VALAHIA UNIVERSITY OF TÂRGOVIŞTE

HABILITATION THESIS

Conception and creativity in the field of land reclamation in the context of climate change effects on agricultural ecosystems

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Abstract

Habilitation thesis represents syntheticly all the scientific activity carried out by the author in the period 1999 - 2014, as a doctoral thesis entitled ***"Contributions to the study of protection with hydraulic works on Razelm – Sinoe ecosystem by the action of the Black Sea"***, under Prof.univ.dr .ing. Adrian Gazdaru.

At its core, the habilitation work was done on the basis of 10 representative papers developed by the author, during the subsequent support of the thesis. Habilitation thesis proves the author's ability to drive scientific research in the field of engineering, plant and animal resources, with specific applications in land reclamation.

The scientific activity carried out by the author in the period 1999 - 2014, was circumscribed to certain topics and areas in accordance with professional career, teaching and research in the field of land reclamation, in the country within the teaching staff of the Faculty of Land Reclamation and Environmental Engineering at the University of Agronomic Sciences and Veterinary Medicine Bucharest, Faculty of Environmental Engineering and Food Science at Valahia University Targoviste, at INCDPM Bucharest, ASAS – INCDPAPM Bucharest, But also abroad at the University of Perugia Italy, University of Molise Italy, Western University of Brittany in Brest France.

This habilitation thesis was developed according to the indicative Guide for achieving this habilitation thesis, according to art. 300 para. (2) of the National Education Law no.1 of January 2011, using the following structure: the summary of the habilitation thesis, scientific achievements and professional development plans and career development and references.

From this thesis emerged the main direction for future research on the author's habilitation thesis, namely the impact of climate change in the last period, particularly its climate warming in our country that caused prolonged droughts (1999 - 2014), particularly agricultural drought.

The author of research continued his scientific activity of a rather broad ecosystem in scope, but mostly quite complex as phenomenology and as producing all forms of sectoral scale drought: meteorological drought, hydrological drought and agricultural drought, the same as the freshwater ecosystem of Razelm - Sione.

In this research, the scientific activity that was carried out by the author has been structured as follows:

1. The hydraulic stability of the Razelm - Sinoe hydro system, in relation to different water transit situations through the system, given hydrological drought in the period 1999-2014;

2. The analysis of agricultural drought in recent years and restriction conditions in terms of water from the irrigation system for the 121 000 ha of Dobrogea plateau for maintaining hydraulic stability in the Hydrotechnical System of Razelm - Sinoe;

3. Considerations on the possibilities for the coastal cord protection associated with the Razelm – Sione system and intense reed vegetation.

Research conducted by the author on Razelm - Sinoe Hydro System, in relation to different water transit situations through the system, taking into account thehydrological drought manifested during 1999 – 2014, has started from the premise that Razelm-Sinoe hydrotechnical system has two most important functions, namely:

- flow controller through the supply channels that take water from Sf. Gheorghe, which supplies Razelm, with the discharge of water from Lake Razelm into lake Sinoe and from here into the Black Sea;

- as a source of water for the irrigation of 121,089 hectares of Dobrogea plateau.

The author of the habilitation thesis revealed that the long string of comments on the flow of liquid and solid discharge transited on the channels of the Hydrotechnical system of Razelm - Sinoe, helps develop statistical calculations that show that between fluid flow and turbidity are distinct significant correlations on Fundea, Fundata and Dranov channels and significant on the Dunavăţ and Mustaca-channels.

Reducing transmission capacity through silting of supply channels of the lake Razelm will lead to reduction of complex discharges from Razelm - Sinoe into the Black Sea, so in dry periods there is an increase in the concentration of salts in the lake under the influence of hydrological regime developments

The irrigation system of Razelm - Sinoe is located in an area characterized by a semiarid temperate climate, considered the driest in the country, from the average annual rainfall of 429 mm falling during the growing season, there is only 226 mm, the total amount being insufficient for the needs of farm plants.

The author of the habilitation thesis introduces a numerical model for calculating entitled Soil - Water - Balance which is a novelty in our country, which has been adapted to the

specific conditions of Dobrogea, ie mainly the pedologicalcharacteristics of soil and type of crop under study .

The main purpose of the research work in the quite complex field of agricultural drought, was to determine precisely what amount of irrigation water that can be taken so as not to affect the stability of the hydrotechnic ecosystem of Razelm - Sione, ie to amplify the mineralization phenomenon of hydrological drought periods.

The suppression problem of irrigation has excluded the possibility given by numerical computing model which can help determine water flows for irrigation of 121,000 ha of agricultural land in the Dobrogea plateau for obtaining agricultural production estimated at 50% - 80% from the production what would be obtained under normal conditions.

The author of the habilitation thesis together with the specialists from INCDPM - Bucharest, proposes a mathematical model for calculating the possibility of using reed vegetation as a mean of protecting the natural coastal belt and thus the protection of freshwater ecosystems of Razelm - Sione.

Reed vegetation can be a mean of protection and defense of embankments against wave action, but due to its roughness can retain fine particles driven by coastal currents.

Also according to the themes of research contracts in which the author of habilitation thesis acted as project manager, the author's habilitation thesis conducted a series of scientific investigations looking at the stability of slopes in the basins of Dâmboviţa and Ialomita, resulting a final conclusion that slope stability must be analyzed and researched entirely from a scientific point of view, upon the sub-basins or watersheds.