



**19th INTERNATIONAL MULTIDISCIPLINARY
SCIENTIFIC GEOCONFERENCE
SGEM 2019**

CONFERENCE PROCEEDINGS
VOLUME 19

Water Resources, Forest, Marine
and Ocean Ecosystems

Issue: 3.1

HYDROLOGY AND WATER RESOURCES
MARINE AND OCEAN ECOSYSTEMS

**19th INTERNATIONAL MULTIDISCIPLINARY
SCIENTIFIC GEOCONFERENCE
S G E M 2 0 1 9**

**CONFERENCE PROCEEDINGS
VOLUME 19**



**WATER RESOURCES. FOREST,
MARINE AND OCEAN ECOSYSTEMS
ISSUE 3.1**

**HYDROLOGY AND WATER RESOURCES,
MARINE AND OCEAN ECOSYSTEMS**

**30 June – 6 July, 2019
Albena, Bulgaria**

DISCLAIMER

This book contains abstracts and complete papers approved by the Conference Review Committee. Authors are responsible for the content and accuracy.

Opinions expressed may not necessarily reflect the position of the International Scientific Council of SGEM.

Information in the SGEM 2019 Conference Proceedings is subject to change without notice. No part of this book may be reproduced or transmitted in any form or by any means, electronic or mechanical, for any purpose, without the express written permission of the International Scientific Council of SGEM.

Copyright © SGEM2019

All Rights Reserved by the International Multidisciplinary Scientific GeoConferences SGEM

Published by STEF92 Technology Ltd., 51 "Alexander Malinov" Blvd., 12 Sofia, Bulgaria

Total print: 5000

ISBN 978-619-7408-81-2

ISSN 1314-2704

DOI: 10.5593/sgem2019/3.1

**INTERNATIONAL MULTIDISCIPLINARY SCIENTIFIC GEOCONFERENCE SGEM
Secretariat Bureau**

E-mail: sgem@sgem.org | URL: www.sgem.org

53. MORPHOLOGICAL VARIATIONS IN MOUNTAIN STREAMS AS PROXY FOR SEDIMENT TRANSPORT: A CASE STUDY., Dr. Davide Brambilla Dr. Vladislav Ivov Ivanov , Assoc. Prof. Dr. Laura Longoni , Prof. Dr. Monica Papini, Italy.....	411
54. NITRATE POLLUTION OF GROUNDWATER FROM BUILT-UP AREAS OF THE GLAVACIOC CATCHMENT, Prof. Dr. Radu Lăcătușu, Dr. Cristian Păltineanu, Dr. Anca-Rovena Lăcătușu, Dr. Nineta Rizea, Șerban Dragomir Romania.....	419
55. OPTIMAL ASSESSMENT OF RESERVOIR ACTIVE STORAGE CAPACITY UNDER UNCERTAINTY, Ing. Stanislav Paseka, Ing. Daniel Marton, Ph.D., Czech Republic.....	427
56. PREVENTION AGAINST FLASH FLOODS IN SMALL CATCHMENTS, Prof. Ing. Andrej Šoltész, PhD., Ing. Lea Čubanová, PhD., Ing. Adam Janík I, Slovakia	435
57. PROSPECTS FOR THE DEVELOPMENT OF RUSSIAN'S SERIAL PRODUCTION OF SPRINKLING MACHINES, Doctor of Agricultural Sciences, Professor Olgarenko G.V., Candidate of Technical Sciences, Leading Researcher Turapin S.S., Russia	443
58. QUALITATIVE ANALYSIS OF WATER AND WELL WATER IN THE LOKAL AREA OF MBLINEC IN SLOVAKIA, MSc. Ľuboš Harangozo, PhD. MSc. Mária Timoracká, PhD, MSc. Ivona Jančo, doc. MSc. Judita Bystrická, PhD., MSc. Marek Šnirc, PhD. Slovakia.....	449
59. RECENT DROUGHT EFFECTS ON BRACCIANO LAKE WATER AVAILABILITY, Giuseppe Sappa, Flavia Ferranti, Francesco Maria De Filippi, Silvia Iacurto, Italy	457
60. RECENT HYDRO-MORPHOLOGICAL AND SEDIMENTOLOGICAL PROCESSES IN THE DANUBE DELTA, ST. GEORGE BRANCH, Dr. Laura Tiron Dutu, Dr. Florin Dutu, Romania.....	465
61. RESEARCH OF PHYTOPLANKTON DISTRIBUTION IN A STRATIFIED RESERVOIR, Assoc. Prof. Dr. Alexander V. Ivanov, Assistant Sayad M. Guseynova, Master Student Denis M. Malyshev, Master Student Ivan M. Krayev, Russia.....	473
62. SAFETY OF TECHNICAL INFRASTRUCTURE IN CRISIS SITUATIONS, Ing. Milan Axman, doc. Sarka Krocova, Ph.D., Czech Republic	481
63. SAP FLOW AS A POSSIBLE INDICATOR OF WATER STRESS, Assoc. Prof. Dr. Viliam Barek, Dr. Anna Barekova, Slovakia	489
64. SEDIMENTATION OF FLOCCULATE SUSPENSION, M.Sc.Eng. Tymoteusz Turlej, Poland	497

PROSPECTS FOR THE DEVELOPMENT OF RUSSIAN'S SERIAL PRODUCTION OF SPRINKLING MACHINES

Doctor of Agricultural Sciences, Professor Olgarenko G.V.

Candidate of Technical Sciences, Leading Researcher Turapin S.S.

**Federal State Research Institution All-Russia Scientific and Research
Institute for Irrigation and Farming Water Supply Systems "Raduga", Russia**

ABSTRACT

The article presents the results of monitoring the availability of the irrigation equipment's production in the Russian Federation. On the basis of the conducted information and analytical studies, the data are presented on the structure of the irrigation equipment park, taking into account the availability and supply of Russian and imported equipment. A complex of engineering, technical, organisational and managerial measures has been developed, which is aimed at providing agricultural producers with domestic irrigation equipment corresponding to the modern scientific and technical level of technology development in the world. The topical issue is not only carrying out developmental and technological works on the development of a sprinkler equipment's new generation, which has the author's priority of the Russian Federation, but also requires an integrated state policy which creates opportunities for the organisation and development of serial production for Russian machine-building enterprises of agro-industrial complex and will reduce the dependence of the industry of land reclamation on imported technology.

Keywords: irrigation technologies and equipment, sprinkling equipment, modernisation, reconstruction, research and development works.

INTRODUCTION

Agrarian production in the Russian Federation is carried out in difficult climatic conditions: the lack of natural moisture is observed on 80% of arable land. Sustainable agricultural production in the arid climatic zone of the Russian Federation can only be achieved through the development of irrigated agricultural land [1,2].

An important risk factor for the further development of irrigated areas is the insufficient number of new Russian development projects on sprinkling equipment which were introduced into production, in the presence of a significant proportion of foreign irrigation equipment. It contradicts the requirements of technical and food security of Russia to give foreign companies the solution to the issues of the State Program for the agro-industrial complex's development, in terms of construction, reconstruction and technical re-equipment of irrigation and drainage systems.

Therefore, it is very important not only to develop design documentation for the new generation sprinkler equipment, which has the author's priority of the Russian Federation, but also requires an integrated State policy that creates opportunities for

Russian engineering enterprises to organise and develop serial production, which corresponds to the objectives of the State Program for the agro-industrial complex development and will reduce dependence industry reclamation from imported technology [3,4].

Federal State Research Institution All-Russia Scientific and Research Institute for Irrigation and Farming Water Supply Systems "Raduga" studies and monitor the actual condition, assess the technical level and the operation of irrigation and drainage systems, addresses the development, production, implementation and operation of irrigation equipment.

While the researches were conducting, the following methods were used as a scientific and methodological base: prospective developments of researches and production organisations, works of foreign and domestic scientists in the field of irrigation technologies and technical means; the results of scientific and technical activities in the field of technology and irrigation technology, which were obtained under the guidance and direct participation of the authors, during researches and development works of the researchers of Federal State Research Institution All-Russia Scientific and Research Institute for Irrigation and Farming Water Supply Systems "Raduga" [3,5,6,7].

At the end of 2017, there are about 4.69 million hectares of irrigated land in Russia, 3.89 million hectares of agricultural production were actually used, 1.32 million hectares of land of the land-reclamation fund were actually watered [1].

Total of 6,393 sprinkler machines (58.3%) in Russia, out of 10,989 sprinkler machines and installations, the Russian sprinkler equipment, including 3013 units of wide-range sprinkler machines, such as wide sprinkling machine "Fregat" 2,966 machines or (46.4%) and wide electrified machine "Kuban" 47 machines or (0.73%). Sprinkling front-type machines are up to only 1088 units, including the following equipment: sprinkler type machines such as twin console sprinkler TCS-100M - 513 machines or (8,3 %); wide frontal sprinkler such as sprinkling wheel wide machine "Volzhanka" - 575 machines or (8,9 %). There are 696 (10,8%) of hose drum sprinklers in total. There are 609 machines or (8,75%) of stationary sprinklers with fast order rain-30. There is also a sprinkling equipment which was produced in the 70s, morally and physically obsolete, only 918 units (14.3%), including: long-distance sprinkler machines such as LDS-45, LDS-70, LDS-100, sprinkling plumes such as wide sprinkling machine. There are only 144 sprinkler machines, including wide-sprinkling sprinkler machines - 68 units, hose drum sprinklers - 76 units of new Russian sprinkling machines on 01/01/2018, the release of 2016 and 2017.

Imported sprinkling machines had a total of 2,414 units (22.1%) such as: wide-spread electrified sprinkler machines - 952 units or (39.4%), including: wide-range circular irrigation machines 839 pcs., frontal machines 113 pcs.; hose drum sprinklers 951 pcs. or 39.3%. Other sprinkler machines and installations are 511 pcs. or 21.3%.

Experience in implementing of the Program for the Land Reclamation's Development showed that, in fact, for the period 2014-2017, only 369.3 thousand hectares of irrigated land were put into operation through capital investments, including by implementation years: in 2014 - 96.8 thousand hectares were introduced, including: irrigation - 91.2 thousand hectares, drainage - 5.5 thousand hectares; in 2015 - 89.5 thousand hectares were introduced, including: irrigation - 80.8 thousand hectares, drainage - 8.7 thousand hectares; in 2016- 90.1 were introduced thousand hectares, including: irrigation - 86.5

thousand hectares, drainage - 3.6 thousand hectares; 101.1 thousand hectares of reclaimed land were introduced in 2017 [1,3].

The structure of irrigated areas which was put into operation for 2014-2017 according to weighted average has the following character: wide sprinkler sprinklers - 56%; hose drum sprinklers - 7.0%; irrigation kits - 1.0%; stationary systems - 0.5%; drip irrigation systems - about 12.0%; surface irrigation technology - up to 21.5%; outdated previous generation sprinklers: wide sprinkling machine "Fregat" - 4,0 %; twin console sprinkler TCS-100MA и LDS-70– 2,0 %.

Today, the commissioning of irrigated land is provided mainly by the supply of foreign irrigation equipment. 98 drum units were supplied to Russia for hose drum sprinklers in 2017. The main exporter is Italy, the share in exports is about 98.0%, including by firms: IRRIMEC-25.6%; OCMIS-16.7%; RM-22.2%; NETTUNO- 13.5%; IRTEC-11.5%. Total imports amounted to 1.637 million dollars.

In 2017, wide sprinkler machines (WSM) were supplied, total - 430 units. Major suppliers: Valley, Lindsay, TL, Reinke. Total imports is 27.560 million dollars.

Russian manufacturers of irrigation equipment resumed mass production in 2015. Production of wide sprinkler machines (WSM) to 168 units for the whole period of 2016-2018 amounted: LLC "Agroldea" - in 2017 – 2 machines, in 2018– 8 machines; "Kazan Plant of Irrigation Technology" – production was started in 2016, in 2017– 34 machines, in 2018– 37 machines; JSC "SKZSK" produced 100 wide sprinkling machines for the years 2017-2018; LLC "BSG", production was started in 2016: wide sprinkling machine "Fregat": in 2016 – 20 machines, in 2017 – 4 machines, in 2018 – 20 machines. They upgraded outdated models of sprinklers "Fregat" which are have the agricultural producers: in 2017 – 4 machines, in 2018 - 9 machines.

Manufacture of hose drum sprinklers is 78 units, for the whole period of 2016-2018, including: LLC "Plant for Sprinkling Machines" – in 2015 – 1 wide drum sprinkler, in 2016 – 14 wide drum sprinklers, in 2017 – 21 wide drum sprinklers, in 2018 – 22 wide drum sprinklers ("Harvest"); OJSC "Promtractor Wagon", the Concern "Tractor plants" – from 2015 to 2017 год - 42 wide drum sprinklers, in 2018– 12 wide drum sprinklers ("Niagara").

An analysis of the irrigation technology market shows that the share of imported sprinkling equipment is growing, because large-scale mass production of Russian sprinkling equipment has not been established last years, mainly due to the lack of high-quality design and technological documentation. Irrigated lands were put into operation for all the years of the implementation of the Land Reclamation's Development Program, mainly due to the supply of imported irrigation equipment, which is on average more than 95% of the total number of technical means for irrigated lands put into operation.

The main problems which are hindering the development and widespread introduction of domestic irrigation equipment:

- the absence of a well-established large-scale production of high-quality irrigation equipment (at the level of world standards) and, accordingly, specialised sales centers (pre-sales preparation) and after-sales service - production base;

- lack of working capital in small and medium agricultural producers for the development of design and estimate documentation and the purchase of irrigation equipment;
- orientation of large agricultural producers on imported irrigation equipment and technology;
- problems of training engineers, hydraulic engineers, mid-level technicians and workers in the production, installation, assembly of irrigation equipment.

Important negative factors which are hindering the development of domestic production are: unfair competition of foreign manufacturers - dumping offers from imported manufacturers, including which are made in China under the brand of well known brands; lack of priority for the Russian manufacturer in the allocation of subsidizing for the purchase of sprinkler equipment, as a part of the Program for the development of land reclamation; negative reputation of domestic sprinkler technology, due to several manufacturers who supplied low quality sprinkler machines, without subsequent service and left the market in consequence; lack of experience in research and production activities in the development and organisation of irrigation equipment's production, promotion of sprinkling equipment on the market.

The tasks of creating and developing domestic production cannot be solved only in the field of researching and development, but should be solved systematically with the implementation of a single complex of organisational, production, institutional, personnel problems and require appropriate scientific, methodological and regulatory support, development of material technical and resource base of scientific and educational and operational organisations of machine-building enterprises.

It is necessary to have in the industry an appropriate regulatory, methodological, scientific and material-technical base, developed infrastructure, highly qualified human resources, socio-economic conditions and sustainable funding under certain conditions for the technical support of irrigated lands and the effective implementation of the sub-program for the development of land reclamation,.

Regulatory issues are resolved, subject to adjustment of the Russian Federation Law on Land Reclamation's development of technical regulations and industry standards for activities in the ameliorative complex, technical regulations on the safety of land reclamation systems and hydraulic structures, preparation of standards harmonised with the international standard system (ISO) regulations on technical regulation, regulatory documents which are aimed at stimulating the construction of new and reconstruction of existing reclamation systems and more efficient using of reclaimed land.

Regulatory and methodological support requires the development of regulatory and procedural documentation for researches, development and technological works and State tests in irrigation technology, certification systems for compliance with agro-ecological requirements and monitoring of the technical level of land improvement systems methodological framework for the design, construction and operation of land-reclamation systems with the mandatory introduction of new scientific technical developments.

Scientific and technical support for a unified scientific and technical policy and improvement of the quality of researches and development, state regulation and support for the development of new, competitive types of irrigation equipment which are

related to the natural and climatic conditions of the Russian Federation, include: a complex of construction and installation works on reconstruction and restoration of reclamation systems, modernisation of irrigation technology and hydraulic equipment; improving the operational reliability and safety of hydraulic structures, technical re-equipment and modernisation of hydraulic structures.

The methods of solving the problem are: to reform the organisational structure of the operation's system of land-reclamation facilities with the creation of regional technology parks and specialised operational bases that ensure high-quality repair and maintenance work; to create a pilot production sites (ranging from 30 to 50 hectares) in various federal districts of the Russian Federation for the development of optimal irrigation technologies; to train and information support for agricultural producers, service, quality assessment and certification of equipment, both domestic and foreign, which are supplied to farms; to develop the human resources in the sector of land reclamation and water management, which includes housing construction and the creation of training complexes for the training and retraining of engineering and working personnel; to form the State order for the specialty of hydraulic engineer and hydraulic engineering; to create low-cost places in the State Agrarian Universities.

CONCLUSION

The development of domestic production and the creation of competitive irrigation equipment are associated with the implementation of a full cycle of scientific researches and experimental development, the solution of issues of widespread introduction of domestic irrigation equipment. Comprehensive measures of State support are needed to solve the problems of creating and developing domestic production, which are viewed in the implementation of areas related to the development of land-improvement and scientific-technical infrastructure and strengthening the material and technical base of scientific institutions, as well as stimulating domestic production and creating a favorable competitive environment for domestic producers irrigation equipment.

Supporting of agricultural producers who commission or exploit reclaimed lands, can be implemented in the following areas:

- It is necessary to focus on the centralised acquisition of domestic irrigation equipment;
- State subsidies give for the irrigation projects with domestic irrigation equipment. To increase the share of state subsidies by 20-25% for high-tech investment reclamation projects;
- to form especially favorable conditions for small agricultural enterprises in the field of leasing irrigation equipment (reduced percentage or compensation of a part of funds for equipment leasing, a leasing period lasts at least 10 years);
- to toughen the responsibility of agricultural producers for the quality and technical level of design solutions and construction of irrigation systems, obligate to provide reports on indicators of the exploitation's efficiency of reclaimed lands and restore the form of statistical reporting on production on reclaimed lands and the technical conditions of irrigation systems.

There is no alternative to state supporting of domestic production, only with the active participation of the federal legislative and executive bodies of the Russian Federation which is aimed at developing of public-private partnerships, ensuring comprehensive

organisation of researches, production and training activities, strengthening the production base. It can be created a cardinal solution and practical using of resource-saving, environmentally safe Russian irrigation technology generation corresponding to the world level of technology development, which will eliminate the dependence on imports and improve the food security of the country..

REFERENCES

- [1] Results of implementation (2014–2017) of the Federal Target Program “Development of Land Reclamation for Agricultural Lands of the Russian Federation from 2014 to 2020”, Russia, pp.108, 2018.
- [2] Kapustina T.A., Bochkareva A.I., Tsekoeva F.K. Spatio-temporal variability of hydrometeorological parameters and their impact on crop irrigation regimes, Land improvement and water management, vol.6, pp.30-33, 2013.
- [3] Olgarenko G.V., Turapin S.S. Prospects for import substitution and development of irrigation equipment for the program of land reclamation in the Russian Federation, Land improvement and water management, vol.2, pp.35-39, 2016.
- [4] Turapin S.S. Development trends of wide sprinkler machines, Equipment for the country, vol.6, pp.18-21, 2016.
- [5] Olgarenko V.I., Olgarenko G.V., Olgarenko I.V. A method of integral efficiency evaluation of water use on irrigation systems, 18th International Multidisciplinary Scientific GeoConference SGEM 2018, vol. 18, issue 3.1, pp. 3-9.
- [6] Gorodnichev V.I. Possible directions for the reconstruction of irrigation systems, Land improvement and water management, vol. 6, pp. 15-17, 2013.
- [7] Olgarenko D.G. The system of indicators to assess the quality of crops' irrigation by sprinkling, Land improvement and water management, vol. 2, pp.23-27, 2014.