1 Title: Land use change in Europe: interpreting regional scenarios from global storylines: land-use change as a basis to discuss and interpret gc-scenarios on a regional level

2 Basics

- 2.1 What do we want to do: develop land use change scenarios for Europe, at a spatial resolution of 10 minutes
- 2.2 Concept of the ATEAM project: using the SRES-Scenarios including models for ecosystem processes to come up with VA
- 2.3 The Basic Problem: how to go from global to regional scale whilst maintaining plausibility and internal consistency
- 2.4 Basic interpretation methodology: develop a comprehensive framework on a regional scale and on the basis of the global scenario
- 2.5 Identify Drivers (qualitative): how fit generic European drivers into the global scenarios?

3 Example: which drivers are important for urban land use change?

- 3.1 quantity
- 3.2 spatial location
- 3.3 simple model: assessment of demand for housing on the NUTS2 level and allocation of the demand to the ATEAM cells > creating maps (e.g. urban land use per ATEAM cell on a temporal horizon)

4 which drivers affect land use quantities and which the spatial allocation?

- 4.1 policy
- 4.2 macro-socioeconomic demand
- 4.3 macro-socioeconomic supply
- 4.4 spatial drivers: resource competition, rural and environmental policy and cc
- 4.5 non-spatial (quantity) drivers: all the rest

5 as a function of the drivers: a simple demand and supply function >> L_t/L_{t0} = D_t/D_{t0} * P_{t0}/P_t * O_{t,t}/O_{t,t0}

- 5.1 quasi-validation with historic trends (1960–2000) and real observed data (e.g. demand change=1,5 or technology change (average for Europe)=2,4 or setaside requirement (10% of cereal areas))

6 scenario parameter values

- a estimated future demand (D_t)
- b productivity changes: estimating climate effects on basis of ENC classes to wheat yields (Eurostat,ENC) > example map shown
- c technology effect
  - how to quantify future changes in crop yield arising from technology and management change?
  - wheat yield differences between countries!!
  - also to mention: relative change in yield is less in time then the absolute change: so the relative changes were used
  - tended towards conservatism in those scenarios
  - how to interpret technology changes per scenario?
- d oversupply factors (baseline=1,0)

7 allocate land use demand (quantitative): european change quantities >> 50% decline in agricultural production areas by 2080

8 allocate land use demand in space (rule-based)

- 8.1 but what about the spatial allocation?? >> scenario spatial allocation rules fit into the SRES-scenario space (A1, A2, B1, B2)
- 8.2 less favored areas: a map of non-optimal locations
- 8.3 arable land in 2080 with HadCM3: Maps for the different SRES Scenarios (percentage of arable land per ATEAM grid cell)
- 8.4 the same for grasslands....
3.10 so what happens to all the spare land? can we substitute food production for energy production on agricultural land: potential biofuel locations (distinguished between woody, liquid and non-woody biofuel), but biofuels still don’t count up to the surplus of land: maybe more forests..

3.11 but what happens to what’s left?? even more trees? abandonment? special areas for nature conservation and/or recreation? and, who pays?

4 Conclusions:

4.1 The scenarios suggest large declines in the surface areas of agricultural land use (especially grassland) for the A (economic scenarios)

4.2 The principal cause of these reductions lays in the assumptions about the role of technological development

4.3 The reduction seems to be only partly compensated by increasing biofuel production and forest land use

4.4 It is unclear what might happen to the large areas of surplus land

4.5 Declines in agricultural areas are less for B (more green) scenarios than for the A scenarios

4.6 This assumes that pressures toward declining agricultural areas are counterbalanced by policy mechanisms that seek to limit crop productivity

4.7 Includes measures to promote extensification or organic production, or

4.8 The substitution of food production by energy production and the planting of trees, or

4.9 An acceptance of overproduction (as with the current CAP)

5 Finally....

5.1 Scenarios are themselves models of the real world...(uncertainty of inputs!!)

5.2 Scenarios can be interpreted from storylines in many different ways – there is no correct answer, and many possibilities

5.3 Scenarios allow us to explore our understanding and preconceptions of how the world works – so came up new that technology is potentially so important for agricultural land use

5.4 Scenarios allow us to confront (policy) questions about the future

6 Some discussion questions (for your study region)

6.1 How do the presented scenarios of land use change compare with your responses to the questionnaire (of Tim Carter)?

6.2 If there are differences, what are they and why?

6.3 Are there additional drivers of importance for land use change?

6.4 What are the possible solutions to the surplus land issue

6.5 What are the consequences of the presented changes to goods and services