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**Criteria for ILTSER
(International Long Term *Socio*-Ecological
Research) Sites selection**

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Criteria for ILTSER (International Long Term *Socio-*Ecological Research)-Sites selection

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I.   Introduction

This paper is an outcome of discussions held in the R1 working group of the ALTER-Net (A Long-Term Biodiversity, Ecosystem and Awareness Research Network) NoE (Network of Excellence) which is a partnership of 24 organisations from 17 European countries. The task of the ALTER-Net "Network of Excellence" is the creation of a European long-term inter-disciplinary facility for research on the complex relationship between ecosystems, biodiversity and society in order to develop durable integration of biodiversity research capacity at a European level (for further information see www.alter-net.info). In order to substantially contribute to the discussion on and selection of LTSER sites within ALTER-Net, the RI working group (dealing with drivers and pressures of biodiversity change) identified the need of establishing criteria along which the future focus sites for research should be selected. This concerns specifically the research on socio-economic drivers of biodiversity change.

Generally terrestrial environmental research is performed within a variety of disciplines. While in the past each discipline organised their knowledge, information and data sets with regard to their own disciplinary interests they nowadays struggle with establishing networks for collecting, analysing and relating information and data

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at common spatial, temporal and organizational scales in order to better understand the linkages between ecosystem dynamics, biodiversity and human activities.

Redman and others (2004) identified five core activities that drive the relationship between social and ecological systems: land use, land cover, production, consumption and disposal. These activities are embedded on the one hand in social pattern and processes, like demography, technology, institutions and culture, and on the other hand in ecological pattern and processes, like primary production, populations and organic matter. With it the core activities cover a wide range of socio-economic factors and it would be very suggestive to focus on these core activities when determining criteria for LTSER-site selection. However the core activities not only mediate between the social and the ecological system they are themselves interrelated with each other. For example land can either be used for production or disposal. Moreover consumption of goods presupposes the production of the goods and disposal is often a by-product of consumptive or productive activities. For the purpose of LTSER-site selection we therefore followed a different route.

In particular we identified two sets of criteria: The *first* one is relevant to site selection and therefore to be applicable to every ILTSER site. This set of criteria is named »site« criteria. The *second* set of criteria is termed »network« or »pool« criteria, which identify a certain range of properties that should be present within the pool of selected sites, i.e. the criteria do not have to occur in every selected site. Rather, the criteria should be recognizable when comparing the entire range of selected sites. Therefore, the criteria ensure that a certain range of a specification occurs among the selected sites.

The authors are convinced that LTSER-site selection according to the criteria proposed in the paper at hand will allow studying a broad range of activities that bridge the ecological and the social system. Moreover before presenting the criteria it should be noted that a criterion of spatial extent of the sites to be selected is not included in the list of criteria, since it does not seem relevant to socio-economic analysis. Rather, the size of the socio-economic system is determined by other criteria, such as income and demography.

II.   »Site« Criteria

- **Data and relevant information have to be available in English language**

Motivation:
One translation for all at one cost.

- **INCOME: measurable and coming from primary, secondary, and tertiary sectors; within each sector one further *sub-criterion* has to be fulfilled:**

    - **intensification or de-intensification processes have to take place in the primary sector**
    - **change in growth rate or change of capital/labour inputs in the secondary sector have to be observed and**
    - **in the tertiary sector the existence of a tourist industry has to be ensured**

Motivation:
According to EU regulation on National Accounts *income* (GDP) has to be defined according to three different points of view: /*first*/ where it comes from (e.g. national production, imports and transfers), /*second*/ for which purposes it is used (e.g. investment, savings, consumption) and /*third*/ how it is distributed among the relevant sectors (e.g. division between labour and capital income). With it a broad data base for research activities is delivered.

Moreover a mix of economic sectors has to be present at each selected site in order to study how their interrelation affects biodiversity (e.g. land use changes driven by shifts from one economic sector to the other). Additionally it is ensured that different types of economic activities are included. Activities that fall in the primary sector are for example: agriculture, forestry, fishery, hunting, gardening, permaculture, mining, and other forms of extraction. The secondary sector includes all kinds of industries and manufacturing: the chemical industry, energy production, the construction sector,

etc. The tertiary sector includes services such as: transport, public administration, tourism and insurance.

Within the three main sectors we define sub-criteria to be fulfilled in each selected site: In the *primary sector* intensification and/or de-intensification processes have to take place since these processes, especially in agriculture, are identified to have major effects on levels of biodiversity. Intensification/de-intensification can be measured by increasing or decreasing inputs [e.g., in Joules, tons, labour] per unit of land area over time. In the *secondary sector* – contrary to the case of agriculture - the intensity of land use cannot be measured directly. Here, it is useful to measure the industrial pressure by a change in growth rates and a change in the relation of labour and capital inputs. The relation of capital and labour additionally delivers information regarding the issue of time use change. In the *tertiary sector* it seems crucial to focus on the tourist industry since we simultaneously have to deal with short and long term effects: tourism for example puts stress on ecosystems by a temporary enlargement of the population size but also by long-term decisions regarding land use and infrastructure (hotels and streets for example remain irrespective of the duration of the tourist season).

By including all three sectors of the economy we are able to ensure a certain size of the selected site. Thus, what is important from a socio-economic perspective is not the size of the site in terms of land area but rather the diversity of the social system within the site. By including the three sectors we can ensure that socio-economic impacts in biodiversity become measurable.

> **POLICY: Site-specific policies directly addressing biodiversity issues to be implemented and government or private investments in biodiversity conservation and improvement to be present. Above that the possibility of participation by stakeholders from all three economic sectors (primary, secondary and tertiary sector) has to be ensured.**

Motivation:

Policy refers to social objectives formulated by a political body and includes specific measures to attain these objectives (e.g. regulations, subsidies, incentives, etc.). Hence policies addressing biodiversity ensure that measures are taken to conserve/improve the level of biodiversity and regulate socio-economic drivers. Consequently, for example, questions referring to the dynamic efficiency of instruments and the acceptance of these can be addressed as well as problems of policy monitoring studied.

Of course not all kinds of policies are designed to induce investments in biodiversity improvement. Therefore it is an additional requirement that either private or government investment in biodiversity improvement actually shows up at the selected sites in order to gain information, e.g. on the relation of policy implementation and innovations relevant for biodiversity conservation.

Moreover the requirement of stakeholder participation refers to the involvement of stakeholders in formulating site-specific policies and implies that information must be conveyed to the public. This allows to study the impact of knowledge accumulation (e.g. by educational measures or scientific research) on the status of biodiversity. Socio-economic research is unable to provide and to improve its knowledge on social processes if stakeholders are not aware of and cannot influence biodiversity-related policy.

> ➢ **SOCIAL STRUCTURE: existence of conflicting social goals that have a potential effect on biodiversity (e.g. investments in infrastructure versus investments in conservation). The conflicts could arise either within the society of the selected site or between societies from inside and outside the sites or due to goals formulated by outside agents (e.g. government, scientists). The conflicts identified do not necessarily have to be open but rather may also be potential or gradual conflicts of interests, such as, generational conflicts; conflicting goals of development that may or may not be recognized; conflicts for which there are established coping mechanisms within the social system.**

In order to analyse the social structure of the sites, information on employment, education, cultural diversity/continuity, grassroots initiatives and time use should be available.

Motivation:

Local goals may not be directly reflected in policies, esp. not if they come from outside the site. Therefore, in addition to the policy requirement, the social structure criterion has to be fulfilled. Conflicts are able to drastically affect biodiversity. This is due to the fact that in many cases social goals of the population conflict with those of the government/administration or, e.g., ecologists. Therefore they often lead to unpredictable actions related to the status of biodiversity. Also, conflicts are the source of constraints faced by policy makers aiming at the implementation of measures improving biodiversity.

- ➢ **DEMOGRAPHY: existence of migration or mobility, i.e. immigration into/ emigration out of the site or movement of people within the site. Data availability on long-term demographic trends (of at least 50 years) and the demographic structure of the site population is additionally required.**

Motivation:

Movement of people influences land use, infrastructure, urbanization rates, and is therefore expected to increase stresses on the ecological systems. Instead of formulating a requirement for a long-term demographic trend that might reflect some of these aspects, we define a criterion of movement to take place. The reasons are that (1) an adaptation process in the ecosystem is expected to occur and (2) that the ecosystem had less time to adapt compared to a situation where movements are identified for the past and adaptation processes already started some time ago.

- ➢ **LAND USE: At each site three different land types have to be found: (1) at least one natural/semi-natural land type; (2) at least two types of agricultural land use and (3) at least one urban or suburban land type.**

Moreover land use data and land cover data has to be provided by the site according to international classifications (e.g. Corine).

Motivation:

Land use has been identified as one of the most crucial drivers of biodiversity change. Land use lies at the interface between socio-economic and ecological processes. It reflects changes in economic structure and demographic structure. It is moreover important to include different types of land use in order to e.g., identify conflicts, shifts between different types of use and type-specific resource uses.

III.   »POOL« CRITERIA

➢ **In the pool of selected sites *vulnerability* due to biodiversity changes has to show. Also a link (at least one, better two for comparison) between ecosystem services and socioeconomic development has to be found, i.e. for example the dependency of economic sectors or populations on a limited number of species or on ecological processes.**

Motivation:

We are seeking for vulnerable social systems as case studies for a dependence on biodiversity. This type of research can contribute to specific problem-solving but also provide information about the feedbacks between ecosystem services and socio-economic development. It also provides the ability to study the co-evolution of society, biodiversity, and management strategies.

➢ **Subsistence production vs. trade networks: Regarding this criterion the relation of total resources locally produced - either for local use in or export from the site - to imported resources from outside the site is important. In particular the sites should fall under three categories:**

0-15%, 15-30%, 30+%

These rates refer to biomass and minerals produced on site that are also consumed there, i.e.: exports and imports should be separately quantified.

Motivation:

In order to analyze the effect of globalization on biodiversity, we are looking for a range of sites along the »subsistence – trade-integrated« range of economic performance. The question behind this criterion is whether a »closed« or »open« economy has beneficial or negative effects on biodiversity.

➢ **Inclusion of two differing economies (in terms of income levels) with similar resource endowments in each European region (North, Mediterranean, Central Europe, Western Europe).**

Motivation:

This criterion helps to explain the influence of income levels on the state of biodiversity either positively (higher investments in protection or restoration) or negatively (e.g. exploitation of resources or ignorance) under the condition of similar resource potentials.

IV.   Concluding Remark

The authors are fully aware that there would have been a lot of further and different criteria suitable for LTSER-site selection. However they are convinced that the design of the criteria suggested in the paper at hand is broad enough to select sites at which researchers can address and answer a variety of biodiversity relevant questions in the future - even those we can not think of today.

V. Literature

Redman, C.L., Grove, M.J. and Kuby, L.H. (2004), Integrating Social Science into the Long-Term Ecological Research (LTER) Network: Social Dimensions of Ecological Change and Ecological Dimensions of Social Change, *Ecosystems, 7,* 161-171.

VI.   Acknowledgements