

# **University botanic garden as an educational resource for the Baikal region (Siberia): tangible and intangible aspects**

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The Botanic Garden of the Irkutsk State University (BG ISU) is the only botanic garden in the Lake Baikal region (the World Heritage Site). It holds a collection of about 3000 species and varieties of plants, representing the flora of Baikal region, ex-USSR and other countries (Kuzevanov, Sizykh 2005). The special attention is given to introduction and cultivation of tolerant and productive plants capable to survive and grow sustainably in the severe climate in Siberia. At present, the Garden holds about 100 rare plant species from the Lake Baikal region as a "living" gene bank of species becoming extinct in their natural habitats. The conservation policy includes special measures for accumulation and propagation of rare and endangered species of regional flora as well as economically valuable plants for educational purposes.

The objective of this work was to emphasize the fact that both tangible (material) and intangible (non-material) aspects of Botanic Gardens activities are equally important for education and public awareness promotion to meet priorities of the regional sustainable development. It reflects the authors' expertise in implementation of educational ideas onto Siberian "ground" from extensive international study tours in numerous BGs of ex-USSR, Europe, USA, Africa, Asia, Australia.

The BG's activities on mobilization of new genetic resources also allow us to enrich the regional cultivated flora with economically and environmentally important plants. As a result the BG has become an exclusive source of high quality nursery-stock of plants for regional gardeners and for the world BGs network. There are many examples when the BG initiated public activities and traditions for the improvement of the green urban environment, helping to establish new "green" businesses to help poor communities to overcome poverty and unemployment, to educate illiterate people and children, and to provide people (including children at-risk and orphans) with the skills necessary for the survival in the frontier conditions of Siberia. From this point of view we consider the BG as an educational tool of the university system functioning as an active interface between natural/cultural heritage and local society. The Irkutsk State University (classical type one) is an intellectual and innovative resource for the sustainable development in the Lake Baikal area. So, the educational mission of our BG is oriented towards strategic national priorities of Russia and the region (economical growth, improvement of human well-being and quality of life, development of education, science, culture, tourism/recreation, exploration of natural resources, etc.) (Table 1).

Intangible resources including educational programs, knowledge, ideas, senses, skills, and other non-material things of BGs have much wider spectrums of end-users including not only the local ones but also international customers. The BG ISU receives monetary and non-monetary benefits through its involvement in public oriented activities and connected to research, education and commercialization of tangible and intangible resources. Feedback provides a sustainable development of the BG and, among others, supports the BG's conservational projects on environmental restoration and protection of rare and endangered plants. The roles of BGs and relative institutions in transformation of genetic resources and biological materials into monetary and no-monetary benefits raised from the use of combination of both tangible and intangible aspects of new scientific discoveries, new biotechnologies and resulted plant based products. A feedback from end-users provides a sustainability of the BG's functioning and also reflects a principle of fair and equal sharing of benefits from the biodiversity use. Local companies, authorities, institutions, nurseries, farmers, green industry enterprises, landscape designers as well as a general public in the region are main immediate consumers of the tangible resources collected and produced by BGs. It is obvious from the Table 2 that resources of BGs have a special environmental, scientific, cultural, aesthetic, and recreational importance. Both tangible and intangible resources of BGs are equally valuable for the sustainable development and linking biodiversity with public education, secure environment, nutrition, healthcare, poverty alleviation, socio-ecological and economical relations in communities, including commercialization. Therefore intangible aspects of BGs are as important as their tangible ones and they can not be discriminated in relation to human well-being and socio-economical improvement in the region. Involvement of BG in classical University education, extended and additional education for different targeted groups plays complementary dualistic roles in biodiversity conservation and ecological innovations for improvement of human well-being (Waylen 2006).

**Table 1.** Some aspects of using of Botanic Gardens' tangible and intangible resources for sustainable development in the Lake Baikal region in relation to current economical and political priorities

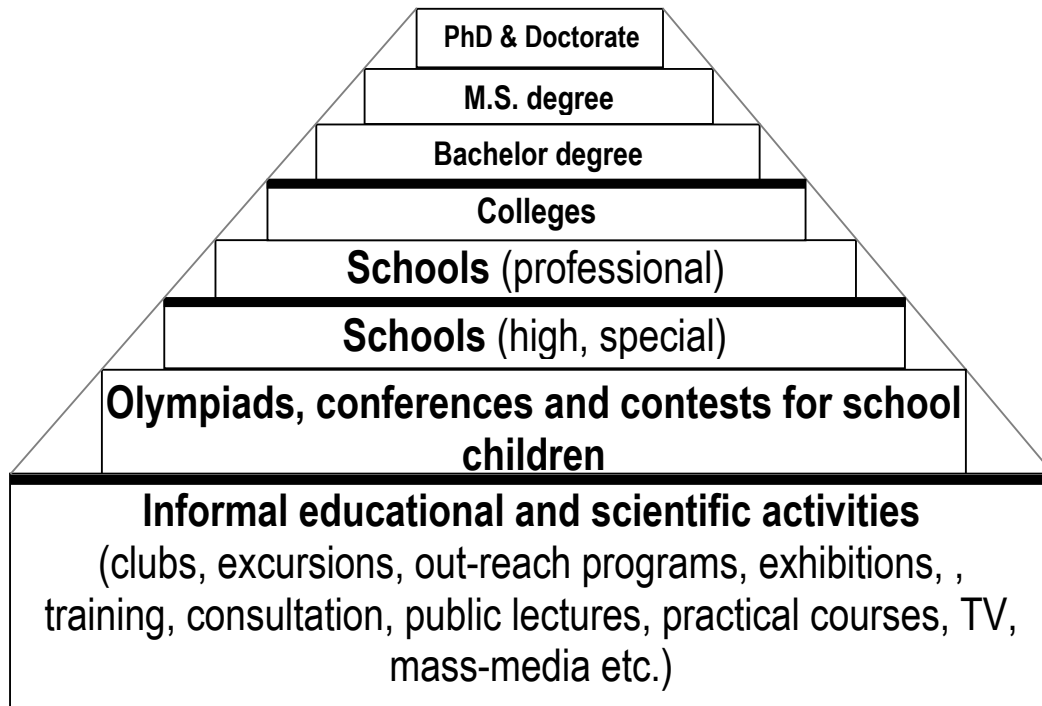
Principal priorities	Tangible resources	Intangible resources
Exploration of potential natural and other resources of the region	<ul style="list-style-type: none"> <li>- economically valuable genetic resources in collections;</li> <li>- park zone, gardens, displays, artifacts, plant derivatives;</li> <li>- data base for the educational web-site</li> </ul>	<ul style="list-style-type: none"> <li>- educational programs for classical and extended university education, public awareness promotion programs (see Table 2 and Fig 1),</li> <li>- initiation and facilitation of public environmental activities;</li> <li>- mass-media and Internet</li> </ul>
Promotion of development of innovative economy through integration of science, education and industry	<ul style="list-style-type: none"> <li>- new mobilized and introduced valuable plants tolerant to severe conditions (climate, pollution);</li> <li>- School of Horticulture facilitating transfer and introduction of innovative technologies and knowledge;</li> <li>- production nurseries</li> </ul>	<ul style="list-style-type: none"> <li>- projects of city greening;</li> <li>- assistance in development of new "green" businesses;</li> <li>- commercialization of products;</li> <li>- linking science with industry through interpretation and trainings;</li> <li>- "cultivation" of environmentally minded staff for local authorities;</li> <li>- public awareness promotion through mass-media;</li> <li>- using of new information technologies for distribution of knowledge</li> </ul>
Formation of modern/contemporary complex infrastructure for tourism and recreation	<ul style="list-style-type: none"> <li>- BG's displays, gardens, facilities;</li> <li>- landscapes and displays outside the Botanic Garden including Siberian taiga and Lake Baikal core zone;</li> <li>- multilingual web-site</li> </ul>	<ul style="list-style-type: none"> <li>- programs of ecological, educational and recreational tourism</li> <li>- agrotourism programs;</li> <li>- international and joint expeditions (<a href="http://bogard.isu.ru/expeditions/lake_baikal.htm">http://bogard.isu.ru/expeditions/lake_baikal.htm</a>)</li> </ul>
Nature conservation in the Lake Baikal area (World Heritage Site)	<ul style="list-style-type: none"> <li>- populations of rare and endangered plants;</li> <li>- plant gene banks (including seed banks)</li> </ul>	<ul style="list-style-type: none"> <li>- educational and conservational programs for public awareness promotion in nature protection and in current legislation;</li> <li>- plant species restoration programs;</li> <li>- international BGs networking;</li> <li>- conservational web-site (<a href="http://bogard.isu.ru/cbd/redlist/redlistbaikal.htm">http://bogard.isu.ru/cbd/redlist/redlistbaikal.htm</a>)</li> </ul>

A regional role of the BG depends on how successfully it links resources with local community via special educational programs. The BG ISU has several target groups of visitors: students and teachers of universities and colleges, school children, school teachers, tourists, gardeners, landscape designers, and special groups (disabled, families with young children, unemployed people, etc.). The employees of the Garden are always ready to provide excursions for visitors, free-of-charge consultations about growing, protection, and use of plants. In many cases the BGs is functioning as a gate to the virgin and beautiful nature for citizens spending most of their time in the urban environment in specific Siberian conditions. Due to the fact that the evolution of human beings was always connected with plants and their use for material and spiritual purposes, it was obvious that plants may have a good tangible and intangible influence on people. So, in addition to the formal educational programs for students and teachers at universities, colleges and high schools, the BG ISU in 1994 started development of special educational programs of continuous (extended) education for different ages and social groups (Fig. 1, Fig.3).

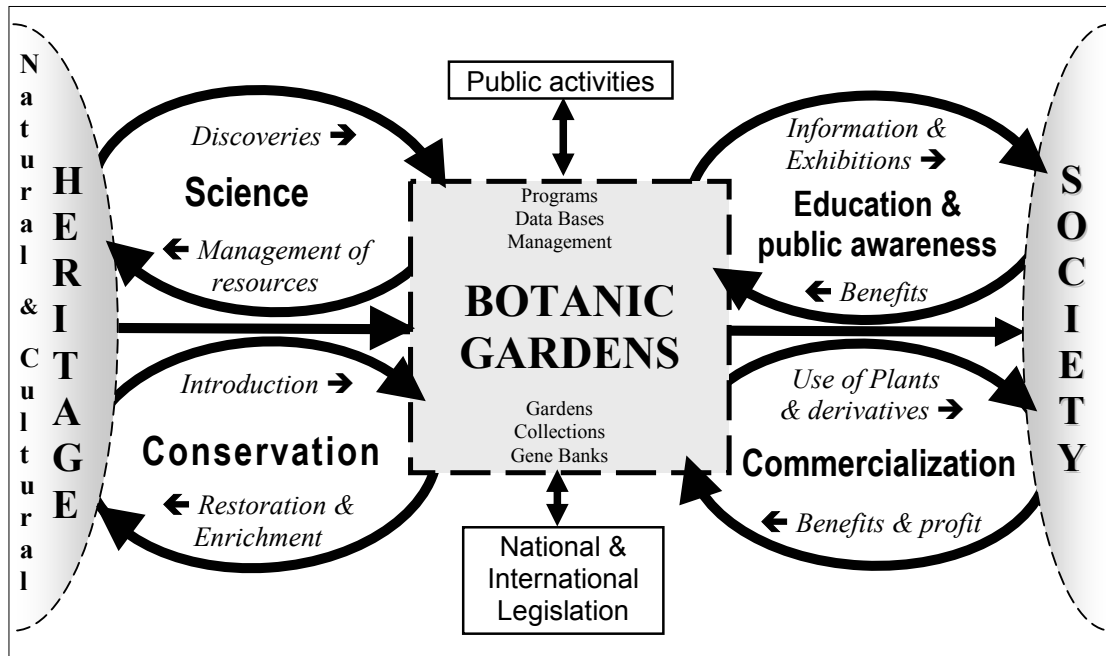
**Table 2** Some Examples of Botanic Gardens Tangible and Intangible Resources Related to Main Aspects of Human Well-being

Aspects of human well-being	Main resources of botanic gardens	
	Tangible resources	Intangible resources
Nutrition	Genetic resources of edible plants (seeds and seedlings for gardeners); demonstration plots. Evaluation gardens and nurseries.	Basic and traditional knowledge and skills about edible plants and how to grow them. Keeping of horticultural traditions of the region.
Healthcare	Genetic resources of medicinally and cosmetically valuable plants (indigenous and introduced). Demonstration plots.	Scientific knowledge and traditional rituals, skills and recipes about cultivation and use of medicinal plants. Legends.
Financial poverty alleviation	Establishment of new 'green' businesses based on plant genetic resources.	Knowledge and skills on management of 'green' businesses including case studies enabling local livelihood alternatives, boosting income.
Community welfare, ensuring freedom and equity for all	Resources for planting trees and shrubs for city 'greening' and beautification of settlements; unlimited access to public resources of BGs for all visitors including disabled ones.	Public activities and traditions promoted by BGs; improvement of interpersonal relations in the community, friendship; transfer of sense of beauty, sense of togetherness.
Education and public awareness	Museums, displays, interpretation, signs, posters, publications, classes, training courses and guided tours, consulting facilities, computerized equipment and media, data bases, libraries, tools, instruments, etc.	Botanical and horticultural information, sharing of skills and technologies, formal and continues education, public activities, environmental propaganda via mass-media and Internet. Public awareness promotion on environmental issues and biodiversity value for human well-being.
Involvement in decision making (personal self-development, self-realization)	Documents outlining the framework of BGs structure, function and activities. Councils and Boards of Trustees, groups of volunteers.	Feeling of freedom and equity for all, an opportunity to take part at management of BG resources and activities, sense of togetherness and responsibility, democratic traditions.
Security	Special facilities and sites at the BGs (garden's complexes, displays, for example, Japanese Garden, Secluded Garden). Collections and nurseries of rare and endangered plants, restored landscapes and new populations of rescued plants in-situ.	Knowledge and skills on creation of special facilities and sites. Sense of peace, calmness, relaxation; feeling of safety, satisfaction. Understanding of BGs value for sustainable development and secure future for mankind.

The Horticultural Therapy approach based on the experience of a few world botanic gardens (the Chicago Botanic Gardens, and others) are being developed for special groups of visitors (orphaned children, disabled, kids with criminal past, older people). In case of orphaned children, the BG can play a role of the "mother" teaching kids how to use plants in the day-to-day life which is an important issue in the frontier environment (Sizykh 2001).



**Fig. 1** Hierarchical pyramid of the use of Botanic Gardens resources for classical university education as well for extended/additional multilevel education and for the public awareness promotion in the Lake Baikal region



**Fig. 2** Positioning of BG ISU as an intellectual and innovative resource and interface between natural/cultural heritage and regional community. Feedback balance of direct and indirect communications (arrows, connections) in management of tangible and intangible resources flows promotes the sustainable regional development



**Fig. 3** Botanic Gardens of Irkutsk State University in educational actions. A) Field studies of indigenous plants, including botanical surveys, plant collecting, ecological monitoring, and environmental restoration near Lake Baikal. B) Educational courses in botany and ecology for university students and school children. C) The Horticultural Therapy program for social adaptation and correction of the social behavior of children with special needs, including disabled, orphaned children and kids with criminal history (children at-risk); D) Practical training in horticulture and botany for students

The "Horticultural Therapy" could be a good example of the implementation of non-traditional educational programs for kids who had a criminal behavior (10-14 years old) and kept in a special isolated school. Special psychological studies since 1999 revealed that the Horticultural Therapy has positive effect on social adaptation and rehabilitation of children at-risk participating in the project (Sizykh, Kuzevanov 2004). Students from universities and colleges (BSc, MSc, PhD students) (Fig.1), from the Youth Educational Centre, and from secondary public schools participate in work-study programs and in on-job trainings. Secondary schools teachers are taking special trainings and tours at the BG for their extended professional development.

Our experience proves that modern BG is not just a beautiful park or a channel for the transfer of pure knowledge and theories because such knowledge and "know-how" cannot be delivered just through books or Internet. Only through practical works and activities the BG can transfer skills and experience connected with traditions and best practices in certain regions.

In new ecological and economic conditions of globalization the role of BGs will be increased substantially due to their well developed networks, traditions of free exchange of experience and resources, direct involvement in the community and direct contacts to the nature. They are becoming an important part of regional ecologically significant resources and elements of regional productive forces for human well-being and sustainable development.

Development of any BG depends greatly on growth of its tangible resources but in case of sustainable development approach tangibles will be rather limited (the land area, the number of educational facilities and constructions, etc.). Therefore, we suppose, that development of BG's intangible resources influencing the society and the environment do not have such limitations or could be even unlimited because numerous intangible educational resources (programs, courses, lectures, tours, etc.) could be successfully based on very limited numbers of the educational material objects of the BGs.

Positioning of BG ISU as an intellectual and innovative resource and interface between natural/cultural heritage and regional community depends on harmonization of development of its tangible and intangible educational resources (Kuzevanov, Sizykh 2006). As seen in Fig. 2 the feedback arrows demonstrate the complex role of the BG activities and valuable resources of plants, knowledge and experience for sustainable development. The university BGs provides educationally useful combination of fundamental and applied science, classical and extended multilevel education, conservation/restoration of natural and cultural heritage, socio-ecological public functions, and commercialization.

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## Biography of Dr. Svetlana SIZYKH, Ph.D. (Ecology)

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