

AVEC workshop Capri, 11.-13.10.2004

Effects of land abandonment and global change on plant and animal communities

## **Discussion group “Vulnerability”**

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### **Introduction to the ATEAM/AVEC vulnerability concept**

Vulnerability is immediately and intuitively understood as the risk of harm. Three elements of vulnerability have been identified: exposure, sensitivity and adaptive capacity. Vulnerability is an integrating concept in several ways:

It integrates over different threats stresses and risks by focussing on the risk of harm itself instead of on particular causes of harm. Vulnerability studies are concerned with multiple causes of risk and multiple drivers of global change, such as land use change, climate change, socio-economic change, pollution etc.

Vulnerability integrates humans and their environment. The system of concern and study is the “coupled human environment system” (also called the eco-social system). Within this system, social systems and ecosystems are coupled by ecosystem services. Ecosystem services form vital links between humans and their environment. The Millennium Ecosystem Assessment distinguishes four types of ecosystem services: provisioning (products obtained from ecosystems), regulating (benefits obtained from regulation of ecosystem processes), cultural (nonmaterial benefits obtained from ecosystems) and supporting (services necessary for the production of all other ecosystem services) ecosystem services.

The concept of vulnerability embraces different types of values which are at the heart of sustainability: ecological, social and economic values. The concept of vulnerability is furthermore concerned with the values of different people and groups of people. Vulnerability science intends to provide salient, legitimate and credible scientific information about risks to the coupled human-environment system to stakeholders to inform their decision making towards enhanced adaptive capacity and reduced vulnerability. Vulnerability assessment is part of the continuous dialogue between different groups of stakeholders and scientists that should ideally be at the heart of a democracy.

In the ATEAM project we focussed on what ecological science has to offer vulnerability science. We therefore used a framework of different ecosystem models to project the provision of ecosystem services important for six sectors over this century. To drive the ecosystem models we used a set of internally consistent global change scenarios based on the SRES storylines A1f, A2, B1, B2. The scenarios are quantitative, spatially explicit projections of climatic, land use, pollution and socio-economic variables over time for Europe (10'x10' grid resolution, . time slices 1990, 2020, 2050, 2080).

Together with stakeholders from different sectors (agriculture, forestry, carbon storage, water, nature conservation, tourism) we selected a number of ecosystem service indicators to be projected throughout the century to estimate potential impacts on these sectors. We included a notion of the sectors' ability to adapt to some of the anticipated changes using a generic, macro-scale socio-economic model of adaptive capacity based on 12 socio-economic indicators.

The result of the ATEAM project are a suite of exposure, potential impact and vulnerability maps of Europe, for multiple plausible future scenarios, multiple ecosystem services and sectors. The multitude of scenarios represents a range of uncertainty resulting from limited knowledge on the one hand and a multitude of choices about society's future on the other.

### **Discussion**

If we believe that scientists should produce knowledge about the environment, rather than assigning value to it, our statements about the environment should be free of value judgement. However, value judgment by scientists was as implicit as it was clear in many of the statements made by scientists over

the last few days. Our discussion therefore first explored whether we could (1) make explicit this value judgement, and (2) arrive at a common value judgment among participants of the conference.

The valued elements that were identified were diverse, but nevertheless seemed to be shared by participants: heterogeneity, biodiversity, traditional agriculture, fair working conditions, ecosystems *per se*. It was recognised that even if we want to sustain traditional agricultural it may be hard to find people who are willing to practice it – two of the scientists present had left their jobs in traditional agriculture to do something else.

Two things remained less consensual and less clear: (1) What are the underlying needs and values expressed by the concern for these environmental elements? (2) What is their order of importance, if any? To frame this in ‘vulnerability terms’: *Which are the ecosystem services that seemed essential to people? What is the order of priority with which they would try to sustain their supply in the face of multiple (global) pressures?*

It was clarified that heterogeneity of a landscape is not always a desirable condition if one wants to conserve biodiversity. It was further explore why we should conserve biodiversity: “Why do we need to hold on to all these species?” – A consensus seemed to form that caution should be exercised not to irreversibly destroy systems or system elements of which we do not understand the function. “A species gone extinct is lost forever, as long as we do not know its function, we should not lose it carelessly.” This leads back to our attempts to understand ‘function’ and ‘value’, which were no more or less fruitful than at countless other events.

It was then agreed that the ideal way to assess vulnerability to the effects of land abandonment and global change is case dependent. Vulnerability of a certain region or case depends on processes and pressures on different, nested temporal and spatial scales and is context dependent. There is a need to integrate multiple stressors. There is a need to consider multiple values of multiple groups of people (scientists, policy makers, stakeholders from different sectors) – but see above on how difficult it is to even identify what we value, and why.