

## OPINION

on the materials for participation in a competition for filling an academic position "professor ", field of higher education 5. Technical sciences, Professional direction 5.7. "Architecture, construction and surveying", scientific specialty "Photogrammetry and remote sensing", in the discipline "Photogrammetry and remote sensing methods ", announced by University of Forestry in State newspaper 102/ 8.12.2023 г., procedure code FOR-P-1123-111

### **Applicants for participation in the competition are:**

#### **1. Associate Professor Maria Tsankova Asenova, Ph.D. Eng**

**Prepared by: Dr. Eng. Penka Yordanova Kastreva, Associate Professor on Professional direction 5.7."Architecture, construction and surveying"**

#### **1. Brief biographical details for the candidate (s)**

Maria Tsankova Asenova, Assoc. Prof. Ph.D. Eng., graduated in 1987 from the Higher Institute of Architecture and Construction, majoring in "Geodesy, Photogrammetry and Cartography" and holds the professional qualification of "Engineer in Geodesy, Photogrammetry and Cartography ". In 2014 ; she successfully defended a dissertation on the topic: "Optimization of the structure of databases and spatial analysis in specialized GIS for forests" and was awarded the scientific and educational degree "Doctor" in the scientific specialty "Photogrammetry and remote sensing".

Since 1987 she held the following academic positions at University of Forestry - Sofia: research engineer (1987-1989), assistant (1989 - 1993), senior assistant (1993 -1997), chief assistant (1997 -2017) and associate professor (2017 - until now). She also held the administrative positions - head of "Forest Management " department and General Assembly vice chairman of the Faculty of Forestry at University of Forestry. In addition to teaching and research activities, the applicant also has extensive practical experience related to geodetic, photogrammetric and cartographic activities, in the restitution of ownership of agricultural lands and forests in Bulgaria.

#### **2. Conformity of the submitted documents and materials of the candidate/s with the requirements according to the Regulations for Development of the academic staff (DAS) at University of Forestry;**

The candidate Assoc. Prof. Dr. Eng. Maria Asenova submitted all required documents, arranged as follows: Folder I, entitled "Documents" - contains a total of 22 documents, in accordance with Art. 65a. (4) from the Regulations for DAS at University of Forestry, namely, autobiography, diplomas, official notes on work experience and academic position held, medical certificate, criminal record certificate, information cards, reference for compliance of scientific production with the minimum national requirements, lists of publications, citations, participation in projects, scientific contributions, etc.; Folder II entitled "Publications" - contains copies of all articles and reports from scientific conferences (33 pieces in total), accompanied by title pages and contents of journals and scientific collections, as well as certificates for reports presented at the relevant scientific forums. The publications are arranged by numbers and groups of indicators (G7 and G8), according to Art. 2b of Law on DAS of the Republic of Bulgaria; Folder III, entitled "Books" - contains copies of: the monograph (B3-1) , the collective monograph (G9-1) , the book based on a dissertation (G6-1), a published university textbook (E23) and a published university study guide ( E24.1 and E24.2) .

A total of 39 scientific papers were submitted for consideration and review, which are described in detail in documents No. 9, No 11 \_ 4 and No. 15.

The monograph (B3-1), the book based on the dissertation work (G6-1) and the collective monograph (G9-1) are written in Bulgarian. The requirements for the volume and content of a monographic work have been met. The papers are peer-reviewed by qualified persons in a professional field 5.7. "Architecture, construction and surveying" and are published by the publishing house "Intel Entrans" and University Publishing House of University of Forestry.

Among the 15 **publications under indicator G7**, only one is written in Bulgarian, and the remaining 14 are in English. Some of them are co-authored with another author (5) or more than two authors (6) and independently written (4). Some scientific works have been published in proceedings of prestigious scientific conferences, such as International Multidisciplinary Scientific



GeoConference&EXPO (7 publications), which are indexed in the world database Scopus. Others (9 publications) have been published in proceedings by International Conference on Cartography & GIS and the Bulgarian scientific journal Forest Science (Nauka za gorata), both indexed in the world database Web of Science.

Among the 18 **publications under indicator G8**, 3 were published in English, and the remaining 15 Bulgarian. Six publications are co-authored with another author, 3 are co-authored by more than two authors and 9 are independently written. The scientific works published in non-refereed editions are mainly in the scientific journals "Management and Sustainable Development" of University of Forestry (6 articles), and "Geodesy, Cartography and Land Management" (Geodezia, Kartografia i Zemeustroystvo) (3) and in edited collective volumes of International Scientific Conferences (9). The journals are included in the National Reference List of modern Bulgarian scientific publications with peer review. All of the above-mentioned research papers were published after the appointment as associate professor in February 2017.

### **3. Evaluation of the educational and teaching activity of the candidate/s**

The work experience of the applicant as a teacher is more than 34 years, which were entirely spent at University of Forestry (service notes №5 and №8). According to a provided official note (document 13\_3), Assoc. Prof. Dr. Maria Asenova conducts lectures, exercises and learning practices for various specialties in the Faculty of Forestry and the Faculty of Ecology and Landscape Architecture and the Faculty of Agronomy of University of Forestry in seven disciplines, according to the curricula. In her teaching activity (since being elected as an associate professor in 2017), Assoc. Prof. Dr. Eng. Maria Asenova has prepared 6 new and updated 3 study programs for disciplines from the study plans for both faculties.

She was the scientific supervisor of one PhD student awarded with the right to defense and is a scientific consultant for one PhD student, enrolled in 2023. Scientific supervisor of 16 diplomants, including a part-time foreign specialist. She has reviewed over 20 student theses.

Applicant has published: 1) university textbook (indicator **E23**) Tepeliev, Yu., R. Koleva, M. Asenova. 2018. " Photogrammetry and Remote sensing ". Sofia: Publishing house at University of Forestry. 279 pp. ISBN 978-954-332-166-7.; and 2) university study guide ( **E24.1** ) Asenova, M. 2023. Guide to working with MapInfo Professional in developing a GIS project. ISBN : 978-619-7703-31-3. ). The main topics covered in these publications are photogrammetry, remote sensing and other new geoinformation technologies and their application in forestry activities, which fully correspond to the requirements of the competition.

The study guide (**E24.2** ) Asenova, M., R. Koleva, M. Danailova, S. Stoyanova. 2023. Manual for exercises in geodesy, contains 165 pages. It is presented in an electronic version and is about to be printed by the Publishing House at University of Forestry.

### **4. Evaluation of the scientific, scientific applied and publication activity of the candidate/s**

#### **4.1. Participation in scientific, scientific-applied and educational projects**

The candidate has participated in a research project at the international level as an external member of the project at Institute of Information and Communication Technologies (IICT) at the Bulgarian Academy of Sciences (BAS); in 18 projects at the national level, of which she was the manager and expert in Photogrammetry and Remote sensing and GIS. **The total number of points under indicator "E" is 158.33** out of the required 150.

#### **4.2. Characteristics of published scientific results**

In all the publications described in item 2, one common theme is outlined - the use of modern geoinformation technologies, such as photogrammetric , remote sensing and LiDAR scanning for the creation of specialized databases (DB) and their application in a GIS environment for planning, management and analysis of the forest territories in our country.

**The monograph (B3.1)** " Geoinformational approaches and solutions in the application of GIS for forest territories" is an author's work of 133 pages, written in a high scientific style and richly illustrated. Some of the figures are illustrations from author's maps, with high cartographic quality, and the symbols in them comply with the symbols system intended for forestry maps according to Regulation 20 of 2016. 154 literary sources were used (55 in Bulgarian, 89 in English and 10 internet



pages), some of which are laws, regulations, rules and instructions from the various fields related to forestry plans.

The monograph is dedicated to the technological stages in creating specialized databases for forestry. Various applications of GIS for solving general and specific tasks in forestry are presented. The examined theoretical questions are practically supported by results from real investigated forest areas. **Total number of points for indicator "B is 100 points."**

The book (G6.1) "Optimization of database structure and spatial analysis in specialized GIS for forests" is an author's dissertation work, published in the form of a book with a volume of 212 pages. 222 literary sources were used (78 in Bulgarian, 47 in English and 97 internet pages). The book is richly illustrated with colorful figures. It contains theoretical and methodological scientific developments with the aim of exploring the possibilities for the creation of specialized databases and applications in a GIS environment for forestry. **The total number of points under indicator "G6" is 30 points.**

The collective monograph G9.1 "Beech forests in the old age phase - structure and natural dynamics" from pages 10 to 46 contains chapter 1 "Determining parameters of forests in the old age phase using remote sensing and GIS", written with first author, Assoc. Prof. Dr. Maria Asenova. The monograph is the result of research carried out on scientific research projects of beech and beech-coniferous forests in the reserves of the Central Balkan and Rila National Parks. Chapter 1 focuses on the study of the concentration of old (century-old) forests in different forest areas by applying remote sensing and GIS. **Total number of points according to indicator "G9" is 5 points.**

**The scientific works presented above fully meet the requirements for a monographic work regarding volume, content, layout and the results achieved in them.**

The remaining publications by indicators G7 (334.65 points) and G8 (257.34 points), the author has summarized in several thematic directions, some of which fall into several at the same time, since combined technologies from the accepted main directions of scientific research are used, namely:

**I. Photogrammetry and Remote sensing** - In this scientific direction, the applicant has considered a wide range of problems and solutions related to the use of data from: unmanned aerial systems (UAS) (G7.2, G7.8, G7.10, G7.11, and G8.1); LiDAR data (G7.12, G8.8); and high-resolution orthophoto and satellite imagery (G7.7, G9.1) for forest research. The following scientific tasks have been solved in the publications, which are summarized here: Automated classification of digital images, mapping of the location, boundaries and condition of forest plantations, as well as conducting analysis to study their key characteristics and health status assessment indices or the degree of damage to plantations. Publications that focus on the development of specialized maps of forests with data obtained from various technologies and integrated in a GIS environment are also referred to this direction, which reflect: the health status of forests (G8.10), the status of forests affected by diseases, pests or other damage by determining a coefficient for the degree of damage to plantations (G7.9); the risk of forest fires (G7.1) and forest fire hazard forecasting (G8.11).

**II. Geographic information systems for forests** - In this thematic area, the author presents various applications of GIS technology. Examples of *the applications of GIS for creation of specialized forestry databases* are presented in three publications. In them, important problems are theoretically examined and solutions are proposed related to: the structuring and implementation of databases for forest territories (B 3.1); performing automated statistical analyzes (inquiries, reports, balances, tables) at the level of the state forestry (G8.9); exploring the possibilities of creating an infrastructure for spatial data for forest territories (G7.14). *The applications of GIS for the protection and control of forest territories* are discussed in publications devoted to ways of detecting illegal actions in forest territories, such as illegal logging (G8.3) and the control of extreme situations, for example forest fires (G8.6). To control forestry activities and reduce the amount of damage, the use of mobile GIS applications is suggested. Another problem related to the management of forest territories is the detection of inconsistencies in digital data for agricultural and forest territories, and a proposal has been made to increase the accuracy of graphic data (G8.7), as well as the integration of data from freely available GIS platforms (G8.12). *The applications of GIS for performing analyzes* for effective control and protection of the forest road network are discussed in (G7.15, G8.5); and the joint application of GIS with photogrammetric and remote sensing was used in the study of forest territories



affected by natural disturbances (G8.15, G8.18) and research and analysis of the state of field protection belts in Bulgaria (G8.13).

**III. GIS with applications in other related fields** – In the third thematic area, other possibilities for using GIS are presented. For example, the applications of GIS for mapping and research of species of conservation importance is discussed in the publication (G7.3); for updating the database on Sofia's centuries-old trees in (G7.6); to create databases for urban tree vegetation in (G8.2); to study the system "soil - soil microorganisms - wood composition" in (G7.13); for the construction of specialized GIS databases for logistics, alternative tourism and the furniture industry in Bulgaria in (G7.4, G7.5, G8.4, G8.14).

**IV. Training.** In addition to the presented textbook (E23.1) and teaching aids (E24.1, E24.2), new scientific directions and technologies are also considered in publications related to GIS training, photogrammetry and remote sensing (G8.16, G8.17 ,).

#### **4.3. Reflection of the applicant's scientific activity in the literature (citability)**

41 citations of 32 publications of Assoc.Prof. Dr. Eng. Maria Asenova are known . Of them: **10 (100 points)** are in scientific publications, referenced and indexed in world-famous databases with scientific information or in monographs and collective volumes (indicator **D12** ); **7 publications (21 points)** are in monographs and collective volumes with scientific review (**D13** ); **24 publications (48 points)** are in non-refereed peer-reviewed journals (**D14** ) . **Total points by indicator "D": 169** out of 100 required.

#### **4.4. Contributions in the works of the candidate/s (scientific, scientific-applied, applied)**

Contribution claims are presented in a list of 19 contributions. They are formulated in detail and correctly. The overall research and applied scientific activity of the applicant is mainly directed in the field of research of the forest territories in our country, applying modern geoinformation technologies.

*The scientific contributions* that stand out in the publications presented for the competition have a theoretical-methodological and scientific-applied nature. The theoretical and methodological contributions mainly refer to:

1) proving with new means existing scientific areas of problems, theories and technologies: a) Combined methods (photogrammetric, remote sensing and Lidar scanning) are proposed for the study of forest territories through automated classification, mapping, analysis and summaries of forest plantations (Contributions 1, 2, 3); b) A methodology and technology have been developed for mapping and assessing the health status of forest plantations and extracting data on the degree of damage to forest plantations from digital images (Contributions 4, 5, 6, 7, 8 and 15), as well as a methodology for creating urban tree vegetation databases (Contribution 19).; c) Methods for classifying the degrees of risk of forest fires and their thematic mapping in a GIS environment, as well as a system for forecasting the danger of forest fires ( Contribution 9); d) An algorithm has been developed for working with spatial data for field protection belts (Contribution 16); e) A technological approach to control forestry activities through mobile GIS solutions for identifying violations in forest territories and by integrating data from freely available GIS platforms in the management and control of forest territories was approved (Contribution 12,13);

2) *analysis, summaries and methodological recommendations* regarding: a) creation of infrastructure for spatial data for forest territories (Contributions 10, 11); b) A model for the structure of a database in GIS for the protection of forests from fires is proposed (Contribution 14).;

3) *obtaining confirmatory facts related to the study of species of conservation importance* : a) An extension of the altitude range of the distribution of studied plant species has been proven (Contribution 17) b) The need for proper design and setting new requirements for the organization of data in the National Register of Ancient Trees in our country has been proven (Contribution 18).

*Scientific and applied contributions* have a marked national significance, related to forest management. It is important to emphasize that in the process of developing the scientific works Assoc. Prof. Maria Asenova collected, researched and analyzed a huge amount of information. The final practical result is the availability of specialized forest databases and thematic maps, on which spatial analyzes have been carried out, supporting theses presented in the scientific studies. The thematic maps by degree of risk of forest fires are part of the national methodology for assessing the risk of



forest fires for Bulgaria, adopted by the Executive Forest Agency (EFA) in 2016. This determines the applied nature and significance of scientific research in its quality of a methodology for providing easily accessible and understandable information in the form of maps and databases with forestry applications.

As a teacher at University of Forestry, the applicant has made an outstanding contribution to the growth of young specialists - forest engineers, prepared to work with photogrammetric and remote sensing and the software products related to them.

For the purpose of this competition, I believe that the scientific and scientific-applied contributions are more than sufficient in terms of volume and importance. *I believe that the presented scientific works have originality in all the contributions indicated and I fully accept the author's claims for them.*

#### **5. Evaluation of the candidate's personal contribution**

**Assoc. Prof. Maria Tsankova Asenova, Ph.D. Eng,** with her professional and scientific activity, contributed to the confirmation of the scientific specialty "Photogrammetry and remote sensing", as well as the development of GIS technology. She is well known among the scientific and student community, as well as by specialists who apply these technologies for planning and management of forest territories in our country. She is a member of the Bulgarian Cartographic Association, the Union of Surveyors and Land Managers in Bulgaria (USLMB), the Bulgarian Geographical Society and as such actively participates in scientific conferences and forums organized by the mentioned professional organizations. She has made a significant contribution in her capacity as vice chairman of the Organizing Committee for the annual international scientific symposium of the USLMB. She is a reviewer of scientific and popular scientific articles in the magazines "Geodesia, cartography, land management", "Forest science" and "Forest" magazine. For the contribution to the geodetic community, Assoc. Prof. Dr. Eng. Maria Asenova received a diploma from the USLMB, an award for the best interactive map in a national competition on the occasion of GIS Day'2017 and a special award for a scientific project of the GIS Circle at University of Forestry with a supervisor Assoc. Prof. Dr. Maria Asenova on the occasion of GIS Day'2023.

#### **6. Critical notes and recommendations**


I recommend that some publications related to the processing of photogrammetric, satellite and unmanned aerial vehicle (UAV) images, such which the applicant has, find a place in the prestigious international Journal of Photogrammetry, Remote Sensing and Spatial Information Sciences – (ISPRS).

#### **7. Personal impressions**

I know Assoc. Prof. Dr. Eng. Maria Asenova as an ambitious scientist and erudite teacher, whose name is known among scientific circles in Bulgaria and abroad. She is respected within her scientific team, as well as among students. She possesses high professional and administrative competence. I believe that the professional and scientific achievements of Assoc.Prof. Dr. Eng. Maria Asenova are at a high level and she deserves to take her rightful place among the best scientists of Bulgaria.

#### **8. Conclusion**

**In view of the above, the candidate to take up the academic position "professor" in the discipline "Photogrammetry and remote sensing" from Professional direction 5.7. "Architecture, construction and surveying"**

Prepared the opinion:   
Assoc. Prof. Dr. Eng. Penka Kastreva

The opinion has been forwarded to: 10.4.2024 г.