and agricultural production areas

Example river runoff

Projected changes in annual river discharge in Europe for the 2070s compared with 2000



Source EEA 2008

Land use policies get integrated with climate use

- Coordinated EU climate adaptation actions are planned according to sectors
 - Agriculture
 - Combination with Agenda 2000 and CAP
 - Water
 - Integration with water directives WFWD, GWD, FD,
 - Biodiversity
 - Integration with habitat directive
 - Natura 2000 areas with 20% of EU territory
 - Fisheries
 - Energy networks
 - Common electricity networks in EU
 - Increase share of renewable energy sources to 20% by 2020

Structural measures on European Level

- White paper of 2009 may lead to a new European climate directive
- The EU has a particularly strong supportive role
 - when the impact of climate change transcends the boundaries of individual countries
 - River basins
 - Bio-geographic regions
- In addition there are other directives
 - In need to be adjusted to future environment conditions
 - The EU water framework directive WFWD
 - Daughter directive on floods and extreme events
 - Daughter directive on ground water resources
 - The EU habitat directive HD

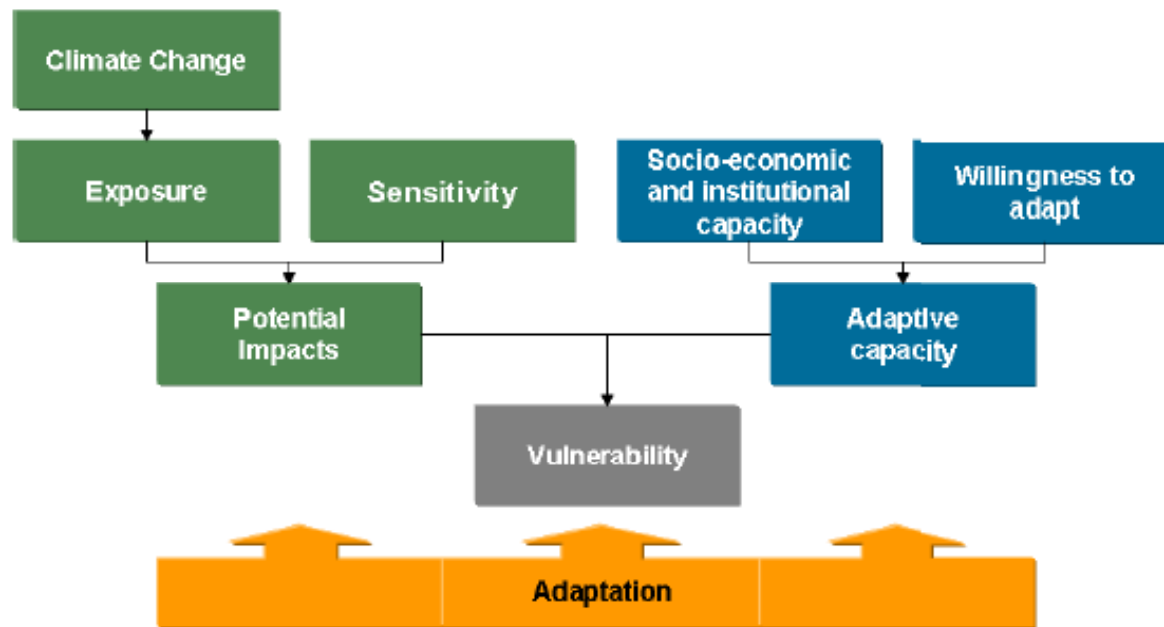
Indicator Report to prepare for adaptation according countries



- Enhanced monitoring of climate change, and in particular its effects on society and the environment.
- Climate-change impact scenarios at the appropriate level of spatial detail
- Better understanding of the socio-economic and institutional aspects of vulnerability and adaptation
- Information on good practices of adaptation actions, in synergy with mitigation actions, and their costs

Mainstreaming actions to decrease vulnerability

- The Adaptive management to climate change
- Robust decision making under uncertainty



Mainstreaming adaptation action at EU level (1)

- Due to regional variability and severity of climate impacts most adaptation measures will be taken at:
 - National
 - Regional
 - Local level
- Adaptation will require solidarity among EU Member States to ensure
 - regions most affected by climate change will be capable of taking the measures

Mainstreaming adaptation action at EU level (2)

- Article 4 of the UNFCCC14 requires national or regional adaptation strategies.
 - Some EU Member States have prepared national adaptation strategies,
 - others have yet to do so
- Exchange best practices between Member States on climate
 - E.g. the bio-fuel electricity generation plant
 - The GHG emission neutral community Bruck an der Leitha Austria

What is Europe Planning Next

- Building a stronger knowledge base
 - Better access to a wide range of data
 - Name most vulnerable areas as compared to others
 - Name best practice examples
- Consider climate change impact in key EU policies
- Combining different policy measures to best effect
 - Innovative funding including market based schemes
 - Supporting wider international efforts on adaptation
 - Non EU countries
 - Developing countries

Part 2: Climate Change Adaptation on National Scale



Flashlight Malta

- Is smallest state of EU (316km², 410.000 inhabitants)
 - Has the highest intensity of tourism
 - Very high water requirements during summer peak
 - According to some sources the water poorest place in the world
 - Ships transport drinking water to Malta
 - Seawater desalination plants
 - Old crusaders water supply
 - in underground caves
- Planned by EU
 - health and heat action plans,
 - coastal and flood defences,
 - natural hazard monitoring,
 - reinforcing the built environment,



Source: Wikipedia 2009

Flashlight Moldova

- Is not part of EU (33,800km², 3.3 million people)
 - Previous state of USSR
 - Actually old part of Romania
- Has the highest intensity of agriculture in Europe
 - 54% of country arable land
 - 40% of population occupied in agriculture
 - 17.3% direct share of agriculture in GNP
- Severe problems with water supply
 - Decline of agricultural production
 - 2007 drought
 - 2008 flood
 - Further decline has to be expected with ongoing climate change
 - Poorest people of the poorest European country will be effected most



Source: Wikipedia 2009

Position of Austria in Europe

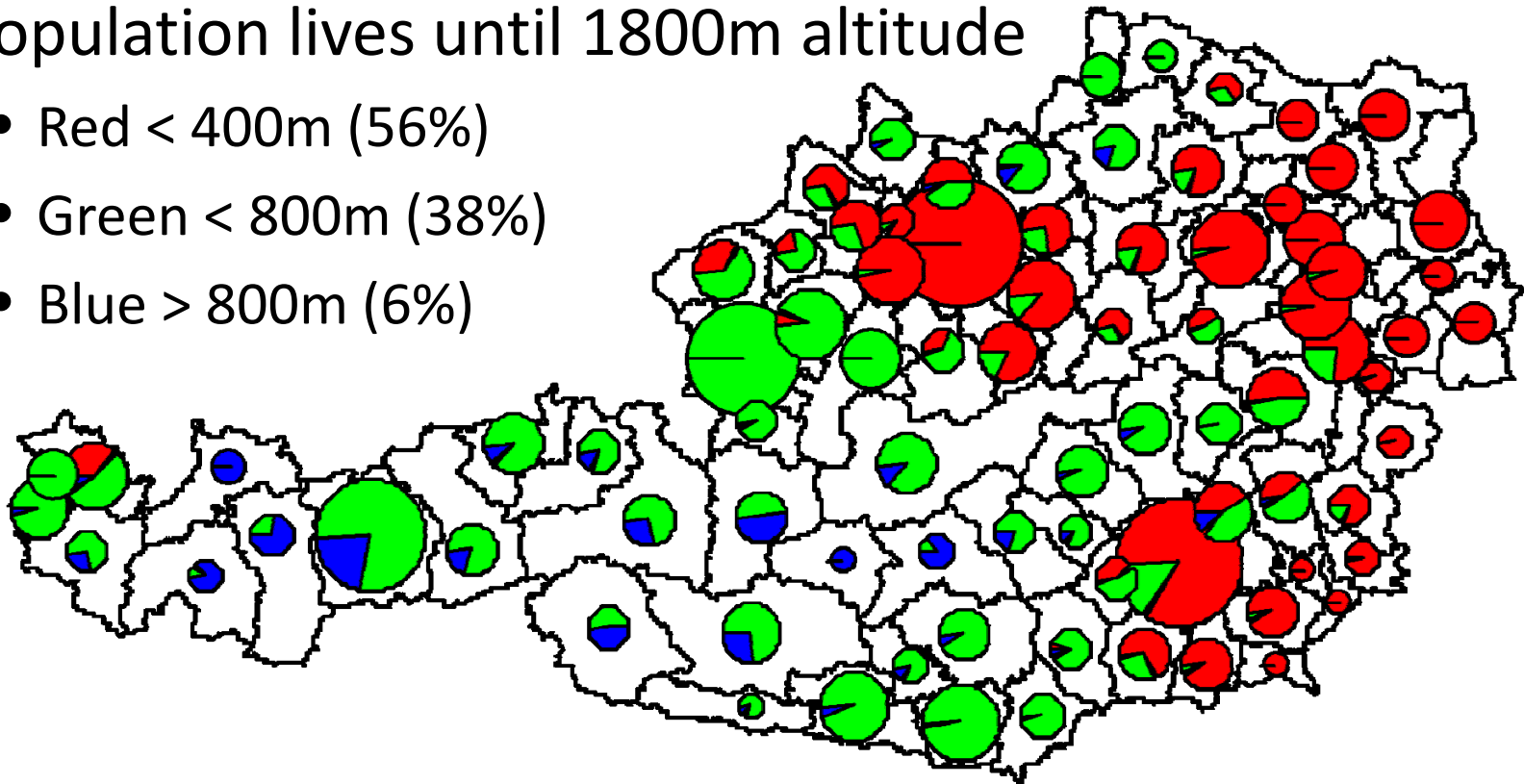


- Two thirds of the country are mountainous
- Since 1995 part of the EU

Austria (84,000km², 8.2 million)



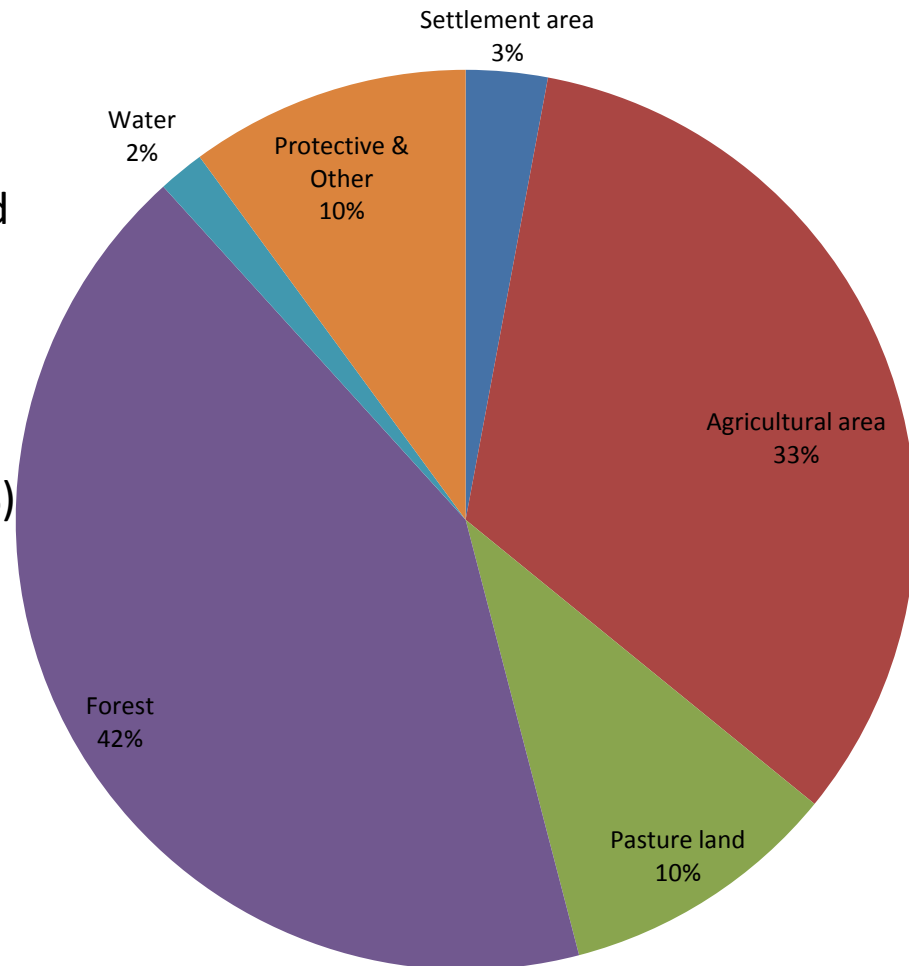
- Particular Role of Altitude
 - Physical altitude 133m to 3797m
 - Population lives until 1800m altitude
 - Red < 400m (56%)
 - Green < 800m (38%)
 - Blue > 800m (6%)



Land Use in Austria 2005 according to six categories (1 to 6)

Six major types of Austrian land uses

- 1) Agriculture is arable land, horticulture and vineyards (33%)
- 2) Pasture is for life stock and skiing (10%)
- 3) Forest is productive forest (42%)
- 4) Water includes surface water system (2%)
- 5) Protective Forests, Rocks and Others (10%)
- 6) Settlement and traffic areas (3%)



Climate Change Adaptation in Austrian Land Use (1a)



- Adaptation in agriculture could be the easier part of adaptation (33% of land)
 - Austria becomes increasingly suitable for rice production
 - Often problems with international agreements, e.g. GATT
 - Trade-offs with importers
 - Wine production becomes possible in higher altitude regions as frost is on retreat
 - Mediterranean plants/fruits can be soon harvested
 - » Occasional examples of orange trees

Climate Change Adaptation in Austrian Land Use (1b)

- Energy plants (bio-fuels) are a compromise with high relevance for climate change
 - New emerging domestic supply to compensate for fossil fuels imports
 - Avoid competition at the food market
 - Bio-fuels (ethanol, biodiesel) supported by state
 - However, oil price is decisive for economic feasibility



Climate Change Adaptation in Austrian Land Use (2)

- Pasture lands are particularly in mountain regions (10% of the land)
 - Harvests may get higher due to warmer weather
 - Species mix in pastures will change
 - Some produce large root volumes and prohibit erosion



Climate Change Adaptation in Land Use (3)



- Productive forests (42% of all land) are forests
 - Are sinks of CO₂
 - Forest area is growing
 - » Marginal agricultural land is afforested everywhere in Austria
 - » Forest area increases, e.g. a new form of use are energy forests, usually harvested after 10 or 15 years as compared to 70 years of traditional agriculture

Climate Change Adaptation in Austrian Land Use (4)

- Water areas (2% of all land)
 - No major change so far
 - Strong interaction with mountains, glaciers and snow
 - Melting water keeps lake systems and river runoff and surrounding land at constant temperatures
 - If glaciers are “consumed” a sudden change in conditions of adjacent land can be expected as well
 - Changes in aquatic flora and fauna can be expected suddenly
 - This may trigger more changes in adjacent land



Climate Change Adaptation in Austrian Land Use (5)



- Protective forests in mountains and other terrain like Alpine rocks (10% of all land)
 - Resilience will decrease
 - forest cycles are more than 100 years in this altitude zone
 - Climate change is too fast
 - Slowly growing problem
 - Tolerance of two, three decades
 - Vulnerability will increase
 - Forest plant societies will experience stress and change with proceeding climate change
 - Beetles and harmful parasites will find better condition
 - A neglect of forest work is usually not connected to climate change but works together with it
 - Likelihood of more extreme events due to climate change

Climate Change Adaptation in Austrian Land Use (6a)

- Settlement and traffic areas (3% of land)



- Are mostly in urban areas
 - But a significant part in rural areas as well
- Settlement areas – usually indoor - can easily be adapted to any climate condition
 - The time of staying indoor is increasing
 - The space occupied by a single person is increasing
 - So an average person does not suffer from climate change conditions
 - Technical means of adaptation like air conditioning
 - exist only since recently
 - » But cost resources and result in additional climate change

Climate Change Adaptation in Austrian Land Use (6b)

- Urban green structures
- Siting new objects in climatically favored positions
- Biological means of adaptation are often underrepresented
- Shading design with plants
- Introduce water for cooling



New combinations climate adaptation and mitigation affecting different land use categories



- Pellet heating systems
 - All over Austria new systems established
 - Often a local community venture where many citizens are integrated
- Electricity generation
 - In Vienna there is the largest bio-fuel electricity generation plant in Europe with 38MW capacity
 - Sufficient to support approximately 100,000 people with energy
- Public subsidies needed
 - current fossil fuel energy prices are still too low for bio

Relation Land Use and Rural Economic Activities

- Initially land use and economic activity was the same
 - Categories of land use were established some 100 years ago
 - Agricultural activity referred to agricultural land use
 - New categories of land use – tourism - build up on these traditional land uses
 - Summer tourism widely depends on water
 - Water – primarily the lake system - is a key attraction in summer tourism
 - Winter tourism strongly relates to pastures
 - Mountain pastures with right inclination were the start of skiing
 - Forests are cleared and converted to pastures
 - Not for cattle breeding, but for tourism

Rural Income in Austria (1)

- Austria still gains about 10% of GDP in the rural areas with approximately 97% of its land
 - Very high for an industrialized country
 - 1.8% in agriculture and forestry
 - 3.5% in summer tourism
 - 4.5% in winter tourism
 - Austrian rural population widely remained on place
 - Rural income is comparable to urban income
 - Rural people in Austria are generally rich
 - Contrast to other industrial countries of Europe
 - Generally no rural tourism tradition in Europe's industrialized countries
 - Rural migration due to lacking alternatives to agriculture



Rural Income in Austria (2)

- In general agriculture is getting less intensive
 - 189,300 farms in Austria (2005)
 - 74,400 still fulltime farms
 - Tourism gives main occupation outside agriculture and many activities are related to tourism
 - 11% or more than 20,000 of Austrian farms produce organically
 - this is highest number in EU
 - Average Farm Size is 40 ha (2005)
 - As compared to other European countries the agriculture is still small scale and extensive
 - In comparison to Japan, agriculture is large scale and resembles Hokkaido



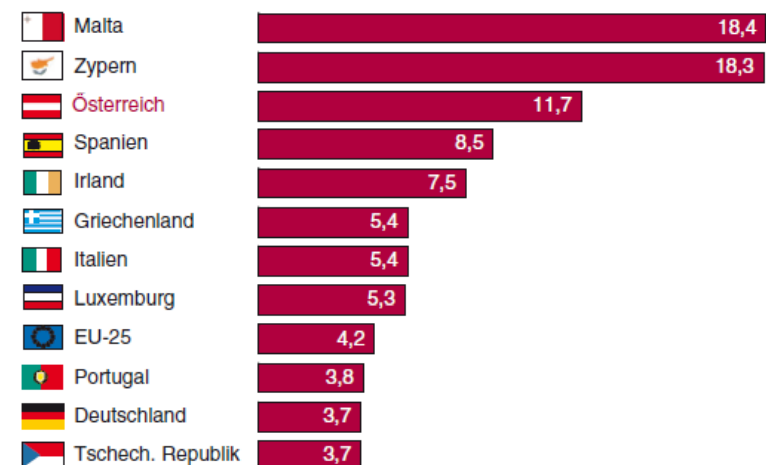
Rural Income in Austria (3)

- Rural Tourism is excellently developed in Austria
 - There are 67,700 tourist companies in Austria (2008)
 - Summer 60 million guest nights
 - Peak was reached in 1980 with 80 million guest nights, since then declining
 - Winter 60 million guest nights
 - Peak is reached in recent years 2005/06 and 2006/07
 - Tourism is the main income
 - As winter guest nights brings € 120.- as compared to summer € 88.- more earnings are made in winter
 - Winter brings nowadays almost as much as summer.
 - If interest in winter tourism continues, the income in winter and biologically inactive time will be larger than summer



Tourism intensity in Europe and Austria in 2006

- Tourism in Europe is primarily rural
 - Beach and coastal tourism
 - Mountain tourism
- There is a heavy weight on summer tourism in Europe
- Austria has a very high tourist intensity
 - Guest nights account for 11.7 per inhabitant
 - is very high and 3rd of Europe 25
 - Only small islands like Malta with 18.4 and Cyprus 18.3 get higher intensities due to summer season
 - However, in particular winter season is growing and threatened by climate change



Climate Change Adaptation in Summer Tourism

- Mountains may become more attractive
 - Better use of existing tourist facilities could be a consequence
 - Still relative cool temperature during hottest month
 - Comparative advantage to Southern European Mediterranean countries
 - But summer tourism is not considered to be as exclusive as wintertourism
- Risk in particular for high Alpine tourism are likely to grow
 - More rock fall
 - Higher risk of hang sliding after heavy rainfalls
 - More torrents



Climate Change Adaptation in Winter Tourism

- So far climate change worked in favour of rural economy
 - Large investments were undertaken in rural Austria for
 - Modernizing skiing infrastructure
 - Skilifts
 - Artificial snow making facilities
 - Widen skitracks for better mechanical preparation
 - Support of rural communities
 - To finance ever increasing cost of adaptation
 - Otherwise financial collapse comes before climate collapse
 - Backlash of winter tourism has to be expected
 - Roughly half of rural income is directly at risk
 - Indirectly even more



Summary

- Europe established a climate change adaptation policy
 - Policy is distributed to the public
 - Public shall participate
 - Cooperation with other countries is promoted
- Currently efforts are made to develop concrete climate adaptation plans with measures
 - For member states
 - For priority sectors
 - For particular vulnerable areas
- The actual adaptation is highly diverse
 - Must be site specific
 - Has to consider considerable more warming than what is experienced today



Thank you for your attention