

===== PROCEEDINGS OF THE 2<sup>nd</sup> NATIONAL CONFERENCE =====  
===== "MATHEMATICAL MODELING IN ECOLOGY" =====

## **2nd National Conference with Invited Foreign Participants “Mathematical Modeling in Ecology. EcoMatMod-2011”**

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2<sup>nd</sup> National Conference with Invited Foreign Participants “Mathematical Modeling in Ecology. EcoMatMod-2011” was held in May 2011 in Pushchino (Moscow Region, Russia) by the Institute of Physical-Chemical and Biological Problems in Soil Science of RAS (IPCBPSS RAS) with the assistance of the Institute of Mathematical Problems in Biology of RAS (IMPB RAS).

There are the following major research challenges in environmental sciences demanding the application of mathematical methods:

- modeling of the biogeochemical circles of elements: first of all, carbon and nitrogen which are especially important for the assessment of carbon balance within the bounds of the Kyoto Protocol;
- management of natural and artificial ecosystems aimed at the preservation of biodiversity and optimization of economically useful production;
- sustainable development of natural ecosystems in various biomes of the Globe: first of all, in boreal and tropical forests, tundra and deserts upon the changes of the environmental conditions including the catastrophic ones (climatic changes, forest fires, outbreaks of insect pests, floods and droughts).

All these research patterns are presented in Russian science. There are several centers in Russia, whose research teams develop mathematical models in ecology. These are Geographical, Biological, and Soil Science Faculties of M.V. Lomonosov Moscow State University collaborated with institutes of the Russian Academy of Sciences, first of all A.N. Severtsov Institute of Ecology and Evolution of RAS. There are also A.M. Obukhov Institute of Atmospheric Physics of RAS and Institute of Global Climate and Ecology of RAS & Meteorology Centre, where investigations on theoretical ecology and global models have been developed. There are Krasnoyarsk Scientific Center of RAS (Institute of Biophysics, V.N. Sukachev Institute of Forest, Computational Center, etc.) and Pushchino Scientific Center of RAS (Institute of Physico-Chemical and Biological Problems in Soil Science, Institute of Mathematical Problems in Biology, Institute of Theoretical and Experimental Biophysics). From these centers, there were most of the reports submitted and most of the post-graduate students attended the conference.

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Apart from the main agenda, there was a meeting in honor of A.A. Lyapunov's centenary. Corr. member of the USSR Academy of Sciences Alexey Lyapunov was one of the founders of mathematical ecology in the USSR. A.A. Lyapunov's followers and colleagues were among the speakers there: Academician Yu.I. Zhuravlyov (Moscow) and Honoured RF Scientist Prof. R.A. Poluektov (St.Petersburg). At the 1<sup>st</sup> EcoMatMod Conference held in 2009, participants also reminisced about the leaders of mathematical ecology in Russia, about A.A. Lyapunov, N.V. Timofeev-Ressovsky, Yu.M. Svirezhev, Alexander Bazykin. The current journal issue includes a memory paper special written by R.A. Poluektov.

It was already after the conference when we lost Albert Molchanov. It is difficult to overestimate his role in our research field development. The Schools on Mathematical Modeling of Complex Biological Systems that he led after A.A. Lyapunov created an informal community which continues to live on at our conferences over 20 years after the last XII School. Albert Molchanov was an amazing person who combined a fierce critic, sifting out far-fetched theories and models, and an instantly kindling enthusiast with an avalanche of associations from all fields of knowledge – in the cases when the model gave a new insight into the object. His participation in the discussion (more precisely, his leading of the discussion) helped to shape large pieces of our understanding of the heart of the problem – and all this with regard and concern towards biology and biologists. It should be noted that these qualities were also characteristic for other leaders of those Schools: Igor Poletaev, Nataliya Bazilevich and, of course, Argenta Titlyanova, an active participant of both the Schools and our conferences. The role of such informal communities (examples are Yuri Svirezhev's seminars in Moscow, Ratmir Poluektov's seminars in Leningrad, Rem Khlebopros's seminars in Krasnoyarsk) is extremely important in both the development of science and the scientific life of their participants.

The journal section devoted to the conference "Mathematical Modeling in Ecology" includes papers that were written on the basis of conference reports and reviewed by members of the Program Committee and invited experts. The section also contains a few papers with the analysis of experimental data and derived theoretical constructions leading us to new models. The papers cover almost all the above-mentioned challenges in ecological modeling and they should play an important role in the further development of ecology-related mathematical modeling in Russia.

Received December 22, 2011. Published January 10, 2012.



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