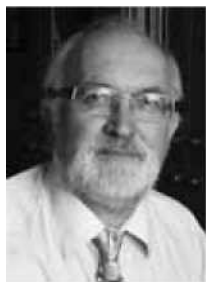


Botanic Gardens

as ecological resources in the global system of social coordinates

Photo by T.Yakusheva,
A.Makarshina

TODAY, MANY PROMINENT RUSSIAN POLITICIANS AGREE THAT IN THE CURRENT SITUATION THE ECOLOGY IS NOT JUST A SCIENCE, BUT ALSO, TO A LARGE EXTENT, A VITAL SECURITY ISSUE OF THE HUMANKIND. WE LIVE IN A WORLD THAT UNDERGOES CONTINUOUS GLOBAL CHANGES IN DIFFERENT AREAS - ECONOMICAL, POLITICAL, SOCIAL, ECOLOGICAL, CLIMATIC, DEMOGRAPHICAL, AND EVERYONE, INCLUDING GOVERNMENTS, ORGANIZATIONS AND INDIVIDUALS, HAVE TO COPE WITH THESE CHANGES. IN THIS ARTICLE, WHICH IS BASED ON SPECIAL STUDIES AND FUNDAMENTAL RESEARCH, THE AUTHOR HAS ATTEMPTED TO ANALYSE, IN THE WAY ADOPTED FOR THE GENERAL PUBLIC, HOW THE ROLE PLAYED BY BOTANIC GARDENS IN THE SOCIETY HAD BEEN CHANGING DURING THE DECADES OF SOCIO-ECONOMIC DEVELOPMENT; HOW THEIR APPEARANCE HAD TRANSFORMED FROM THE MONASTERY AND "APOTHECARY" GARDENS TO THE MODERN UNIVERSITY AND ACADEMIC INSTITUTIONS, CROSS-DISCIPLINARY PUBLIC COMPLEXES. THE IDEA OF THE PRESENT WORK IS A COMPREHENSIVE SCIENTIFIC ANALYSIS PROVING THE IDEA THAT MODERN BOTANIC GARDENS ARE A SPECIAL TYPE OF SOCIALLY ORIENTED ENVIRONMENTAL AGENCIES IN URBANIZED AREAS. DUE TO THEIR SCIENTIFIC, EDUCATIONAL AND PLANT RESOURCES, THEY CAN BE REGARDED AS A UNIQUE ANTI-CRISIS "TOOL" HELPING PEOPLE FROM DIFFERENT LAYERS OF SOCIETY TO ADJUST TO GLOBAL ENVIRONMENTAL CHANGE AND PROMOTING THE SUSTAINABLE DEVELOPMENT OF OUR CIVILIZATION



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Decisions of the UN Conference of 1992 in Rio de Janeiro established the framework for common principles of sustainable development in relation to particular demographic and climatic changes currently experienced by the humankind. The top invention of the civilization is a "city" as the most active nodal point of the human interaction with the natural components of the environment. It is the development of cities that provides advantages and the key characteristics of competitiveness to regions and countries. Cities are the main driving force of progress, unique artificial objects (the "second nature" according to the definition of Immanuel Kant), in which the livelihood of most people is sustained.

Our studies based on a special research of the botanic gardens network in 153 countries showed that the better the coordination of the reciprocal connections between natural resources and society, the greater the environmental, social and cultural role which botanic gardens play in the community and market economy; accordingly, the higher the human development potential index of the country, the more active the society's involvement in conservation and ecological restoration of the natural heritage.



botanic gardens of the 21st century

The trends observed during last three hundred years and especially in recent years demonstrate an accelerated growth and development of many types of new botanic gardens in developing countries, while the existing gardens in developed countries are undergoing a major renovation. So the relevance of the present research topic is due to the need of revising the traditional view on many botanic gardens being pretty conservative organizations of agricultural and horticultural type according to the common public point of view.

All the efforts, the expertise and research potential is aimed at improvement of human well-being and preservation of plants. Growth and development of modern botanic gardens are connected mainly not with the rural way of living but with the level of urban development. Analysis of the dynamics of the world botanic gardens for the period 1700-2009 suggests that active growth in their number coincided with scientific and technological revolutions and periods of fast economic and cultural development as well as accelerated urban development in the second half of the XIX century.

That is why, for example, the resources of botanic gardens start to gain in importance and influence in the national system of protected areas providing access to natural and cultural heritage and its sustainable use.

Each country has its own definition of a botanic garden and its functions in connection with the socio-economic development. For example, botanic gardens for an economically prosperous country are mainly recreational, environmentally-friendly green parks where everything is focused on the needs of visitors to communicate with nature through contact with plants.



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Today, their traditional botanical and horticultural features and objectives have been expanded and updated with new powerful environmental priorities and socially oriented activities with interdisciplinarity or cross-disciplinary resources. Our studies showed that the dynamics of the number of botanic gardens was connected mainly with the processes of growth and development of the urban population, i.e. with the urbanization as a stage of civilization development.

The modern botanic garden is a strictly protected green area holding documented collections of living plants and landscaped gardens where the managing company creates resources for scientific research, education and outreach programs, public displays of plants, garden specimens and technologies for biodiversity conservation, plant production and services based on plants, their derivatives and knowledge about them.

In recent years, the very formulation of the function of botanic gardens in the world has been evolving. It can be stated that the mission of the global network of modern botanic gardens is associated with the transformation of their tangible and intangible resources for the purposes of biodiversity conservation and well-being improvement of the society as a whole as well as individuals, including the improvement in their environmental education.

This, in turn, is associated with the formation of a healthy and secure environment in urbanized territories. Thus, the entire set of the botanic garden resources is designed to recreate the natural conditions in the urban environment, to maintain and improve the health of people with beautiful, green environment, smoothing the excess stress, providing organized leisure and recreation in open spaces or indoors.

Therefore, highly developed countries, where there are sufficient conditions and financial resources, have developed very strong traditions of botanic gardens construction and management. The focus in these countries is in the improvement of quality of life of the citizens provided via the development of ecologically sound environment in cities. Botanic gardens in the developing and underdeveloped countries are, first of all, research institutions and plant nurseries. They help to supply the local population with seedlings for city greening and for private gardens as well as to carry out numerous educational functions, providing basic horticultural and ecological knowledge necessary for the survival.

Nevertheless, in general, one can identify the main functions of the modern botanic garden:

- scientific and educational activities;
- providing a basis for creating eco-technological parks for introduction of economically significant innovations and technologies in fields of horticulture, ecology, energy, urban greening and resource-savings and others;
- creation of genetic banks to preserve the natural flora and restore plant biodiversity;

modernization of Irkutsk Botanic Garden into an innovative, interdisciplinary, socio-cultural and environmental integrated resource for sustainable socio-economic development of the Baikal region

In this work, Irkutsk Regional Administration sees several priority areas that are virtually identical to the above:

1. Creation of innovative economics
2. Infrastructural development.
3. Exploration of natural resources and increasing their share processed within the region.
4. Development of touristic and recreational potential of the region.

All of these principles and attitudes are fully consistent with the concept of development of the Botanic Garden of Irkutsk State University, an important object of the Baikal region, a specially protected natural area in the city of Irkutsk.

Thus, we can conclude that the main purpose of tangible and intangible resources of botanic gardens is to maintain life supporting functions of natural systems necessary for sustainable urban development, social as well as environmental, and the social security in each country and in the world, to improve environmental conditions and well-being of people



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- providing the "horticultural therapy" programs and helping people in rehabilitation and social adaptation services;
- developing touristic and recreational facilities;
- introduction of new species and forms of edible and decorative plants and their supply to the population;
- protection, conservation and restoration of natural areas and rare plants.

At present, the Irkutsk Botanic Garden takes part in the ongoing reconstruction project which will turn it into a research and educational center, eco-technological park and tourist-recreational complex. Such examples of environmental programs supported by the Irkutsk Regional Administration, the Administration of the City of Irkutsk as well as the federal ministries of Russia and international organizations, show the importance and the prospects of reconstruction and

The maintenance of environmental quality and sustainable use of biological resources is beneficial for development of eco-tourism. This kind of tourism is closely connected with the protection of rare and endangered plants and animals, with the building of infrastructure, which, in turn, creates new jobs in the region.

The development of eco-tourism stimulates environmental awareness of both tourists and local residents. It is the educational level of society as a whole that determines its sustainable development and economic growth. In addition, ecotourism generates revenues, part of which is spent on environmental protection, thus ensuring the resumption of resources for development of ecological tourism.

1. Students of the Service and Marketing Faculty of Irkutsk State University during their internship at the Botanic Garden
2. Planting of the successfully introduced plants to the display areas
3. Spring flowering of the Siberian almond in the Botanic Garden of Irkutsk State University
4. Primula sieboldii in the display garden

The mission of the global network of modern botanic gardens is associated with the use and utilization of their tangible and intangible resources for biodiversity conservation to enhance the well-being of the society as a whole as well as each individual person.

The generalized model of a diversified modern botanic garden can be represented as a system using its various resources related to scientific research, education, nature conservation, environmental restoration, production of plant-based goods and souvenirs, innovations and commercialization for a wide range of interests of individuals and the community. The model presents the main activities as well as reciprocal connections describing the movement of tangible and intangible resources needed for sustaining and preserving biodiversity, biotechnology development, and useful production, on the one hand, and society and the market - on the other.

The main purpose of tangible and intangible resources of botanic gardens is to maintain life-supporting functions of natural systems needed for sustainable urban development, environmental and social security in the country and the world, to improve the ecological conditions and human well-being.

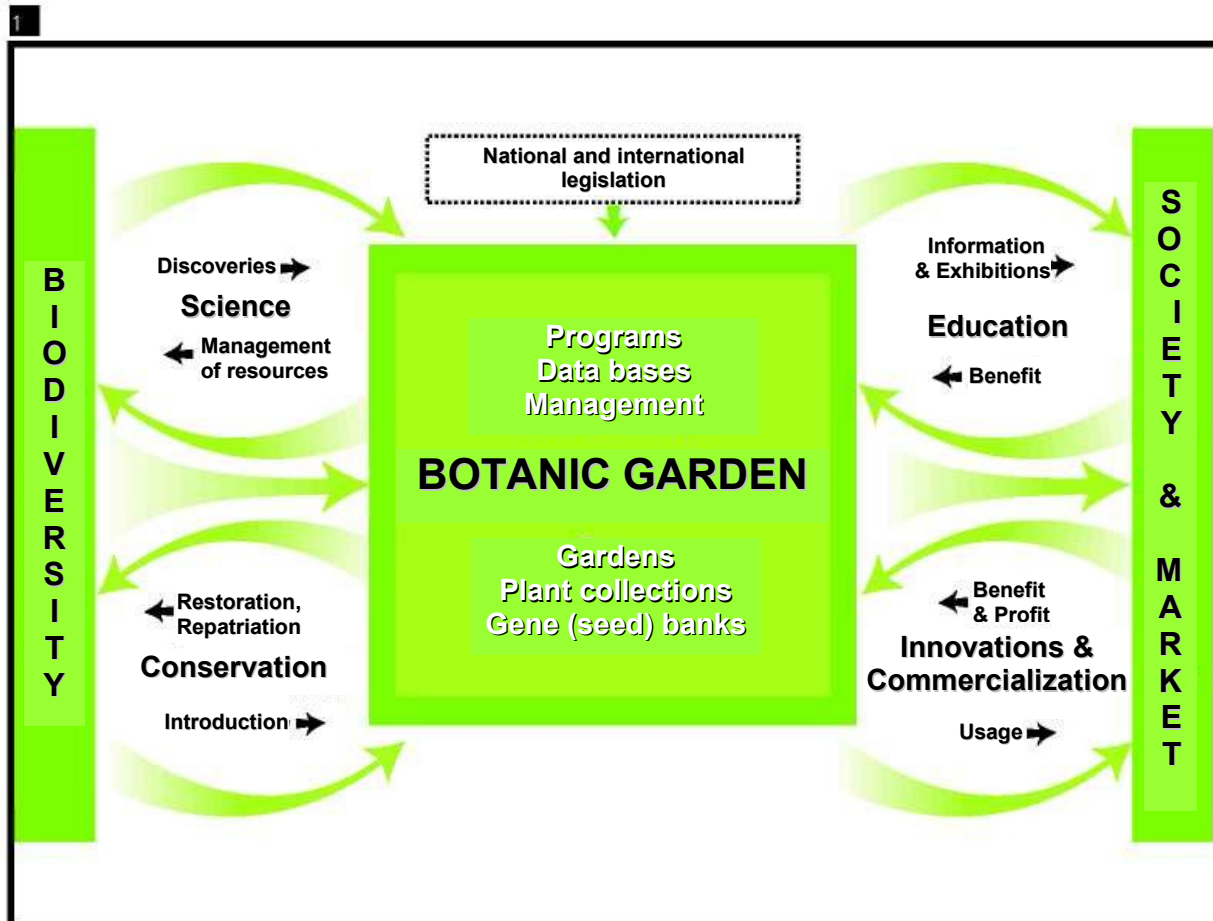
Simplifying this complex model, we can say that botanic gardens serve as the "mediators" between the natural and cultural heritage, on the one hand, and society and market, on the other. And the better such a relationship is established, the greater the socio-cultural role of botanic gardens, the higher the country's human potential development index. That is why in the conditions of the global economical and climatic crisis the botanic gardens play the role of anti-crisis instruments.

In the conditions of economic crisis botanic gardens:

- provide people with economically significant plant resources;

- help to the poverty alleviation and provide knowledge and survival skills through the introduction of environmental innovations and new demanded plants;
- help address an ecological illiteracy;
- contribute to the environment-friendly and healthy lifestyles in urban areas;
- serve as one of the most inexpensive tools for social adaptation and rehabilitation using the horticultural therapy;
- promote the development of various forms of "green businesses" and create new jobs.

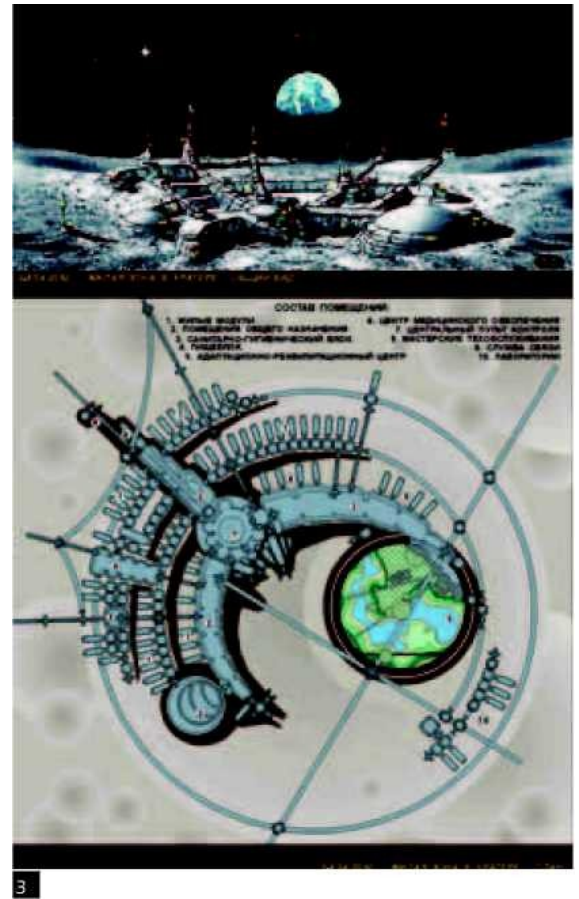
Which conclusion can be drawn from the above statements even it being a simplistic adaptation of the voluminous scientific work? The research has demonstrated the need to reconsider the traditional conservative views and the widespread, at least in Russia, idea of a botanic garden as an organization of a narrow agricultural profile. As is evident from the study, botanic gardens are in demand mostly in urban areas. This means that there is an opportunity to strengthen the environmental component where it is most needed - in major cities and metropolitan areas. Currently, in both the developed and developing countries, one can observe a trend aimed at modernizing the traditional, especially universities-based, botanic gardens and transforming them into socially-oriented environmental institutions of a new type.



With the help of specially designed recreational activities, tourism, educational programs as well as through the environmental education the spiritual rehabilitation of the population is conducted. Consequently, in the global system of social coordinates, botanic gardens should be considered as ecologically significant resources to promote sustainable development of the society with all social and age groups - from little children to senior citizens. As a place with the highest concentration of international living plant collections, gathered by the 'plant-hunters' and scientists from the remotest corners of our planet, a botanic garden promotes better understanding of traditions and culture of people of different nationalities, to improve international relations. A typical example is the existence in the world botanic gardens of special international landscape features with different styles of ethnobotanic gardens (French, Russian, Japanese, Korean, Muslim, Biblical, etc.) which mutually enrich spiritual lives of people who speak different languages.

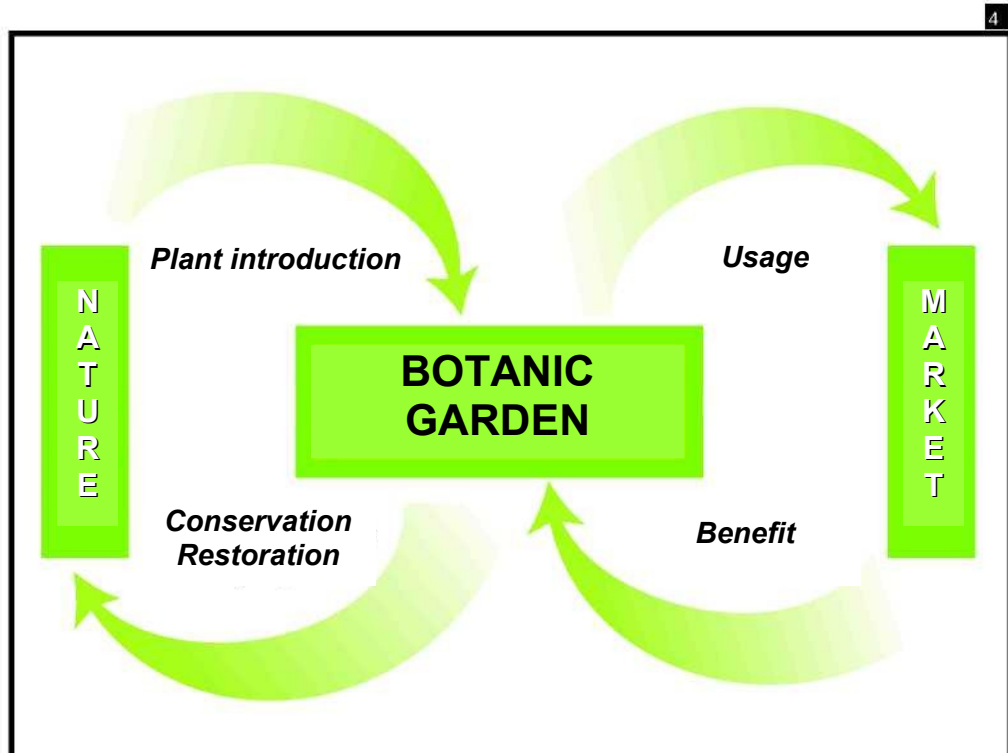
It can be emphasized that main technologies used by botanic gardens, the arrangement of their greenhouses and plant collections are key elements of life support systems in extreme conditions during the space exploration. For instance, the central position in the projects involving life-sustaining systems and rehabilitation of astronauts at the future space stations and long-term settlements on the Moon and Mars, has already been given to the adaptation and rehabilitation centers - hydroponic greenhouses in the semblance of a botanic garden. These space greenhouses and adaptation-rehabilitation space centers must have such key elements of a classical botanic garden as documented collections of living plants, introduced for scientific research, conservation, demonstration and educational purposes as well as for food supply and creating a healing environment and recreation in stressful extraterrestrial conditions.

And in the conclusion, I would like to emphasize the following. It seems no accidental that a professional journal dedicated to the issues of landscape organization in the cities and the conservation of natural areas, has chosen such theme to publish the articles on "botanic gardens of 21st century" as the most important and urgent. Also, it is not a coincidence that our research work, the highlights of which were introduced today to the readers of "LAD" magazine, had been supported by a grant from the state program "Development of Scientific Potential of Higher Education". All of this is the unconditional recognition of the importance assigned to the problem in question and the need to address it. The development of botanic gardens as a universal environmental resources of the civilization is a worldwide trend marking the transition to a post-industrial society, to the sustainable development and to the knowledge economy, for the improvement in the quality of life and human well-being.



1. Botanic Garden in management of resources circulation between the nature and society
2. Animals are also our ecological resource
3. The concept of the Moon base 2050 - a suggested analog of a botanic garden with useful plants (A.G.Sizentsev et al. "The Man in the Universe", 1997)
4. Botanic Garden in the system of plant resources circulation in the market economy conditions

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Literature (downloadable):

- [1] BOTANIC GARDENS AS ECOLOGICAL RESOURCES IN THE GLOBAL SYSTEM OF SOCIAL COORDINATES. The author: V.Ya.Kuzevanov. — Architectural magazine «LANDSCAPE ARCHITECTURE AND DESIGN. » (Moscow), that. 29, № 2, p. 7-11, 2010. http://bogard.isu.ru/articles/2010_lad/lad_2_2010.pdf
- [2] BOTANIC GARDEN FOR IRKUTSK. ABOUT RECONSTRUCTION OF THE UNIVERSITY BOTANIC GARDEN IN THE BAIKAL REGION. Authors: V.Ya.Kuzevanov, A.J.Parshin. — Architectural magazine «ARCHITECTURE. CONSTRUCTION. DESIGN» (Moscow), No 3, p. 80-83, 2010. http://bogard.isu.ru/articles/2010_acd/irkbg_arch_design_2010.pdf
- [3] THE PROJECT OF THE IRKUTSK BOTANICAL GARDEN ON BASIS ECOLOGIZATION OF SYSTEM OF LAND TENURE IN CONDITIONS OF FORMATION OF THE LAND MARKET IN IRKUTSK. The author: V.Ya.Kuzevanov. In: Land resources, housing construction and economic development of regions: Materials of the All-Russia scientific - practical conference (Irkutsk, March, 25-26, 2010). — Irkutsk: Publishing house IRGTU, p. 61-78, 2010. http://bogard.isu.ru/articles/2010_land_resources/kuz_sem_res_2010.pdf
- [4] THE OASIS OF THE SCIENCE, EDUCATION AND RECREATION. The author: M.Ogneva. The political newspaper "OBLASTNAYA", Irkutsk, March 3rd, 2010. http://bogard.isu.ru/articles/2010_oblastnaya/obl_100303.pdf
- [5] «BOTANIC GARDEN» OF V.N.BASNIN. In: Connection of times: Basnins in a history of Irkutsk / S.I.Medvedev, E.M.Pospehova, V.N.Chebykina, eds. — Irkutsk:Printing house «On Chekhova», 2008. — p. 48-61. Author V.Ya.Kuzevanov. The article about the first botanical garden in Siberia created in Irkutsk by a merchant Vasily Nikolaevich Basnin with of assistance of botany classics of Nikolay Stepanovich Turchaninov in the middle of the XIX century. <http://bogard.isu.ru/articles/basnin/48-61.pdf>
- [6] « THE CATALOGUE OF PLANTS OF THE V.N.BASNIN'S GARDEN ». In: Connection of times: Basnins in a history of Irkutsk / S.I.Medvedev, E.M.Pospehova, V.N.Chebykina, eds.. — Irkutsk:Printing house «On Chekhova», 2008. — p. 128-138. Author V.Ya.Kuzevanov. The list of exotic plants from the different countries collected in a collection of "Botanical Garden» of V.N.Basnin in Irkutsk in the middle of XIX century. <http://bogard.isu.ru/articles/basnin/128-138.pdf>
- [7] THE KAYA HERITAGE. Part 1. About future of Kaya Grove and the Irkutsk Botanic Garden. Between three rivers of Irkutsk (Angara, Irkut and Kaya) it is necessary to keep and protect this largest city forest for the present and the future generations of Irkutsk people. Author Victor Kuzevanov. [Magazine the PROJECT BAIKAL](http://bogard.isu.ru/articles/baikal_project_2009/kaya_heritage_52-59.pdf) (the Edition of Irkutsk Branch of the Union of Architects of Russia), № 19, 2009, p. 52-59. http://bogard.isu.ru/articles/baikal_project_2009/kaya_heritage_52-59.pdf
- [8] THE KAYA HERITAGE. Part 2 (continuation). About future of Kaya Grove and the Irkutsk Botanic Garden. The reason of tragedy Kay Grove as public territory is covered in so-called «a rule of capture»: the general(common) resource gets to the that builder who the first will grasp it, and a construction of buildings on a place of a green zone in an initial stage appear temporarily profitable, thanking overuse of our general(common) resources, due to their exhaustion. Authors Victor Kuzevanov and Svetlana Sizykh. [Magazine the PROJECT BAIKAL](http://bogard.isu.ru/articles/baikal_project_2009/kaya_heritage_52-59.pdf) (the Edition of Irkutsk Branch of the Union of Architects of Russia), № 20, 2009, p. 38-45. http://bogard.isu.ru/articles/baikal_project_2009/kaya_heritage_52-59.pdf
- [9] RESOURCES of the BOTANIC GARDEN of IRKUTSK STATE UNIVERSITY: scientific, educational and socio-ecological aspects. Irkutsk: Publishing house of Irkutsk State University, 2005.-243 pages. http://bogard.isu.ru/books/bgisu_resources_2005.pdf

- [10] UNIVERSITY BOTANIC GARDENS IN THE ECO-EDUCATION SYSTEM. The concept of development of ecological education in the Russian Federation in view of a key role of university botanical gardens as unique scientific-educational objects. Authors: V.Ya.Kuzevanov, A.R.Vodjanik. The All-Russia conference by ecological education, Moscow, on October, 21-23, 2009 — the Electronic resource in State Public Scientific Technical Library <http://bogard.isu.ru/presentations/2010/1261570073.ppt>
- [11] UNIVERSITY BOTANIC GARDEN AS THE EDUCATIONAL RESOURCE FOR THE BAIKAL REGION: material and non-material aspects. Proceedings of the 6-th International Congress BGCI on Education in Botanical Gardens, September 10th-14th, 2006, Oxford http://bogard.isu.ru/articles/oxford_2006/Sizykh_S-AS.pdf
- [12] HORTICULTURAL THERAPY: Use of botanic gardens resources for social adaptation and rehabilitations. The reference manual. Irkutsk: Publishing house of Irkutsk State University, 2006.- 48 pages. http://bogard.isu.ru/books/ht_2006.pdf
- [13] EDEM IN THE CITY MASTER-PLAN. The garden in the Kaya relic grove will occupy more than 100 hectares. (the Newspaper «The East-Siberian Truth» № 25518, February, 21, 2007) — To see http://www.vsp.ru/show_article.php?id=39025, to download http://bogard.isu.ru/articles/vsp_2007/edem.pdf
- [14] MISSION OF THE BOTANIC GARDEN IN THE BAIKAL REGION. Proceedings of the 3-rd Global Congress of Botanic Gardens, Wuhan, China, 2007 <http://www.bgci.org/files/Wuhan/PaperEd/Kuzevanov-Sizykh%20-%20Russia.pdf>
- [15] RESOURCES OF BOTANIC GARDENS: LINKING BIODIVERSITY AND HUMAN WELL-BEING. Proceedings of the 3-rd Global Congress of Botanic Gardens, Wuhan, China, 2007 <http://www.bgci.org/files/Wuhan/PapersSustainable/Kuzevanov.pdf>
- [16] ABOUT THE PROJECT OF DEVELOPMENT OF THE IRKUTSK BOTANIC GARDEN, Magazine «Science from First-Hand», Number 1, 13 (2007), p 10-11 (Photos by V.A.Korotkoruchko's) <http://bogard.isu.ru/articles/korotkoruchko.pdf>
- [17] The review «BOTANIC GARDENS RESOURCES: TANGIBLE AND INTANGIBLE ASPECTS OF LINKING BIODIVERSITY AND HUMAN WELL-BEING», Magazine “Hiroshima Peace Science”, 28 (2006), p 113-134 (in English), (RESOURCES OF BOTANIC GARDENS: MATERIAL AND NON-MATERIAL ASPECTS OF CONNECTION THE BIODIVERSITY AND WELL-BEING OF PEOPLE [review in English](#)) <http://home.hiroshima-u.ac.jp/heiwa/JNL/28/Kuzevanov.pdf>
- [18] SPECIES-RICHNESS PATTERNS OF THE LIVING COLLECTIONS OF THE WORLD'S BOTANIC GARDENS: A MATTER OF SOCIO-ECONOMICS? Janice Golding, Sabine Gusewell, Holger Kreft, Victor Y. Kuzevanov, Susanna Lehvavirta, Ingrid Parmentier and Marco Pautasso: Annals of Botany 105: 689–696, 2010 http://bogard.isu.ru/articles/2010_annbot/annbot08093_100318.pdf
- [19] BOTANIC GARDENS AS ECOLOGICAL RESOURCES IN THE GLOBAL SYSTEM OF SOCIAL COORDINATES. Kuzevanov V.Ya., Sizykh E.V., Gubiy E.V. In: Economic and environmental problems in the changing world (The collective monograph). S.-Petersburg: Publishing house NPK "Rost". 2010. p. 158-167 http://bogard.isu.ru/articles/2010_eco_soc/BGs_eco_social_resources.pdf