EDUCATING RIVER MANAGERS OF THE FUTURE BY TEACHING CONCEPTUAL SYSTEMS UNDERSTANDING

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In this abstract the need for a better and more integrated environmental education to achieve sustainability in catchment management is pointed out, and the development and first evaluation results of a new engaging learning software (DyanLearn, www.dynalearn.eu) are described.

Humans have changed riverine landscapes in large parts of the world in a way that their natural ecological functions are critically impaired. Integrated river basin management is therefore one of the biggest challenges of the 21st century (UNESCO IHE). Achieving the Millenium Development goals of coupling human welfare with healthy riverine environments is only possible when the co-dependence of people and the biophysical dimensions of ecosystems are acknowledged and physical, chemical, biological, social, economic and political issues are considered adequately. A comprehensive ecosystem approach including human behavior, and social sciences has to be taken to achieve understanding and as a basis for sustainable management. Especially education has been recognized as an important factor for achieving sustainability in the long term.

Within the DynaLearn (DL) project, an interactive, hierarchically structured learning environment able to capture and simulate causal relationships across disciplines and scales without the necessity of using numbers is being developed. Six Learning Spaces (LS) including concept maps, generic causal reasoning, qualitative system dynamics simulations based on rates, state variables, assumptions and agents allow for a cross disciplinary exploration of practically every topic at different levels of complexity. Furthermore the software is able to simulate non-linear dynamics and emergent properties of systems. Accompanying the DL Software a new curriculum based on a constructivist and hierarchical ecosystem approach including thermodynamics and archetypical system patterns is being developed.

First evaluations of a prototype of the software at a secondary technical high school and at the University of Natural Resources and Life Sciences yielded significant effects of the DL Software on learning and causal understanding.