

## PHD THESIS ABSTRACT

### **”Research on the Safety and Risk Assessment in the Operation of Hydrotechnical Constructions in Case of Natural Disasters Arising from Climate Change”**

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#### **Chapter I. The topicality and importance of the research. The PhD Thesis opportunity and purpose**

The doctoral thesis approaches the current Global concerns at the highest scientific level, of decision-making, economical, environmental, and of sustainability. The safety of hydro-technical constructions under the uncertain risk arising from climate change has a systemic approach.

#### **Chapter II Climate change: scientific base, recorded modifications and effects, global professional approaches in the forecasting process, measures in order to prevent and mitigate the induced effects.**

A scientific foray into this area is realized in order to understand the complex phenomena that cyclically occur in the Planet climate. The current anthropogenic contribution to climate variability is highlighted. The modeling issues of the anthropogenic processes are approached.

#### **Chapter III. The hazard, risk, vulnerability, and disaster at the Global, European and Romanian area. The analysis of the climate change impact and the importance of prevention, mitigation, and adaptation measures.**

Theoretical aspects, regarding the hazard, risk, vulnerability, and disaster, which are involved in the geo-system relationship with social and biophysical systems, are presented. The geological, hydro-meteoclimat, and biophysical hazards are presented, as well as the climate change influence on thereof. The study is focused on Romania and on the South East European Region as well as on the common prevention, mitigation and adaptation measures to be taken.

#### **Chapter IV. The analysis of dams safety and risk during the operation under the climate change impact**

Safety and risk analysis during operation of hydroelectric dams under the impact of climate change. The role of the hydro-technical dams for a sustainable society is argued. The collapse of hydro-technical dams and the problems that generally occur to operating or newly-designed hydro-technical constructions, under the aggressive effect of climate change are analyzed. The alternative structural solutions are proposed to concrete and filling dams as a result to the current hydrological inadequacy. A mathematical modeling of safety to extreme floods of the Mileanca dam, located on the Botoșani County, is performed.

#### **Chapter V. Studies on the risk and safety assessment in the operation of hydro-technical structures during the extreme hydrological events in summer**

The summer hydrological impact of climate change on the safety of hydraulic structures, such as dams, embankments or urban sewerage networks, is analyzed. The multivalent benefits of small dams located on hilly and plain areas, are highlighted, to prevent and mitigate the hydrological imbalances induced by climate change. The applied research is focused on the structural safety of fill dams and dikes, in North-eastern Moldavia, to summer extreme floods, in the last two decades.

#### **Chapter VI. The study of winter hydro-meteorological phenomena on the Bistrița River, exacerbated by the effects of climate change**

The winter hydro-meteorological phenomena that occur on the Bistrița River upper basin represent the main risk of disasters on human communities from that area, and on constructions on this river. The causes, evolution, and effects of the winter phenomena manifested on the upper Bistrița River are studied. It is ascertain that the location of Topoliceni and Izvorul Muntelui dams developed the amplitude and frequency of the ice jam phenomena on the Upper Bistrița River.

#### **Chapter VII. Overall conclusions. Own contributions. The capitalization of the studies**

It is presented: scientific and technical contributions; observations, recommendations and proposals; the research dissemination through 12 published scientific papers, and the attending 4 international conferences and symposiums; general conclusions.