ECOLOGICAL RISK ASSESSMENT

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ECOLOGICAL RISK ASSESSMENT

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ECOLOGICAL RISK ASSESSMENT

(subject)

is connected with some disciplines

radioecology

HUMAN ECOLOGY

ECOTOXICOLOGY

ECOLOGICAL SAFETY

GEOECOLOGY

ENVIRONMENTAL chemistry

THE DEMANDS TO HOLDER OF A MASTER'S DEGREE

- Be in possession of some topics in geoecology, chemistry, biology, toxicology, epidemiology
- *To apply the Ecological Risk Assessment methodology in the point of interdisciplinary approach*
- *To participate in Ecological Risk Assessment and Management*
- *To understand the principles and foundation of the interaction "Human Health-Environment"*

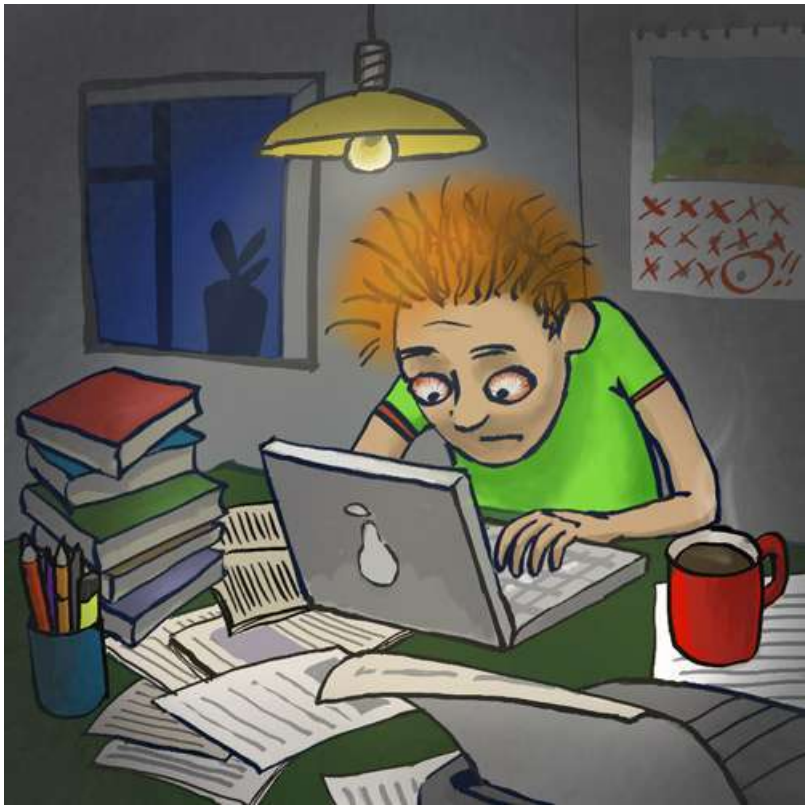
The aim of the course

- is to give knowledge of the environmental state and risk awareness. The course attempts to create an image of risk assessment and management in combination as an effective tool in environmental management and protection.

having taken the course students are to

- know the differences between risk and hazard;
- be aware of multiple aspects and interdisciplinary character of risk studies;
- have an orientation in legislation and standards concerning risks;

be able to recognize environmental hazards and identify risks;
know the main steps of environmental risk assessment procedure;
have an imagination of typology of risk assessment methods;



students should

- know how to organize risk assessment;
- know how to choose a suitable methodical approach for practically carrying out risk analysis;
- have an overview of risk perception, acceptance and communication;
- have skills to characterize environmental risks and evaluate risk level;
- be able to discuss and evaluate risk assessment reports;
- be able to take part in risk-based decision making ;
- have a conception of how to use risk assessment and management as effective environmental management tools.

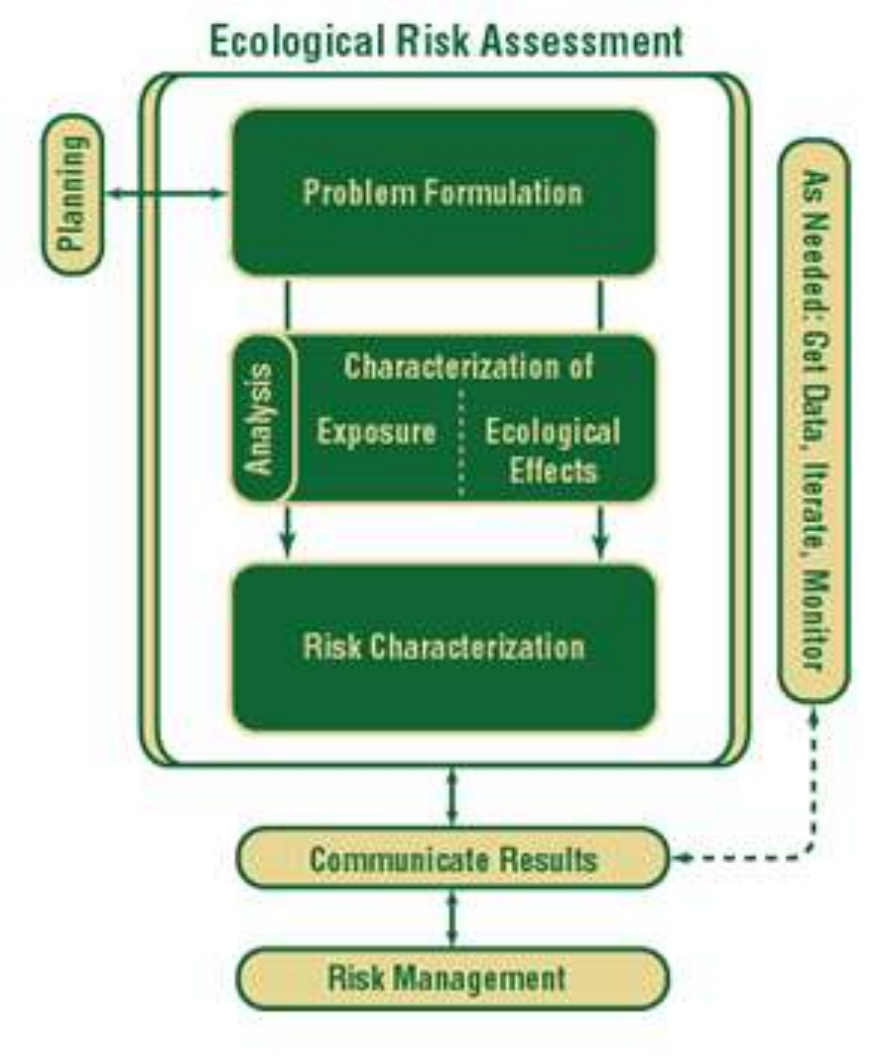
Course contents

- **Introduction**
- **ECOLOGICAL RISK ASSESSMENT**
- **The chemical risk and the european regulations**
- **Human health risk assessment from exposure of chemicals**
- **Carcinogen Risk Assessment**
- **Radiation Risk Assessment**

Key Words

hazard identification;
dose-response assessment;
exposure assessment;
risk characterization
chemical pollution
environmental risk
risk assessment

ECOLOGICAL RISK ASSESMENT



ASSESSMENT OF HUMAN HEALTH RISK FOR THE POPULATION CAUSED BY CHEMICAL POLLUTANTS OF THE ATMOSPHERE

There are some significant advantages to this discipline, such as:

- 1. Seminars with active communication between lecturers and students – not only standard lectures
- 2. The latest techniques are used (e.g. educational games, case studies, business role plays, and idea creation are facilitated by using PowerPoint presentations in class), and the internet is used for activities
- 3. Elements of extramural education are used.
- 4. Classes with specialists from the state nature conservative organizations who can give their insights and personal experience from a real perspective to students of our department

activity

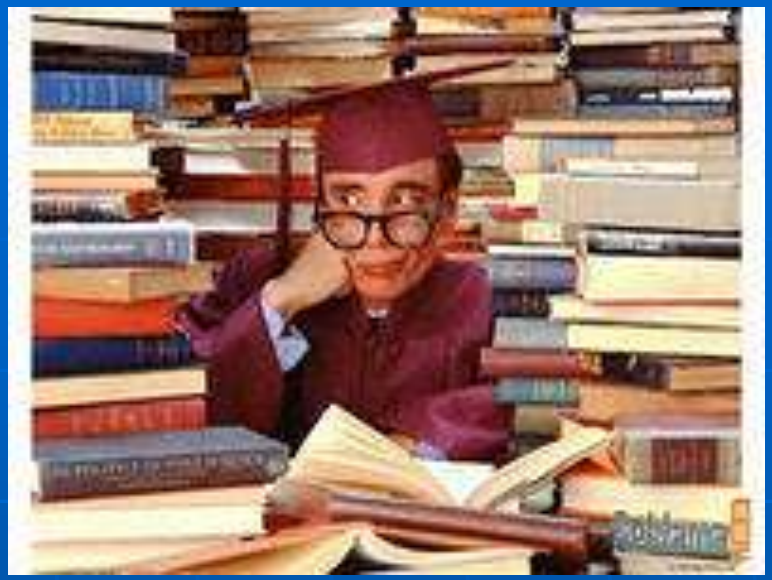
- 10 lectures
- 10 practical works (seminars, practical works, Works with PCs)
- Self-study

EXAM

not only standard lectures

- Seminars with active communication between lecturers and students – not only standard lectures. The latest techniques are used (including analytic technique for analysis of contaminants, computer data base, computer programes) and idea creation are facilitated by using PowerPoint presentations in class).

Self-study



- Self-study involves an exercise of carrying out environmental risk analysis, assessment and evaluation and making proposals for environmental risk management and also risk-based decisions, concerning land-use and emergency planning.

ECOLOGICAL RISK ASSESSMENT

- We hope the program of the course would be usefull for the students of the universities learning science of environment safety and safety of technical systems as well as for experts engaged in issues of ecological safety.
- We are trying to built our resources gradually and so far with support from both our universities and the outside community.

At the moment the terms «security»and «hazard» and «risk» are mentioned in a large number of different international regulatory documents

During last years the term "RISK" became very popular in different areas: engineering, economics, environment, management, biology & medicine, etc. and different authors use this term in different senses.

Below we consider some definitions of risk in different sources.

ecological risk assessments

- are used to support many types of actions, including the regulation of hazardous waste sites, industrial chemicals, and pesticides; radionucledes, or the management of watersheds or other ecosystems affected by multiple chemical, physical, or biological stressors

STANDARTS AND LEGISLATIONS

- Environmental management standards (ISO 14000)
- IPCS. Glossary of Exposure Assessment-Realated Terms: A Compillation, Prepared by the Exposure Terminology Subcommittee of the IPCS Exposure Assessment Planning Workgroup for the International Programme on Chemical Safety Harmonization of Approaches to the Assessment of Risk from Exposure to Chemicals. 2001 .
- Government/Research Councils Initiative on Risk Assessment and Toxicology. Developing New Approaches to Assessing Risk to Human Health from Chemicals. Report prepared by the Risk Assessment and Toxicology Steering Committee. Leicester (UK), 1999.
- U.S. EPA. Human Health Evaluation Manual, Supplemental Guidance: Standard Default Exposure Factors. Publication 9285.6-03. Office of Emergency and Remedial Response, Washington, 1991
- WHO/IPCS. Environmental Health Criteria 210: Principles for the Assessment of Risks to Human Health from Exposure to Chemicals. World Health Organization, International Programme on Chemical Safety. Geneva, 1999.
- "РУКОВОДСТВО ПО ОЦЕНКЕ РИСКА ДЛЯ ЗДОРОВЬЯ НАСЕЛЕНИЯ ПРИ ВОЗДЕЙСТВИЙ ХИМИЧЕСКИХ ВЕЩЕСТВ, ЗАГРЯЗНЯЮЩИХ ОКРУЖАЮЩУЮ СРЕДУ. РУКОВОДСТВО. Р. 2.1.10.1920-04"(Russia)

Definitions of risk

There are many definitions of *risk* that vary by specific application and situational context.

One is that risk is an issue, which can be avoided or mitigated

(where in an issue is a potential problem that has to be fixed now.)

Risk is described both qualitatively and quantitatively.

Definitions of risk

Qualitatively, risk is proportional to both the expected losses which may be caused by an event and to the probability of this event. Greater loss and greater event likelihood result in greater overall risk.

Definitions of risk

- In common risk is the chance that something undesirable will happen.
- Risk is described as a situation which would lead to negative consequences.
- *Risk* is considered as an indicator of threat, or depends on threats, vulnerability, impact and uncertainty

Definitions of risk

$$\text{Risk} = (\text{probability of event occurring}) \times (\text{impact of event occuring}).$$

$$\text{Risk} = (\text{probability of an accident}) \times (\text{losses per accident}).$$

The concept of acceptable risk

- For a long period another concept – the so called concept of absolute safety or zero risk has been the bases of industrial enterprise operation.
- The concept of zero risk was replaced by the so-called concept of acceptable risk, the basis of which was formed by the principle —to foresee and to prevent.
- This concept implies the probability of accident and, hence, the measures for prevention from accident occurrence and development.

Strategic Risks in different fields of human activity

Sphere of vital activity	SR Parameters
Political	Political damage (degree of political instability, terrorist threats, level of defensibility of the country, level of trust to authorities by the population)
Economic	Economic damage (non-received gross national product, falling of performance level, investment into fixed capital, etc.)
Social	Social damage (decrease of average life expectancy, level of untimely death, share of the population below the breadline, etc.)
Natural - technogenic	Frequencies of emergency situations, economic and social losses (number of victims, number of people with the broken conditions of life, economic damage)
Scientific and technical	Scientific and technical damage (share of assignments for science in gross national product, share of hi-tech production)

The nature itself from one side and the humans' activity from the other side are sources of risks. The avoidances on large chemical enterprises, breaks in oil- and gas-pipelines etc. represent significant hazard and lead to high damage for population and environment. Since these risks are connected with reliability of appropriate equipment, their study directed to excuse the payment for the providing and support of the necessary level of

Strategic risks in natural and man-caused spheres

These **risks** nowadays become of strategic character in connection with global changes of inhabitancy, development of technosphere and increasing scales of acts of nature.

1.Risks of development of dangerous natural phenomena (earthquakes, flooding, hurricanes, landslips, floodings, karst, forest fires, etc.) (risk importance 1.00);

The earthquake and tsunami, 2011

The 2011 Tohoku earthquake and tsunami caused ruptures in multiple water mains originating from the city's water supply. Train service was also stopped due to damage caused to

Fukushima

Fukushima City is about 63 kilometres north-west of Fukushima I Nuclear Power Plant, the site of the nuclear accident that followed the tsunami. Although outside the nuclear accident exclusion zone, the levels of radiation in the city caused residents to remain indoors more, reducing economic activity.

- The Fukushima disaster is the largest of the 2011 Japanese nuclear accidents and is the largest nuclear accident since the 1986 Chernobyl disaster. Japanese officials initially assessed the accident as Level 4 on the International Nuclear Event Scale (INES) despite the views of other

es
as
to

- Many countries have advised their nationals to leave Tokyo, citing the risk associated with the nuclear plants' ongoing accident. International experts have said that a workforce in the hundreds or even thousands would take years or decades to clean up the area.

PINATUBO

2 days 1991

10 billion tonnes magma
20 milj ton SO2
600 000 ton Cu
800 000 ton Zn
1 000 ton Cd
300 000 ton Ni
550 000 ton Cr
10 000 ton As
800 ton Hg

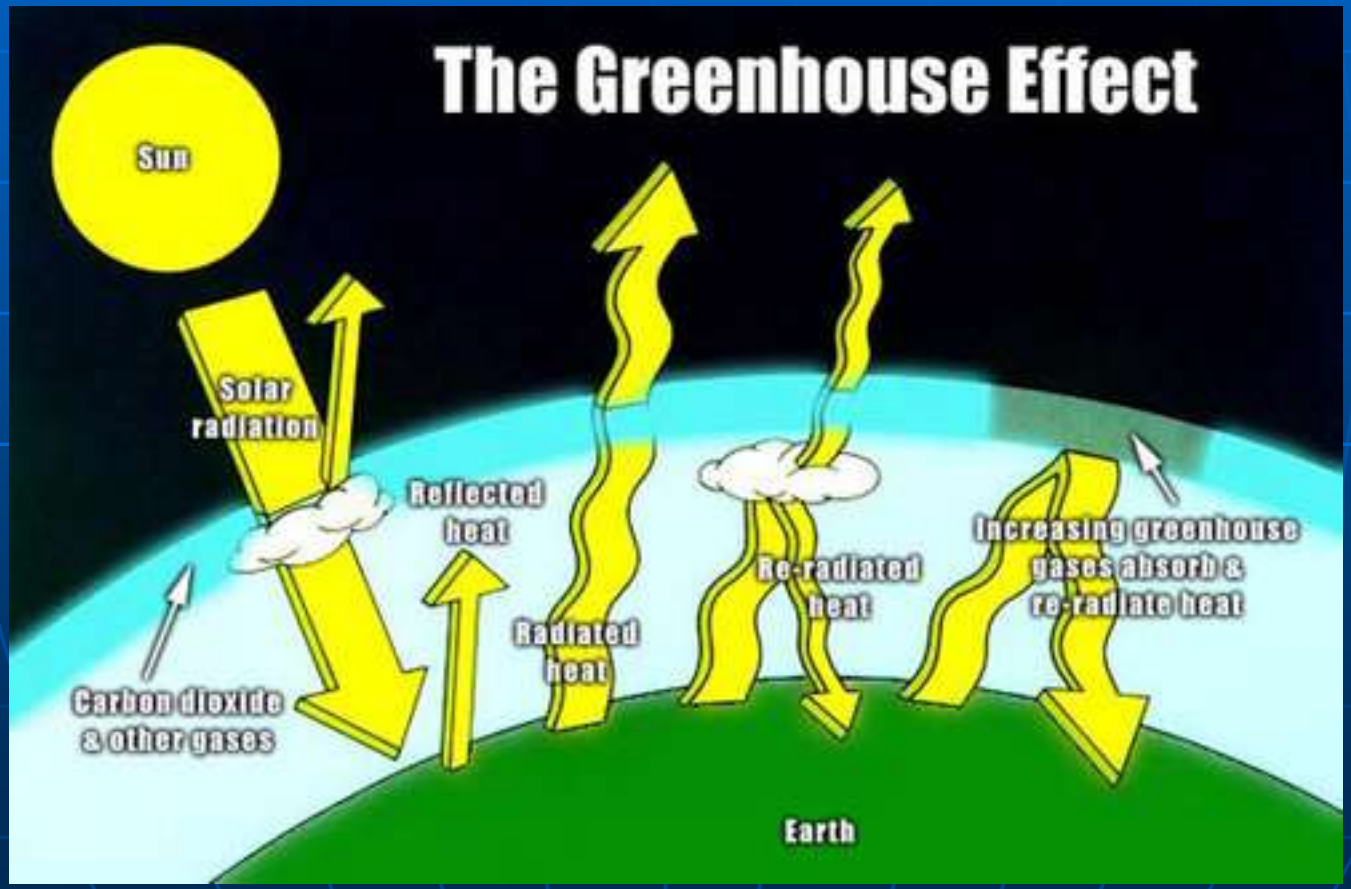
60 volcanoes per day
>3000 volc. At midocean ridges

HAIL in the surroundings of Tomsk in august-2008 – unusual natural phenomena in Siberia

2. Risks of failures and accidents at potentially dangerous objects (0.94);

3. Environmental contamination (0.43);

4. Risks connected with global change of climate, degradation of environment, planetary risks (0.24);



Development of research in the sphere of risk analysis and assessment in Russia

the guideline of European Community 82.501.EEC 1 Seveso II Directive

- In Great Britain in 1985 the basic part of legislation to prevent large accidents called SIMAH

development of the research in the sphere of risk management in Russia

The following factors contributed

- 1. Traditional fields of mechanics, the theory of machines and mechanisms in particular, deal with the study of reliability of various devices. Such methods as event tree and failure tree have been taken from this sphere into the theory of risk management that played significant role in risk investigation intensity.
- 2. The progress in the field of industrial and environmental safety was initiated due to some large industrial accident or catastrophe.
- 3. A wide circulation of foreign experience of risk analysis.
- 4. Development of managements as a science contributed to the comprehension of the process organization in risk analysis and assessment.