ISSN 1993-3916

Том *Volume* **18** **Номер** **Number** **1 (50)** **Март** **March** **2012**

РОССИЙСКАЯ АКАДЕМИЯ НАУК
RUSSIAN ACADEMY OF SCIENCES

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 applied 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.

МОСКВА: Товарищество научных изданий КМК
MOSCOW: KMK Scientific Press Ltd

2012

RUSSIAN ACADEMY OF SCIENCES
DEPARTMENT OF BIOLOGICAL SCIENCES
DAGESTAN SCIENTIFIC CENTER
PRICASPIYSKIY INSTITUTE OF BIOLOGICAL RESOURCES
WATER PROBLEMS INSTITUTE

SECTION "Problems of arid ecosystems and combat against desertification"
Scientific council "Problems of ecology and biological systems"

ARID ECOSYSTEMS

Vol. 18, No. 1 (50), 2012, MARCH
Journal is founded in January 1995
Issued 4 times per year

Addresses of Editorial Offices:
*Russia, 119333 Moscow, Gubkina str., 3, WPI RAS
Tel.: (499) 135-70-41. Fax: (499) 135-54-15
E-mail: arid.journal@yandex.ru

**Russia, 367025 Makhachkala, Gadjieva str., 45, PIBR DSC RAS
Tel./Fax: (872-2) 67-60-66
E-mail: pibrdncran@mail.ru

MOSCOW: KMK Scientific Press Ltd

2012

РОССИЙСКАЯ АКАДЕМИЯ НАУК
ОТДЕЛЕНИЕ БИОЛОГИЧЕСКИХ НАУК
ДАГЕСТАНСКИЙ НАУЧНЫЙ ЦЕНТР
ПРИКАСПИЙСКИЙ ИНСТИТУТ БИОЛОГИЧЕСКИХ РЕСУРСОВ
ИНСТИТУТ ВОДНЫХ ПРОБЛЕМ

СЕКЦИЯ "Проблемы изучения аридных экосистем и борьбы с опустыниванием"
Научного совета по проблемам экологии биологических систем

АРИДНЫЕ ЭКОСИСТЕМЫ

Том 18, № 1 (50), 2012, март
Журнал основан в январе 1995 г.
Выходит 4 раза в год

Адреса редакции:
*Россия, 119333 Москва, ул. Губкина, 3, ИВП РАН
Телефон: (499) 135-70-41, Fax: (499) 135-54-15
E-mail: arid.journal@yandex.ru

**Россия, 367025 Махачкала, ул. Гаджиева, 45, ПИБР ДНЦ РАН
Телефон: (872-2) 67-09-83
E-mail: pibrdncran@mail.ru

Москва: Товарищество научных изданий КМК

2012

© Журнал основан в 1995 г.
Издается при финансовой поддержке
Прикаспийского института биологических ресурсов
Дагестанского научного центра Российской академии наук,
Института водных проблем Российской академии наук,
Регионального благотворительного фонда им. А.М. Солтанмута,
Товарищества научных изданий КМК
и содействии региональных отделений секции
"Проблемы изучения аридных экосистем и борьбы с опустыниванием"
Научного совета "Проблемы экологии биологических систем"
отделения биологических наук Российской академии наук

The journal has been founded in 1995.
It is published under financial support of
Pricaspiyskiy Institute of Biological Resources
Dagestan Scientific Center of Russian Academy of Sciences,
Water Problems Institute of Russian Academy of Sciences,
A.M. Soultanmut Regional Charitable Foundation,
KMK Scientific Press Ltd
with assistance of regional departments of the section:
"Problems of Arid Ecosystems and Desertification Control",
Scientific Council "Problems of Biosystems Ecology"
Department of General Biology of Russian Academy of Sciences

Журнал включен в список Реферируемых журналов и
Базы данных ВИНИТИ, входит в Перечень изданий,
рекомендованных ВАК РФ, с 2011 г. переводится на английский
и распространяется издательством Springer за пределами России.
Сведения о журнале ежегодно публикуются в международной
справочной системе по периодическим и продолжающимся
изданиям
«Ulrich's Periodicals Directory». Информация о журнале и архив
располагаются на сайте www.iwp.ru

The journal is included in the list of reviewed journals,
database of VINITI and in the list editions, recommended
by Higher Attestation Commission of Russian Federation.
It is translated from Russian to English and distributed by Springer
Publisher House outside of Russia.
Information about the journal is annually published in the International
inquiry system of the
«Ulrich's Periodicals Directory». Information about Journal and
archive are at the site www.iwp.ru

CONTENTS

Volume 18, Number 1(50), 2012 MARCH

ABSTRACTS

ECOLOGICAL DEMANDS TO SOCIAL-ECONOMIC DEVELOPMENT OF MONGOLIA UNDER CLIMATE ARIDIZATION

© 2012 D. Regdel*, Ch. Dugarjav, P.D. Gunin*****

* *Presidium of Mongolian Academy of Sciences, Mongolia,*
Mongolia, 190060 Ulaanbaatar, Premier A. Amar st., 1. E-mail: mas@mas.ac.mn
** *Institute of Botany MAS*
Mongolia, 190070 Ulaanbaatar, Jukov st., 77. E-mail: ibot@mongol.net
*** *A.N. Severtsov Institute of Ecology and Evolution RAS*
Russia, 119071 Moscow, Leninskij pros., 33. E-mail: monexp@mail.ru

In the present report, the authors stress ecological demands to social-economic development of Mongolia and those features, which help or, opposite, make the country development difficult. Data on natural resources exploitation for the last 20-30 years were analyzed, and advantages and defects of new and traditional methods were revealed. Here are formulated basic ecological demands to management of biological and mineral resources that most correspond to the conception of the steady development.
Keywords: natural resources, socio-economic development, regulatory support.

MODERN USE OF PASTURES AND WATER SUPPLY OF MIDDLE GOBI AIMAG OF MONGOLIA (ON EXAMPLE OF BRIGADE RASHAANT)

© 2012 S. Enh-Amgalan *, Y.I. Drobyshev **, S.N. Basha ** D. Amgalanbaatar *, B. Baasandorzh*

** Institute of Geography, Mongolian Academy of Sciences*
Mongolia, 210 620 Ulaanbaatar, P.O.B. - 361. E-mail: amgalan1969@yahoo.com
*** A.N. Severtsov Institute of Ecology and Evolution RAS*
Russia, 119071 Moscow, Leninskij prosp., 33. E-mail: monexp@mail.ru

The paper presents the detailed characteristics of the pastures and the structure of livestock over the last decades in the Middle Gobi aimag of Mongolia as an example of Rashaant bug (brigade). The problems of watering places were investigated, as well as the recommendations for optimizing the structure of populations and ecosystems conservation for study area was provided.
Keywords: Middle Gobi aimag, livestock, pasture types, desertification and degradation of pastures.

EXPANSION OF *EPHEDRA SINICA* STAPF. IN ECOSYSTEMS OF DRY STEPPE IN EASTERN AND CENTRAL MONGOLIA

© 2012. P.D. Gunin*, S.N. Bazha*, E.V. Danzhalova*, I.A. Dmitriev*, Yu.I. Drobyshev*, T.I. Kazantseva, I.M. Miklyaeva***, G.N. Ogureeva***, N.N. Slemnev**, S.V. Titova****, E. Ariunbold*****, C. Battseren******, L. Jargalsaikhan*********

* *A.N. Severtsov Institute for Ecology and Evolution, Russian Academy of Sciences*
Russia, 119071 Moscow, Leninskij prosp., 33. E-mail: monexp@mail.ru,
** *V.L. Komarov Botanical Institute, Russian Academy of Sciences*
Russia, 197376 Saint-Petersburg, Prof. Popova str., 2. E-mail:bulgancum@gmail.com,
*** *M.V. Lomonosov Moscow State University, Geographycal faculty*

Russia, 119992 Moscow, Vorobievy Gory, MSU. E-mail: inessa-miklyaeva@yandex.ru,
[****]Institute of Geography, Russian Academy of Scienses
Russia, 109017 Moscow, Staromonetnyi per., 29. E-mail: canopuss@yandex.ru,
[*****]Saint-Petersburg State Forest-Technical Academy
Russia, 194021 Saint-Petersburg, Institutskyi substreet, 5.
[******]Kazan (Privolzhskyi) Federal University
Russia, 420066 Kazan, Kremlevskaya str., 18. E-mail: tseegi_117@yahoo.com
[*******]Institute of Botany, Mongolian Academy of Science
Mongolia, 210351 Ulaanbaatar, Zhukov avenue, 77. E-mail: l_jaga_cj@mail.ru.

The features of the present distribution and cenotic association of ephedra (*Ephedra sinica* Stapf.) in ecosystems of the arid steppes of Central and Eastern Mongolia are presented. This study results a long-term monitoring carried out on Bayan-Unjul and Tumentsogt Study area in a framework of Joint Russian-Mongolian complex biological expedition of Sciences and the ASM. The interrelation between cenotical role of ephedra and the main parameters of plant communities (abundance of perennial and annual species in plant cover, aboveground phytomass) was presented. During recent decades formation of communities with the dominant role of *Ephedra sinica* in degraded ecosystems of arid steppes in Mongolia and changes of its status depending on the conditions of atmospheric moisture was analyzed.
Keywords: arid steppes, large-scale mapping, grassland ecosystems, ephedra (*Ephedra sinica* Stapf.) expansion, environmental monitoring.

EXPERIENCE OF INVESTIGATION OF THE HYDROTHERMAL REGIME IN DARK CHESTNUT SOILS OF CENTRAL MONGOLIA

© 2012 S.N. Bazha, P.D. Gunin, S.V. Kontsov

A.N. Sevetrtsov Institute of Ecology and Evolution Russian Academy of Sciences
119071, Leninskij prosp., 33. Moscow, Russia. E-mail: monexp@mail.ru

The annual moisture and temperature dynamics of three model experimental areas in Central Mongolia pertaining to the zone of risky agriculture, is described in the article. The comparative analysis of basic characteristics of the hydrothermal regime (natural moisture, moisture content, negative and positive temperature sums, and soil temperature gradients) made it possible to differentiate in detail the annual soil hydrothermal regime by periods of expenditure, accumulation, and preservation of heat and moisture.

Against the background of change in the direction of vertical temperature gradients, the critical cycles in dynamics were educed, which in general determine the efficiency of functioning of vegetation communities for this type of soil.

Keywords: Central Mongolia, dark chestnut soils, moisture content, moisture migration, hydrothermal regime, vertical temperature gradient, moisture content dynamics, herbal-cereal steppe.

LEAF AND BIOMASS TRAITS OF MONGOLIAN FOREST-STEPPE SHRUBS LINKING TO THEIR ECOLOGICAL PROPERTIES

© 2012 L.A. Ivanova*, L.A. Ivanov*, D.A. Ronzhina*, G. Tserenkhand **, S. Tsooj, S.N. Bazha*****

**Botanical Garden, Ural Division, Russian Academy of Sciences*

Russia, 620144 Yekaterinburg, Vos'mogo Marta str., 202a.
E-mail: Larissa.Ivanova@botgard.uran.ru
***Institute of Botany, Mongolian Academy of Sciences*
Mongolia, 210620 Ulaanbaatar, Zhukov avenue 77. E-mail: sh.tsooj@yahoo.com
****A.N. Severtsov Institute of Ecology and Evolution, Russian Academy of Sciences*
Russia, 119071 Moscow, Leninskij prosp., 33. E-mail: sbazha@inbox.ru

Structural and functional parameters of leaves and biomass for 10 species of Mongolian forest-steppe shrubs were studied. The shrub species had 5-10-fold differences on the sizes and above-ground biomass and 1.5-2-fold distinctions on the leaf parameters. Two groups of parameters connected with ecological properties of shrubs were emphasized. The first group – bush height and diameter, leaf area ratio, leaf thickness and density, water content – was connected with species competitiveness. The second group – leaf area, transpiration rate and water use efficiency – was concerned with plant tolerance to arid stress.

Keywords: leaf traits, biomass, forest-steppe, Mongolia, shrubs, transpiration, water use efficiency, arid stress.

VALUES OF CARBON STABLE ISOTOPES ($\delta^{13}C$) IN THE THALLII OF ARID VAGRANT LICHEN *XANTHOPARMELIA CAMTSCHADALIS* ACROSS AN ALTITUDINAL GRADIENT IN KHANGAI PLATEAU

© 2012. L.G. Biazrov

A.N. Severtsov Institute of Ecology & Evolution, Russian Academy of Sciences
Russia, 119071 Moscow, Leninskyi prosp., 33. E-mail: lev.biazrov@rambler.ru

Carbon stable isotopes ($\delta^{13}C$) are measured in organic matter (OM) of the thallii of an arid vagrant lichen *Xanthoparmelia camtschadalis* collected across an altitudinal gradient, from 1550 to 3250 m a.s.l. in the steppe and highland meadows in Khangai Plateau, Mongolia. In Eastern Khangai, in the steppes at low and medium altitudes, OM is enriched in ^{13}C with the increasing altitude from 1550 to 2300 m a.s.l. In the highland meadows of Central Khangai, OM is depleted in ^{13}C with the increasing altitude. According to own data, the results obtained at a local scale do not always correspond with those on a regional scale. Probably, the populations of *X. camtschadalis* growing in the steppes at low and medium altitudes without permafrost, have another carbon discrimination as compared to those formed at the highland meadows on permafrost soils.

Keywords: vagrant lichens, Xanthoparmelia camtschadalis, stable isotopes, carbon-13, fractionation, discrimination, local scale, regional scale, altitude, mountain steppes, high mountain meadows, permafrost, Khangai plateau, Mongolia.