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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 Department of Biological Sciences 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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HISTORY OF THE LAST ARAL SEA

2009. A.A. Svitoch

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Abstract. The history of the Aral Sea has two epochs – prolonged background and epoch of existence of the last (up to 1961) sea basin. The Aral background begins from the Late Pliocene, when its basin was filling up by the Ackchagyl and Apcheron sea waters, and finishes by the lengthy Pleistocene subareal period. Paleogeography of the last stage of the Aral Sea existence is not prolonged and covers only Holocene. At first, the limno-brackishwater stage is recognized. In the middle of this period, as a result of bursting Amu-Daria waters to the Aral Sea, the large desalinate marine reservoir is formed here, characterizing by abrupt oscillations of level and salinity and also wide spreading of mollusks *Cerastoderma glaucum* (*Cardium edule*).
Keywords: The Aral sea, history of development, geological structure, relief, holocene, palaeogeography

LARGE SCALE MAPPING OF DAURIA-MONGOLIAN STEPPES FOR MONITORING PURPOSES

© 2009. G.N. Ogureeva, I.M. Miklaeva, M.V. Bocharnikov, S.V. Dudov, I. Tuvshintogtokh

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Abstract. In 2008 within the summer period the recent coenotic diversity and the status of dry-steppe ecosystems have being studied at the territory of Tumen-Zogt experimental station located in the Kerulen river basin of Eastern Mongolia. The study was aimed at estimating the dynamics of vegetation in dry steppes due to changing the environment and the extent of anthropogenic effects. Under study were also links between the distribution of forb-sod-gramineae und dry-sod-gramineae steppes covered by different herbaceous vegetation within the hummocks in a number of adjacent geographical facies – phytocatenas – from local watershed to the depression bottom. The grass cover of steppes is predominated by Gramineae (*Stipa krylovii, S. grandis, S. sibirica),* low sod (*Cleistogenes squarrosa, Koeleria cristata Festuca lenensis, Agropyron cristatum*) and rhizomous Gramineae (*Leymus chinensis). Caragana stenophylla* and *C.microphylla* occur in the composition of plant communities as well. 16 phytocatenas have been thoroughly examined to give 168 complete geobotanical descriptions. In landscape of the territory under study there are flat surfaces elevated by 800-940 m above sea level, low hummocks with gentle slopes and flattened hummock trains (940-1200 m) and high hummocks with steep erosion-dissected slopes (1000-1400 m). Based upon a comprehensive analysis of phytocatenas it seemed reasonable to establish that plant communities in steppes are confined to altitude and exposition and reveal floristic and structural peculiar features. The large-scale map of vegetation (M 1:200 000) has been compiled, thus estimating the recent status and fluctuation of steppes (according to data obtained in 2008). The natural typological diversity of steppes is shown as based on the environmental-morphological classification of vegetation. In the legend the association groups and associations are taken as the basic mapping units, each being accompanied by a list of specific community species. The recent vegetation cover is represented by modified communities practically everywhere, whose majority is the stages of digressive successions resulted from permanent (seasonal or all over the year) grazing. Natural fluctuations in the steppe grass cover are caused by cyclic anomaly of seasonal distribution in the precipitation. The rainfall in the first half of the summer was conducive to intensive vitality of annual grasses, what served as a reason for reformation of sinusial structure of steppe communities. It is worth emphasizing that there exists a trend to decreasing the floristic diversity of steppes due to shortening a share of low low-sod-gramineae grasses.
Keywords: steppe ecosystems, coenotic diversity, mapping, monitoring, phytocatena, vegetation dynamics.

DYNAMICS OF ABUNDANCE AND BIOMASS OF THE LITTLE GROUND SQUIRREL (*SPERMOPHILUS PYGMAEUS* PALL., 1778) IN PASTURES OF KALMYKIA FOR THE 28-YEARS PERIOD

© 2009. S.A. Shilova, L.E. Savinetskaya, V.V. Neronov

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Abstract. Investigations were carried out in the south of Kalmikia (near village Achineri, Chernozemelsk district , "Cherniye zemli") in 1981-2008 years. The native semidesert has been replaced by high grass anthropogenic steppe because of cattle and small livestock abundance reduction and pasturage press decreasing. Little ground squirrel abundance is steady decreasing from the end of 80th. There were good stable settlements of this species with rodents numbers up to 40 animals per ha before 1983. However 5-6 years later just single settlements were found near aged cattle shelters where vegetation was sparse because of pasturage. For the next 14-15 year the area was covered by massive anthropogenic steppe and little ground squirrel abundance wasn't restored. No inhabited settlement was found within a range 20 km from our field station. Replacement of the native semidesert by high grass anthropogenic steppe has caused little ground squirrel abundance decreasing as this species wasn't adapted to habitats with high and dense vegetation.

Little ground squirrels are of great importance for the biocoenosis. This species is very significant in the process of microrelief and soil complexity forming. Little ground squirrels hoeing saline soil and increase soil penetration for water (Abaturov, Zubkova, 1969). About 12 thousands species of different systematic groups use the burrows of little ground squirrels in clay semidesert (Okulova, 2003).

The little ground squirrels are very important part in steppe eagle ration in the south of Russia, including Kalmikia. Fragments of this species are found in 97.4% of steppe eagle faeces (Savinetsky, Shilova, 1986). Steppe eagle abundance correlates with little ground squirrel one. In 1981 (the year of high little ground squirrel density) in Ergini one can find 19 eagles along the standard 30 km line. In 1994-1995 years in the period of little ground squirrel depression no one steppe eagle was found along the same line (Savinetsky, Shilova, 1986).

Little ground squirrel extinction over the wide territory in the South of Russia and long-term 15-17 years depression can significantly influence the pasturable ecosystems structure. Before depression little ground squirrel biomass in Cherniye zemli was 10800 g/ha. After little ground squirrel extinction abundance of other rodents hasn't increased on that territory so biomass decreasing wasn't compensated. Because of decreasing and interruption of little ground squirrel activity their sandmounts become to be destroyed little by little. In this condition to study the biocoenosis structure specific is very urgent.
Keywords: little ground squirrel, biomass, landscape of semidesert, dynamics of abundance.

SECTORAL PROBLEMS OF ARID LANDS DEVELOPMENT

METHODS OF THE INTEGRATED ASSESSMENT OF NATURAL PASTURE ECOSYSTEMS

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Abstract. Pasture ecosystems possess vast fodder resources (pasture forage, grassy weight for hay, silo, etc.). Annually formed resource of natural pasture ecosystems forage makes 160 million tons of dry matter or 145 billion fodder units. These pastures of the country, alongside with fodder weight accumulate 550 million tons of organic matter in underground part and render significant influence to reproduction and preservation of optimum parameters of environment. On the basis of the analysis and generalization of experimental multitude data the methods of natural pasture ecosystems complex estimation by energy and economic criteria are developed. Offered methods alongside with an estimation of the fodder weight measured by the contents of fodder units, allow to estimate the efficiency of pasture ecosystems by the contents of total and

metabolizable energy, and also to define their nature protection role. By offered technique of economic and ecological functions the complex estimation of natural pasture ecosystems of tundra, wood, forest-steppe, steppe, semidesert and desert zones of Russia is given. The first time application of the given method has allowed estimating for the energy quantity accumulated in pasture ecosystems at a level 3 thousand Tjoule of gross energy.

Keywords: integrated estimation, energy estimation, pasture ecosystems, exchange energy, gross energy, nature protective role, fodder resources.

REMOTE SENSING METHODS OF LAND RESOURCES ASSESSMENT IN DAGHESTAN

© 2009. N.V. Stasuk*, E.P. Bikova*, M.Z. Zalibekova, A.K. Saidov****

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Abstract. The paper presents the results of long-term usage of aero- photo- space images materials in soil and soil-thematic cartography, assessment of agricultural state of lands in Daghestan, soil and ecological regionalizing, assessment of soil degradation and operative soil monitoring.

Keywords: hydro-morphic, space survey, spatial, degradation, desertification, monitoring, decoding, land resources, erosion.

ECOLOGICAL MONITORING OF THE CHANGES OF BIOTIC COMPONENTS IN STEPPE GEOSYSTEMS UNDER CONDITIONS OF A GEOCHEMICAL ANOMALY

© 2009. E.P. Bessolitsyna

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Abstract. The ongoing long-term observations of the dynamics of biotic components in steppe geosystems in the contamination zone of the Sayanogorsk Aluminum Smelter (SaAS) revealed a negative influence of technogenic contamination on the invertebrate abundance and biomass.

The conceptual framework has been developed for diagnosing the state of steppe geosystems and the degree of their transformation, based on the principles of structural-functional organization of the soil biota, a forecast is made for the development of the ecological situation, and the possible uses of the characteristics of zoocenoses in optimizing the ecological monitoring system under conditions of geochemical anomalies are demonstrated.

Keywords: technogenic impact, steppe geosystems, soil, abundance and biomass of invertebrates, structure of zoocenoses, state, ecological monitoring.

REVIEWS

FIRST GUIDE OF THE MONGOLIAN BIRDS
REVIEW OF THE BOOK «PHOTO GUIDE TO MONGOLIAN BIRDS (125 SPECIES)», THE AUTHOR SH. BOLDBAATAR ULAANBATAAR: MONGOLYN MAKHCHIN SHUVUUNY SAN, 2008. 158 P.

© 2009. N.V. Lebedeva

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Abstract. The first photo-guide of the Mongolian birds (125 species; Boldbaatar, 2008) published in the Mongolian language is discussed. The guide gives the brief descriptions in the Mongolian language and

photos of 125 bird species, their names in five languages: Latin, Mongolian, English, Russian and Japanese. This edition will be useful for bird-watchers, tourists and zoologists interested in avifauna of Mongolia.
Keywords: birds, species, photos, description of species, the Mongolian, English, Russian, Japanese languages.

CHRONICLE

New books

Stasyuk N.V. DYNAMICS OF SOIL COVER OF TEREK DELTA. Mahachkala: Publ. house of Daghestan Scientific Center of Russian Academy of Sciences, 2005. 193 p.

The evaluation of a modern state and temporal changes of the soil cover of large agricultural area of South Russia is given in the monography on the basis of long-term researches and new methodological approaches. For the first time the comparative analysis of its composition and structure was carried out within the natural and anthropogenic periods of the Terek delta development, the rates and features of degradation process were determined, the monitoring timing was established, the principles of the operative control were developed and the long-term forecast was made.

For soil scientists, geographers, ecologists, specialists on preservation of the environment and resources conservation.

Dryland Ecosystem. Indian Perspective. Editors: K.P.R. Vittal, R.L. Srivastava, N.L. Joshi Amal Kar, V.P. Tewari, S. Kathju. Jodhpur: M/s Evergreen Printers, 2007. 250 p.

Drylands, covering about 41% of the earth's land surface and inhabited by more than 2 billion people, are one of the world's most challenging ecosystems. About 70% (228.3 million ha) of India's total land area (327.9 million ha), spread over almost all the states of the country, except Goa, Kerala, and the states in the north-east and the islands, is classified as drylands.

The book "Dryland Ecosystem: Indian Perspective" have embarked on a wide range of topics dealing with the problems and management of drylands areas. This book is a step towards that realization, especially for making the arid lands more sustainable. The critical reviews by the learned authors on different aspects of drylands and the future needs suggested would get the attention of all concerned.

Contents: 1.Desertification in Arid Western India: Current Scenario.2.Climate Change and Dryland Agriculture. 3.Farming Systems for Sustainable Agriculture in Indian Arid Zone. 4.Horizontal and Vertical Diversifications of Rainfed Cropping Systems in India.5.Sustainable Forest Management: Criteria and Indicator Approach.6.Water Resource Management in Indian Arid Zone.7.Afforestation of Salt Affected Lands in Arid Areas.8.Soil Quality and Fertility - Context and Perspective in Dryland Research.9.Prospects of Horticulture in Arid Zone.10.Integrated Management of Forest and Agricultural Insect Pests in Arid Regions.11.Managing Dryland Resources to Increase Productivity and Livelihood in Indian Perspective.12.Watershed Management: An Entry Point for Improved Livelihoods and Sustainable Development in the Dryland Areas of Asia.13.Role of Livestock in Dryland Farming: Indian Perspective.

Charles F. Hutchinson, Stefanie M. Herrmann. The Future of Arid Lands – Revisited. A Review of 50 Years of Drylands Research. The Netherlands: Springer (UNESCO). 2008. 200 p.

Within the United Nations System, UNESCO has one of the longest traditions in addressing dryland problems from a scientific point of view. The first international research program dealing with these zones was launched back in 1951 under the direction of an International Advisory Committee. It was followed by a series of UNESCO intergovernmental programs having significant components relating to drylands.

The year 2006 was declared "International Year of Deserts and Desertification" by the United Nations General Assembly. This proved to be a timely occasion to assess the development of scientific research relative to the projections made 50 years ago, which were based on the knowledge at that time. Professor Charles F. Hutchinson and Dr. Stefanie Herrmann at the University of Arizona were assigned this mammoth task. The UNESCO-commissioned book *The Future of Arid Lands - Revisited* comes some 50 years after the publication of *The Future of Arid Lands.* This new book can help to determine the scientific path for future operations to promote sustainable development in countries affected by desertification. UNESCO considers the book an important contribution to the UN Decade of Education for Sustainable Development (2005-2014) for which UNESCO has been designated lead agency. As the world's drylands are among the most poverty-stricken regions of our planet, and in line with the UN-wide joint effort to reach the

Millennium Development Goals, we need to mobilize all our collective efforts to ensure sustainable development in the world's marginal areas that are the deserts.

Species and communities in extreme conditions. Collective monograph devoted to 75-year anniversary of academician U.I. Chernov. Eds.: A.I. Babenko, N.V. Matveeva, O.L. Makarova, S.I. Golovach. Moscow-Sophia: Association of scientific publishers KMK – PENSOFT. 2009. 494 p.

Uriy Ivanovich Chernov is the most outstanding modern expert in ecology and biogeography foremost of Arctic, not only in Russia, abroad as well. He is the author of more than 200 scientific publications, the most known among them - monographs "Natural zonality and animal world of the earth" (1975), "Structure of animal population in Sub-Arctic regions" (1978), "Life of tundra" (1980). In the book under consideration his pupils and followers made an attempt to show the development of sin-ecological and biogeographical works of Uriy Ivanovich. The book includes the articles on evaluation of flora and fauna diversity of Arctic and arid territories, on analysis of the structure of its natural communities and items of protection of these regions. In several articles the methodological problems of research works are lighted up (methods of geographical trends in biodiversity studies, choosing of units for geographical analysis of biota components, etc.). All authors – zoologists, botanists, geographers and ecologists from different institutions and countries – are united by aspiration to come from facts to phenomena, from phenomena – to the laws, which is so organic for the scientific thought of Uriy Ivanovich Chernov.

TO THE JUBILEE OF ACADEMICIAN NINA TROFIMOVNA NECHAEVA

14-15 of December, 2009 in Moscow there will be held the Scientific Readings devoted to 100-anniversary of Nina Trofimovna Nechaeva, an outstanding researcher, academician of the Turkmenian Academy of Sciences, Laureate of the USSR National Prize, Hero of Socialist Labor. Taking into consideration her great merits in researching arid ecosystems and development of measures to combat desertification, the Bureau of Branch of biological sciences RAS by the resolution of 31 of March, 2009 decreed to lay organization of the Readings on the A.N. Severtsov Institute of Ecology and Evolution RAS. The program will include reports on principal directions of researches of arid ecosystems developed by N.T. Nechaeva. Also an excursion is planned to the All-Russian Scientific Institute of Feeds. By the beginning of the Readings a special volume of "Arid Ecosystems" magazine will be issued devoted to 100-anniversary of academician of the Turkmenian Academy of Sciences N.T. Nechaeva.

The Organizing committee invites all interested specialists to send their propositions about conducting the Readings as well as texts of their reports up to 20000 symbols long. The deadline is 20 of September, 2009.