



NEWSLETTER

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NATURNET-REDIME Qualitative Reasoning Curriculum to enhance uptake of Millennium Development Goals and Millennium Ecosystem Assessment

Tim Nuttle, Friedrich-Schiller-Universität Jena, Germany; Paulo Salles, University of Brasília, Brazil

Sustainable development (SD) is "a real increase in well-being and standard of life for the average person that can be maintained over the long-term without degrading the environment or compromising the ability of future generations to meet their own needs." NaturNet-Redime's primary goal is to develop educational programmes to increase the understanding of SD in Europe, with the goal of facilitating implementation of the EC's Strategy for Sustainable Development...

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NATURNET-REDIME project



At a time when the policy for sustainable development in Europe is under considerable stress from the increasing focus on economic development, the Commission's mid-term review of the EU sustainable development agenda (Gothenburg Strategy)

claimed that the strategy for sustainable development (SD) has so far failed to deliver.

However, through its influence on the environmental, social – and economic - agendas, sustainable development has helped bringing about in Europe an increased efficiency of resources, an increased level of innovation, and an increased awareness of the limits of development.

The policy for sustainable development does require further support from decision makers, scientists and the ordinary citizen. It is for this reason that DG RTD has chosen to strengthen the infrastructure for the promotion and dissemination of the sustainable development agenda across Europe by commissioning the NATURNET-REDIME (NNR) project to provide forward-looking, interactive web portal services for sustainable development that integrate existing knowledge & educational practices & content of SD with the most advanced information and communication technologies.

The NATURNET-REDIME project (NNR) is the result of the merger of two projects that each sought to use web and computer technologies to disseminate knowledge about sustainability.

The aspects of the NATURNET component of the project focus on building an interoperable Internet architecture, where users can access and visualise much of the data on sustainable development that

currently exists in scattered, non-integrated form throughout the world. Mobile Internet technologies will allow users to access location-specific information in the terrain, wherever they are.

The REDIME component of the project focuses on learning through modelling. People learn about system behaviour best when they can construct mental models of how the system works. This approach aims to develop tools for the public to learn about sustainable development and will be made possible by enhancing Qualitative Reasoning (QR) modelling tools to make them easy and interesting to use. Users will assemble these pieces of knowledge like building blocks to create and run simulations. In contrast to passive learning by traditional lecture or reading formats, a deeper understanding of cause and effect will be facilitated.



All learning materials of the project will be available via the NATURNET web portal, where users will find appropriate curricula to lead them through the learning process. Interaction with end users throughout the project will provide feedback to the project partners to ensure that the tools are optimised.

EU strategies for sustainable development

Pierre Valette, Daniel Deybe – European Committee

The Environment Directorate of DG RTD included in the work programme of FP 6 a specific topic on "Strategies for sustainable land management, including coastal zones, agricultural land and forests", whose global purpose is to develop tools and methods in the field of land use that allow:

- Ex-ante impact assessment of policies at different levels, from micro to macro
- To identify the contributions of the different sectors and global policies to the EU Sustainable Development Strategy.



With on average 117.5 people living on each of the EU's 3 million square kilometres, it is easy to see why land use planning and management is such an important environmental issue for the Union. The way we use our land space can have major impacts on the quality of our environment. These can be direct, such as the destruction of natural habitats and landscapes, or indirect, such as the increase of the amount of traffic on our roads leading to more congestion, air pollution and greenhouse gases. Land use planning and management decisions are usually made at local or regional level. However, the European Commission has a role to play in ensuring that Member States take environmental concerns into account when putting together their land use development plans.

Naturnet-Redime is one of a set of research projects that contributes to fulfil these objectives, important for the future of the European Union. This project will help - through the use of e-learning techniques - to the training of users and stakeholders on the sustainable development concept and on the tools available for impact assessment. It also will allow the user, based on the Qualitative Reasoning approach, to build up its own model of analysis to help him finding a solution for his own problem.

Qualitative Reasoning

Bert Bredeweg - University of Amsterdam

Qualitative Reasoning technology has proven to be cost effective, reliable and efficient, as a means to analyse the behaviour of systems without numerical information. The technology has been applied successfully to problems in the automotive industry, aeronautics and spacecraft, thermodynamics, and ecology. For a recent overview of this Artificial Intelligence that involves non-numerical description of systems and their behaviour, preserving all the important behavioural properties and distinctions. Qualitative Reasoning technology is of great importance for developing, strengthening and further improving education and training on topics dealing with

systems and their behaviours. It is well known that an essential part of modern education and training involves the comprehension of systems and their behaviours. That is, being able to distinguish a system from the environment in which it operates, to identify the parts that it is made of, and to predict or explain its behaviours. Research in the cognitive sciences has shown that when learners have a causal model of system behaviour, they are better able to apply their knowledge to new situations. Qualitative Reasoning models are a way to develop such causal models, because they capture the fundamental aspects of a system or mechanism, while suppressing much of the irrelevant detail. This approach makes expert

knowledge available to non-experts for direct use in educational and applied contexts. An important advantage of Qualitative Reasoning over other techniques like expert or knowledge-based systems is that Qualitative Reasoning transfers not just predictions based on expert knowledge, but also makes this knowledge explicit, allowing its transfer to others. Hence, our approach will help reconcile the conflicting interests of stakeholders and facilitate restoration and sustainable development throughout Europe.

Successful applications

Qualitative Reasoning technology has proven to be cost effective, reliable and efficient, as a means to analyse the behaviour of systems without numerical information. The technology has proven to be cost effective, reliable and efficient, and has been applied successfully to problems in the automotive industry, aeronautics and spacecraft, thermodynamics, and ecology. For a recent overview this Artificial Intelligence research, consult the special issue of the AI magazine on Qualitative Reasoning (Bredeweg & Struss, 2003). The great majority of research on Qualitative Reasoning (and Artificial Intelligence techniques more generally) is still published only in artificial intelligence or computer engineering journals. This is because currently, mainly Artificial Intelligence researchers and knowledge engineers develop such models, because virtually no easy-to-use tools are available for researchers, managers, teachers, stakeholders, and decision makers that would facilitate the uptake and application of this technology.

Learning with models

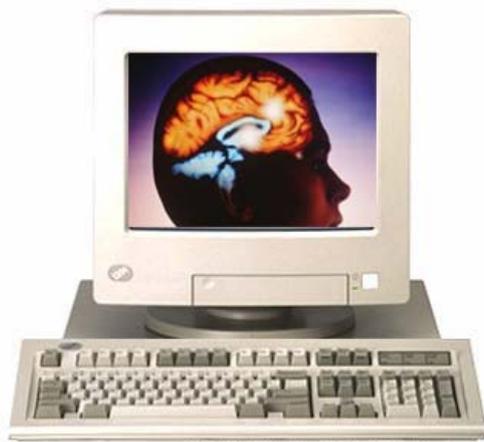
Part of the NaturNet-Redime project focuses on learning through modelling and simulation. People learn about system behaviour best when they can construct mental models of how the system works. Within the project this approach is made to use by developing tools for the public to learn about sustainable development. This will be made possible by enhancing Qualitative Reasoning modelling tools to make them easy and interesting to use. A team of sustainability experts will organise and explicate cause-effect processes into the new Qualitative Reasoning workbench, allowing this knowledge to be transferred and re-used. Users will assemble these pieces of knowledge like building blocks to create and run simulations. In contrast to passive learning by

traditional lecture or reading formats, a deeper understanding of cause and effect will be facilitated.

Qualitative reasoning thus provides a framework for teaching about thresholds of sustainability because it focuses attention on identifying and understanding the range of possible behaviours. With Qualitative Reasoning, attention can be focused on causal factors, including environmental, economic and social impacts of policies and management actions. Furthermore, because of the natural ontology used in Qualitative Reasoning, explanations are easy to generate from simulation results. Hence, Qualitative Reasoning models and the stakeholder involvement in developing them will facilitate incorporation of sustainability in decision-making processes.

Towards a workbench

Qualitative Reasoning technology is of great importance for developing, strengthening and further improving education and training on topics dealing with systems and their behaviours. However, easy-to-use tools are currently not available. The goal of the NaturNet-Redime project is to develop such tools, particularly a workbench (based on Qualitative Reasoning technology) that can be used by stakeholders (novices and experts alike) to help them articulate and understand sustainable development issues, and by doing so improve their decision-making abilities. The workbench will be delivered in



three phases. During the first phase (first half year of the project) individual pieces of existing Qualitative Reasoning software (for modelling and simulation) will be integrated into a single seamless software package. During the second phase, the workbench will be augmented with features to facilitate collaborative working and learning. The third phase is reserved for enhancing the software with smart online help, with the goal of increasing the overall usability of the workbench.

The Qualitative Reasoning workbench will facilitate scenario building and simulations to be run to evaluate risks and forecast potential impacts and externalities of proposed management actions that result from sustainable development initiatives. Furthermore, the dissemination through the NaturNet-Redime web portal will ensure maximum dissemination to all segments of society. Following our educational programmes, which include training events and online tutorials, where users will be able to access the Qualitative Reasoning workbench to investigate whatever sustainable development scenario they are interested in.

User-workshop

The NaturNet-Redime consortium is organising a workshop (10-14 October 2005) to introduce Qualitative Reasoning technology to Ecologists and workers on Sustainable Development issues. Particularly, Tuesday 11 October and Wednesday 12

October are open for participants from outside the consortium to participate and learn about the features of the new Qualitative Reasoning technology. However, the number of available places is limited. Contact Bert Bredeweg (bredeweg@science.uva.nl) for details.

Report on the elaborated service standards and recommendations for the NATURNET-REDIME system

Harald Stelzl – Joanneum Research

The current work in Task 2.1 is the production of a detailed description about different technical standards including recommendations for the further work in the NNR-project. The task is leaded by JOANNEUM RESEARCH and has started in project month 1 after the kick-off-meeting. Many partners are involved in this task and have contributed much work to produce a very well defined manual about the different technological topics. Beside JOANNEUM RESEARCH mainly involved have been the partners FELIS, CCSS, IGN, IMCS and MOVIQUITY. The work on this deliverable has nearly been finished in August, some minor changes will be made during September.

The main topics which have been covered by our work are:

- the analysis of WebService standards

- the analysis of Metadata and Thesaurus
- the analysis of multimedia standards and virtual reality
- the analysis of OGC standards
- the analysis of e-learning standards
- the analysis of networking standards
- the analysis of standards addressing mobile environment

All these tasks have been done in strong correlation with the project aims to prepare useful material for the further work packages WP3 and WP5.

In beginning of September the last corrections in the deliverable will be done to prepare a final version for the European Commission.

Tools For The NATURNET-REDIME Map Server Portal

Karel Charvat – Czech Centrum for Science and Society

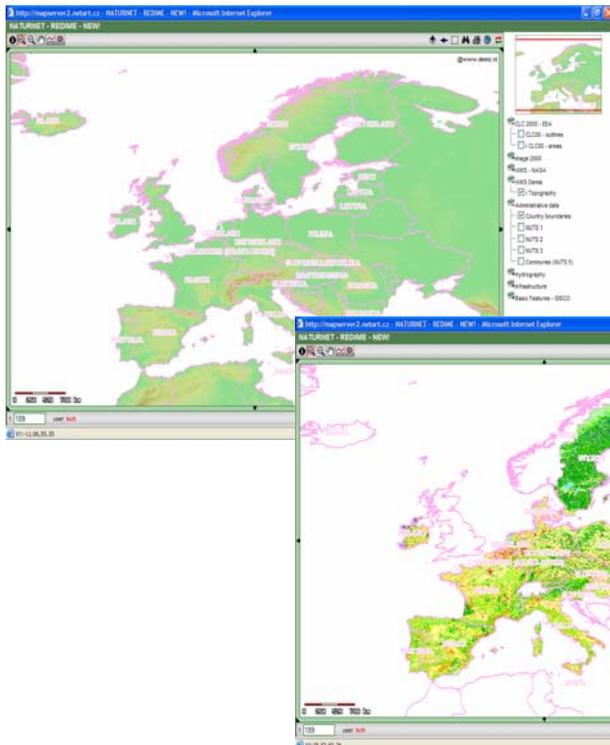
For the testing of access to distribute the NaturNet Redime Mapserver is designed by NATURNET REDIME project team and implemented. There is an Open Source technology Mapserver of University of Minnesota. The solution is based on implementation of OGC standards (WMS, WFS), which allow sharing

data from different servers across Europe. The CCSS server hosts the solution.

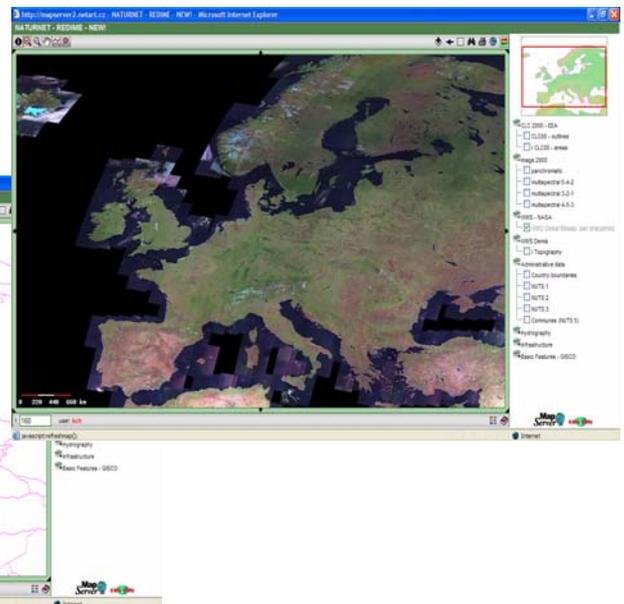
The focus is mainly testing of WMS services. A Web Map Service (WMS) produces maps of geo-referenced data. It defines a "map" as a visual representation of geo-data; a map is not the data itself.

Currently accesible data layers

Demis Server trough WMS

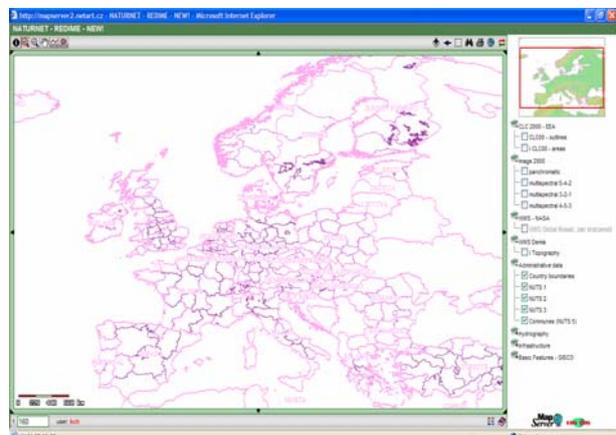
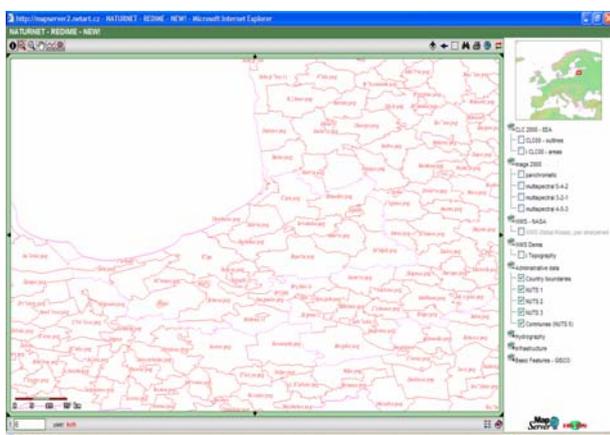


WMS services of NASA



CLC2000 Data of EEA replicated on CCSS server

Eurostat NUTS data replicated on CCSS server



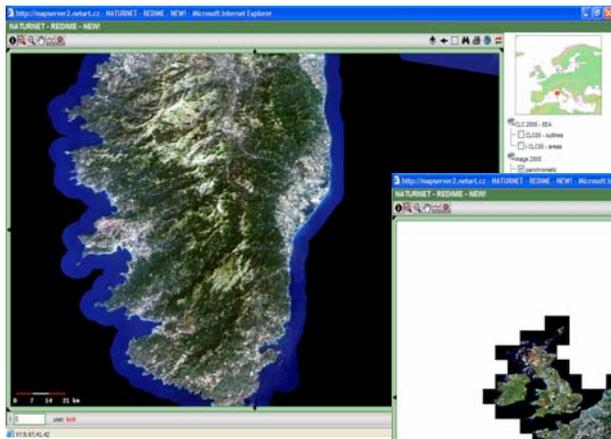
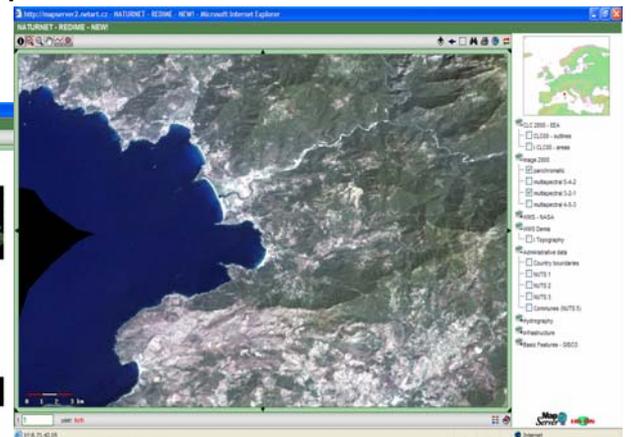
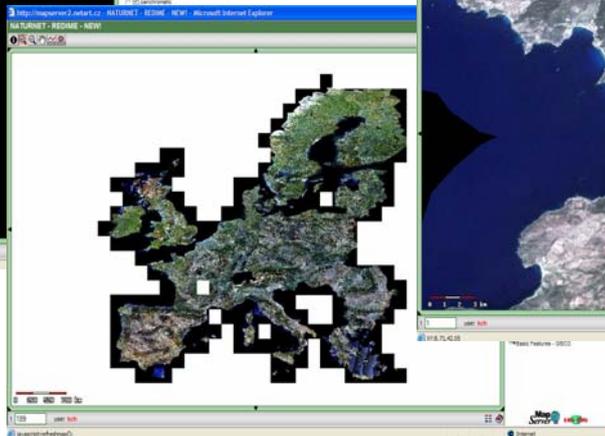
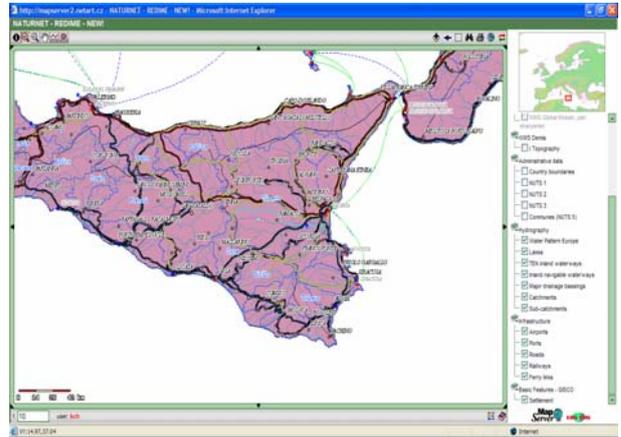
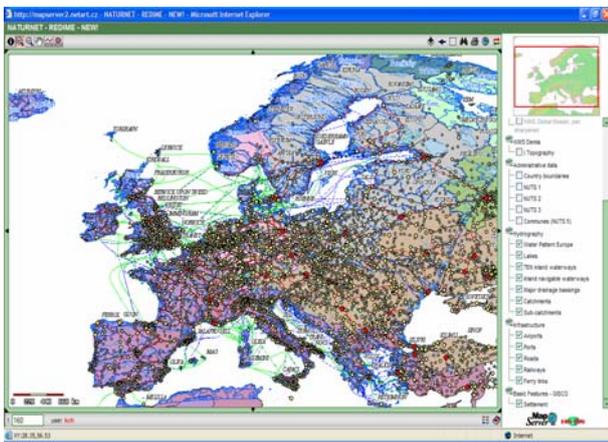


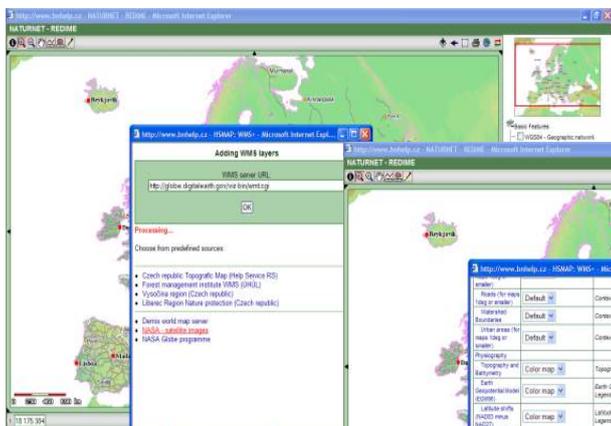
Image 2000 replicated on CCSS server



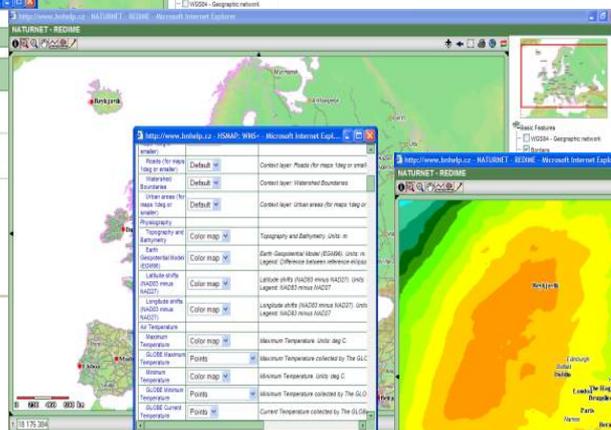
GISCO (Eurostat database) replicated on CCSS server



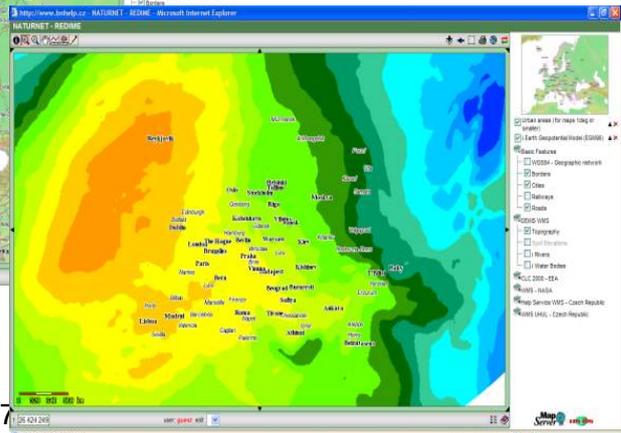
Any user can add its own WMS services using special functionality of server



Now it is possible to ask for existing layers, using GetCapabilities request



And add new layers to composition



E-learning and digital libraries in the NATURNET-REDIME project

Markus Jochum, Octavian Iercan, Christian Schill, University of Freiburg, Germany

The aim of the NaturNet Redime project is to provide educational tools that help to understand the need for sustainable development. The way of presenting the content to a broad public sitting in front of a computer is different compared to traditional learning methods. The average user avoids reading



long texts on screen and will rather use tools with colored visualizations and interactivity. In addition educational tools can help to prepare specific learn goals in a learning management system. For that reason at the beginning of the project a review of educational provisions and opportunities was carried out focusing on already existing eLearning portals and digital libraries containing learning materials. The aim of the examined eLearning tools is to support the lectures at schools or universities whereby the tools serve at a medium that is situated between the teachers and the learners. The content is adapted to the needs of the students and thus it is specialised to the respective course of studies. The design of the NNR portal will be different regarding the content and the target groups. NNR will contribute to spreading the idea of sustainability to a broad audience all over Europe, to the so-called life-long learners.

NNR created a pattern for the selection of the best fitting e-learning platform for NNR – Redime's needs. The selection pattern was determined by combining several aimed parameters, like: e-learning standard, license type, developing language, database used, number of languages in which the platform is translated, etc. In the end we chose two e-learning platforms, namely ILIAS and MOODLE. ILIAS platform uses as a standard SCORM 1.2 and MOODLE is using IMS standards but is also SCORM compliant. The

platform that will, in the end, be chosen will have to fulfill also other additional conditions from the first ones used in the first stage of selection. One would be ease to operate the e-learning tool; another would be the additional functions that are included in a specific platform.

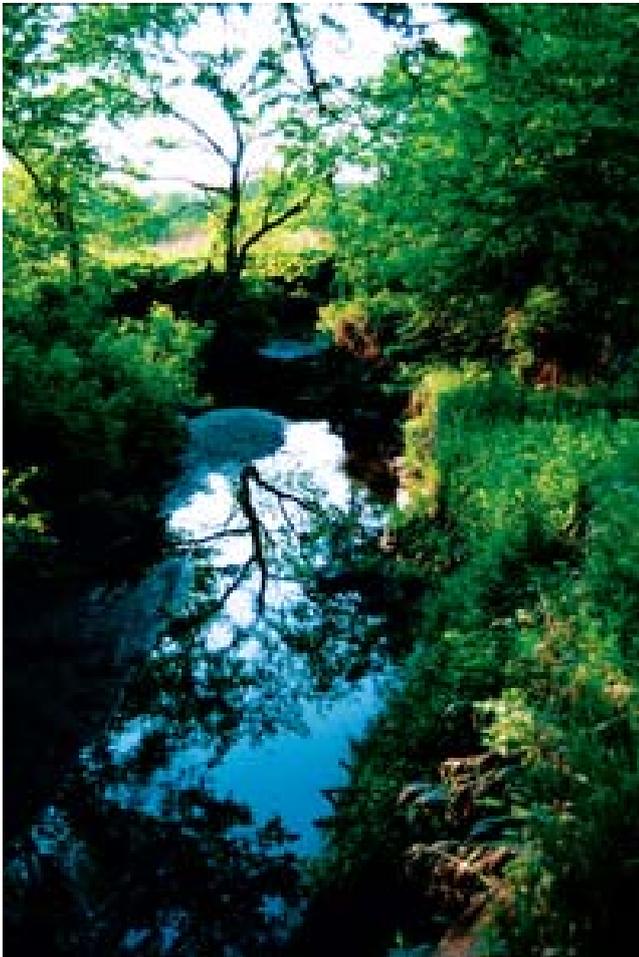
The digital libraries offer the possibility to gather lots of information to a specific subject. By entering keywords, selecting categories, selecting the grade suitable for the target audience, selecting the age of the material, etc. the system filters through metadata search the wanted information for the users specific interest. The results are single sources of various kinds, e.g. articles, papers, Power Point presentations, etc. and the user has still to decide what is of importance to him. The aspect of metadata is also considered in NNR. Learning material will be gathered by keyword search to one specific subject.

The design of the NaturNet portal compared to the existing tools will be new as a digital library will be combined with eLearning modules. The NaturNet Redime project will establish three examples based on the needs of the NNR regions. The questionnaires revealed that in the municipalities and schools are computers with a fast internet connection that allows using a rich media content learning portal. The form of presentation envisaged by the NNR regions will be a mix of text, audio, video, simulations, 2D and 3D maps and models with interactivity.

Regarding the content that should represent the NNR regions issues towards sustainable development the next step is to clearly define specific problems in the regions that can be put in the learning modules in terms of visualisations. Environmental issues concerning land use are appropriate to being used for visualisations. Land use management can be easily expressed and explained by showing the spatial component in geographical maps and 3D models.

NATURNET-REDIME Qualitative Reasoning Curriculum to enhance uptake of Millennium Development Goals and Millennium Ecosystem Assessment

Tim Nuttle, Friedrich-Schiller-Universität Jena, Germany; Paulo Salles, University of Brasília, Brazil



Sustainable development (SD) is “a real increase in well-being and standard of life for the average person that can be maintained over the long-term without degrading the environment or compromising the ability of future generations to meet their own needs.”¹ NaturNet-Redime’s primary goal is to develop educational programmes to increase the understanding of SD in Europe, with the goal of facilitating implementation of the EC’s Strategy for Sustainable Development.

One of the approaches of the NaturNet-Redime project is to use Qualitative Reasoning (QR) technology to develop educational curricula about sustainability. A step towards implementing this approach was the development of the *Guidelines for*

Sustainable Development Curriculum (NaturNet-Redime deliverable 6.8), which identifies three interrelated aspects based on the above definition:

1. increase in well-being and standard of life for the average person;
2. environmental health;

long-term maintenance of this balance and keeping options open for the future. Each of these three concepts requires further elaboration. What factors contribute to the increase in well-being and standard of life for the average person? How does one weigh the importance of well-being of not only the ‘average person’ but also of the poor and the wealthy? Just what is ‘environmental health’? What processes are important to consider? How do we evaluate long-term sustainability? How open should options be left for the future? The *Guidelines* outlines three content areas in which NaturNet-Redime partners will develop interactive QR models and curricula to address these questions.

These content areas are:

1. the Millennium Development Goals (MDG) and Millennium Ecosystem Assessment (MA),
2. case studies of SD scenarios in European river basins, and
3. SD problems of particular relevance to the EU.

Work has recently begun transferring the knowledge contained in the MDG and MA into QR models. SD problems of particular relevance to the EU where a QR approach to learning is likely to be effective will be identified in the near future. Also, work on case studies of SD issues within European river basins will commence after the release of the new QR workbench in October (see article, this issue). Reports on these activities will occur in future newsletters.

¹ William P. Cunningham and Mary Ann Cunningham. *Principles of Environmental Science*. McGraw-Hill online: http://highered.mcgraw-hill.com/sites/0072452706/student_view0/glossary.html. (accessed 6 July 2005).

The Millennium Development Goals and the Project NATURNET-REDIME

In September, 2000, the United Nations issued the Millennium Declaration. As a consequence, discussions on poverty, hunger, education, gender, health, environment and cooperation held over the past 20 years in conferences, protocols and conventions under the UN umbrella were summarized in a set of 8 goals and 18 targets to be achieved mostly until 2015. These goals are known as the Millennium Development Goals (MDG), and 48 indicators were selected to monitor the progress of the countries towards them.

The MDG are different: for the first time, the UN launched a campaign throughout the world to disseminate ideas about human development and sustainable development for the general public. Communication about the MDG has to be clear, objective, and understandable for the “average citizen”. The idea was to create a feeling that ‘we can do’ something about the goals.

We see the MDG as an opportunity to discuss sustainable development and therefore to start our work in the Naturnet –Redime project. In fact, one of the first project results is a set of Qualitative Reasoning models about the seventh MDG (ensure environmental sustainability). This is considered the most difficult goal to be understood and to be achieved on time, due to conceptual problems in defining sustainability, lack of knowledge about the basic phenomena and lack of data for the indicators to monitor the MDG7. Qualitative Reasoning may give as valuable models and communication tools in these conditions. The models



include 10 indicators and other quantities to represent deforestation and biodiversity conservation; efficiency in the use of energy; atmospheric pollution with greenhouse gases and ozone depletive gases resulting from different human activities, as agriculture, industry, services and petrol consumption; domestic solid fuel consumption; access to safe water and to sanitation. The models were presented in the 2nd MONET Workshop on Model Based Systems, a meeting included in the official program of the International Joint Conference on Artificial Intelligence (IJCAI-05), held in Edinburgh, Scotland, in 30 July 2005. As expected, our work had a warm welcome, and raised interest on the Naturnet-Redime Project. Ongoing work is to evaluate the models with different users and stakeholders in the water basin committees. The paper presented at the workshop will be available at the project web site.

QR Models for the Millennium Ecosystem Assessment

In concert with the Millennium Declaration, The United Nations initiated the MA in 2001. The MA has become “the most comprehensive inventory of the Earth’s ecosystem services to date,”² involving over 2000 scientists from 95 countries over the last four years³. The MA clarifies the many linkages between the ability of the Earth’s ecosystems to provide services and human well-being (Figure 1). Hence, SD

is not just a luxury of wealthy nations but is essential for every person on the planet⁴.

² Gewin, V. 2005. Dispatches: Millennium Assessment means business. *Frontiers in Ecology and the Environment* 3: 180.

³ Millenium Ecosystem Assessment. 2005. *Ecosystems and Human Well-Being: Synthesis*. Island Press, Washington, DC, USA.

⁴ Millenium Ecosystem Assessment. 2005. *Living Beyond Our Means: Natural Assets and Human Well-being*. pre-publication draft available at www.MAweb.org.

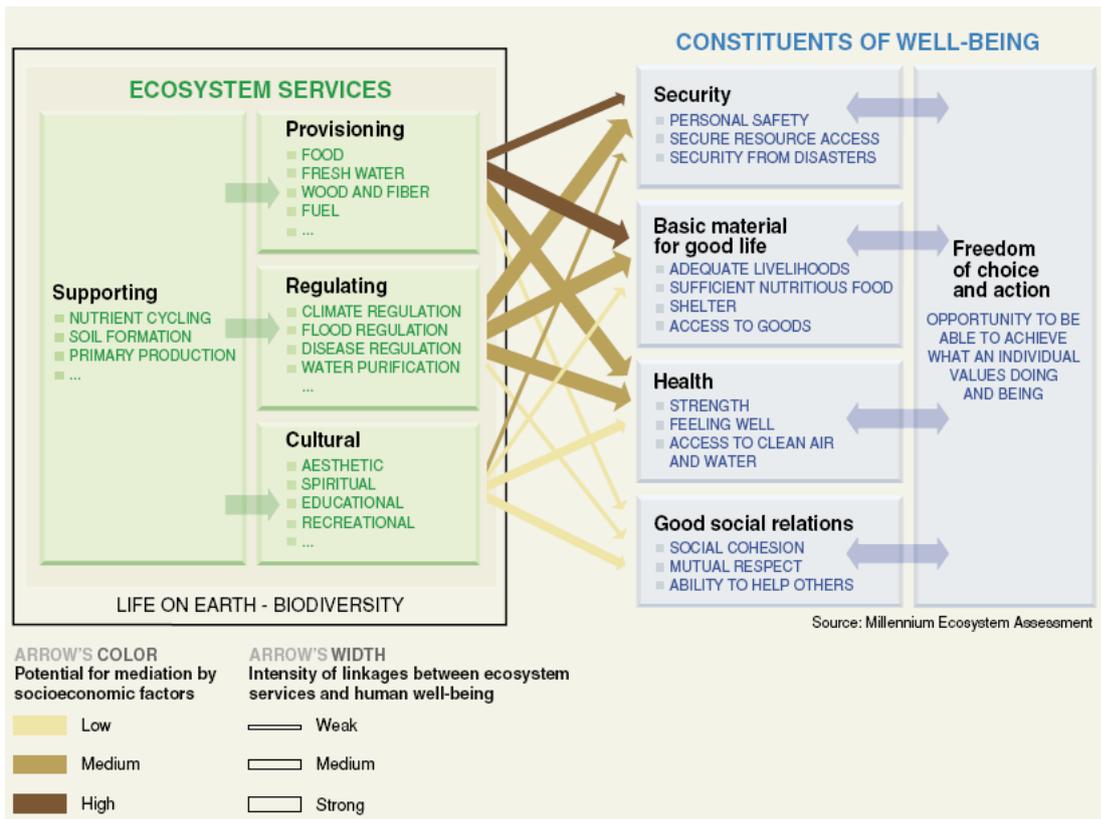


Figure 1. From the Millennium Ecosystem Assessment: human well-being depends on services provided by Earth's ecosystems.

Transferring the findings of the MA into educational materials driven by QR technology has great potential for enhancing understanding about sustainability worldwide. The *Guidelines* outline a plan to implement QR models and curricula that explore these linkages. Development of this content will be aided by details provided in various MA Synthesis Reports (available starting October 2005). Synthesis Reports are targeted towards different stakeholder

groups, such as business and industry and decision makers. However, there is a great opportunity to make this information more interactive to enhance deep understanding and exploitation by more diverse stakeholder groups. Hence, the educational content developed within NaturNet-Redime has great potential to provide significant positive impacts by synergizing with the content of the MA, which has already drawn considerable international attention.

Events of interest

- "Nanning International Conference on Sustainable Urban Development - From Research to Action" Nanning, China, from 9 to 11 November 2005, www.iclei.org/itc/relay
- The World Summit on the Information Society and the role of Local Authorities: Bilbao, 9th– 11th of November 2005
- IST-Africa 2006 Conference and Exhibition, 3 - 5 May 2006, CSIR International Convention Centre, Pretoria, South Africa, <http://www.ist-africa.org/Conference2006/default.asp>
- 7th EC conference on Safeguarded Cultural Heritage Understanding & Viability for the Enlarged Europe. The conference will take place in Prague, The Czech Republic from 31st May to 3rd June 2006. www.arcchip.cz/ec-conference
- The 4th World Congress of Computers in Agriculture and Natural Resources, Orlando, Florida, USA from July 24 to 26th, 2006. It is a collaborative effort among agricultural information technology associations worldwide, <http://www.wcca2006.org>
- POSITIVE SYSTEMS: THEORY AND APPLICATIONS, POSTA06 - Second Multidisciplinary International, Grenoble (France) from August 30 to September 1, 2006, <http://www.lag.ensieg.inpg.fr/POSTA06/index.php>

Rural areas as engine for Lisbon strategy

leading theme:

“Rural Areas and New Member States as Engines for Implementing the renewed Lisbon Strategy”

Tuesday, 29 November 2005

Conference Centre Albert Borschette, Rue Froissart 36, Brussels (BE)

Invitation

The currently reiterated Lisbon Strategy's goals are reflected in working agendas, initiatives and plans being prepared by different Directorates of the European Commission. Community's strategic guidelines for rural development (within the programming period of 2007-2013), Cohesion Policy in Support of Growth and Jobs, i2010, and EU Strategy for Sustainable Development in the 7th Framework Programme can serve as only a few examples.

The major organizers of the 2nd @rural conference, i.e. the EFITA and the rural@work Community (representing European citizens, international associations, industry, regional and local policymakers, entrepreneurs and farmers) are active partners in implementation of these strategic issues. They have been deeply involved in rural development. They represent individual regions, have participated in rural development initiatives, introduced new technologies, created rural knowledge societies and promoted rural development oriented research.

Collaboration between all these stakeholders and the aforementioned Commission's initiatives is both necessary and feasible, but – due to different reasons – has not been exercised to a desired extent so far. Being active in their regions, the rural organisations may easily implement the new strategies via their networks throughout Europe. Eventually, the collaboration will provide essential feedback to the Commission for fine tuning of future initiatives and achieving the common goals. An actual scope of the collaboration depends

however on a range of entities that wish to get involved in the process, as well as their expertise and willingness to co-operate and exchange relevant experiences.

To facilitate this scenario a number of organisations* decided to support the @rural Conference to work towards achieving the goals of the renewed Lisbon Agenda and i2010, and to increase involvement of ambitious players from New Member States in common European undertakings. Therefore, the Conference's main focus will be on rural areas and the New Member States as engines for implementing the Lisbon strategy. This year's Conference will be a follow-up to the 1st @rural conference held in Brussels in December 2003.

Focus:

The Conference's strategic objectives will encompass:

- informing European Communities about the new DG strategies that focus on rural development and the renewed Lisbon strategy;
- discussing arising challenges with representatives of different European organisations and EC Directorates willing and interested to support dissemination of this information;
- presentation and review of the current activities of national and regional governments;
- presentation and review of the current activities and results of EU-wide communities of interest (EFITA, rural@work, association of Local Actions Groups);
- presentation and review of the current results of EU research activities;
- presentation of results of leading regional undertakings (including Interreg and Leader projects);
- Initiation of a discussion framework in order to identify new ways to promote rural development and economic viability based on the Lisbon Agenda and i2010;
- establishing a collaborative networking platform for the participants, so as to facilitate and enhance collaboration between individuals, EC and Special Interest Groups dealing with different topics;
- establishing of an on-going feedback mechanism to the European Commission.

Supporting organisations:

- The European Federation for Agriculture, Food and Environment (EFITA),
- The rural@work community, being a member of the AMI@Work Family of Communities,
- The Czech Society for Information Technology in Agriculture (CSITA),
- The Czech Centrum for Science and Society (CCSS),
- Institute of Communication and Information Technologies in Poznan (ITTI)
- COMIST project
- Local Action Group Gal Platani Quisquina as representing Association

The conference will be free of charge.

Interested participants are invited to register www.efita.cz. Due to limited space, registrations will be made in order of their submission. Confirmation of the registration will be sent to participants by e-mail (it is necessary to bring the printed confirmation to the conference venue), provided all required information is provided.



SIXTH FRAMEWORK PROGRAMME

Educational programmes on social, economic, and environmental tools for the implementation of the EU Strategy on Sustainable Development at both EU and international levels

NATURNET-REDIME

New Education and Decision Support Model for Active Behaviour in Sustainable Development Based on Innovative Web Services and Qualitative Reasoning

Project no. 004074
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