

UNESCO CHAIR/UNITWIN NETWORK PROGRESS REPORT FORM

Title of the Chair/Network:	NETWORK on “Water Resources”
Host Institution:	Irkutsk State University
Date of establishment of Chair/Network: <i>(mm, yyyy)</i>	August 14 th / December 25 th , 2009
Period of activity under report: <i>(mm, yyyy - mm, yyyy)</i>	September 1 st , 2009 – September 1, 2014
Report established by: <i>(name, position)</i>	Arkady MATVEEV, Dean of the faculty of biology and soil sciences of Irkutsk State University, professor, manager of the Chair-UniTwin Network
Partners:	<p>University of Savoie / University Mont Blanc (<i>co-director of the UNESCO Chair of water resources</i>)</p> <p>National University of Mongoly (<i>Ulaan-Baator</i>) - Монголия</p> <p>The University of Geneva (Geneva) – Switzerland</p> <p>Institute of biology of development of RAS (Moscow) –Russia</p> <p>The University of Bouriatia (<i>Ulaan-Ude</i>)- <i>Russia</i></p> <p>The Institute of fundamental and experimental biology of RAS (<i>Ulaan-Ude</i>)- <i>Russia</i></p> <p>Limnological Institute of RAS (Siberian branch) – Irkutsk, Russia</p> <p>Institute of geochemistry of RAS (Siberian branch) – Irkutsk, Russia</p> <p>Institute of Earth crust of RAS (Siberian branch) – Irkutsk, Russia</p>

	<p>Institute of geography of RAS (Siberian branch) – Irkutsk, Russia</p> <p>The Institute of General Genetics of RAS (<i>Moscow</i>) - Russia</p>
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To be returned by electronic mail to both: unitwin@unesco.org and i.nichanian@unesco.org

Or by mail to UNESCO, Division for Teacher Development and Higher Education,

Section for Higher Education

7, place Fontenoy – 75352 Paris 07 SP, France

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1. Executive Summary:

Major outcomes, results and impact of the Chair, including on national policies, in relation to its objectives as stated in Article 2 of the Chair Agreement (between the Institution and UNESCO)

(Not exceeding 300 words)

1. Edition of 12 monographs and books.
2. More than 100 problem publications have been published dealing with the water issues.
3. Holding field summer practice for the students of Wellesley-college in 2011, 2013.
4. Organization of every-year scientific conference in ecology and biology for students of Irkutsk (2009 - 2014).
5. Organization and holding of every year Olympiad in biology among Irkutsk students (2009 - 2014).
6. Participation (2009-2014) as jury members in Irkutsk municipal, regional Olympiads in biology, ecology and Baikal science. Delivering public lectures for schoolchildren of Irkutsk on water resources during “week of science”, organized by the University every year. Participation in 20 TV programs, devoted to nature protection and rational use of biological resources of lake Baikal and other water bodies.
7. Organization in 2010 – 2014 of 5 complex expeditions on study of systematics and ecology of salmonids in Baikal rift zone jointly with Institute of biology of development (Moscow), Institute of problems of ecology and evolution (Moscow), Institute of general genetics (Moscow) and Institute of systematics and ecology of animals (Novosibirsk)
8. Organization in 2011 – 2014 of International Schools for Junior Researchers «Ecology of large waterbodies and their catchments» with participation of students from Germany, Switzerland and USA (a video-**Appendix № 5** - <https://www.youtube.com/watch?v=HY--GSjXVew&list=UU-ATpW9hxI3TG677KR4wZGw>).
9. Preparation and defense of 14 Ph. D. theses.
10. Fulfillment of State contract with Ministry of innovation of Irkutsk region on “Assessment of anthropogenic influence on fishery productivity of water bodies of Irkutsk region to determine of complex steps for sustainable reproduction of valuable species of fishes in modern conditions”.

11. Fulfillment in 2012 within the program of UNO development the contract EMO/2012/008 from 01/06/2012 research work devoted to “Study of questions, connected with health of benthic zone in Selenga delta” where changes in benthos due to pollution will be noted.
12. NSF Dimensions of Biodiversity 2011-2014. Lake Baikal Responses to Global Change: The Role of Genetic, Functional and Taxonomic Diversity in the Plankton (Michigan State University; University of California; Wellesley College; University of Texas; East Tennessee State University).
13. Signed agreement on double diplomas (April, 2014) –Bachelor’s level – Irkutsk State University and University Mont Blanc: Licence Professionnelle “Acquaculture” (**Appendix № 1**).
14. Implementation of the 1st stage of UNESCO’s Associated Schools Project Network (2013-2014) (**Appendix № 4** http://isu.ru/ru/about/international_dep/foreign_student/inform/buklet.pdf).
15. Expansion of international collaboration through the involvement of Universities from Japan, China, America, Switzerland, Poland, Russia and other countries in the NETWORK on “Water Resources”.

2) Activities:

Overview of activities undertaken by the Chair during the reporting period

a) Education/Training/Research

(key education programmes and training delivered and research undertaken by the Chair during the reporting period, target group and geographical coverage)

i) Education (leading to certificate)

In April, 2014 the agreement on double diplomas of Bachelor’s level between Irkutsk State University and the University Mont Blanc was signed: Licence Professionnelle “Acquaculture” delivered at Univ. Savoie Mont Blanc : 20 students per year, corresponding to about 400 hours of lectures and 4 months of field practice, 60 European Credits ECTS. (Appendix № 1)

A new Master degree will open in September 2014 at Univ. Savoie Mont Blanc, devoted to mountain water systems. This master will be done in collaboration with the Haute “Ecole du paysage d’ingenierie et d’architecture” (HEPIA, Genève, CH), Lausanne univ. (CH), Neuchatel univ. (CH) and the Franch-Comté Univ. (Besançon, F). 600 hours of lectures and 6 months of field practice, 120 European Credits ECTS.

**Activities Connected with UNESCO’s
Associated Schools Project Network**

Fulfilling the resolutions of the International Conference held in August, 2013 (with the participation of the Commission of the Russian Federation for UNESCO, Mongolia, France and Buryatiya), which was hosted by Irkutsk State University (**Appendix № 2**), in 2013-2014 the ISU has started to implement Stage 1 of the ASPnet (UNESCO's Associated Schools Project Network) – the creation of a UNESCO Associated Schools network at the municipal level. The Lyceum of Irkutsk State University, Gymnasium № 2, Gymnasium № 3, and school № 64 of Irkutsk have become the ASPnet participants. The program of activities for secondary schools has been developed (**Appendix № 3**), **in line with it a UNESCO month has been successfully conducted under the aegis of the UNESCO Chair of Irkutsk State University:**

1. The Scientific conference on ecology and linguistics on the topic *“Baikal – Strategic Resource of the Planet in the XXI Century” with the participants from abroad hosted by Gymnasium № 3;*
2. The International 3-stage conference in English **to identify the best learners of English tested in line with the European Classification criteria (conducted together with Pearson Test of English International Examination Center and the Irkutsk Center for Information and Methodology Support);**
3. The Conference on Law under the aegis of the Law Institute of Irkutsk State University hosted by Gymnasium № 2;
4. Linguistic Conference hosted by school № 64;
5. **Final Readings devoted to the UNESCO activities** hosted by the Lyceum of Irkutsk State University.

The events mentioned above have been based on the following UNESCO activities:

- disseminate information on the United Nations and UNESCO;
- linguistic education;
- ecology and environment;
- learning of the world's cultural and natural heritage;
- human rights, child's rights, democracy, non-violence.

Photos and information on the conducted events are attached

	<p>(Appendix № 4- ISU leaflet, PDF-format, pp. 18 – 19 - http://isu.ru/ru/about/international_dep/foreign_student/inform/buklet.pdf).</p>
<p>ii) Training (short term)</p>	<p>The idea of holding International Summer Schools was implemented in the framework of the program "Baikal" promoted by the Scientific and Educational Center, head of which was the vice-rector of Scientific Affairs Arguchintsev Alexander V. who became the rector of Irkutsk State University in 2012. Over the last 5 years, the organization framework of the Baikal international schools has gained new contours. Thus, the Department of Water Resources and the UNESCO ISU chair, co-directed by the University of Savoy (referred to as "The University of Savoie Mont Blanc" from 2015) made the joint decision to hold numerous International Baikal Schools in different countries home to university partners. Hence, the idea of a summer school network partnership was born. The 2013 International School was held on the shores of Lake Baikal at the ISU research station "Bolshiye Koty" (The school's theme was «Ecology of large water bodies and their watersheds» with the participation of undergraduate and PH. D. students from Russia, France, Germany, Switzerland, the USA (Appendix № 5- a video https://www.youtube.com/watch?v=HY--GSjXVew&list=UU-ATpW9hxl3TG677KR4wZGw).</p> <p>Furthermore, a joint International Summer School has been organized in 2014 by the University of Savoy, involving researchers, PhD graduates as well as undergraduates from partner universities located in Germany, Switzerland and Russia. International Summer school in limnology 2014: Lake ecology and temporal dynamics, Evian, 23 August - 2 September, 33 registered participants, about 40 conferences. Co-organized by Univ. Savoie Mont Blanc (CARRTEL laboratory), Irkutsk State University (faculty of Biology) and University of Geneva (Forel Institute).</p>
<p>iii) Research</p>	<p><u>Irkutsk State University</u></p> <p>The interdisciplinary research conducted at Lake Baikal :</p> <ul style="list-style-type: none"> • Studies on the adaptation principles and mechanisms of biological systems to abiotic and biotic environmental factors on different levels (physiological, biochemical, molecular-biological and population size of species levels). The objects of research are mainly the biosystem of Lake Baikal, its flora and fauna, and in particular its freshwater shrimps. • Monitoring of the status of Lake Baikal's ecosystem, of problems linked to the self-purification process of the lake's waters, of its endemic species

and of the human impact on its waters.

- Research studies on the environmental features of the invertebrates living in Lake Baikal as well in the reservoirs of the Pribaikal region. An emphasis is also put on the role invertebrates play in self-purification processes. Moreover, students study the toxic effect of oil on aquatic organisms as well as the transformation and detoxification processes of petroleum hydrocarbons using microorganisms, worms and residues.
- Studies on the structure and feeding of fish populations in different areas of Baikal.
- Ornithological studies of Baikal fauna, especially of aquatic bird species.
- Geographical assessment of river basins and aquatic landscapes of Lake Baikal's territory based on experimental studies, remote sensing, GIS-technology, methods of landscape planning and modeling of hydrological processes.
- Modeling of the diffusion and transfer of human-caused pollution in the Baikal region.
- Transformation of landscapes within the Baikal drainage basin applying data of satellite remote sensing.

Univ. Savoie Mont Blanc :

One of the CARTEL's priorities is studying the functioning and evolution of lake systems in relation with their watersheds. The disciplinary field in question is Limnology. Research is conducted with a view to help in decision-making in the natural resource management of large lakes and to participate in the current major scientific debates of the functional role of biodiversity and the impact of global changes on ecosystems. The studies entail long-term follow-up which constitute a precious environmental database to understand the effects of anthropisation and climatic changes.

Its scientific partnership is also structured around multidisciplinary research involving a global approach to the causes and impact of pollution in rural environments (INRA-CEMAGREF programme « AQUAE » coordinated by Thonon and including in particular colleagues belonging to 3 units of the Hydrobiology and Wildlife Department and to the INRA-ENV laboratory).

The partnership in research and in research-development is organised around 3 Scientific Interest Groups (SIG): the "Northern Alps" SIG (including INRA-CEMAGREF and Chambers of Agriculture of the Alps for mission-oriented research on themes concerning the relations between

	<p>agriculture, development and environment), the "lakes" SIG (which associates INRA, CSP and CEMAGREF teams around 4 themes: network, sampling, indicators and management) and the "cyanobacteria" SIG (22 research teams belonging to 15 different institutes: CNRS, AFSSA, IP, Cemagref, ENS, Universities...).</p> <p><u>The University of Bouriatia</u></p> <p>In the frame of scientific subject matter:</p> <ul style="list-style-type: none"> - Influence of anthropogenic factors on the chemical contents of water bodies. - Carbonic and nitric waters of Baikal region. - Microbiological aspects of lake Baikal ecosystem. <p>Grant projects have been implemented (2011-2014) RFFR (Russian Foundation of Fundamental Research)</p> <ul style="list-style-type: none"> - 12-05-00871-a Mechanisms of biogenic formation of natural waters' chemical composition - 12-05-98096-p_Siberia_a Scientific foundations of the integrated model of water resource management in Baikal area - Integrated project of Siberian branch of the Russian Academy of Science №5 Mineral sources of Baikal-Mongolian region: hydro chemical passport and prospects for the practical use (balneology, geothermal resources, extraction of useful components) <p><u>Mongolian State University</u></p> <p>Project Services (UNOPS) Ппоект EMO/2012/008 (IWC-78317) Selenga_delta</p>
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b) Conferences/Meetings

(key conferences and meetings organized by the Chair or to which its Chairholder contributed)

i) Key conferences and workshops hosted by the Chair

La conférence internationale des chaires UNESCO Coordination des recherches dans le domaine de formation, ainsi que des recherches écologiques sur l'eau. Septembre 2009, Khanty-Mansysk, Yurga . Pays participant: Russie, Brésil, l'Espagne, Malaysia, Koweït, Sri Lanka, Pakistan, Pays-Bas, Mongolie, des pays de la communauté des pays indépendants. Total number of participants more 150.

XXII-ème Congrès balnéologique Coordination des recherches dans le domaine balnéologique. Institut de balnéologie de Pologne, septembre, 2009, Pologne. Total number of participants more 100.

X congrès de l'association hydrobiologique relevant de l'Académie des Sciences de la Russie Coordination des recherches dans le domaine hydrobiologique. 28 septembre– 2 octobre 2009, Vladivostok l'Académie des Sciences de la Russie. Total number of participants more 300.

13-ème Colloque mondial concernant l'étude des lacs Sensibilisation des participants aux problèmes liés à l'état des milieux lacustres. 1-5 novembre 2009, Voukhan, Chine . Total number of participants more 1500.

V Colloque National «La formation écologique et l'instruction dans les intérêts du développement durable» La socialisation à la base des valeurs du développement durable, la mise en commun des efforts de la société et de la science dans la sauvegarde de l'environnement. Nijné-Vartovsk, avril, 2010. Total number of participants more 120.

International Journey of Exergy, Paris, June, 2011. Total number of participants more than 100/

International Conference on “Modern problems of general parasitology”, (*Russia, Mongolia, Germany, France, Poland*) 2012, Moscow. Total number of participants more 100.

2nd International Conference Mineral resources-reference material. 27-28 November, 2012, Ulaanbaatar, Mongolia. Total number of participants more 100.

“Structure, functioning and ecological safety to the 80's anniversary of biologic, geographic and chemic departments of Buryat university, 2012 Ulaan-Ude. Total number of participants more 50.

EcoSummit 2012 - Ecological Sustainability, Ohio, October 2012. Total number of participants - more than 1 000.

Conference devoted to 100 anniversary of FA Forel death, Geneva, September, 2012. Total number of participants- more than 100.

«VIII Scientific and Operations Meeting (Conference in Biology and Biotechnics of Ciscoes Breeding and Reserve» Tyumen, November, 2013. Total number of participants - more than 100.

International conference “Central Asian Environmental Problems and Potential Solutions”. June, 2013. Darchan, Mongolia. Total number of participants - more than 100.

International conference “Chemistry and Clean Energy”. 5-16 September, 2013, Ulaanbaator, Mongolia. Total number of participants - more than 100.

All-Russian conference with the participants from abroad «Ecological problems of Lake Baikal. Analysis and Forecast of Lake Baikal’s Conduction Caused by Climate Change». 31.10-01.11 2013, Irkutsk. Total number of participants - more than 67.

VI All-Russian congress with the young scientists biologists «*Symbiosis-Russia 2013*». Irkutsk, August, 2013 (**Limnological Institute** of RAS). Total number of participants - more than 200.

XXII International Symposium in Biology and Ciscoes Management. Listvyanka, August, 2014. (*Institute of general genetic of RAS*). Total number of participants - more than 100.

XII International Ecological Event «Save and Protect» in the framework of X International Youth Ecological Forum «One Planet – One Future!», Khanti-Mansiysk (Russia), May, 2014 (with the participation of 29 delegations from abroad). Total number of participants - more than 300.

VII International Conference of UNESCO Associated Schools Project Network «The Ob’ – Irtishskiy rivers’ basin”: young people learn and preserve the natural and cultural heritage in world’s great river regions», Khanti-Mansiysk (Russia), May, 2014. Total number of participants - more than 300.

ii) Other conferences/organizational activities undertaken by the Chairholder

Scientific workshop (17.02.2014-19.02.2014) in Bremerhaven, Alfred-Wegener Institute for Polar and Marine Research "Lake Baikal and effects of global changes" (LabEglo). Participating institutes: UFZ—Helmholtz Centre for Environmental Research; University of Leipzig; Fraunhofer Institut für Zelltherapie und Immunologie; Irkutsk State University; Alfred-Wegener-Institute Helmholtz Centre for Polar and Marine Research, Lebanese University, Tripoli, Lebanon. Total number of participants - 25.

Scientific workshop (02.02.2014-07.02.2014) in Saarbrücken, Helmholtz Institute for Pharmaceutical Research «Endemic Actinomycetes of Lake Baikal as a Source of New Biologically Active Compounds» in the frame of DAAD international project. Total number of participants - 12.

iii) A selection of conference presentations by the Chairholder and other colleagues

Colloque national «Etude des problèmes biologiques et écologique de la région baikalienne», Septembre 2009, Irkoutsk avec la participation de l’Institut de biologie générale et expérimentale de l’Académie des Sciences de la Russie (Branche Sibérienne). Total number of participants more 50.

Colloque national «Problèmes biologiques et écologiques de la région baikalienne». Sensibilisation des participants aux problèmes biologiques et écologiques de la région baikalienne, 23-25 septembre, 2009, Irkoutsk. Total number of participants more 200.

Workshop for scientific workers, undergraduate and Ph.D. students with the participants from Wellesley-college, Michigan State University, East Tennessee State University, University of Texas, National Center for Ecological Analysis and Synthesis, University of California on the project of «Dimensions of Lake Baikal’s Biodiversity» . June, 2013, at the ISU research station "Bolshiye Koty", Total number of participants - 15.

Workshop for undergraduate and Ph. D. students, scientific workers and professors on the topic « Baikal Zooplankton Population Genetics », 2.08.2013, at the ISU research station "Bolshiye Koty". Total number of participants -13.

Workshop for undergraduate and Ph. D. Students, scientific workers and professors on the topic « Temperature as an abiotic factor of major importance » . , 27.08.2013, at the ISU research station "Bolshiye Koty". Total number of participants - 11.

c) Interuniversity Exchanges/Partnerships

(principal exchanges/partnerships between the Chair and other institution,s including UNESCO Chairs/UNITWIN Networks)

Collaboration with international universities in the framework of NETWORK on “Water Resources”:

Korea Environment Institute (Seoul, Republic of Korea)

Korea Institute of Water and Environment (Seoul, Republic of Korea)

Myongji University (Seoul, Republic of Korea)

National University of Mongolia (Ulaan-Baator, Mongolia)

Institute of Geocology Mongolian Academy of Sciences (Ulaan-Baator, Mongolia)

Fudan University (Shanghai, Chine)

Northwest University (Xi`an, Chine)

The University of Lyon (France)

The University of Geneva (Switzerland)

d) Publications/Multimedia Materials

(major publications and teaching/learning materials)

Please tick relevant fields of

[tick]

[no.]

<p><i>output and indicate volume of output:</i></p>	<p>Books <input type="checkbox"/></p> <p>Books (edited) <input type="checkbox"/></p> <p>Books (chapters) <input type="checkbox"/></p> <p>Monographs <input type="checkbox"/></p> <p>Research Reports <input type="checkbox"/></p> <p>Journal Articles (refereed) <input type="checkbox"/></p> <p>Conference Proceedings <input type="checkbox"/></p> <p>Occasional Papers <input type="checkbox"/></p> <p>Teaching/Learning Materials <input type="checkbox"/></p> <p>Multimedia Materials (CD-Rom) <input type="checkbox"/></p> <p>Multimedia Materials (Video) <input type="checkbox"/></p> <p>Multimedia Materials (Other) <input type="checkbox"/></p>
<p><i>Give details of major publications and materials including full citations.</i></p> <p>i) Theses</p> <p>Pezet Florent, 2014 : Bilans et transferts de phosphore dans le bassin versant du lac du Bourget : caractérisation, interprétation et modélisation des flux. Thèse Univ. Savoie</p> <p>Richard Alexandre, 2014 : Régulation densité-dépendante des juvéniles de truites <i>Salmo trutta</i> sous l'effet du repoissonnement: implications pour la gestion. Thèse Univ. Savoie</p> <p>Zhong Xu, 2014 : Diversité et rôle fonctionnel des virus phytoplanctoniques dans les lacs péri-alpins. Thèse Univ. Savoie</p> <p>Larras Floriane, 2013 : Evaluation écotoxicologique de l'impact des pesticides sur les communautés microbiennes benthiques en zone côtière lacustre. Thèse Univ. Savoie</p> <p>Rimet Frédéric, 2012 : Diatoms: an ecoregional indicator of nutrients, organic matter and micropollutants pollution. Thèse Univ. Savoie</p> <p>Alric Benjamin, 2012 : Impact des perturbations sur les réseaux trophiques pélagiques lacustres : approche paléo-écologique. Thèse Univ. Savoie</p> <p>Kermarrec Lenaïg, 2012 : Développement d'outils moléculaires pour l'utilisation des diatomées comme bioindicateurs de la qualité des écosystèmes aquatiques lotiques et pour l'étude de leur taxonomie et de leur écologie. Thèse Univ. Savoie</p> <p>Sotton Benoît, 2012 : Impact des efflorescences à cyanobactéries toxiques (<i>Planktothrix rubescens</i>) sur les populations de poissons. Thèse Univ. Savoie</p> <p>M.V.Pastukhovym (supervisor A.N. Matveev) on mercury accumulation (2012).Irkutsk State</p>	

University

A.V. Mokry (supervisor E.A. Silow) on phytoplankton organization (2011). Irkutsk State University

Mangot Jean-François, 2011 : Dynamique spatio-temporelle du picoplancton eucaryote lacustre : approches moléculaires par FISH et pyroséquençage. Thèse Univ. Savoie

Pollet Thomas, 2011 : Mieux connaître la diversité et la dynamique des groupes bactériens non dominants dans les écosystèmes naturels: l'exemple des Planctomycetes en milieu lacustre. Thèse Univ. Savoie

Janjua Yamin Muhammad, 2010 : Études sur la structure des populations de poissons, leurs interactions trophiques et leur gestion dans le lac d'Annecy. Application de modèle « ECOPATH with Ecosim » (EwE). Thèse Univ. Savoie

Berdjeb Lyria, 2010 : Impact des virus et des flagellés hétérotropes sur les ressources nutritives, la qualité de la matière organique, la dynamique et structure des communautés microbiennes lacustres. Thèse Univ. Savoie

ii) Monographs and books

1. Jang Min Chu, Ick Hwan Ko, Luntan Janchivdorj, Gomboev B.O., Khakhinov V.V., Namsaraev B.B. and oth. Integrated Water Management Model on the Selenge River Basin. Basin Assessment and Intergrated Analysis (Phase II). – Publisher: Published by Korea Environment Institute, Seoul, Republic of Korea, 2009. – p. 367 (Key pollution sources of the Selenga River are identified from the river outlet (Mongolia) to the place where it flows in Lake Baikal.).
2. Jang Min Chu, Chang Hee Lee, Luntan Janchivdorj, Bair Gomboev, Khakhinov V.V., Namsaraev B.B. and oth. Integrated Water Management Model on the Selenge River Basin. Development and Evaluation of the IWMM on the SRB (Phase III). – Publisher: Published by Korea Environment Institute, Seoul, Republic of Korea, 2010. – p. 304 (Ways of reduction on the anthropogenic load on the Selenga River and its tributaries are suggested).
3. Sirezhapova A.S., Namsarayev B.B., Abiduyeva E.U. Seasonal and yearly changes of microorganisms activity in the lakes of Anon-Kerulensk group containing salt and sodium bicarbonate. – Ulaan-Ude. – Publisher: State Agroicultural Academy of Bouriatia, 2010. – p. 104. (Hydro chemical and microbiological characteristics of Transbaikalia salt lakes are given).
4. Namsarayev B.B., Khakhinov V.V., Garmayev E.Zh., Plusnin A.M. et. al. Geoterm microorganisms activity in Baikal Rift Zone. – Publisher: Geo Academic Publishing House, Novosibirsk, 2011. – p. 302 (Thermal springs of Baikal region are considered).
5. Namsarayev B.B., Khakhinov V.V., Zaitseva S.V., Dagurova O.P. Water systems of South-eastern Pribaikalye. – Publisher: The University of Bouriatia press, Ulaan-Ude, 2011. – p. 160. (Hydrological and hydro chemical characteristics of Pribaikal water ecosystem are given).
6. Silow E.A. Some Applications of Thermodynamics for Ecological Systems / E.A. Silow, A.V. Mokry, S.E. Jørgensen // J.C. Moreno-Pirajan (Ed.). Thermodynamics -

Interaction Studies - Solids, Liquids and Gases. – Vienna: InTech, 2011. – P. 319-342. ISBN: 978-953-307-563-1. Available from <http://www.intechopen.com/articles/show/title/some-applications-of-thermodynamics-for-ecological-systems>

7. Rare species of plants and animals of Irkutsk city / Eds: V. V. Popov, A.N. Matveev. – Irkutsk: «Time to travel», 2011. – p. 159.
8. Fishery melioration of waterbodies / A. N. Matveev, V.P. Samusenok, A.L. Yuriev, A.I. Vokin, R.S. Andreev. – Irkutsk: SB RAMS, 2011. – p. 44.
9. Takhteev V.V. Biota of waterbodies Of Baikal rift zone / V.V. Takhteev, E.A. Sudakova, A.N. Matveev et al.; – Saarbrücken: Palmarium Academic Publishers, 2012. – p.302.
10. Eds :O.T. Rusinek, V.V. Takhteev, D.P. Gladkochub, T.V. Khodger, N.M. Budnev. Baikal Science : Textbook for students of natural faculties of universities in 2 books. Novosibirsk: Nauka, 2012. – 1114 P. Book 1. – P. 1–468. Book 2. – P. 469–1114. (Fundamentals of Baikal science are given).
11. Kotokelskoye Lake : Natural Conditions, biota, ecology / N.M. Pronin, L.L. Ubugunov, A.N. Matveev et al. – Publisher: BSC SB RAS, Ulan, Ude, 2013. – p. 360.
12. Red Book of the Republic of Buriatia: Rare and extinct species of animals, plants, and mushrooms/ A.N. Matveev, V.P. Samusenok, et al. – Publisher: BSC SB RAS, Ulaan,-Ude, 2013. – p. 340.

iii) Publications

Indicative list of published works related to water resources made universities belonging to NETWORK on “Water Resources”:

Namsarayev B.B., Khakhinov V.V., Turunkhayev A.V. Marsh ecosystems of the Svyatoy Nos Peninsula isthmus (lake Baikal) // Geography and nature resources. - 2009. № 4. - P. 66-71. (The impact of marshes on the ecosystem of Lake Baikal is considered).

Ulzetueva I.D., Zhamyanov D.Ts.-D., Khakhinov V.V., Gomboev B.O. Research of saturation of mineral waters with quattz and amorrhuous silica in cold carbonic and nitric thermal waters in Southwest Transbaikalia // Geochimica et Cosmochimica Acta, V. 74, Issue 11. (Amorrhuous silica in cold carbonic and nitric thermal waters of Zabaikalye is researched).

Zilov E.A., Ermakov E.L. Dynamique saisonnière de la plasticité écologique des insectes. Problèmes actuels du droit, de l'économie et de la gestion :Actes du colloque international, 14-15 mai 2009– Irkoutsk, 2009. livr. V, Vol. II– C. 378-379.

E. Silow. Lake Baikal as possible sentinel of the Climate Change. 13th World Lake Conference. Abstract volume.– Wuhan, 2009.– P. 109-110.

S. Shimaraeva, L. Izmestyeva, E. Silow. Long-term dynamics of under-ice community of Baikal phytoplankton and climate change. 13th World Lake Conference. Abstract volume.– Wuhan, 2009.– P. 111.

E. Pislegina, E. Silow. Long-term dynamics of Baikal zooplankton and climate change. 13th

World Lake Conference. Abstract volume.– Wuhan, 2009.– P. 110-111.

E. Panasenkova, S. Timofeeva, E. Silow. The study of structural exergy in Ust-Ilimsk reservoir ecosystem. 13th World Lake Conference. Abstract volume.– Wuhan, 2009.– P. 298.

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Namsarayev B.B., Khakhinov V.V. Ecological role of Baikal nature territory water and earth systems microbe communities// Vestnik of BSC. - 2014 №1. - P.150-164. (Ecological impact of various microorganisms on Baikal region water bodies)

Some parameters of cellular and metabolic assessment of the thermal stress responses in the Palearctic gastropod *Limnaea stagnalis* from Baikal region (under review)

The comparative study of stress metabolisms marker activities in Baikal and Palearctic amphipods species under temperature changes (under review)

Peculiarities of stress-response in Baikal endemic amphipods species in view of evolution, thermal resistance and thermal preferences (under review)

Adaptation to environmental salinity modulates thermal stress response in amphipods *Gammarus lacustris* and *Gammarus pulex* (Amphipoda, Crustacea) (under review)

e) Cooperation with UNESCO Headquarters, Field Offices

Participation of the Commission of the Russian Federation for UNESCO (Moscow, Russia) representatives in the International Conference and the Drafting Committee (Conference Resolution, August, 2013 –See Appendix № 2).

Participation of the Commission of the Russian Federation for UNESCO (Moscow, Russia) representatives in the Opening of International Summer Schools in 2013 (lake Baikal) and in 2014 (lake Geneva).

Collaboration with the Regional and National coordinators of the UNESCO Associated Schools Project Network– the whole period.

Participation in the UNESCO Associated Schools Project Network International Conference (Khanti-Mansiysk) –February, 2014.

f) Other

(any other activities to report)

The CARRETEL Laboratory (Univ. Savoie Mont Blanc & INRA, France) participates to the following monitoring systems and observatories as the “Observatoire de Recherche en Environnement des Lacs alpins (OLA)” : OLA has obtained in 2010 a status of SOERE (système d’observation et d’expérimentation au long terme pour la recherche en environnement) from the “Alliance nationale de recherche pour l’environnement (Allenvi). OLA is part of the AnaEE network (Analysis and Experimentation on Ecosystems).

All the research conducted by the CARRETEL is undertaken in close collaboration with the socio-economic partners: International Commission for the Protection of Lake Geneva Waters (CIPEL), Intercommunal Association of Lake Annecy (SILA); Water Agencies like CISALB at Lake Bourget for monitoring lake quality; Evian Water Company; Chambers of Agriculture and SIVOM : problems involving diffuse pollution; DDAF and professional and amateur fishing associations : halieutic management.

3. Future Plans and Development Prospects:

Outline of action plan for the next biennium and short/medium and long-term development prospects. Please do not hesitate to refer to difficulties that the Chair has experienced (Not exceeding 300 words)

Development of concept of development net UNITWIN, including:

- widening the e-learning and research activities through the net, in particular with the University of Savoie and an enlargement towards new active members (including in Switzerland, Central Asia where potential partnerships have been already identified);
- technologies transfers in water resources use and process;
- opening to the cooperation with firms.

In September, 2014-September, 2019 the NETWORK on “Water Resources” of Irkutsk State University is planned to conduct the following activities:

1. Participation in the Intergovernmental Programme of Scientific Cooperation of International Water Resources for UNESCO (PHI phase VIII 2014-2021)
2. The CARTELE of Savoie University (France) has a European perspective, participating in a REX project (Euro-limpacs: global change impacts on European lake ecosystems), in the «CHARRNET» network, in the current EUROLAKES programme ("Integrated Water Resource Management for Important Deep European Lakes and their Catchment Areas"), and in a French-Swiss-Italian INTERREG programme focusing on ecogenetics of trout (identification and conservation strategy of native populations, involving the collaboration of the Universities of Bern and Padua and INRA Jouy-en-Josas).
3. Determination of prior tasks in researches till 2018 together with countries participating in the network. Organization of workshops and seminars (in the same vein of the Summer Schools with already existing universities-partners within the NETWORK on "Water Resources").
4. Edition of monographs, textbooks, papers on themes of chair.
5. Implementation of the joint project by the University of Bouriatia (UB) and City University of Tokyo (Japan) to do a research on organic substance in natural water and muck of Lake Baikal basin.
6. Implementation of the joint project by the University of Bouriatia and Chinese colleagues (Fudan University, Shanghai; Northwest University (Xi`an) to do a research on accumulation of heavy metal in the deltas of Selenga and Hwang Ho rivers.
7. Development of the project (UB and University of Savoie Mont Blanc) to study the processes of formation of mineral water in the mountain-folded formations (comparison of groundwater chemical composition in new rift zones (for example, the Baikal region) and old rock formations (for example, the Alps). In the framework of this project it will be possible to compare the aquatic ecosystems in areas with developed industry and areas where there are practically no enterprises, polluting the hydrosphere.
8. Organization of web-page for students, PhD-students and junior researchers from net at www.isu.ru, www.lake.baikal.ru. Libraries, textbooks etc, useful information.
9. Continuation of complex interdisciplinary researches of mountain lakes of Baikal zone and French Alps (a book is going to be published early 2016 edited by the State University of Irkutsk and the University of Savoie devoted to a multi-disciplinary comparison between the Siberian lakes and the French Alps –see below).
10. Fulfillment of complex ecological and molecular-genetic studies of salmonids in centers of their formation in Eastern Siberia and French Alps jointly with University of Savoie, Institute of genetics, Institute of systematics and ecology of animals SB

RAS.

11. Organization of complex interdisciplinary expedition to study Selenga basin.
12. Preparation of book "Lake Baikal and alp lakes" (in French and Russian" together with net co-supervisor of the Chair – the University of Savoie.
13. Edition of book «Lake Baikal and alp lakes» (in Russian and French) together with University of Savoie (200 pages).
14. Organization of field teaching-research station for water resources in Bolshie Koty and delivering research-practical workshops there.
15. Organization of language training of students for further exchange between participants.
16. Continued development of interuniversity net on educational and research cooperation in the field of water resources.
17. Creation of computer data bank on biological, hydrological, hydrochemical of ecosystems of large waterbodies and mineral sources.
18. Development of international master program in water resources management.
19. Organization of second international symposium Ecosystems and natural resources of mountain countries "Baikal. Current state of surface and underground hydrosphere of mountain countries" with active participation of junior researchers.
20. Clearance for an international master programme devoted to water resources management and development.
21. Participation of ISU and BSU in organizing and holding the 2015 International Summer School which is planned to be held in the Republic of Buryatia. The proposed theme is «**Assessment of water bodies in the context of global change**». The international school is planned to be held under the aegis of University of Geneva on Lake Baikal, involving ISU and the University of Bouriatia. A number of universities from Switzerland and Russia are supposed to participate in the 2015 International Summer School.
22. Since 2015 ISU is planning to develop the idea of annual scientific-educational schools step-by-step, so it has introduced the format of including three stages:

Stage 1 = Preparation. This stage begins 6 months before the expected date of arrival of participants. Students meet teachers in charge of the school's scientific topics online. They do preparatory readings, study theoretical issues, get in touch with students (upper-class undergraduates and PhD graduates) and consultant professors. As a result, the workload load of students is established in ECTS credits.

Stage 2 = Fieldwork. This stage corresponds to the "Summer School", during which field

research is conducted by using Lake Baikal as a scientific research "tool".

Stage 3 = Analysis – students analyze the data collected during the fieldwork, write and defend research papers. Later, articles regarding the research conducted are published.

As a result, the two week fieldwork experience gives rise to a collaboration program between universities lasting several months, at a minimum cost for both partners.

23. Future prospects – 2015 -2019 - Associated Schools Project Network

The implementation of the Strategy and Plan of Action, developed at the International Forum for the 60th Anniversary of the ASPnet, which was held in Seoul (September, 2013), with the participation of the Drafting Committee Members from Philippines, Bahrain, Bhutan, Denmark, Germany, Japan, Korea, New Zealand, Trinidad& Tobago, Ghana, and Canada:

At the International Level:

Strategy 1 (**Strengthen networking and collaboration through various ICT platforms – Information and Communication Technologies**). *Plan of Action 1* (Develop an online network of ASPnet schools from different countries as an avenue for collaborating and exchanging good practices).

At the Regional Level:

Strategy 1 (**Strengthen networking and collaboration through various regional programmes for ASPnet national coordinators, administrators, teachers and students**);

Strategy 2 (**Maximize ASPnet’s participation in programmes initiated by the UNESCO Regional Field Offices, UNESCO-related centres, UNESCO Chairs and other UN agencies**).

Plan of Action 1 (organize training programmes, conferences, workshops and similar activities at the regional level);

Plan of Action 2 (Participate in programmes organized by UNESCO Field offices, UNESCO-related centres, UNESCO Chairs and other UN Agencies).

At the National Level:

Strategy 1 (**Establish partnership between ASPnet schools and other organizations, both public and private**);

Strategy 2 (**Improve coordination of ASPnet schools through the national coordinators and the National Commissions for UNESCO**);

Strategy 3 (**Expand membership; develop national ASPnet websites and social network**

accounts; involve the media).

Plan of Action 1 (Organize programmes to initiate partnership between ASPnet and other organizations (government, non-government, private);

Plan of Action 2 (Organize annual or bi-annual conferences for ASPnet school coordinators, administrators, teachers and students);

Plan of Action 3 (Expand membership; develop national ASPnet websites and social network accounts; involve the media).

At the School Level:

***Strategy 1* (Develop partnerships by organizing relevant joint programmes with teacher-training institutions, local government units, community associations, non-government organizations and the private sector);**

***Strategy 2* (Promote global citizenship by participating in national and/or regional ASPnet flagship programmes);**

***Strategy 3* (Promote a whole-school approach for ASPnet activities).**

Plan of Action 1 (Organize joint programmes to form partnerships between ASPnet and other organizations, both public and private);

Plan of action 2 (Create annual plan of action that includes the school's participation in international, regional and/or national ASPnet flagship programmes);

Plan of action 3 (Engage the entire school (i.e., administration, teachers, students, parents) in ASPnet activities to stimulate the ASPnet experience at the school level).

Appendix:

1) Human Resources

Arkady MATVEEV , Dean of the faculty of biology and soil sciences of Irkutsk State University, professor, manager of the Chair-UniTwin Network - 3500 \$ / year

Tatiana LICHTOVANNAYA, Head of ISU International Affairs Department, Administrative Coordinator of the Chair-UniTwin Network - 3500 \$ / year

E. BRUNAT, Vice-president for International and European relations (2010-2013): 3600 € / year

Th. VILLEMEN, Dean of the faculty of Mountain Science, University of Savoie (2010-2012) and from 2012 First Vice-president of Univ. Savoie Mont Blanc, co-manager of the Chair-UniTwin Network : 4800 € / year

The CARRTEL Laboratory has a permanent staff of 45 as well as approximately 15 people completing their PhD or on post-doctoral or research courses.

2) Financial Resources

<i>Please tick sources of financial contribution and specify the amount in U.S. dollars</i>	[tick]	Amount (\$)
Host Institution	<input type="checkbox"/>	_____
Partner Institution	<input type="checkbox"/>	_____
_____	<input type="checkbox"/>	_____
Government Body	<input type="checkbox"/>	_____
Other Public Institution/Body	<input type="checkbox"/>	_____
_____	<input type="checkbox"/>	_____
(incl. Research Councils)	<input type="checkbox"/>	_____
UNESCO	<input type="checkbox"/>	_____
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Other UN Agency	<input type="checkbox"/>	_____
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IGO	<input type="checkbox"/>	_____
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NGO	<input type="checkbox"/>	_____
_____	<input type="checkbox"/>	_____
Industry	<input type="checkbox"/>	_____
	<input type="checkbox"/>	_____

	<hr/> <p style="text-align: center;">Other Private</p> <hr/>
<p><i>Give details of financial contributions, material resources and space.</i></p> <p><u>Contribution UNESCO/United Nations Office for Project Services (UNOPS)</u></p> <p>- Project EMO/2012/008 (IWC-78317) Selenga_delta (January 2011 –Mai 2013): 23 790 \$</p> <p><u>Irkutsk State University (Irkutsk, Russia - Non-budgetary funds)</u></p> <p>- Human resources, material resources (2009 -2014) : 99 600 \$</p> <p>- Missions, voyages, publications 2009 - 2014: 36 000 \$</p> <p>- Accord № 112-09-492 L'Université technique d'Etat d'Irkoutsk et laboratoire écologique interuniversitaire – La liquidation d'une source de la pollution par l'arsenic du territoire du terrain industriel de l'usine métallurgique a Svisk(région d'Irkoutsk), 2009 – 2010 - 34 000 \$</p> <p>- Accords № 8 et № 428 Institut de géographie relevant de l'Académie des Sceinces de la Russie (Branche Sibérienne) – analyse des échantillons du sol, des plantes et de qualité d'eau, 2009-2011 - 110 000 \$</p> <p>- Organisation of the international summer schools 2011 -2013 : 110 000 \$</p> <p>-Implementation of the UNESCO ASPnet (UNESCO Associated Project Network) 2013-2014 : 9 000 \$</p> <p><u>Organizations governmental (Россия)</u></p> <p>- Développement du potentiel scientifique de l'école supérieure (2009-2010)" (projet RNP.2.2.1.1/5901": 105 000 \$</p> <p>- State contract №111-12-513 with the Ministry of innovative development of Irkutsk region: 58 070 \$</p> <p>- State contract №111-12-510 with the Ministry of natural resources and ecology of Irkutsk region: 15 820 \$</p> <p>- State contract №111-13-509 with the Ministry of innovative development of Irkutsk region: 88 236 \$</p> <p>- State contract №111-13-516 with the Ministry of natural resources and ecology of Irkutsk region: 31 992 \$</p> <p><u>Industry (Россия)</u></p>	

Contract №111-07-645 with society with limited responsibility «Baikal Engineering»: **4 000 \$**

Main Partner University Savoie Mont Blanc:

Financial Support for international exchanges in the framework of the UNESCO Chair & UniTwin Network on water resources, 2011-2014 : **32 000 €**

Coopération Savoie-Sibérie : Ecologie lacustre, ARC Environnement – region Rhône Alpes, 2012-2013: **8250 €**

Organisation of the international summer school 2014 : **55 000 €**

Total : 836 158 \$

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