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АРИДНЫЕ ЭКОСИСТЕМЫ
ARID ECOSYSTEMS

Журнал освещает фундаментальные исследования и результаты прикладных работ по проблемам аридных экосистем и борьбы с антропогенным опустыниванием в региональном и глобальном масштабах. Издается с 1995 года по решению Бюро Отделения общей биологии Российской академии наук.

The journal is published by the decision of General Biology Department Bureau of Russian Academy of Sciences (RAS). The results of fundamental and practical investigations on the problems of arid ecosystems and on struggle against anthropogenic desertification are published on its pages. Principles of system study of arid territories and the dynamics of their biology potential changes in global and regional aspects are put into basis.

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ABSTRACTS

THE AREA OF THE DRY PLAIN LANDS OF RUSSIA[1]

© 2009. A.N. Zolotokrylin, E.A. Cherenkova

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Abstract. Desertification definition as a form of the land degradation, leads to ambiguous estimations of the area of such lands. In last documents of the Convention on Combat Desertification, for example for the countries of Central and the Eastern Europe, the term "desertification/degradation" is used for territories out of the dry lands. Authors consider that it is necessary to limit desertification studying to the dry lands with the natural preconditions of desertification. Consequences of human activities for territories out of the dry lands need to be carried to degradation.

Northern border and the area of the dry plain lands of Russia in the modern climate conditions according to the recommendation of the UN Convention on Combat Desertification are defined. The map-scheme of distribution of Moisture Index (TMI) where evapotranspiration is calculated on Thornthwaite method is presented. The arguments for taking into consideration the border of the dry lands while estimations of desertification/degradation done for reduction of their distribution are presented in the discussion section.

The hypothesis considering desertification as the dry lands degradation, caused by interactive aridization of climate and anthropogenic/natural degradation of lands with feedback in climatic system (the dry lands-atmosphere) is a reason of limitation of desertification territory by the dry lands (Золотокрылин, 2003).

The analysis of Russian sub-regional national programs shows that the area of desertification territory is considerably overestimated because of inclusion of degraded sub-humid and humid lands. Authors suggest to take into consideration the dry lands border in estimations of desertification/degradation to decrease their deviation. In this case, the area of the dry lands is the limiting area of possible desertification distribution in the modern climate conditions. According to new calculations, the area of the Russian Plain dry lands does not exceed 0.7 million sq km. Authors suggest to detach degraded lands outside of the dry lands and not interpret them as desertification.

Keywords: dry lands, desertification, degradation of land, Moisture Index, evapotranspiration according to Thornthwaite method.

CHANGES OF SOIL-INHABITED TESTATE AMOEBAE COMMUNITIES ALONG FOREST-STEPPE GRADIENT IN THE MIDDLE VOLGA REGION[2]

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Abstract. Patterns of soil-inhabited testate amoebae communities in the territory of Kuncherovskaya forest-steppe (Middle Volga) included all stages of transformation from xerophytic psammophilous steppe throw xero-mesophitic meadow-steppe and stepped oak forest, mesophytic oak, maple and lime-tree forests towards aspen-forest and osier-bed was studied. 28 testate amoebae species and forms were identified. Three community types are formed along the steppe-forest gradient: from psammophilous steppe (dominants are *Phryganella acropodia, Euglypha tuberculata, Trinema lineare*), meadow-steppe (*Centropyxis sylvatica globulosa*, tiny form of *Centropyxis aerophila sphagnicola, Trinema complanatum*) and forests (*Cyclopyxis kahli, Centropyxis sylvatica, Centropyxis aerophila sphagnicola*). In more humid biotopes (forests) community heterogeneity is affected by factors, which are connected with vertical soil composition. In more dry biotopes (steppes) it is affected by horizontal spatial heterogeneity. With the increasing of humidity, species richness and abundance grows. Abundance of

[1] This work was supported by the RFBR grant № 07-05-00593.
[2] This work was supported by the RFBR grant № 07-04-00185.

testate amoebae in steppes does not exceed 100 ind. per 1 gram of absolutely dry soil, whereas in forests it reaches as more as 1150 ind./g.
Keywords: testate amoebae, forest-steppe, community structure, soil nanofauna.

ARIDIZATION AND DESERTIFICATION OF TERRITORY AS THE MEDICAL-ECOLOGICAL FACTOR

© 2009. L.I. Elpiner, A.Ye. Shapovalov

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Abstract. The results of investigations on the forecast of aridization and desrtification's medical-ecological consequences are given. The authors use analog natural model of water-triggered ecological catastrophe to show mechanisms of human pathology development in the changing hydrological situation. Concept and methodology of these phenomena's forecast are presented. The phases of pathological processes development are shown. The techniques of medical ecological consequences of the territory's aridization have been elaborated. These techniques are based on the interdisciplinary basis with the use of forecasts in related scientific fields. The role and the place of medical ecological investigations in the problem of global climate change have been determined.
Keywords: global climate changes, aridization, water factor, human health, health risk assessment

EXPERIENCE OF SHIFTING SANDS AFFORESTATION WITH USE OF SALINE WATER FOR WATERING

© 2009. B.K. Mamedov, A. Arnageldyev, N.K. Nurberdiev

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Abstract. The article concerns the problem of utilization of collector-drainage waters for shifting sand afforestation and reveals the results of experiments carried out in 2004-2006 on barchans massifs near Kekirdek Settlement in Central Karakum Desert. Year-old seedlings of desert plants (black saxaul – *Haloxylon aphyllum* – and *Salsola paletzkiana*) with closed root system grown up in nursery were planted on experimental plot. Planting of seedlings was carried out manually without a preliminary layout of sand with subsequent irrigation from May, 20 till October, 20. Experiment has been replicated in 4 trials with 10, 20 and 30 days interval of water application and control trial – without irrigation. 3 liters volume of water for irrigation was delivered directly to root system according to certain technology.

Three-year observation over *Haloxylon aphyllum* and *Salsola paletzkiana* growth and development has shown that the highest results were obtained on plots with 10 and 20 days interval between irrigation. High safety and maximal growth of plants were observed. The height of three year old *Haloxylon aphyllum* trees watered each 10 days varied from 225 up to 292 cm, and *Salsola paletzkiana* bushes – from 175 up to 261 cm. Every 20 days watering after three years gives the height of *Haloxylon aphyllum* from 165 up to 242 cm, *Salsola paletzkiana* – from 175 up to 245 cm. Monthly interval watering brought to withering of certain part of plants, and the rest part grew much more slowly in comparison with the first and second variant of experiment. The lowest parameters of plants' safety and growth were revealed on a control plot: 27% of *Haloxylon aphyllum* and 32% of *Salsola paletzkiana* remained after three years. *Haloxylon aphyllum* height was from 94 up to 140 cm, and *Salsola paletzkiana* – from 125 up to 167 cm.

In Karakum desert where deficiency of moisture reaches critical mark collector-drainage water with salinity 2-5 g/l can be used for creation of protective and productive pastures. 20 days interval between watering with amount of water 3 liter per plant is the most effective one. It provides high safety and growth rate of desert plants and requires less water. Moreover, its crone grows and develops 2-2,5 times faster than plants of the control variant. Thus, according to this technology highly productive fodder and wood plants are useful to establish forest-pasture plantations in three years.
Keywords: Karakum desert, moving sands, phytomelioration, collector-drainage water.

GROWTH OF YOUNG *POPULUS DELTOIDS* AS EFFECTED BY VARIOUS WEED-CONTROL TECHNIQUES IN THE CENTRAL PLAINS OF THE UNITED STATES

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Abstract. Various synthetic mulches were tested on an alluvial site in three studies to examine survival and growth of cottonwood and hybrid poplar seedlings. Blue, clear, and yellow waste plastics; black, brown, and gray/black polyethylene; and polypropylene fabric weed barrier were compared with cultivation; sod; or isoxaben + orazalin (Gallery + Surflan) or sulfometron methyl (Oust) herbicide weed control treatments. After five years, cottonwood seedling survival was moderately high (50-91%) for all synthetic mulch types, whereas seedling survival with cultivation and Oust treatments ranged from 60 to 76%. Seedling growth was best with Oust herbicide, slightly less for cultivation, and nearly the same for all plastics. Planting in sod or use of Gallery + Surflan is not advisable, as these treatments yielded the poorest results. Oust provided the best environmental conditions for growth. Synthetic mulches seem to be practical for use in tree establishment under environmental conditions found in the central Great Plains.
Keywords: *Populus deltoides*, biomass, survival, height, plastic mulches, weed control, polyethylene, polypropylene, herbicide.

DROUGHT AND PASTURES PRODUCTIVITY ON PLAINS OF TURKMENISTAN

© 2009. M. Nurberdiev*, G.S. Bekieva*, B.K. Mamedov, L. Orlovsky*****

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Abstract. According to the long-term monitoring data (1954-2006) the duration of the vegetation growth period of spring desert grasses varies from 45-46 days in the northern and northwestern Turkmenistan to 60 days in the eastern Turkmenistan. In spite of high fluctuations in vegetation growth period in plain Turkmenistan – from 21 to 105 days in different years – grass productivity depends on duration of growth period at lesser extent. More reliable factor defining the yield of pastoral grasses is moisture supply of transpiration index (MSI).

Suggested model allows calculation of both coefficient of transpiration moisture supply and number of moisture supplied days for given third of month based on sum of rainfall, air temperature and rainfall use by grasses:

$$MSI = N = \frac{\sum_o \cdot K}{T_{5-16^\circ}} \cdot n \qquad (1)$$

where N is number of days supplied with moisture;
Σ_o – sum of precipitation for given third of the month;
K – empiric rainfall use coefficient by grasses (0.22);
T – average air temperature for given third of month for the period from +5 °C to +16 °C, n – number of days in the given third of month (8-9 for the last third of February, 10-11 – for the rest of months).

Correlation analysis of long-term data showed the existence of tight correlation between yield of forage herbs (y) and number of humid days (N). If we define the number of humid days per ten-day period using the equations given in the article, we can count the yield shoot of fodder herbs per this period. Sum of shoots for all ten-day periods of vegetation season compose the amount of maximal yield of fodder herbs for the year under concern.

Scientific value of this method:

- It gives tools for estimation and reconstruction of pastures yield for past years according to data of weather stations, if such information is absent for some reasons;
- It can serve as manual for specialists in agro-meteorology at National Committee of hydro-meteorology for technical and critical control of information on pastures yield that they receive from distant weather stations;

It enables the specialists to reconstruct the long-term information on pastures yield, to make analysis of productivity dynamics of desert ecosystems and to reveal the tendencies in the state and changes in productivity of desert vegetation.

Elaboration of effective drought monitoring system, as well as development of drought mitigation measures and improvement of forage reserve for small cattle livestock are among the urgent tasks for the researchers in cooperation with decision-makers and local authorities.

Keywords: Turkmenistan, Karakum desert, drought, pastures productivity.

CENTRAL ASIAN RELATIONS OF SPECIES FROM THE SECTION ENGLERIA (LEONOVA) TZVEL. OF THE GENUS *TYPHA* L.

© 2009. A.N. Krasnova

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Abstract. Species from the section Engleria (Leonova) Tzvel. of the genus *Typha* L. are related ecogenetically to a specific group of plants with features of xerophytes and hydrophytes. They were formed in severe conditions of the desert regions of Central Asia. Probably, the section evolved in Miocene. A taxonomical composition of the section is analyzed. According to the presence of archaic features *Typha przewalskii* Skvortzov can be referred to the subsection Mandshuriae A. Kasnova.

Keywords: ecoadaptation, florogenetic lines, archetype, morphological features.

RUSSIAN STEPPE CONSERVATION STRATEGY: NGOs' POSITION

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Abstract. Steppes represent one of the most intensively used in the economy and at the same time one of the most disturbed and endangered biomes within the territory of the former USSR. They are in need of special protection and restoration and in the shift towards a non-destructive usage. Meanwhile, state policy relating to steppe ecosystems use and conservation is lacking. Russian environmental NGOs and scientific experts develop their own vision in this problem area. The see the key in the intensification of wild nature conservation on agricultural lands and ecologization of agriculture in general, as well as in ecological and social responsibility of agricultural enterprises, development of non-traditional and non-public forms of territorial protection of nature on private and municipal lands and prioritization of nature conservation projects aimed at steppe conservation. This Strategy is open for further discussion and represents a basic document for developing plans of action in specific areas identified.

Keywords: Steppes of Russia, protection of nature, NGO.

TO THE NEW STRATEGY OF RUSSIAN STEPPES' CONSERVATION: REVIEW OF THE BOOK "STRATEGY OF RUSSIAN STEPPES' CONSERVATION: OPINION OF NON-GOVERNMENTAL ORGANIZATIONS" M.: Center of wild nature conservation, 2006. 36 p.

© 2009. V.A. Minoransky

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Abstract. The book under consideration includes a lot of valuable and important ideas on steppes conservation worked out by Russian and foreign specialists. Meanwhile carelessness in determination of the concept «steppe», insufficiency in evaluation of importance of its biological component and non-consideration of existing scientific and practical experience of governmental and informal organizations of European Russia caused the weakness of this work and absence of some important statements in it, that may lower its value and state of being required.
Keywords: biological resources, biodiversity, conservation, restoration, forest amelioration, ecological nets, regional strategies.

DISSERTATIONS FROM RUSSIA AND THE COUNTRES OF THE FORMER SOVIET UNION

Shapovalova I.B. (Russia) «Composition and structure of ornithological complexes of islands Volgograd reservoir» (Specialty 03.00.16 - Ecology) / Abstract of the PhD thesis (biological sciences). Moscow: Russian university of friendship of the peoples, 2008. 17 p.

Reservoirs are considered as a complex ecological factor. Ecological peculiarities of ornithological complexes on reservoirs' islands were revealed. It was shown that negative influence of acute daily trends of water levels is stronger than that of seasonal trends. The list of birds in biotops of the middle part of Volgograd reservoir was composed.

The materials of the work are useful to forecast bird population at planning future reservoirs using technique of landscape-ecological analogues.

Ulanova S.S. (Russia) «Geoecological assesment of artificial reservoirs IN Kalmykia and water-terrestrial ecotone systems at their coasts» (Specialty 25.00.36 - Geoecology) / Abstract of the PhD thesis (geographycal sciences). Moscow: Water problems Institute Russian academy of Sciences, 2008. 21 p.

The actual task of a geoecological assessment of the artificial reservoirs created under conditions of arid regions is solved in this work. The technique of geoecological studying and an assessment of reservoirs has been developed taking as an example the artificial reservoirs of republic Kalmykia and water-terrestrial ecotone systems at their coasts. The thesis research has shown that artificial reservoirs under conditions of arid zones are important factors of landscapes' transformation and increase of biodiversity. Change in mineralization of waters of artificial reservoirs is one of the principal factors determining their use. Coastal ecosystems are exposed to the influence of reservoirs to a greatest extent; here the ecotone system is formed, which has the heightened richness of soils, vegetation, birds, that is quite rare for the arid conditions. The nature protection role of artificial reservoirs changes gradually, increasing in due course.

Gelantia M.R. (Georgia) «Social-ecological aspects of forsed Migration of population of Abkhazian» (Specialty 03.00.16 - Ecology) / Abstract of the PhD thesis (biological sciences). Moscow: Russian university of friendship of the peoples, 2008. 26 p.

The work deals with the process of systemic analyses of forced migration of population and psycho-physiological and ecological-medical adaptation of migrants on the reference of ecological interdisciplinary points, including demographic and social-rights aspects. On the base of the consequences, there is presented the conception of overcoming negative aspects of forced migration of population of Abkhazian

Maturazova E. (Uzbekistan) «The Character of anthropometrical indicators in the blood and blood circulation system in infants in the environment of South Priaralie» (Specialty 03.00.13 - Man and animal physiology) / Abstract of the PhD thesis (biological sciences). Tashkent: Institute of physiology and biophysics of Uzbek Academy of Sciences, 2008. 20 p.

Have been examined 540 children having an age of 6-14, who have born and reside in the various areas of the South Priaralie. Aim of the inquiry: to study the character of anthropometrical indicators of age groups and also the blood and blood circulation in infants residing in South Priaralie.

For the first time have been studied the anthropometrical indicators, the characters of blood and blood circulation in infants of different age and gender affected by ecological conditions of livelihood living in various areas of Priaralie in Karakalpakstan Republic. The results of the thesis can be used at

health care departments of Health Ministry of Karakalpakstan Republic aiming to define the reserved possibilities and functional activeness of cardiovascular system.

Kadirov G.U. (Uzbekistan) «Transformation of plant cover of lake Aydarkul» (Specialty 03.00.05 - Botany) / Abstract of the PhD thesis (biological sciences). Tashkent: Research-and-production centre «Botany» of Uzbek Academy of Sciences, 2008. 20 p.

Aim of the inquiry: indentification and demonstration of typological structure of the vegetable cover types of meadows and defing their level and mechanism of anthropogenic transformation with the help of global pictures taken from the sattelite.

Obtained results and their novelty are the ways Methods of research. A wide scale map growing world of Audarcul is created with the help of satellite data, (ASP) and multy-staged legend on the basis of typo-typological principles was worked out. Complexes of nature areas – (CNA), 51 cartographical units and their antropogenic modification. In the builds (of Hojaev in Kizilkum) two meadow places 7 types of meadows were discovered, and their anthropological modification where degree of their violation are shown with index А, Б, В. Around Aydarcul 300 species of biolo – morphological spectra belonging to 176 species and 44 families are recorded. Worked out optimum versions of usage of the created map in cattle farm and forestry.

Mambetullaeva S. (Uzbekistan) «Quantitative assessment of ecological factors formulating the extremity of environment of animals' nature in the Southern Priaralie» (Specialty 03.00.16 - Ecology) / Abstract of doctorate thesis (biological sciences). Tashkent: Institute of zoology of Uzbek Academy of Sciences, 2008. 34 p.

Subjects of the inquiry: Limnetic ecosystems; The main species of small mammals: *Rhombomys opimus* (Lichtenstein, 1823), *Microtus ilaeus* (Thomas, 1912), *Ondatra zibethica* (Linnaeus, 1766); Figures from Karakalpak steering organization «Suuakaba», «Karakalpaktutynyu», the «Headhydrometcenter», Karakalpak scientific research institute of experimental and clinical medicine, Karakalpak branch of prophylactic carantin and special infection center of Ministry of Health of Republic of Uzbekistan, orgmethodcenter of № 1 clinical department of Karakalpak Republic, Central Republic Hospital of Karakalpak Republic, The Ministry of macroeconomics and statistics of Karakalpak Republic. Aim of the inquiry: To held a complex, quantitative assessment of exogenous impacts of ecosystem. To study the react of ecosystem through the mathematical methods of analysis existing all quantitative interrelation and regularity in ecosystem aiming to gain diagnostics and control on the state of ecosystem in the zone of ecological crisis.

For the first time has been revealed the main ecological factors and held complex quantitative assessment, their impacts on the function of limnetic ecosystem and on the population regularity of mammals and on the health condition of community. The results obtained can be used for solving ecological problems of the region Priaralie and optimization of the environment. Sphere of usage: Protection of environment and health of population.

Iashkov I.A. (Russia) «Ravine-balka relief of urbanized territory: composition, development, geoecological danger (taking Saratov city as an example)» (Specialty 25.00.36 - Geoecology ans 25.00.25 - Geomorphology and evolutional geography) / Thesis abstract …..candidate of geographical sciences. M.: State University of land planning, 2008. 22 p.

The thesis is written at the cathedra of geoecology of geological faculty of Saratov state University named after N.G. Chernishevskiy. In the work the interaction of erosion process with other geoecological processes (landslide, carst-suffosion, process of watering etc.) on the urban territory of Saratov as a whole and on model polygons is analyzed. The original algorithm of counting of the fractal dimension for the research of the self-similarity of the plan picture of erosion net is worked out and approved for the first time for the territory under consideration. The analysis of the features of co-evolution of natural and artificial drainage systems of urban territory is made. For the first time for the territory the recommendation for nature conservation organizations and municipal ecological committees on monitoring and prognosis of the dynamics of potential erosion danger was worked out.

NEW BOOKS

Morozova O.V. Taxonomic richness of Eastern Europe: factors of spatial differentiation/ (editor-in-chief A.A. Tishkov) Institute of Geography RAS. M.: Nauka, 2008. 328 p.

The variety of flora of Eastern Europe on three different levels: species, genera, family – is under consideration in the monograph. The data on γ-diversity of the region is presented; dependence of this index from the square of the territory is studied. The data on dependence of taxonomic variety from several factors, such as climate, historical-biogeographical factors, geo-diversity and anthropogenic factors, is received for the first time for the large region. The possibility of making prognosis for changes in flora under global climatic changes is analyzed. The correlation between level of variety and sites of flora refugiums is studied. The spatial division into districts of the territory according to floristic variety and leading environmental factors is made. The deviation of such division into districts from common zonal division of the Eastern Europe is considered. The system of local territories that could be used for flora monitoring is proposed. The monograph is dedicated to biologists, ecologists, geographers and specialists in environmental protection.

Zaidelman F.R. Genesis and ecological basis for reclamation of soils and landscapes: textbook. M.: Book-house University, 2009. 720 p.

The textbook is devoted to consideration of the soils formation conditions, when soils are considered as natural-historical formations and objects of melioration. The features of soils genesis under conditions of humid landscapes are shown and data on conditions of soils formation in main natural zones of the Earth is systematized. Principal attention is paid to the processes of podzolic- and gley-soil formation, to lessivage, sulfate-reduction, ferrallitization, peat-formation, floodplains soils formation, hydrogenic-accumulative and other factors of soils formation. The defining role of soils in choosing of melioration systems constructions, in evaluation of ecological and economic efficiency of melioration measures, in prognoses of degradation processes due to melioration and agricultural use, in defense against dangerous changes is shown in the work. While soils are direct and often unique object of melioration, all mentioned data can serve as the basis for solving of theoretical and applied problems of their properties and regimes optimization. The book is dedicated to students-soil-scientists, specialists in melioration, agriculturist, ecologists who study at the universities and agricultural high schools, to PhD students, to scientists and practical specialists. It is recommended as the textbook for students of high schools, speciality 02.07.01 – Soil science.

Gruzdev V.S. Bioindication of environmental state. M.: State University of land planning, 2008. 142 p.

The monograph is written basing on generalization of original author's field studies made with analysis of literature data on bioindication of ecosystems' components and ecosystems as a whole. Some chapters are devoted to bioindication of the state of atmospheric air, soils, water and vegetation. Methods of bioindication and its application together with landscape indication are considered in details. Practical recommendations on application of bioindication methods are presented.

Monograph is interesting for ecologists and geographers, it could be used in the work of state organizations for monitoring of environment and for working out measures of landscape and ecosystems protection against pollution and exhaustion. It could be used in education process by teachers and students on ecology, nature use, biology, environmental protection and environmental engineering as well as by scientists.

Lettol R. The Aral sea (Series: Biology, Ecology, Agronomy). Publishing house Harmattan, France, Paris, 2009. 318 p.

The Aral sea is situated in the center of the desert plain in Central Asia. In previous times it was on the fourth place among the biggest lakes on Earth according to the area of water surface. Changes in the water flow of rivers that fed it became the reason of its desiccation. Up to 1970 only 90% of its territory and 80% of its volume remained as a sea. The desiccation of the sea coasts, degradation of flora and fauna began. The quality of life and activity of population in the deltas worsened.

The following results of research work are presented in the monograph: history of the Aral region and nations that lived in it during historical times, catastrophic consequences of its desiccation from the

point of view of ecosystems as well as from the point of view of population health and the regions economy. In the final part of the book the possibilities of its reconstruction are discussed.

Contents: 1. Central Asia and Aral; 2. Climate and biomass; 3. Geography of the Aral; 4. Excursion around the Aral; 5. Extinction of the Aral; 6. Changes in salinity; 7. Regressions in the past times; 8. The Aral before Russians; 9. Russia settling; 10. History of the Aral mapping; 11. The Aral sea in XX century; 12. Changes in the sea biomass; 13. Man's activity; 14. Impact on population health; 15. State of the Problem in 2008; Conclusion.

TOWARDS ANNIVERSARY OF NIKOLAI IVANOVICH KORONKEVICH

Congratulation from Editorial board of the journal «Arid ecosystems», Water Problems Institute of Russian Academy of Sciences, Institute of Geography of Russian Academy of Sciences, Biogeographical Commission of Moscow Center of Russian Geographical Society, colleagues from M.V. Lomonosov Moscow State University and Russian Academy of Agriculture Sciences.

TOWARDS ANNIVERSARY OF ALEKSANDER ALEKSANDROVICH CHIBILEV

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