

REVIEW

by Prof. Dr. Plamen Iliev Ninov

member of a scientific jury in a competition for the academic position of "professor" in the "Hydrological Forecasts" section at the "Forecasts and Information Service" Department of NIMH Professional field 5. Technical sciences, professional direction 5.7. Architecture, construction and geodesy, scientific specialty "Engineering hydrology, hydraulics and water management"

The competition was published in the "State Gazette" issue No. 100 of 01.12.2023

This review was prepared on the basis of the Order of the General Director of the NIMH No. ND-04-3 of 29.01.2024 and the decision of the scientific jury, taken at the meeting of 29.02.2024. It complies with the requirements of the Law on the Development of the academic staff in the Republic of Bulgaria (ZRASRB), the Regulations for its implementation (PPZRASRB) and the Regulations of NIMH on ZRASRB.

I. Requirements to the candidate

according to Art. 29 (1) and Art. 29b of ZRASRB, art. 60 of the PPZRASRB and Art. 56 (1), (2) and Art. 57 (1) of the Regulations of NIMH under ZRASRB

Associate Professor Dr. Snezhanka Stoyanova Balabanova, who is the only candidate in the competition, was born in 1958. She graduated from the University of Architecture, Construction and Geodesy - Sofia (1976 - 1981). She received the educational and scientific degree of doctor in the scientific specialty "Engineering hydrology, hydraulics and water management" No. 34800 from 12.01.2011 after a successfully defended thesis "Operational hydrological modeling of river runoff and resource assessments using GIS".

The candidate holds the position of hydrological engineer in Hydrological Data Processing and Analysis at the National Institute of Meteorology and Hydrology - BAS, Sofia (1986 - 2012). Main activities and responsibilities are related to hydrological data processing, regional hydrological analyses, calculation of components of water balance and of extreme characteristics with different return periods, assessment of hydrological characteristics for basins without direct observations, product creation and work with GIS and geographic database, hydrological modeling in a GIS environment. After winning the competition, she held the scientific position of Associate Professor in the "Hydrological Forecasts" section at the Department of Hydrology of NIMH-BAS with activities hydrological information processing, hydrological and hydraulic modeling, modeling and working with GIS, preparation of hydrological forecasts. In the period 2012-2014 Snezhanka Balabanova has worked as Associate Professor, head of the "Hydrological Forecasts" section at the "Forecasts and Information Services" Department. From 2014 until now, she leads the scientific and operational activities related to hydrological forecasts, early warning systems for floods in the city of Sofia in the above mentioned section at NIMH.

Assoc. Prof. Sn. Balabanova takes part in national and international courses: 1. Application of Meteosat Second Generation satellite products in Meteorology and Climatology, November 2004, Italy; 2. Water balance elements in GIS (GIS), December 2004, Slovakia; 3. Creating Geographical Databases, September 2007, ESRI UK; 4. International Course on Hydrometeorological Analysis and Forecasting, June 2008, USA; 5. International course on GIS modeling with the SWAT model, November 2010, Netherlands; 6. Hydrological forecasting, distance course at WMO, January - February 2011; 7. Flash flood forecasting model, September 2011, Turkey; 8. Black Sea Middle East Flash flood guidance system

list of 12 such publications, and for each of them she calculated the corresponding number of points. As can be seen from the above table, the total number of points is 133.19 points with a minimum requirement of 100 points for "Professor". The presented publications are thematically related to hydroforecasts, floods, as well as evaluations and analysis of model results. All works are in English and for each of them the corresponding DOI-index is presented. I accept the publications presented in group B (indicator 4) as satisfying the conditions of the minimum requirements.

From **Group F** Scientific publications that are referenced and indexed in world-renowned databases with scientific information 40/n or distributed in a ratio based on the contribution protocol, candidate Assoc. Prof. Balabanova presented six publications in this group, collecting 133.33 t. All are in English and are presented at scientific forums, where the publications are indexed in the world scientific databases or are book chapters.

For Scientific publications in non-refereed peer-reviewed journals or in edited collective volumes 20/n or distributed in a ratio based on the contribution protocol, Associate Professor Balabanova has submitted 16 publications with a total of 107.1 points. The total number of points for the entire group 220.33. The subject matter is quite diverse, although all the publications are in the field of the scientific subjects mentioned above - hydroforecasts, floods, assessments and analysis of model results. For each article from indicator group D, the corresponding number of points is shown, and their sum exceeds the minimum required number. I accept the publications presented in group D as meeting the minimum requirements for a "professor" in hydrology.

In the documents submitted by Associate Professor Balabanova for the competition, there is a list of 34 publications, as well as the full text of each one of them.

Group D is dedicated to citations and is represented by 2 indicators (indicators 12 and 14). Prof. Balabanova presented her citations for each of these indicators. Citations or reviews in scientific publications, referenced and indexed in world-famous databases with scientific information or in monographs and collective volumes - 66 items. 10 items each - a total of 660 items. Citations or reviews in non-refereed peer-reviewed journals - 17 items. 2 items each - a total of 34 items. The total number of points in this group of indicators is 694, which many times exceeds the required 100 points.

The last **Group E** contains indicators related to leadership and participation in research and educational projects. And here, Prof. Balabanova demonstrated significant activity, as the total number of all indicators - 440 items again repeatedly exceeded the required number - 150 items.

Special mention should be made of Assoc. Prof. Balabanova's great contribution to the development of young scientists at the institute, to their professional development. According to the indicator of management of a successfully defended theses, the candidate is the manager of three successfully defended doctoral theses. I would like to stress that Assoc. Prof. Balabanova has always supported the work of other young scientists in their thesis preparation, which I have witnessed.

The indicator participation in a national scientific or educational project is represented by three scientific research projects, each of them with significance for practice.

In the preparation of a water balance for the territory of the Vitosha Nature Park, project No. 5103020-11-654 "**Implementation of priority activities from the management plan of the Vitosha Nature Park - phase II**" financed by Contract No. 5103020-C-001 to the Operational program "Environment 2007-2013", (2013 - 2014) a new methodical approach was developed for the assessment of the water and water balance and with an integrated analysis of all elements (precipitation, temperatures, evapotranspiration, land cover, hydrogeology, water distribution, transfer of waters, etc.). For the purposes of the Management Plan, the main trends and risks, the impact of climate change and extreme events have been assessed and management recommendations have been made.

In "**Assessment of the formation of water flows on the territory of the Elatsite Mining Complex and preparation of recommendations for their management**", financed under Contract No. PO-32-126-1/19.10.2017 between NIMH and GI-BAN, (19.10.2017 - 30.11.2019) a water balance was prepared in the area of the Mining Complex as a whole, as well as for the individual zones in it at different time periods; assessment of the runoff with consideration of HTS; recommendations for managing the formed water flows and improving the ecological condition of the water in the area.

In "**Determining the areas with natural restrictions according to dryness criteria**" with the Ministry of Agriculture, Contract No. RD-50-49 / 07.04.2017 (2017-2019), a study of the amount of precipitation, potential evapotranspiration by months and years was carried out and the drought index was calculated for 64 stations from the NIMH network. By order of the Ministry of Agriculture, Food and Forestry of Bulgaria, maps were obtained with the spatial distribution of ETP and the annual amounts of precipitation for all stations in a GIS environment. As a result, the drought index (AI) values by year for the whole country were obtained.

Participation in international scientific or educational projects

Candidate has presented projects in which she has participated and/or led. The project with the acronym **H-SAF** or "**Satellite Application Facility on Support to Operational Hydrology and Water Management**" - involved in a validation of satellite products for precipitation, soil moisture, hydrovalidation of precipitation, statistical evaluations and analysis of results. Hydrovalidation for the outflow of the Iskar River to the town of Novi Iskar using neural networks, statistical evaluations and analysis has been done.

Participates in FLOODGUARD "**Integrated actions for joint coordination and responsiveness to flood risks in the Cross Border area**", funding from the European Union Program "Intereg V-A Bulgaria-Greece", by assessing the impact of climate change on flood risk. Also she has participated in the project, "**Flood warning system establishment in Arda river basin for minimising the risk in the cross border area**" (ARDAFORECAST) under the European Territorial Cooperation Program Greece - Bulgaria (2007 - 2013). The information system, runoff modeling and forecasting, hydraulic modeling and flood routing were developed within the project.

Works in the project "**Mitigating the vulnerability of water resources to climate change**" project code: SEE/D/0143/2.1/X Assessment of the current and future vulnerability of water resources and classification of risks for drinking water under climate change conditions, funded by Operational program for Southeast Europe through the European Regional Development Fund 2013-2014.

Candidate is a member of the working team of the project "**Danube WATER integrated management**" (WATER), ETC code 161, Romania-Bulgaria program 2007-2013. She has participated in the creation of prognostic hydrological models and technologies for Bulgarian tributaries of the Danube River.

Management of a national scientific or educational project

First of all, two projects under the national program "Young scientists and post-doctoral students" financed by the Ministry of Education and Science, of which the candidate is the leader, should be noted:

"**River Runoff and Flash Flood Forecasting in Urbanized Areas Using a Fully Distributed Hydrological Model**", young scientist - Valeria Yordanova. A hydrological model for the Ogosta River catchment was developed using the TOPKAPI software product. The parameters of the model are determined based on a digital relief model, a soil map and a land cover map. A sensitivity analysis was performed mainly with respect to high waves and their peaks. The operation of the Ogosta dam is also included in the simulations.

- Creating a methodology for assessing the threat of floods "Methodological guidelines for assessing the threat of floods";
- Hydrological modeling and analyzes of the results. Early warning systems. Hydrological models have been developed that are used to forecast river runoff and predict river and flash floods;
- Exploring the possibilities and application of artificial neural networks in hydrological forecasting;
- Study of the impact of climate change on water resources and types of floods in Bulgaria;
- Using satellite data in runoff modeling

The reference provides a detailed explanation of each of these contributions, as well as their publications. I agree with the contributions thus formulated.

III. Opinions, recommendations and notes

I have known Snezhanka Balabanova for many years. I highly value her professionalism, her ability to work. We have worked together on several projects and she has always been competent, accurate and precise. An important characteristic of the candidate is her collaborative and communicative skills, her ability to participate and lead teams of young scientists. I have no recommendations or criticisms.

Conclusion

From the inspection of the materials submitted for the competition, no violations were found in the procedure. The requirements of Art. 29 (1), (2), (3), Art. 29b (2), (3) of ZRASRB, Art. 60 (1) (2) and (4) and Art. 61 (1), (3) of PPZRASRB art. 56 (1), item, item 4, item 5, item 6, item 7, (2), (3) of the Regulations of NIMH under ZRASRB.

Based on the f the acquaintance with the documents of the candidate for the competition and the assessment of the publications presented by her, I give a clear and categorical assessment that **Assoc. Professor Dr. Snezhanka Balabanova** fully deserves to be awarded the academic position of "**Professor**" and I call on the other members of the Honorable Scientific Jury to join this assessment.

REVIEWER:

/ Prof. Dr. Plamen Ninov /