SCI-CONF.COM.UA

PERSPECTIVES OF WORLD SCIENCE AND EDUCATION

ABSTRACTS OF VIII INTERNATIONAL SCIENTIFIC AND PRACTICAL CONFERENCE APRIL 22-24, 2020

OSAKA
2020

PERSPECTIVES OF WORLD SCIENCE AND EDUCATION

Abstracts of VIII International Scientific and Practical Conference

Osaka, Japan

22-24 April 2020

Osaka, Japan

2020

UDC 001.1
BBK 79

The 8th International scientific and practical conference "Perspectives of world science and education" (April 22-24, 2020) CPN Publishing Group, Osaka, Japan. 2020. 980 p.

ISBN 978-4-9783419-8-3

The recommended citation for this publication is:
Ivanov I. Analysis of the phaunistic composition of Ukraine // Perspectives of world science and education. Abstracts of the 8th International scientific and practical conference. CPN Publishing Group. Osaka, Japan. 2020. Pp. 21-27. URL: http://sci-conf.com.ua.

Collection of scientific articles published is the scientific and practical publication, which contains scientific articles of students, graduate students, Candidates and Doctors of Sciences, research workers and practitioners from Europe, Ukraine, Russia and from neighbouring coutries and beyond. The articles contain the study, reflecting the processes and changes in the structure of modern science. The collection of scientific articles is for students, postgraduate students, doctoral candidates, teachers, researchers, practitioners and people interested in the trends of modern science development.

e-mail: osaka@sci-conf.com.ua
homepage: *http://sci-conf.com.ua*

TABLE OF CONTENT

UDC 543.38+556.013 (282.05)

ANALYSIS OF POSSIBLE NEGATIVE ENVIRONMENTAL AND SOCIO-ECONOMIC CONSEQUENCES OF FRESHWATER DRAIN REDUCTION TO THE DNIEPER-BUG MOUTH REGION

Korzhov Yevgen
PhD, Candidate of Geographical Science, Senior Lecturer at the Department of Aquatic Water Biological Resources and Aquaculture
Kherson State Agrarian-Economic University
Kherson, Ukraine

Abstract: The article analyzes the main tendencies of changes in the Dnieper-Bug mouth region water salinity. The reasons for the increase in water salinity in the aquatic ecosystems of the region were identified and conclusions were drawn regarding the possible negative environmental and socio-economic consequences of these changes.

Keywords: water salinity, hydrological regime, sea level, mouth region, estuary, Dnieper, Southern Bug, Ukraine

The volume and quality of the water coming into the water body is the main water-balance characteristic of the hydro-ecosystem. Violation of these parameters, even on a small scale, can cause dramatic changes in the ecological status of the water body. Changing the conditions for the existence of hydrobionts leads to their migration to more favorable conditions, which causes the transformation of species composition and energy flows in local ecosystems. Violation of the ecological status of a water body can result in significant water-economic, sanitation and socio-economic losses. The most sensitive to such changes are insignificant aquatic ecosystems, one of which is the Dnieper-Bug mouth region. It is located in the central part of the Black Sea lowland and includes the mouth sections of the Dnieper and the Southern Bug and the Dnieper-Bug estuary.

The analysis of long-term series of observations on the runoff volume of the Dnieper and the Southern Bug indicates that the combined effect of factors of natural and anthropogenic impact on the Dnieper-Bug mouth region at the present stage has led to the transformation of a number of hydrological parameters of its aquatic ecosystems. The reduction of the freshwater runoff of the Dnieper, as the main source of freshwater of the system, compared to the period before the construction of the reservoir cascade on it, due to the influence of climatic and anthropogenic factors now reaches 17.5 km^3 [1, 2, 3, 4]. Particularly striking is the downward trend in the Dnieper runoff volume (***W***, km^3) that began to be observed in the first decades of the 21st century (Fig. 1). At present, the average annual runoff in the Dnieper mouth is 37.66 km^3 over two decades.

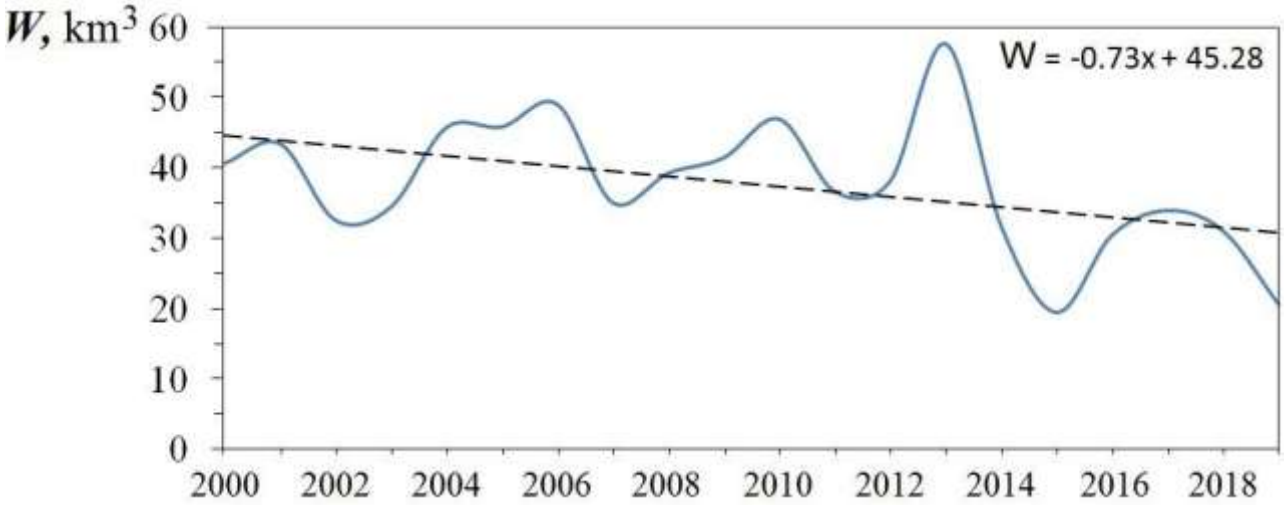

Fig. 1. Long-term change of the Dnieper annual runoff volume for the period 2000-2019 years. The dotted line is the trend line described by the equation *W* = -0.73x + 45.28

The volume of runoff of the Southern Bug in the 2000s, compared to the beginning of the last century, decreased by 0.31 km^3 [5]. The total reduction of the freshwater runoff of the Dnieper and the Southern Bug due to the influence of climatic and anthropogenic factors has now exceeded 17.8 km^3.

The lack of fresh water in the water balance of the Dnieper-Bug mouth region is offset by the filling of the aquatic ecosystem with the salt waters of the Black Sea shelf zone. The increase in saltwater intake through the Kinburn Strait at the present stage is caused by the combined change in climatic factors contributing to a gradual

rise in sea level. The difference between the average annual sea level values for the period 1875-2010 was 47 cm (Fig. 2).

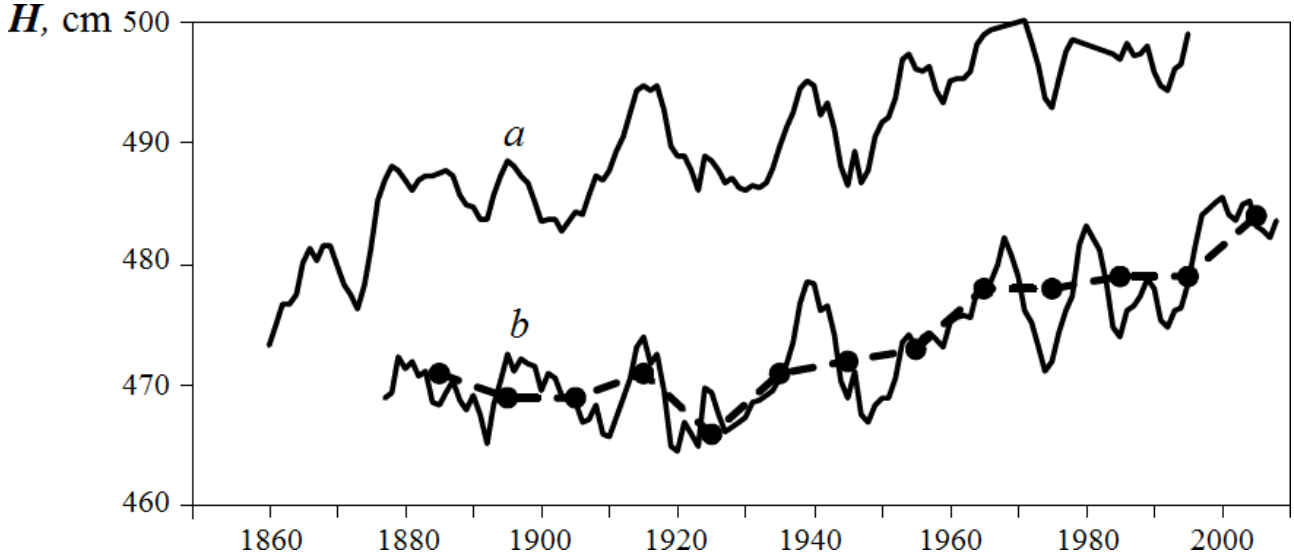

Fig. 2. Perennial changes in the level of water (*H*, cm) of the Black Sea in Constanca (Romania) (*a*) and Sevastopol (*b*) - data are averaged over a sliding period of 5 years. Dotted line - average over 10 years [6]

The lowest water level was observed in 1921 (450 cm), the highest in 2010 (497 cm), which is the historical maximum for the entire period of instrumental research. Among the reasons for these changes are increased rainfall, a decrease in average annual wind speeds and volumes of evaporation over the water area, and there is also a steric effect [6].

The main parameter of the aquatic ecosystem of the Dnieper-Bug mouth region that has been affected by the above changes is water salinity. According to the studies of 1963-1985, the greatest salinity of water was noted in [7] in the western part of the Dnieper-Bug estuary, which is in direct hydraulic connection with the Black Sea. The average annual salinity values for chloride-ion water at this site were 3.00–4.98‰. The highest seasonal values reached 6.02–6.77‰ in summer and autumn. Further, the salinity of the waters decreased in the direction of the river systems. In the central part of the Dnieper-Bug estuary, its annual values were 1.94–2.75‰, in the eastern part – 0.56–1.55‰. At the mouth of the Southern Bug, salinity for most of the year fluctuated within 2–3‰. The waters of the Dnieper mouth section had salinity below 1.0‰ (Table 1).

Table 1

Average annual salinity values (‰) in the Dnieper-Bug estuary during different periods of study

Segment of estuary	Research periods	
	1963-1985 years [7]	2013-2018 years *
Western	3,00–4,98	6,5–7,2
Central	1,94–2,75	4,0–5,0
Eastern	0,56–1,55	1,9–3,3

*Note: * averaged on the basis of the author's seasonal expedition full-scale researches of the Dnieper-Bug estuary (spring, summer, autumn 2013-2018 years)*

Data from full-scale researches, analysis of their spatial and temporal distribution confirms that the gradual increase in salinity of water in the Dnieper-Bug mouth region is associated with the active flow of saline and the reduction of fresh water. Changing the salinity of the waters at this stage of the Dnieper-Bug mouth region has already led to an increase in the number of invasive, alien species of hydrobionts. It should be emphasized that migration and displacement of alien species is usually negatively affected by region native flora and fauna and results in reduced biodiversity. Reducing of the rivers flow, increasing salinity significantly alter the conditions of existence of hydrobionts, expand the boundaries of their distribution, reproduction and wintering. Often invasions lead to the naturalization of harmful species of aquatic organisms under new conditions and their displacement of native flora and fauna. The result of the invasion may be the loss of native local biodiversity, the transmission of disease to aquatic organisms and to the person, which carries considerable economic losses [8, 9, 10, 11].

A significant socio-economic problem of increasing the salinity of water in the water system of the Dnieper-Bug mouth region may be a change in the water-economic status of the Dnieper mouth. According to the annual reports of the Department of Ecology and Natural Resources in the Kherson region, about 1035 million m^3 of Dnieper water is used on average per year for drinking and sanitary, industrial, agricultural and other needs [12, 13, 14]. Also, the water of the Dnieper mouth is

partly used for water supply in more than 30 settlements, including Kherson and Mykolaiv. Increasing the water salinity to more than 1‰ may make it impossible to use the Dnieper waters for drinking and agricultural purposes.

Conclusion. According to the author's monitoring studies conducted in 2013–2018, the highest salinity values are observed in the western part of the Dnieper-Bug estuary. Here, the salinity increased by 2.7–3.5‰ compared to the observation period 1965–1985 and is now predominantly 6.5–7.2‰, and in the central part of the estuary by 2.1–2.3‰ and is 4.0–5.0‰. The lowest values of water salinity increase in estuary are noted in the eastern part – by 1.3-1.8‰ and present salinity here makes 1.9-3.3‰. Shown by us tendencies to change the regime of salinity in the aquatic ecosystem of the Dnieper-Bug mouth region have a great importance in formation the quality of the aquatic environment of the study area. Increasing the salinity of water can cause the endemic, rare species of aquatic organisms to disappear, radically change the species composition of the region's flora and fauna, increase the number of invasive species that are not typical for the territory of Southern Ukraine, disrupt established energy flows in local ecosystems, and make the Dnieper mouth not suitable for water supply and water consumption, etc.

LIST OF REFERENCES

1. Timchenko V. M. Dynamics of Environmentally Significant Elements of Hydrological Regime of the Lower Dnieper Section / V. M. Timchenko, Y. I. Korzhov, O. A. Guliayeva, S. V. Batog // Hydrobiological Journal – Begell House (United States). Vol. 51, Issue 6, 2015. – P. 75-83.

2. Коржов Е. И. Некоторые экологически значимые аспекты водного режима Нижнего Днепра. / Е. И. Коржов // Наукові читання присвячені Дню науки. Вип.3: Зб. наук. пр. – Херсон, Вид-во: ПП Вишемирський В.С., 2010. – С.4-9.

3. Тимченко В. М. Динамика экологически значимых элементов гидрологического режима низовья Днепра / В. М. Тимченко, Е. И. Коржов, О. А. Гуляева, С. В. Дараган // Гидробиол. журн. – 51, №4. – 2015. – С. 81-90.

4. Коржов Є. І. Антропогенний вплив на екосистему пониззя Дніпра та можливі шляхи його послаблення / Є. І. Коржов // Наукові праці Українського науково-дослідного гідрометеорологічного інституту. – Вип. 267. – К.: Ніка-Центр, 2015. – С. 102-108.

5. Korzhov Ye.I. Ecohydrological investigation of plain river section in the area of small hydroelectric power station influence / collective monograph: Current state, challenges and prospects for research in natural sciences // O.V. Averchev, I.O. Bidnyna, O.I. Bondar, L.V. Boyarkina, etc. – Lviv-Toruń: Liha-Pres, 2019. – 240 p.

6. Гидрометеорологические условия морей Украины. Том 2: Черное море / Ильин Ю.П., Репетин Л.Н., Белокопытов В.Н. и др.; МЧС и НАН Украины, Морское отделение Украинского научно-исследовательского гидрометеорологического института. – Севастополь, 2012. – 421 с.

7. Жукинский В.Н., Журавлева Л.А., Иванов А.И., Тимченко, В.М. и др. Днепровско-Бугская эстуарная экосистема. – АН УССР. Ин-т гидробиологии. – К.: Наук. думка, 1989. – 240 с.

8. Білик Г. В. Огляд основних аспектів впливу кліматичних змін на сучасний стан іхтіофауни Дніпровсько-Бузької гирлової області / Г. В. Білик, Є. І. Коржов // Наукові читання, присвячені Дню науки. Екологічні дослідження Дніпровсько-Бузького регіону. – Вип. 12. – Збірник наукових праць. – Херсон, – 2019. – С. 3-10.

9. Білик Г. В. Шляхи відтворення аборигенних видів риб Дніпровсько-Бузької гирлової області в природних умовах / Г. В. Білик, Є. І. Коржов // Матеріали III Всеукраїнської конференції молодих науковців «Сучасні проблеми природничих наук». – Ніжин: «Наука-Сервіс», 2018. – С.25.

10. Коржов Є. І. Шляхи збереження червонокнижних видів флори та фауни водних екосистем НПП «Нижньодніпровський» / Є. І. Коржов, В. М. Дзеркаль, Г. В. Білик, А. А. Пономарьова // «Біорізноманіття степової зони України: вивчення, збереження, відтворення» (з нагоди 10-річчя створення національного природного парку «Меотида»). Серія «Conservation Biology in

Ukraine». – Вип. 13. – Слов'янськ: Видавництво «Друкарський двір», 2019. – С. 79-85.

11. Коржов Є. І. До питання змін кисневого режиму водних мас руслової мережі пониззя Дніпра під час згінно-нагінних явищ / Є. І. Коржов, В. А. Жежеря, С. С. Дубняк // Наукові читання, присвячені Дню науки. Екологічні дослідження Дніпровсько-Бузького регіону. – Вип. 11. – Збірник наукових праць. – Херсон, – 2018. – С. 7-12.

12. Korzhov Ye.I. Peculiarities of External Water Exchange Impact on Hydrochemical Regime of the Floodland Water Bodies of the Lower Dnieper Section / Ye.I. Korzhov, A.M. Kucheriava // Hydrobiological Journal – Begell House (United States). Vol. 54, Issue 6, 2018. – P. 104-113.

13. Тімченко В. М. Основні фактори погіршання екологічного стану пониззя Дніпра / В. М. Тімченко, В. Л. Гільман, Є. І. Коржов // Гідрологія, гідрохімія, гідроекологія. – 2011. – Т. 3(24). – С. 138–144.

14. Коржов Є. І. Особливості впливу зовнішнього водообміну на гідрохімічний режим заплавних водойм пониззя Дніпра / Є. І. Коржов, А. М. Кучерява // Гидробиол. журн. – 54, №4. – 2018. – С. 112-120.

15. Науково-практичні рекомендації щодо покращення стану водних екосистем гирлової ділянки Дніпра шляхом регулювання їх зовнішнього водообміну / Є.І. Коржов. – Херсон, 2018. – 52 с.