



KUNGL  
TEKNISKA  
HÖGSKOLAN

Course Compendium

Royal Institute of Technology  
Dept of Civil and Environmental Engineering  
Division of Land and Water Resources

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## Natural Resources Management

### Project instructions

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## Preface

Traditional university education is divided into separate fields with often negligible communication. Monologue lectures are combined with recipe exercises. Knowledge is regarded as a singularity, and focuses on details rather than problem solving and cognisance. However, information creation and senescent is accelerating; knowledge acquisition is thus more important than details. Further, the problem of catching the full attention of an audience or reader is well known. A few years after finished educations, students in general do not remember more than 20 to 30 %. Knowledge of central themes and definitions is often lacking. Interviewing former students about the benefits of their technical studies, few or none refers to detailed technical knowledge to be important. Instead professional engineers stress the importance of cognisance, of adopting learning styles and understanding; transferring generic knowledge and skill to create tractable technical solutions for ill-structured problems. This emphasises a holistic problem orientated view encompassing complexity of true problems.

The course Natural Resources Management (NRM) is partly problem based, using project work as vehicle for learning. Lectures are restricted to central concepts, and recent examples as catalysts. Combination of active knowledge creation and complex examples in both lectures and projects should mitigate the lack of representativity, i.e. over-bridge white spots in detailed knowledge. Each project theme represent a smorgasbord of tasks to choose from. In general sub-problems are related to methodological approach, data and model accuracy, management practices, and/or mitigation actions. Project instructions are written with extensive lists of references. The idea is that the students should use the reference lists for seeking the necessary information. Project results are presented as written articles, where each report will be anonymously refereed and graded by three other students, and then checked and graded by the course staff. Students are encouraged to improve the reports for higher grades. To get a top grade, one or more freely chosen sub-problems have to be solved without written instructions. From a list of six topics (see below), at least two must be chosen, and then the students can choose to do either a third project, or review a scientific book approved by the staff. Also the review will be anonymously refereed and graded.

As knowledge acquisition and information seeking is an individual process, there is no common course literature. Apart from the lectures, seminars held by the students introducing each project and forming the common knowledge basis. The seminars are also intended for improving oral presentation skills.

The examination form has a strong influence on the learning styles adopted by students. To be successful advance learning methods should avoid examinations that favour surficial knowledge of details that can be regurgitated at the time of exam. Instead a deep understanding of central concepts and ideas together with knowledge about knowledge creation should be credited. This must also be made clear to the students from the very beginning. In NRM examination is thus in the form of seminars and a final triple jump examination.

Supervision is given at scheduled hours in a GIS-laboratory, emphasising immediate feedback with recommendation to further progress.

Self studies are emphasised, and to increase availability of knowledge each student has a connection to internet and the central library at KTH. Questions asked by single students or groups, but of common interest are put in a list on the network server. Information and instructions, together with



articles covering some of the lectures are also put in the network. Outside supervision hours e-mail can be used for communication.

List of available projects

Project	Topics treated	Comment
Eutrophication	Nitrogen and phosphorus sources and transport, static modelling, expert systems.	Project intended for introducing GIS for environmental modelling.
Acidification	Sulphur and nitrogen atmospheric transformations, error analyses and handling, statistical modelling, integrated GIS modelling.	Engineering approach, more suitable for students in EE.
Ecological villages	Decision support methods and GIS, site selection by suitability studies.	Planning and decision approach, more suitable for students in SI.
Cyprus	Satellite image classification, dynamic modelling of the surface water cycle in GIS, land allocation and scenario generation.	Integrated approach of modelling patterns and processes, more suitable for EE.
Managua	Satellite image classification, static mapping of groundwater vulnerability (DRASTIC), land allocation and scenario generation.	Integrated approach of managing groundwater resources and land use, example from developing country, suited for SI.
Kristianstad	Dynamic modelling of the surface and sub-surface water cycle, land allocation and scenario generation.	Integrated approach for modelling groundwater resources and land use, can be coupled to studies in QH, suited for EE students.