

## **Bridging the gap between science and decision makers for sustainable development of multi-functional land use in developing countries**

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### **Introduction**

Sustainable land use is a key issue to improve food security, control land degradation and reduce poverty, especially in developing and transition countries. Global changes and growing demands on resources have resulted in dynamic changes of land and related sustainability issues. Hence policy- and decision makers have increasing demand for *ex-ante* assessment tools to support decision making processes in a sustainable way. The EU-funded projects LUPIS ([www.lupis.eu](http://www.lupis.eu)) and SENSOR-TTC ([www.sensor-ip.org](http://www.sensor-ip.org); Helming et al., 2008) develop methods and tools for assessing policy- and/or alternative problem scenario impacts on land use and sustainable development (SD) in a selected number of case study regions in Africa, Asia and Latin America.

When developing scientific tools, the focus is often on specific scientific questions, while the applicability and usability for stakeholders is often neglected. To have impact however, communication with stakeholders and usability of tools is of major importance. Therefore, the assessment, communication and visualization tool 'Pro-Vision' is developed. Pro-Vision is used to support the impact assessment procedure considering participatory approaches and to evaluate anticipated impacts on sustainable development issues.

### **Methodology**

In Pro-Vision, the analytical chain is developed based on the Driver-Pressure-State-Impact-Response (DPSIR) framework (OECD, 2003), to structure different case study regions and to identify cause-effect relations between policies/problems, land use changes and regional sustainability issues. The DPSIR framework is used to (a) develop regional specific land use change scenarios, and to (b) evaluate possible impacts of land use changes on sustainable development (Figure 1).

For the scenario development, Pro-Vision is first applied to elaborate and visualize alternative land use change scenarios, e.g., during regional stakeholder workshops. Stakeholders and experts are asked to specify possible land conversion dynamics (type specifications, suitability and allocation dynamics), and to discuss possible scenario outcomes.

For the second part, Pro-Vision is used to evaluate possible land use change impacts on sustainable development. The concept of Land Use Functions (LUFs) as developed by Pérez-Soba *et al.* (2008) is used in the Pro-Vision tool to assess in an integrative way the economic, environmental and social impacts that land use changes have on sustainable development. Land Use Functions are developed to illustrate most relevant sustainability issues at regional level and are defined as goods and services associated with land use (e.g., economic: food production; environmental: maintenance of ecosystem processes; social: provision of work). For the evaluation of impacts, stakeholders and experts are asked to identify a key set of Land Use Functions and to define causal-chain dependencies between land use and sustainability. This is done by assigning region specific weights between land use types and Land Use Functions.

In the final step, sustainable development can be interpreted using the LUFs framework, to allow stakeholders, and scientists identifying at a glance those functions of the land which are fostered or hindered under various scenarios of land use changes, and making it possible to explore the trade-offs between them.

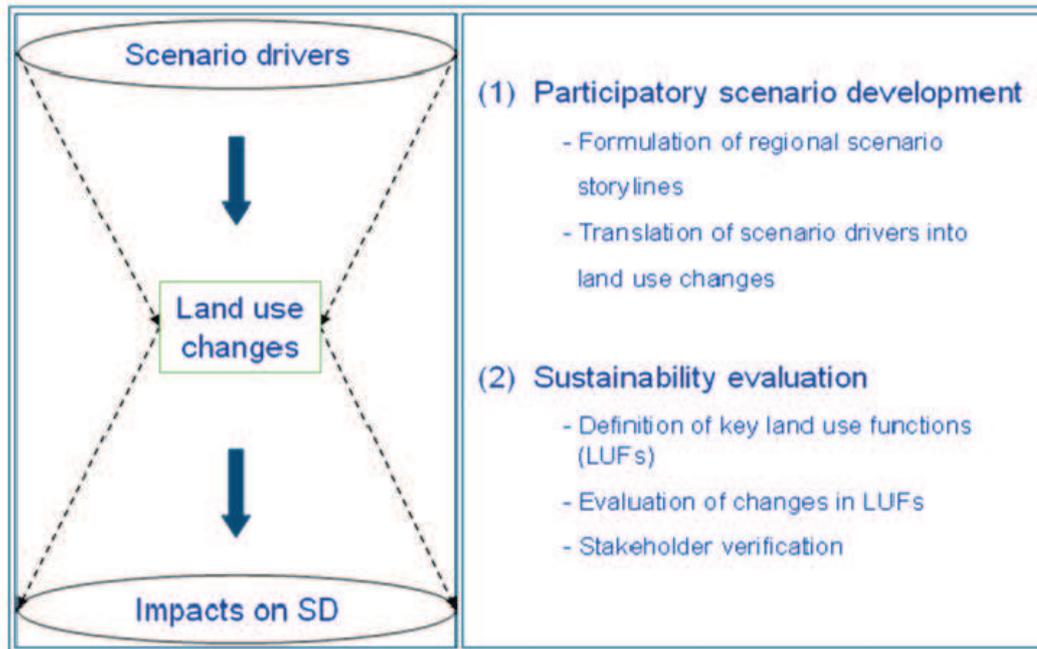


Figure 1. The methodological framework of the Pro-Vision tool is based on the DPSIR framework, and is used to support (a) participatory scenario development and (b) sustainability evaluation.

### Results, discussion and conclusion

The two projects LUPIS and SENSOR-TTC aim at assessing alternative policy/problem scenarios in different case study regions. The methodological framework of both projects builds upon European assessment methods (Reidsma *et al.*, 2008; Helming *et al.*, 2008), and is currently being adapted and tested in a selected number of case study regions in China and Brazil to identify strengths and weaknesses of this approach, and also to provide a primer for sustainability impact assessment in developing countries. A heterogeneous set of land use related problems is assessed: water pollution in China, and side effects of infrastructure projects and land conversion in Brazil.

By using Pro-Vision, integrated assessments of land use policies are possible that do not depend on the use of complex tools, but by complementing quantitative and qualitative approaches which are insightful for decision makers and other stakeholders. In order to bridge the gap between scientists and decision makers, participatory communication and visualization tools are needed to support the understanding of complex causal-chain relationships between policies and their impacts on regional sustainability issues. The Pro-Vision tool has been developed to support this process. Pro-Vision enables users and stakeholders to identify causal-chain relationships between land use changes and regional sustainability issues and improve their decision-making process.

### References

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