Evaluation of the Research and Professional Activity of the Institutes of the Czech Academy of Sciences (CAS) for the period 2010–2014

Final Report on the Evaluation of the Institute

Name of the Institute: Biology Centre of the CAS, v. v. i.

Fields, in which the Institute registered its teams:

Earth and related environmental sciences

Observer representing the Academy Council of the CAS: Josef Lazar
Observer representing the Institute: Vladimír Košťál, substitute observer Jaroslav Vrba

Commission No. 5: Earth and related environmental sciences
Chair: Prof. Dr. Franz Fiedler

Date(s) of the visit of the Institute: October 30, 2015
Programme of the visit of the Institute: see attached Minutes from the visit

Evaluated research teams:
No. 11 - Hydrochemistry and ecosystem modelling

A. Evaluation of the Institute as a whole

B. Evaluation of the individual teams

Evaluation of the Team No. 11: Hydrochemistry and ecosystem modelling

Report on the Research Team of Hydrochemistry and Ecosystem Modelling, Biology Centre of the CAS

1. **Introduction**. The Research Team of Hydrochemistry and Ecosystem Modelling is embedded into the Institute of Hydrobiology of the Biology Centre of the CAS. It is a rather small team consisting of four research groups (in total 5.9 FTE). The main research mission of the team is to link hydrological and biogeochemical (nutrient) cycles at the catchment and at the ecosystem scales (catchment-lake systems), and to understand the multi-faceted consequences of human activities on these complex cycles. The two senior scientists, J. Hejzlar (head of the team) and J. Kopácek, are internationally well-recognized researchers in the fields of aquatic ecology and biochemistry. The next generation of scientists already performs very well too.

2. **Strengths and Opportunities**. The team (as well as the entire Institute of Hydrobiology and the Biology Centre of the CAS) are well-equipped and very professionally managed. The relatively small research team exhibits a very good performance with respect to income and research output (high-quality research papers, as well as major success in competing for funding, including international funding – in total 1.2 Mill. Euro during the evaluation period). The team published 44 papers in journals with an impact factor; and many of the publications are receiving high international visibility (8 out of the 10 papers assessed during Phase I being rated as excellent). The long-term monitoring of and research programmes on lakes and reservoirs put the team in a key position, both nationally and internationally, considering the importance of long-term data in assessing climate change impacts on ecosystems, the global boom in reservoir development, and the increasing demand for innovative and sustainable reservoir and lake operation and management schemes. However, this unique opportunity is not yet fully exploited (see below). There are several other research activities of the team that are considered very good to excellent (e.g., P-binding in sediments and photochemical transformation of DOM, to list a few examples). The integration of the various research groups is, in general, very good, although there exist major opportunities for improvement (and hence of focus).

3. **Weaknesses and Threats**. As stated in the self-assessment report, a key weakness of the team is an insufficient integration of the various research groups within the team, as well as within the Institute, which hinders the full exploitation of the unique opportunities available. Indeed, considering the small size of the research team, too many topics are covered which leads to the dilution of resources and competences. The long-term research and monitoring programmes of the Institute are at risks due to the lack of solid funding and continuous commitment and support. The number of

doctoral students is comparatively low, as is the number of international (guest) researchers.

4. **Recommendations**. This very good team of distinguished researchers deserves full support in the future. However, a stronger integration into international networks is highly recommended. The long-term monitoring and research programs must be integrated into GLEON (Global Lake Ecological Observatory Network), as well as into LTER (Long-Term Ecological Research) Europe (so far this is not yet the case). This would also means that the long-term data are made openly accessible, considering intellectual property rights and quality standards. The research team should seek to better integrate its hydrological and biogeochemical expertise and also its models at the catchment and at the ecosystem scale. Hence, collaboration with complementary research teams nationally (e.g., at universities and other Institutes of the CAS) and internationally must be strengthened. The integration of empirical, experimental, and modelling approaches should be further strengthened – again through national and international collaboration networks (in particular in respect to modelling competences). The research team must better link its competences and develop a joint, coherent research strategy for the future, with long-term observational programmes at its core. At present, the research programme is primarily driven by the specific interests of the individuals.

5. **Detailed evaluations**.
   a) The publication record of the team is very good, being at an internationally competitive level. Of the 10 papers submitted for evaluation, 4 were in category 1, 4 in category 2 and 2 in category 3. This level must be maintained in the future. Improved integration into international networks would allow the full exploitation of the unique data, which again would lead to research outputs at the top level (e.g., papers in PNAS, Nature Geoscience, etc.). The main long-term research sites (i.e. lakes and reservoirs) need to be integrated into GLEON. This would further increase international visibility, sustain quality management, and consequently secure the long-term sites.
   b) The laboratory and field research infrastructure of the team (and of the Institute and Centre) is very good to excellent. However, the Institute and the Centre should provide full support in developing a sustainable strategy to maintaining the long-term research and monitoring programmes, which are key assets (but see above).
   c) Considering the rather small team, it is recommended to further link the competences and to focus the research activities. A joint research agenda setting, with a clear focus, is required. At the same time, a balanced age structure of the staff needs to be sustained. The participation of more students and post-docs would be desirable.
   d) In a national and international context, the team is very good; however, the team should further strengthen collaborations with scientists/research teams abroad. This could be achieved through EU-funded projects, bi-directional exchange programmes, and the above mentioned integration of the study sites into international networks.

Implementing a more focused research strategy and full integration of the research into international networks (including modelling) would help the team to bring long-lasting prestige to the Czech Republic in environmental research.

Date: December 28, 2015

Commission Chair: Prof. Dr. Franz Fiedler