



14. März 2012

**Stellungnahme zum  
Leibniz-Institut für Gewässerökologie und Binnenfischerei (IGB)  
Berlin**

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## Vorbemerkung

Die Einrichtungen der Forschung und der wissenschaftlichen Infrastruktur, die sich in der Leibniz-Gemeinschaft zusammengeschlossen haben, werden von Bund und Ländern wegen ihrer überregionalen Bedeutung und eines gesamtstaatlichen wissenschaftspolitischen Interesses gemeinsam gefördert. Turnusmäßig, spätestens alle sieben Jahre, überprüfen Bund und Länder, ob die Voraussetzungen für die gemeinsame Förderung einer Leibniz-Einrichtung noch erfüllt sind.<sup>1</sup>

Die wesentliche Grundlage für die Überprüfung in der Gemeinsamen Wissenschaftskonferenz ist regelmäßig eine unabhängige Evaluierung durch den Senat der Leibniz-Gemeinschaft. Die Stellungnahmen des Senats bereitet der Senatsausschuss Evaluierung vor. Für die Bewertung einer Einrichtung setzt der Ausschuss Bewertungsgruppen mit unabhängigen, fachlich einschlägigen Sachverständigen ein.

Vor diesem Hintergrund besuchte eine Bewertungsgruppe am 1. und 2. September 2011 das Leibniz-Institut für Gewässerökologie und Binnenfischerei (IGB) in Berlin. Ihr stand eine vom IGB erstellte Evaluierungsunterlage zur Verfügung. Die wesentlichen Aussagen dieser Unterlage sind in der Darstellung (Anlage A dieser Stellungnahme) zusammengefasst. Die Bewertungsgruppe erstellte im Anschluss an den Besuch den Bewertungsbericht (Anlage B). Das IGB nahm dazu Stellung (Anlage C). Der Senat der Leibniz-Gemeinschaft verabschiedete am 14. März 2012 auf dieser Grundlage die vorliegende Stellungnahme. Der Senat dankt den Mitgliedern der Bewertungsgruppe und des Senatsausschusses Evaluierung für ihre Arbeit.

## 1. Beurteilung und Empfehlungen

Der Senat schließt sich den Beurteilungen und Empfehlungen der Bewertungsgruppe an.

Seinem **Auftrag** gemäß widmet sich das IGB der Erforschung von Gewässer-Ökosystemen und darin ablaufenden biologischen Prozessen sowie der Erarbeitung wissenschaftlicher Grundlagen für die nachhaltige Bewirtschaftung von Binnengewässern. Darüber hinaus erbringt das Institut forschungsbasierte Dienst- und Beratungsleistungen für Politik, Wirtschaft und Öffentlichkeit.

Insgesamt gesehen liegen sehr gute **Arbeitsergebnisse** vor. In den letzten Jahren ist eine deutliche qualitative Steigerung der Publikationsleistung festzustellen. Die vom IGB erbrachten Beratungs- und Serviceleistungen sowie die Ergebnisse des Wissenstransfers und der Öffentlichkeitsarbeit entsprechen aktuellen Bedarfen der Forschung und des Gewässermanagements. Sie sind umfangreich und qualitativ hochwertig.

Nachdem Ende 2007, nach zweieinhalbjähriger Vakanz, ein neuer Direktor sein Amt angetreten hat, trat das IGB in einen notwendigen **Erneuerungsprozess** ein. Dieser erfolgreiche Prozess und die wissenschaftliche Leistungssteigerung sind wesentlich auf die exzellente **Leitung** des Instituts durch den Direktor zurückzuführen. Unterstützt von einer dienstleistungsorientierten **Verwaltung** und von einem engagierten **Wissenschaftlichen Beirat** ist es ihm gelungen, auf der Grundlage eines partizipativen Ansatzes eine sehr positive Dynamik für das IGB in Gang zu setzen. Merkmale des Erneuerungsprozesses sind sinnvolle Strukturreformen, der Aufbau einer

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<sup>1</sup> Ausführungsvereinbarung zum GWK-Abkommen über die gemeinsame Förderung der Mitgliedseinrichtungen der Wissenschaftsgemeinschaft Gottfried Wilhelm Leibniz e.V.

neuen Infrastruktur, die Intensivierung von Kooperationsbeziehungen und eine beachtliche Steigerung der Drittmittel. Das IGB ist auf gutem Weg, sich zu einem weltweit sichtbaren und in Fragen der Gewässerökologie führenden Forschungsinstitut zu entwickeln. Dies gilt nicht zuletzt vor dem Hintergrund, dass Forschungen zu den wissenschaftlichen Grundlagen einer nachhaltigen Aquakultur an Bedeutung gewinnen.

Der Erneuerungsprozess ist noch nicht abgeschlossen. Um in eine Phase der nachhaltigen Sicherung wissenschaftlicher Erfolge eintreten zu können, müssen die infrastrukturellen und technischen Voraussetzungen noch weiter verbessert werden. Die Raumsituation des IGB ist kritisch, sodass bauliche Erweiterungen dringend erforderlich sind. Außerdem ist es nötig, die Ausstattung mit Personalmitteln den gestiegenen Anforderungen anzupassen. Es wird dem Institut empfohlen, seine zusätzlichen Bedarfe zu priorisieren und gemeinsam mit seinem Aufsichtsgremium und den Geldgebern zu prüfen, inwieweit die wichtigsten Vorhaben durch den im Pakt für Forschung und Innovation vorgesehenen Mittelaufwuchs gedeckt werden können. Für darüber hinaus gehende Bedarfe sollen ggf. zusätzliche **Mittel der institutionellen Förderung** vorgesehen werden. Es wird begrüßt, dass das Land Berlin als Zuwendungsgeber noch im Laufe des Jahres 2012 die Verbindlichkeit des Stellenplans aufheben wird.

In den vergangenen Jahren hat das IGB das Volumen seiner kompetitiv eingeworbenen **Drittmittel** in bemerkenswerter Weise gesteigert. Besonders erfolgreich war es dabei hinsichtlich der Einwerbung von EU-Mitteln, was die große europäische Wertschätzung seiner wissenschaftlichen Leistungen unterstreicht. Sein Ziel, kompetitiv vergebene Drittmittel in Höhe von rund einem Drittel seines Kernhaushalts einzuwerben, hat das IGB 2010 erreicht. Diese Aufteilung wird als sinnvoll erachtet. Allerdings sollte sich das Institut bemühen, im Drittmittelbereich den Anteil von Fördermitteln der DFG weiter zu steigern.

Die Ausbildung und Betreuung des **wissenschaftlichen Nachwuchses** ist hervorragend. Dies gilt sowohl für die Promovierenden, deren Anzahl stark gestiegen ist, als auch für das promovierte und sich weiter qualifizierende wissenschaftliche Personal. Bedauerlich ist jedoch, dass es dem IGB bislang nicht gelungen ist, **Frauen in Führungspositionen** zu beschäftigen. Diesbezüglich muss es seine Ziele konsequenter verfolgen.

Auf lokaler, nationaler und internationaler Ebene sind die **Kooperationsbeziehungen** des IGB intensiv und erfolgreich. Sowohl für akademische Institutionen wie die drei Berliner Universitäten und die Universität Potsdam als auch für Behörden und anwendungsorientierte Organisationen ist das IGB ein attraktiver Partner.

Das anspruchsvolle, konsistente und fokussierte Forschungsprogramm des IGB umfasst neben der langfristigen Erhebung, Auswertung und Bereitstellung grundlegender Daten auch hoch relevante Fragen der Grundlagen- und anwendungsorientierten Forschung sowie die Bearbeitung aktueller Themen von gesellschaftspolitischer Relevanz. In dieser Tiefe und Reichweite können die Aufgaben des Instituts nicht an einer Universität erfüllt werden. Eine Eingliederung des IGB an eine Hochschule wird daher nicht empfohlen. Das IGB erfüllt die Anforderungen, die an eine Einrichtung von überregionaler Bedeutung und gesamtstaatlichem wissenschaftspolitischem Interesse zu stellen sind.

## **2. Zur Stellungnahme des IGB**

Der Senat begrüßt, dass das IGB beabsichtigt, die Empfehlungen und Hinweise aus dem Bewertungsbericht bei seiner weiteren Arbeit zu berücksichtigen.

## **3. Förderempfehlung**

Der Senat der Leibniz-Gemeinschaft empfiehlt Bund und Ländern, das IGB als Einrichtung der Forschung und wissenschaftlichen Infrastruktur auf der Grundlage der Ausführungsvereinbarung WGL weiter zu fördern.

## **Annex A: Status Report<sup>1</sup>**

### **Leibniz-Institute of Freshwater Ecology and Inland Fisheries (IGB) Berlin**

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<sup>1</sup> This status report, compiled by the Evaluation Office, has been approved by the institute and the relevant Federal and State departments.

## 1. Development and Funding

The Leibniz-Institute of Freshwater Ecology and Inland Fisheries (Leibniz-Institut für Gewässerökologie und Binnenfischerei, IGB) was founded in 1992. Following a recommendation by the German Science Council (Wissenschaftsrat), three East German institutes were merged to establish the IGB. Two of the institutes previously belonged to the former GDR Academy of Sciences.

After successful evaluation by the Science Council in 1997, the IGB became a member of the Leibniz Association in 2000. In 2005, the IGB was positively evaluated by the Leibniz Association Senate.

The responsible departments at Federal and Länder level are the Federal Ministry of Education and Research and the Berlin Senate Department for Education, Science and Research.

## 2. General Research Concept and Focus Areas

According to the statutes of the IGB, its mission is the generation, dissemination and application of knowledge about freshwater ecosystems and inland fisheries as a basis for their sustainable development and management. The scientists develop innovative tools to meet existing and emerging challenges of freshwater ecosystems in interaction with human societies.

The IGB is the largest freshwater research institute in Germany and is currently experiencing a dynamic phase of transformation. In December 2007, the current director was appointed. During the past few years, a matrix organisational structure has been introduced, the long-term and large-scale experimental research programs have been extended, and several leading positions for scientists (three department heads, seven tenure-track positions) have been filled or are in the process of recruitment. In addition, the IGB has initiated large programs on emerging research issues both at the national and international level.

Within the next five years, the IGB is determined to concentrate on the recently established research activities and directions. At the same time, the IGB strives to continue 1) to support the development of novel and promising research directions; 2) to strengthen co-operation and integration across the disciplinary diversity at IGB, which ranges from environmental physics to evolutionary ecology; and 3) to foster a lively international atmosphere through various networking and exchange programs.

Basic and applied science is advanced in five research departments and the central chemical laboratory. In 2010, the IGB developed a structure of three cross-cutting research domains integrating knowledge across departments. The research domains focus on aquatic biodiversity, aquatic boundaries, and human-freshwater ecosystem interactions. The cross-cutting research domains were initially established for four years (January 2010 - December 2013). Continuation is possible depending on the performance of the domain. The two key goals of the domains are to conceptually advance interdisciplinary research across the institute and to bridge basic science with application.

### Department I: Ecohydrology

The main research aim of Department I is to explore the complex feedback mechanisms between physical, biogeochemical, and ecological processes in coupled ecosystems. According to the IGB, processes supporting the ecosystem's provision of goods and services to society are intimately linked to the spatial and temporal availability of freshwater. Thus, a holistic understanding of coupled freshwater-terrestrial systems provides an essential basis for developing strategies for sustainable water resource management.

An understanding of hydrological and biogeochemical mechanisms in aquatic ecosystems such as lakes, rivers, ground waters and riparian wetlands, linked with their terrestrial environments, is achieved by integrating advanced empirical, experimental and modelling approaches, and by continuing close co-operation with the other IGB departments.

Important projects are, among others, "Heat and Mass Transport in Lakes Covered by Seasonal Ice" (SLICE), "Interactions of Flexible Aquatic Vegetation with Turbulent Flows in Rivers", and "Modelling of Surface-subsurface Water Resources in the Lietzengraben Catchment" (ELaN).

### Department II: Limnology of Shallow Lakes and Lowland Rivers

The Department studies how biotic communities in lowland freshwaters react and adapt to natural and anthropogenic drivers (i.e. climate change, nutrient input, hydromorphological alterations). The scientists focus on the biological structure, ecological function and long-term development of interconnected river-lake ecosystems as well as their terrestrial catchments. Research areas span the biological hierarchy from genes to organisms to ecosystems, and include phytoplankton, macrophytes, periphyton, fungi, zooplankton and benthic invertebrates and the related ecosystem processes incorporating abiotic components.

The Department combines expertise in limnology, hydrobiology, geography, molecular ecology, genomics and modelling. This provides the basis for conducting both basic and applied research and to develop integrative management strategies. The Hydroecological Field Experimental Channel (HEFE) recently established by the Department provides a unique research infrastructure on the River Spree as it facilitates experimental hydrological and ecological studies under in-situ conditions, especially concerning the effect of flow velocity on various key variables of river ecosystems. The newly established "Berlin Center for Genomics in Biodiversity Research" integrates new departmental research expertise in genomics and molecular ecology with bioinformatics expertise and next-generation sequencing facilities.

The Head of Department II retired in July 2011. The IGB is currently seeking a suitable successor.

Important projects are, among others, "Lake at Risk Under Climate Change – Climate Variability Matters" (LakeRisk), "Nitrogen Limitation in Freshwaters" (Nitrolimit), and "Water Bodies in Europe – Integrative Systems to Assess Ecological Status and Recovery" (WISER).

### Department III: Limnology of Stratified Lakes (Stechlinsee site)

The Department, located at Stechlinsee, strives to understand the impacts of global environmental change on freshwater ecosystems and to improve freshwater management by transfer of this knowledge. Emphasis is placed on lakes and inter-relationships within microbial communities, including algae and zooplankton. According to the IGB, this focus is based on the recognition that microbes are essential, yet often neglected, constituents of ecosystems; that they have short generation times, which allow them to rapidly respond to changes in the environment; and that a range of new technologies makes them increasingly amenable to detailed analyses.

The approaches used in the department to improve understanding and management of freshwaters range from long-term observations to field surveys and microcosm, enclosure and whole-lake experiments, which are combined with a variety of analytical methods (including metagenomics) and modelling. The Department is located on the shore of deep and oligotrophic Stechlinsee, which participates in the Global Lake Environmental Observatory Network (GLEON). Since the last evaluation, the Department's facilities have been complemented by a large pilot enclosure facility and a flow cytometer equipped with a single-cell sorter. The IGB estimates that a further funding of € 5 million will be needed within one or two years to implement the complete enclosure facility.

In 2011, a new Head of Department took office, and one member of the Department has taken on the responsibility as coordinator of the cross-cutting research domain "Aquatic Biodiversity".

Important projects include "Climate-driven Changes of Biodiversity of Microbiota" (TemBi), "RNA-expression of Aquatic Communities" (REAL), and "The *Dictyosphaerium*-morphotype of Green Algae – Its Paraphyletic Origin and Variability in Response to Ecosystem Conditions".

### Department IV: Biology and Ecology of Fishes

Researchers at this Department aim to understand the interplay of natural and human-induced ecological factors, and how these factors – whether acting alone or in concert – shape the structure and function of freshwater fish populations. The results bear relevance for both management and conservation of wild fish populations. Hypothesis-driven laboratory and mesocosm experiments, whole-lake manipulations, and comparative field studies are complemented by theoretical studies and fish population modelling.

In response to recommendations from the last evaluation, the IGB has streamlined the departmental research by focusing on the behavioral and evolutionary ecology of fishes, and their consequences for fisheries management. To this end, the institute appointed two senior scientists complementing the departmental expertise: one experimental behavioral ecologist and a theoretical biologist with a strong background in ecology and evolution. The cross-cutting research domain "Human-Freshwater Ecosystem Interactions" is coordinated by a member of Department IV.



Important projects are, among others, “Adaptive Dynamics of Recreational Fisheries“ (ADAPTFISH), “FischFIT-Monitoring – Integrated Microsystems Technology in Waters”, and “The Impact of Climate Variability on Recruitment, Life History, and Physiology of Sympatric Pairs of Ciscoes in Lakes”.

#### Department V: Ecophysiology and Aquaculture

The main research aim of Department V is to understand the mechanisms underlying the impact of multiple environmental stressors on aquatic vertebrates, which affect aquatic organisms, either directly by obvious toxic effects, or indirectly through physiological responses that have less obvious, long-term impacts on development and/or reproduction. The investigated stressors include both natural and anthropogenic compounds such as endocrine disruptors and pharmaceuticals, and environmental factors such as artificial illumination. Information about physiological processes in various environments is used as the scientific basis for sustainable aquaculture development through partial replacement of fish feed constituents by sustainable components, the introduction of new species, stress minimization, and disease prevention and treatment.

The IGB has strengthened this Department by a joint professorship for aquaculture with the Humboldt University Berlin and by a tenure track position for reproductive physiology and experimental aquaculture in 2011. During the past three years, three members of Department V received appointments as professors.

The Department has significantly contributed to the OECD test guideline (No. 231) for detection of (anti)thyroidal compounds. Important projects are, among others, “Aquaponic System for Nearly Emission-free Production of Fish and Tomatoes” (ASTAF-PRO), “Pharmaceutically Active Substances in Aquatic Ecosystems” (PAKT), and a joint IGB-business project on how the quality of rearing water is improved by ultrasound and UV-radiation in closed recirculation systems (ULTRASYS).

#### Central Chemical Laboratory (CL)

At the Central Chemical Laboratory, research and service tasks are tightly interlinked to the benefit of both. This means that the unit conducts research and provides service in equal shares. The main aims are to advance the understanding of biogeochemical transformation processes in aquatic and semi-aquatic boundaries (research), and to develop and adapt laboratory and field analytical methods to meet the multiple requirements of diverse research groups at the IGB (service).

The Chemical Analysis section of the unit is focused on determination of inorganic nutrients, organic carbon, metals and selected organic compounds with ecological significance. The service portfolio includes planning and implementation of monitoring programs for field and laboratory experiments and long term studies in lakes, rivers and wetlands in co-operation with the other IGB departments. Another task is supporting young scientists in the subject of water chemistry within the framework of the IGB’s projects.

The Biogeochemistry section of the unit concentrates on aquatic and semi-aquatic boundaries as “hot spots” concerning matter transformation of carbon (C), nitrogen (N) and phosphorus (P). These boundaries are often characterized by steep temporal or spatial changes of redox conditions dominating carbon and nutrient fluxes in semiaquatic and aquatic ecosystems. They control carbon or phosphorus sequestration or release on a landscape scale. Such boundaries include fens, temporary aquatic systems or sediment-water interfaces. A better understanding of these processes is critical to the development of effective lake and peatland restoration.

Important projects are, among others, “Impact of Macrozoobenthos on the Matter Transport and Biogeochemical Processes in Lake Sediments”, “Mediterranean Intermittent River ManAGEMENT” (MIRAGE), and “Nutrient Retention in Natural and Restored Fens”.

A member of the CL coordinates the cross-cutting research domain “Aquatic Boundaries and Linkages”.

#### Cross-cutting Research Domain I: Aquatic Biodiversity

The primary aims of the cross-cutting Research Domain are 1) to assess biodiversity at different spatial and temporal scales, 2) to understand the environmental factors determining biodiversity and population structure, and 3) to improve the understanding of the underlying mechanisms controlling the coupling of biodiversity and ecosystem functioning.

The Research Domain integrates the wide variety of biodiversity research at the IGB into a common framework, primarily by linking biodiversity assessment and conservation research with studies on its role in ecosystem functioning. The overall aim is to provide the scientific basis for sustainable freshwater ecosystem management. The research on aquatic biodiversity uses predictive models and thus provides stakeholders, economists and politicians with the tools required to evaluate the consequences of biodiversity change. To achieve these goals, the scientists conduct empirical field studies and develop experimental approaches (e.g. in large-scale mesocosms). They document and evaluate long-term changes in aquatic biodiversity based on existing and currently extended long-term time series of IGB-run environmental observatories (e.g. in Lake Stechlinsee, Lake Müggelsee, and River Spree). The ultimate goal is to develop and improve the forecasting capability by integrating current and future knowledge of aquatic biodiversity, thus providing stakeholders, economists and politicians with a tool to evaluate the consequences of future changes in biodiversity.

Important projects include “Biodiversity of Freshwater Ecosystems” (BioFresh), TemBi (also see Dept. III), and “Genomics of *Stentor* and its Endosymbionts”.

#### Cross-cutting Research Domain II: Aquatic Boundaries and Linkages

The main aim of the cross-cutting Research Domain is to identify the underlying mechanisms that control the stability of aquatic ecosystems and their function for the matter cycle in the

landscape. The identification of aquatic boundaries and the quantification of their transformation capacity form the basis for the determination of critical loads and thresholds for regime shifts, the prediction of long-term development under rapid environmental changes, and the development of sustainable management strategies.

Large-scale field experiments, field and laboratory process studies, as well as modelling, aim to develop unifying and scale-independent conceptual models of the functioning of aquatic boundaries. The scientists investigate both the interactions among different boundaries and the impact of water level fluctuations and climate alteration on boundaries. The focus is on five freshwater boundaries: groundwater/surface water, sediment/water, pelagic redox zones, lake littoral/terrestrial surrounding area, and riparian wetlands such as fens and floodplains.

Important projects are, among others, "Restoration strategy for Lake Arendsee", "Influence of internal waves on the microbial community and geochemical processes in sediments" (Seiches), and "Lake Stabilisation by Aquatic-Terrestrial Coupling under Global Change Scenarios" (Terralac).

### Cross-cutting Research Domain III: Human-Freshwater Ecosystem Interactions

In this cross-cutting Research Domain, human dominated aquatic ecosystems are studied using inter- and trans-disciplinary research approaches to identify impacts, effects, and feedback mechanisms, both direct and indirect, which are inherent and characteristic for social-ecological aquatic systems and adjacent terrestrial areas. The results are sought to facilitate the comprehension, management, and improvement of the ecological potential of freshwaters, and allow the identification of key feedbacks between ecological and human systems. They thus provide the scientific basis for an integrative management of aquatic ecosystems.

Important projects are, among others, "Protection of Aquatic Biodiversity Based on Fish Stocking Practices" (Besatzfisch), "Sturgeon Restoration", and "Developing an Integrated Model to Predict Abiotic Habitat Conditions and Biota of Rivers for Application in Climate Change Research and Water Management" (IMPACT).

### Future development

The IGB has taken measures of activity to further its development within the next five years.

First, the IGB aims to promote innovative research by 1) extending its institutional seed-grant program to support promising research ideas, 2) expanding and exploiting its unique infrastructure for carrying out large-scale experiments in the field and laboratory, 3) raising the application rate for DFG grants, and 4) attracting internationally leading and promising young scientists through several fellowship programs.

Second, to support the integration of research across disciplinary boundaries, the IGB plans to 1) establish research clusters on topics that address emerging issues in freshwater science and application (to be primarily led by the cross-cutting research domains), 2) fill open research positions, preferably at the intersection of disciplines, 3) establish research positions jointly with

partner institutions in the Berlin-Brandenburg area, and 4) build partnerships with research institutions that offer complementary expertise.

Third, to strengthen international co-operation, the IGB aspires to 1) lead the establishment of a European Large Rivers research network, 2) organize international workshops and conferences, 3) encourage and promote IGB scientists to spend short research stays and sabbaticals at internationally leading institutions, and 4) support excellent PhD candidates to spend part of their graduate program at laboratories in other countries. To this end, IGB is an associate partner in the "SMART" Erasmus Mundus Joint Doctoral Program (EU-funded).

### 3. Cooperation

Research cooperation: The IGB cooperates with over 36 universities and research institutions worldwide. IGB scientists have published during the past three years more than five joint publications with 26 different institutions, 18 of them abroad.

Seven IGB scientists hold joint professorships (full, associate or junior level) at one of the three universities in Berlin. The first joint appointment with the University of Potsdam has recently been approved. Cooperation with these universities is achieved through common research projects and joint applications for third-party funds, as well as through teaching and supervision of students.

The IGB coordinates (Loss of the Night) and co-leads (NITROLIMIT) large projects funded by the BMBF with partner institutions at the national level. Additionally, the IGB receives funding through the "Leibniz Joint Initiative for Research and Innovation" for eight projects jointly conducted with other research institutions (for four projects as lead institute).

At the European level, the IGB has been highly successful in securing EU funding. The institute coordinates two large integrative projects, among them the largest EU project dedicated to freshwater biodiversity ("BioFresh"), and it serves as a workpackage-leader for five additional projects.

Research visits: The number of research visits, including those of sabbatical visitors and fellows supported through various foundations and sources, has increased in recent years. Between 2008 and 2010, 86 scientists from 32 countries spent more than four weeks at the IGB, and 54 of them stayed for more than three months. While most guests received external funding (e.g. DAAD, AvH), the IGB fellowship program has supported 14 guests since 2009. 17 IGB scientists have each spent more than four weeks as academic visitors at foreign universities or research institutions. This number does not take into account field research conducted abroad.

### 4. Results of Work

Publications: Since the last evaluation, the IGB has increased its publication record in international peer-reviewed journals, particularly in high-ranked scientific journals (IF>3). While the total number of scientific articles has remained at approximately 300 per year, the number of peer-reviewed articles has increased by 64%, and the number of publications in high-impact journals has more than doubled (for more detailed information refer to Appendix 2).

According to the IGB, this increase in quality and quantity is ascribed to 1) institutional measures taken for quality assurance, 2) the successful recruitment of internationally renowned scientists, 3) increased focus on cutting-edge research topics, 4) increased success in acquiring competitive research grants, and 5) the implementation of an institutional bonus program with publications as the major performance indicator.

In addition to publications, invitations to present at international conferences, to serve on editorial boards, and to contribute conceptual articles to journals have concurrently increased.

Consulting: In addition to their engagement in research and teaching, IGB scientists advise science foundations by evaluating scientific proposals. They provide consultation services to public authorities, research institutes, and public and private associations. At the international level, the IGB provides expert advice to the European Commission, the International Association of Hydrological Sciences, OECD, FAO, UNESCO and DIVERSITAS, among others. Business consulting relates to fish health and welfare, for example of manufacturers of aquaculture products.

Knowledge Transfer and Communication: The IGB is strongly concerned with the transfer of knowledge to the public. To increase the acceptance of and respect for the work of the IGB, publicly visible activities, such as field work and restoration, are presented for different target groups. For example, the IGB has established partnerships with professional fishermen and anglers to minimize mortalities in sturgeon by-catch. The institute has professionalized its information material by editing new print products, revising its corporate design, and relaunching its institutional and project websites.

The IGB attracts media attention with its projects and scientists (print, radio, TV). Presence of the IGB in national and international radio and TV broadcasts in particular has increased since the last evaluation.

IGB scientists are involved in research projects with patent potential. Aquaculture projects are particularly suitable for technology transfer. For example, the IGB scientists assess how sensor implants monitor fish stress and health status, how water rearing can be improved by ultrasound and UV-radiation, and how nutrient fluxes can be modelled. A new sustainable aquaponic system has led to a European wide patent.

During the reporting period, 2008-2010 IGB scientists organized 13 conferences or workshops with more than 50 participants, and 28 smaller conferences or workshops.

## **5. Promotion of Junior Academics and Non-Academic Staff**

The promotion of future generations of freshwater ecologists has a high priority at the IGB and is achieved by two major activities. In its efforts to support scientists during the early phases of their career, the IGB has established a structured PhD training program and an international fellowship program.

Graduate level: In 2009, the IGB started its graduate education and training program. The program is designed to improve professional as well as scientific skills. As an element of the program, the IGB supports the participants by giving individual advice (e.g. on experimental design or statistical analyses), which supplements the candidates' scientific supervisors' contribution. In

April 2011, the institute submitted a proposal for an International Leibniz Graduate School on “Aquatic Boundaries and Linkages in a Changing Environment”.

Since 2009, the IGB offers between two and four fellowships per year for PhD students, post-docs or senior scientists for a stay of six months up to two years each. The fellows carry out their own independent research agenda hosted by and in close collaboration with IGB scientists.

Through a joint professorship with the Freie Universität, the IGB participates in the EU Erasmus Mundus Joint Doctoral Program “Science for the Management of Rivers and their Tidal Systems” (SMART).

Between 2008 and 2010, 23 PhD candidates, 55 Master/Diploma candidates, and 25 Bachelor candidates successfully completed their studies at the IGB in cooperation with degree-granting institutions. At present (December 2010), 64 PhD candidates from 14 countries and 23 students work at the IGB. About one quarter of the PhD candidates are from foreign countries. The average duration of a PhD dissertation is 4.2 years.

Post-doctoral level: Since the last evaluation, two Junior Professorships have been positively evaluated and extended. Both scientists have also been offered tenured faculty positions abroad. Furthermore, three scientists have been promoted by Habilitation (post doctoral research and lecture qualification in the German university system). The IGB intends to increase its efforts to attract post-doctoral scientists through established international fellowship programs (e.g. Marie-Curie, DAAD, AvH).

Vocational training of non-academic staff: In 2010 the IGB offered three positions for apprentices. The institute aims at enhancing the number of apprenticeship positions to seven by 2014.

## 6. Institution, Management, and Structure

Together with seven other Leibniz institutes in Berlin, the IGB forms the Forschungsverbund Berlin e.V., which is an incorporated society (eingetragener Verein). The Association acts as the legal entity and provides administrative services. Its supervisory body is the Board of Trustees (Kuratorium).

Ten leading international scientists covering the core research domains of the IGB form the Scientific Advisory Board (Wissenschaftlicher Beirat) of the IGB.

According to the statutes of the Berlin Research Association, the institute is co-operatively led by the director (scientific management) and the managing director of the association (administrative management). The Director of the IGB is appointed for a period of five years by the Board of Trustees on recommendation of the Scientific Advisory Board. Re-appointment is possible. The current director has led the institute since December 2007.

With respect to its matrix structure, the IGB has both a management structure for its discipline-oriented research departments (five departments and one central chemical laboratory) and the three cross-cutting research domains (refer to Appendix 1). The Department Heads have been jointly appointed with one of the three Berlin universities where they hold professorship. The newly established cross-cutting research domains are each led by a Scientific Coordinator. Both departments and cross-cutting research domains receive secure block funding, and competitive funding, according to the performance of the specific unit.

The IGB uses several quality indicators for its internal quality management: The publication of results in peer-reviewed journals is encouraged at the IGB, as it serves as an instrument of quality control. Moreover, the IGB regards the participation in scientific conferences and successful applications for competitive research grants as additional evaluation instruments.

A performance-based resource allocation (Kosten-Leistungsrechnung) was implemented in 2002 using several of these indicators to calculate the budgets of the research units. The quality management for laboratory analyses and the application of field probes is provided through regular calibration of methods and sensors and, additionally, by internal and external reference analyses.

Quality assessment of the IGB's work is also carried out by the Scientific Advisory Board on an annual basis. An ombudsperson is responsible for safeguarding good scientific practice in accordance with recommendations of DFG guidelines.

## **7. Financial Resources and the Use thereof**

Budget: During the reporting period, the average annual total budget of the IGB was approximately 14.9 Mio €. The financial support of the IGB by the Federal and Länder Governments within this budget amounted to an average of 10.3 Mio € per year. Part of it was obtained through a competitive allocation process within the Leibniz-Association. In addition, the IGB obtains third-party funds of 3 to 5.3 Mio € annually (which means that third-party funding has been doubled since the last evaluation). Third-party funds received in the period from 2008-2010 came from Federal and Länder Governments, the German Research Foundation (DFG), and the European Union. Further funds were received from industry, foundations, and other miscellaneous funding sources. Please refer to Appendix 3 for more detailed information.

According to the IGB, its recent success has led to a lack of adequate space and of basic resources for investments, maintenance and running costs. It also entails a need for additional administrative staff, as well as for an advanced computational infrastructure to remain at the forefront of freshwater research. Based on the DFG standards for running costs (e.g. heating, electricity, general maintenance) and basic consumables, the IGB estimates a lack of 400,000 € annually.

Research departments and cross-cutting research domains receive block funding of 40% based on the number of institution-funded scientists. The remaining 60% of the allocation of the institutional resources is based on the overall performance of the research units.

Facilities: The IGB has three laboratory and office buildings. While two of them are located in Berlin (on the shore of Müggelsee), one is situated in Neuglobsow, 70 km north of Berlin (on the shore of Stechlinsee). In 2004, the IGB built a new aquarium hall at the Berlin site.

At the Neuglobsow site, the newly renovated guest house comprises 15 guest rooms for visiting scientists and PhD students.

Due to the considerable growth of the institute since the 1990s, the IGB has identified the requirement of an additional 830 m<sup>2</sup> of space at the Berlin site. Transitionally, one research group is currently housed in additional rented office space at Berlin-Adlershof (45 min by public transport from Lake Müggelsee). As far as its infrastructure is concerned, according to the IGB it

generally faces a mismatch between the required and received financial resources for covering costs for maintenance and basic consumables.

Technical Equipment: The IGB continuously extends and updates its laboratory facilities to meet international standards in molecular, microbial, biogeochemical, and ecological research. The institute also improves its in-situ techniques (opto-loggers, multi-parameter probes, distributed temperature sensing) for continuous recording of physical and chemical variables at high spatio-temporal resolution. Among the latest investments for field research are a 3D-telemetry system, an infrared camera, an unmanned helicopter (with Freie Universität Berlin) and a Next Generation Sequencer (with Freie Universität Berlin). In early 2011, a new research vessel designed for sampling and research in large rivers was commissioned.

Experimental Facilities: The IGB has established large experimental infrastructure partly financed through additional support by the Federal Ministry of Education and Research. In eutrophic Lake Dagow and oligotrophic Lake Stechlin, the IGB has set up large enclosures to study the effects of global change on food webs and ecosystem processes. The IGB has divided whole lakes for the study of the diversity and activity of bacteria.

Since 2010, a HydroEcological Field Experimental Channel along the River Spree has allowed the institute to study the consequences of hydrologic and hydraulic alterations on ecosystem processes and biodiversity under field conditions.

At its headquarters at Müggelsee, a new aquarium hall, outdoor ponds, a new aquaponic hall and mesocosm halls are mainly used for aquaculture research, experimental behavioural studies and for studying the effects of multiple stressors on aquatic organisms.

A novel 3D-telemetry system (2010) on Lake Kleiner Döln allows the simultaneous positioning of up to 150,000 fish simultaneously for in-situ behavioural studies.

Long-term monitoring of several lakes, rivers and wetlands is conducted by the IGB and partly integrated into a global monitoring network.

## **8. Personnel**

Personnel: At the end of 2010, the IGB employed 200 persons, corresponding to 159.5 fulltime equivalents. This means that the institute has grown considerably since the last evaluation. During the last six years, the number of fulltime equivalents increased by 30%. The institute and its Scientific Advisory Board have agreed on the number of 220 employees as an upper limit of growth (see also Appendix 4).

The staff is comprised of 81 scientists, 42 PhD candidates and 77 non-academic staff. Presently, 64% of the scientific staff is employed in non-permanent positions. The IGB strives to keep the share of non-permanent contracts above 50% to allow high flexibility for research management (see also Appendix 5).

In terms of personnel management, the IGB sets an immediate priority on the appointment of a new Head of Department II. In addition, the IGB intends to establish six new group leader positions within the next five years. Four of these positions are currently held by persons retiring within this time period.

The IGB has identified a critical need for skilled technical staff. In order to support new research fields, analyses, and maintenance of large-scale experimental infrastructure, the IGB



has projected the need to hire five technicians within the next three years. The IGB also expresses the need for three additional administrative staff (IT, human resource management, and general administration). While the number of scientific staff has almost doubled since 1992, the administrative staff (7 FTE) has remained constant during this period.

Gender equality: The proportion of female scientists is 33 percent. About 21 percent of the group and project leaders are female scientists and 50 percent of the leading positions in management and laboratories are held by women. All heads of department, however, are men.

The IGB is trying to increase the proportion of female scientists in leadership positions. Thus, the IGB has designed measures for gender mainstreaming, such as additional financial support for female doctoral students and post-docs or career development of young parents.

## 9. Recommendations of the Last Evaluation

The IGB responded to the recommendations stated in the evaluation report of 2005 (highlighted in italics) as follows:

*Appointment of director*: As recommended, a new director was selected and took up the position in December 2007. He was also appointed as a professor of Aquatic Ecology at Freie Universität Berlin.

*Focused, coherent research program*: As recommended, the institute restructured its research program in 2008 by establishing cross-cutting research domains and focusing on large, problem-oriented research projects. In addition, a Research Funding Committee was established at IGB to assess the suitability and coherence of research proposals intended for submission for external funding.

*Identification of inter-disciplinary topics linked to departments*: In 2010, a matrix structure was implemented linking three cross-cutting research domains to five research departments and the central chemical laboratory. The IGB also maintains several large-scale experimental and advanced laboratory facilities as well as smaller projects where interdisciplinary research is realised. In addition, the IGB has improved its cooperations with complementary research institutions in the region.

*Focused research goals for Department I / Modernisation and integration of numerical models*: The research goals of Department I have been revised and they are focussed on understanding the hydrological and biogeochemical fluxes in aquatic ecosystems, especially the exchange of mass and matter between lakes, rivers, ground water and riparian wetlands, and on elucidating the complex feedback mechanisms between physical, biogeochemical, and ecological processes. The Department claims to use state-of-the-art numerical models (e.g. FEFLOW, MODFLOW, SUTRA, PHT3D for modelling subsurface hydrology and reactive solute transport; ArcEGMO, ASM and MODFLOW for simulation of large-scale hydrologic processes; and POM and ROMS for modelling flow and transport in lakes).

*Development of a modelling concept for the institute*: The modelling concept used at IGB is characterised by a close cooperation between modellers and empiricists. Four new tenure track positions supplement the existent modelling expertise at the IGB. The IGB claims that the new combined expertise strengthens interdisciplinary approaches, leading to IGB-specific models,

inter alia for ecohydrology, matter fluxes, and evolutionary biological development of populations. However, from the point of view of the IGB, a single overarching modelling approach is not desirable because model choice is conditioned by permanent developments in specific subject areas.

*Offer modelling courses:* New graduate training programs have been established comprising modelling courses. In addition, graduate and post-graduate supervision grants individual advice on study design and modelling.

*Intensify public relations to improve visibility:* The IGB employs a full-time public relations officer (since 2009), relaunched its website and organises science-policy events (e.g. Dialogue on Müggelsee, Science-meets-Parlament events). Yet, according to the IGB, the visibility of IGB has greatly increased as a consequence of the improved scientific performance. Through publications, projects, scholarly networks, activities as editors and organizers of conferences, IGB researchers have become more visible, as demonstrated by the increasing number of invitations as speakers at international and national conferences.

*Clearer distinction of research profiles for fish departments:* The departments were restructured in 2008 to define distinct and complementary research profiles. Department V has been renamed as "Ecophysiology and Aquaculture".

*Extension of international cooperation:* Since the last evaluation, the number of international partner institutions that share more than five publications each with IGB scientists has increased from 3 to 18. Research collaboration at the European level has been strengthened through an increasing number of EU-funded projects. The number of foreign scientists working at the IGB has doubled since 2004. At the same time, a growing number of international scientists visit the IGB.

*Increase third-party funding / Improve publication performance in high-ranking refereed journals:* Funding through the DFG and the EU has increased by 105% and 195%, respectively, since the last evaluation. The IGB was particularly successful in raising funds for large, integrative research projects. The number of peer-reviewed articles has increased by 64% since the last reporting period, and the number of high-impact publications has more than doubled.

*Strengthen scientific advisory board with expertise of active scientists:* Four active scientists from leading international institutions have replaced retiring members on the board.

*Funding bodies were asked to financially support investment in technical infrastructure:* The funding bodies have supported the IGB in acquiring new infrastructure. Of particular importance has been the purchase of key high-tech equipment for both laboratory and field studies. However, according to the IGB, there is still a mismatch between the required and the received resources for investments, maintenance and consumables.

*Widen access to electronic publications:* The library service has improved since the last evaluation. All employees have access to more than 4000 electronic journals.

*Develop further criteria performance-related funding program (leistungsbezogene Mittelvergabe):* The IGB has added new criteria to assess the performance of individual research units as part of its performance-related funding program. As a reward instrument, the IGB implemented a funding system in 2008 that returns 50% of the overhead of DFG and EU grants to the successful scientists to support their research activities.

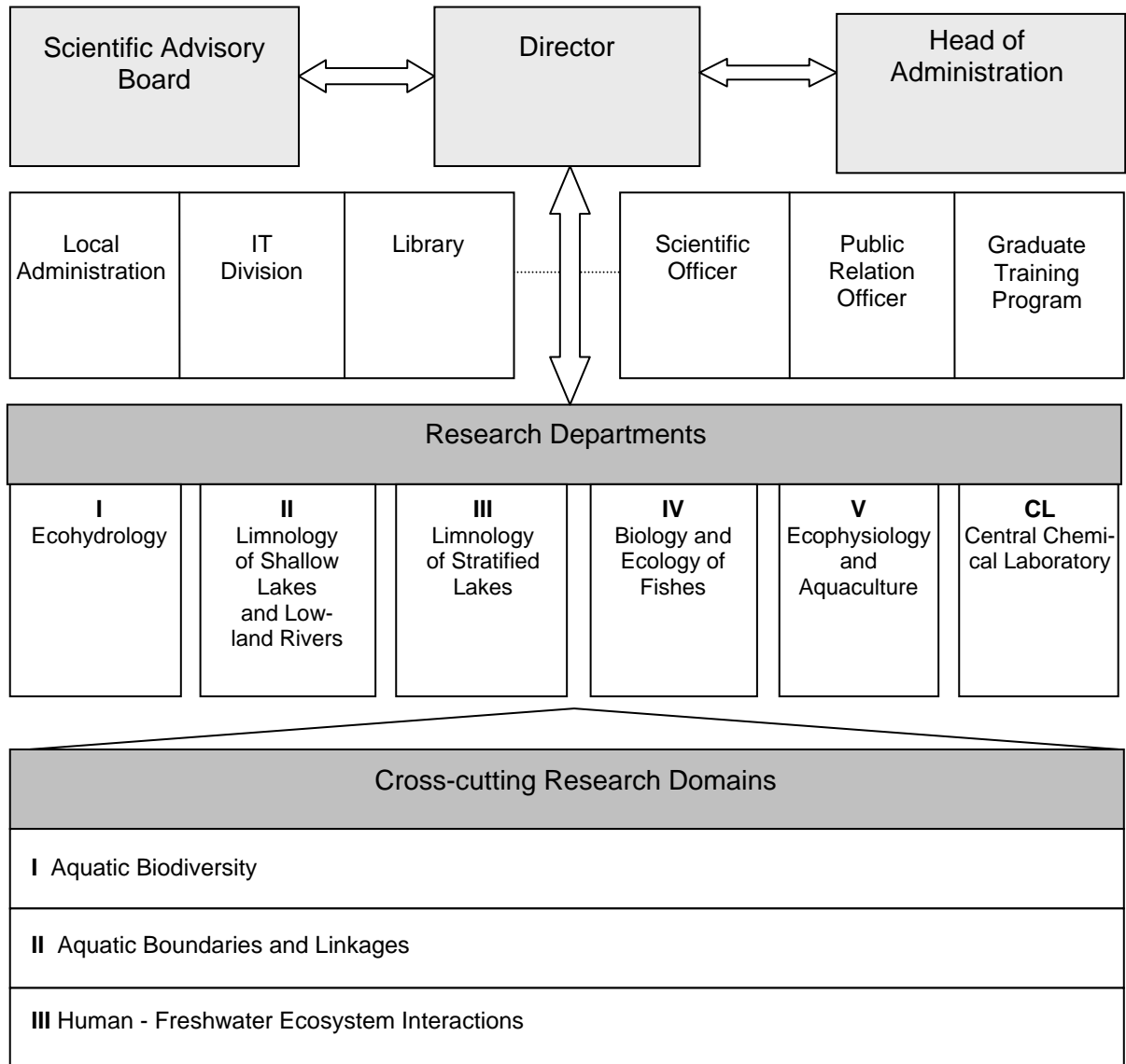
*Support young scientists in career planning:* In 2009, the IGB established both a graduate training program and an international fellowship program to attract young scientists, mainly at the

postdoctoral level. In addition, department heads invite their staff for appraisal interviews once a year. The development of individual career plans is part of the talk.

*Promotion of women in leading scientific positions:* At present, 20.6% of the group and project leaders are female scientists. Half of the positions with responsibility for personnel (management positions) or interdepartmental tasks are women. However, departments and domains are exclusively headed by male scientists.

**Appendix 1**

**Organisation Chart**



## Appendix 2

### Publications and Patents

	Time period		
	2008	2009	2010
<b>Total number of publications</b>	<b>315</b>	<b>304</b>	<b>264</b>
Monographs	3	1	2
Individual contributions to collected editions and serials	44	21	16
Articles in peer reviewed journals	131	133	159
Articles in other journals	79	95	57
Working and discussion papers	48	49	25
Editorialship (monographs, collected works)	10	5	5
"Total number of publications" per FTE in "Research and scientific service (without doctoral candidates)"	4.8	4.4	3.7
Number of "Articles in peer reviewed publications" per FTE in "Research and scientific service (without doctoral candidates)"	2.0	1.9	2.3

<b>Industrial property and similar rights (in the past 3 years, until 2010)</b>	granted	applied for
Patents	19	41
Other protection rights	1	1
Agreements relating to commercialisation of results / licences	0	

## Appendix 3

### Revenue and Expenditure (in € 1,000)

Revenues (spent in budget year)		2008			2009			2010		
		T€	% <sup>2)</sup>	% <sup>3)</sup>	T€	% <sup>2)</sup>	% <sup>3)</sup>	T€	% <sup>2)</sup>	% <sup>3)</sup>
<b>Revenues (total sum I., II. and III.; without contribution to DFG)</b>		13,527			15,193			16,053		
<b>I.</b>	<b>Revenues (sum I.1., I.2. und I.3)</b>	13,212.10	100.0		14,642.10	100.0		15,494.70	100.0	
1.	<u>Institutional funding (except for construction work and real estate)</u>	10,176.10	77.0		10,490.10	71.6		10,179.00	65.7	
1.1	Joint institutional funding by Federal Government and Federal States on the basis of the implementation agreement for Leibniz-institutions (AV-WGL) (except for construction work and real estate)	9554.0			10167.5			9625.0		
1.1.1	<i>Amount thereof obtained in competitive allocation processes ("SAW-Verfahren")</i>	622.1			322.6			554.0		
1.2	Institutional funding other than 1.1 (except for construction work and real estate)									
2.	<u>Third-party funding for research promotion</u>	<b>3036.0</b>	<b>23.0</b>	<b>100.0</b>	<b>4152.0</b>	<b>28.4</b>	<b>100.0</b>	<b>5315.7</b>	<b>34.3</b>	<b>100.0</b>
2.1	German Research Foundation (DFG)	462.4		15.2	644.1		15.5	757.0		14.2
2.2	Federal Government, Federal State(s) (Bund, Land/Länder)	1939.9		63.9	1943.1		46.8	3952.8		74.4
2.3	EU project funds	64.7		2.1	1010.0		24.3	299.8		5.6
2.4	Business and industry (if applicable, please specify according to source of funding)	157.6		5.2	25.4		0.6	6.7		0.1
2.5	Foundations (if applicable, please specify according to source of funding)	6.0		0.2	28.6		0.7	30.9		0.6
2.6	Other project funding (if applicable, please specify according to source of funding)	405.4		13.4	500.8		12.1	268.5		5.1
3.	<u>Income from service and commercialisation of results</u>									
3.1	Scientific service									
3.2	Scientific consulting									
3.3	Commissions									
3.4	Publications									
3.5	Commercialisation of results based on intellectual property rights, e.g. patents									
3.6	Commercialisation of results (other than 3.5)									
3.6	<i>If applicable, please specify other income from service</i>									
<b>II.</b>	<b>Other income (e.g. membership fees, donations, rental fees, withdrawals from reserves)</b>	<b>315.3</b>			<b>550.7</b>			<b>558.3</b>		
<b>III.</b>	<b>Revenues for construction work (institutional funding by Federal Government and Federal States, EU structural funds)</b>									
<b>Expenditure (spent in budget year)</b>		<b>T€</b>			<b>T€</b>			<b>T€</b>		
<b>Expenditure (without contribution to DFG)</b>		<b>13915.8</b>			<b>14334.4</b>			<b>15523.6</b>		
1.	Personnel			8040.8			8765.9			9627.7
2.	Costs for materials			3126.8			3362.5			4029.0
2.1	<i>Amount thereof paid for process costs to obtain intellectual property rights (patents)</i>									
3.	Investment for equipment and procurement			1736.5			1377.9			1112.2
4.	Construction work, real estate			593.4			406.4			102.6
5.	Allocation to reserves ("Rücklagen")			418.3			421.7			652.1
6.	Other									
Contribution to DFG (if paid for the institution – 2,5 per cent of the revenues from institutional funding)				247,9			254,6			261,0
1) Preliminary data: yes / no										
2) Figures I.1, I.2 and I.3 add up to 100 per cent. The issue here is the proportion (in %) of "Institutional funding (except for construction work and real estate)", "Third-party funding for research promotion" and "Income from service and commercialisation of results".										
3) Figures I.2.1 to I.2.6 add up to 100 per cent. The issue here is the proportion (in %) of the different third-party funding sources for research promotion.										

## Appendix 4

## Employees Funding

– as of reference day 31.12.2010 –

	FULL TIME EQUIVALENTS			PERSONS
	Total number	Financed from third-party funding		Total no. of persons
	171.87	58.45	34	230
	Number (100%)	Number	%	Number
<b>Research and scientific service</b>	<b>102.24</b>	<b>52.18</b>	<b>51.04</b>	<b>147</b>
Professors / directors (C4, W3 and similar)	3	0	0	3
Professors / directors (C3, W2, A16 and similar)	1	0	0	1
Scientists in leading position (A15, A16, E15 and similar)	6.5	0	0	7
Heads of junior research groups/ Junior professors/ "Habilitanden" (C1, W1, A14, E14 and similar)	2	0.51	25.50	2
Scientists without leading position (A13, A14, E13, E14 and similar)	61.46	33.39	54.33	68
Doctoral candidates (A13, E13, E13/2 and similar)	21.04	14	66.54	42
Student and graduate research assistant	7.24	4.28	59.12	24
<b>Supporting service</b>	<b>54.21</b>	<b>6.27</b>	<b>11.60</b>	<b>65</b>
Laboratory (E9 to E12, upper grade of the civil service)	15.02	0.5	3.33	18
Laboratory (E5 to E8, middle grade)	23.07	4.27	18.51	28
Animal care (E5 to E8, middle grade )	1	0	0	1
Workshops (E5 to E8, middle grade)	5	0	0	5
Library (from E13, higher grade)	0	0	0	0
Library (E9 to E12, upper grade)	1.5	0	0	2
Library (E5 to E8, middle grade)	0	0	0	0
Information technology (E9 to E12, upper grade)	2.35	0	0	3
Secretary of the Department	6.27	1.5	23.92	8
Technology (large scientific equipment, service)	0	0	0,00	0
<b>Administration</b>	<b>12.42</b>			<b>15</b>
Head of Administration	0.5	0	0	1
Staff (from E13, higher grade)	1	0	0	1
Staff (E9 to E12, middle grade)	1.5	0	0	2
Inhouse management (budget, human resources and similar) (from E13, higher grade)	0	0	0	0
Inhouse management (budget, human resources and similar) (E9 bis E12, upper grade)	5.5	0	0	6
Maintenance	3.92	0	0	5
<b>Vocational trainees</b>	<b>3</b>			<b>3</b>
<b>Scholarship holders</b>	<b>13.5</b>	<b>10.5</b>	<b>77.77</b>	<b>19</b>
Doctoral candidates	5.5	5.5	100	11
Postdocs	8	5	62.50	8

**Appendix 5**

**Temporary Employments and Proportion of Women <sup>1)</sup>**

– In persons and as full-time equivalents (FTE); financed by basic institutional and third-party funding; as of reference day 31.12.2010 –

	Total no. of persons		Persons with limited employment contracts		Total no. of persons	Women		Total number of women	Women with limited employment contracts	
	Number (100%)	Number	%	Number		%	Number		%	
<b>Research and scientific service</b>	<b>123</b>	<b>95</b>	<b>77.2</b>	<b>123</b>	<b>50</b>	<b>40.6</b>	<b>50</b>	<b>45</b>	<b>90</b>	
Professors / directors (C4, W3 and similar)	3	0	0	3	0	0	0	0	0	
Professors / directors (C3, W2, A16 and similar)	1	0	0	1	0	0	0	0	0	
Scientists in leading position (A15, A16, E15 and similar)	7	1	14.3	7	1	14.3	1	0	0	
Heads of junior research groups/ Junior professors/ "Habilitationen" (C1, W1, A14, E14 and similar)	2	2	100	2	1	50.0	1	1	100	
Scientists without leading position (A13, A14, E13, E14 and similar)	68	50	73.5	68	25	36.8	25	21	84	
Doctoral candidates (A13, E13, E13/2 and similar)	42	42	100	42	23	54.8	23	23	100	
<b>Scholarship holders</b>				<b>19</b>	<b>9</b>	<b>47.4</b>				
Doctoral candidates				11	6	54.5				
Postdocs				8	3	37.5				

<sup>1)</sup> Employment acc. to BAT, TVöD or classification according to other pay and wage tariff schemes (e. g. for medical staff) for persons who are financed from institution resources (incl. vocational trainees and visiting scientists, provided they are paid from basic institutional funding or from third-party funding, etc., but not incl. internships (0), diploma students (16), ancillary staff (12), scientists without payment (7), PhD students without payment (3), and persons under other contracts for works and services (1)). In the case of joint appointments, persons whose salaries are reimbursed proportionately by the institute.



## **Annex B: Evaluation Report**

**Leibniz Institute of Freshwater Ecology and Inland Fisheries  
Leibniz-Institut für Gewässerökologie und Binnenfischerei  
IGB, Berlin**

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Appendix:

Review Panel, Guests and Co-operation Partners

## 1. Summary: Evaluation and Significance of the Institute, Main Recommendations

The Institute of Freshwater Ecology and Inland Fisheries (IGB) carries out research on freshwater ecosystems and their biological processes, and also develops scientific bases for the sustainable management of inland waters. In addition, the Institute carries out research-based services and consultation in the areas of policy, economy and the public sector.

The IGB is currently undergoing a notable process of renewal. The Institute's new director took office in December 2007, following a two and a half year vacancy caused by the non-renewal of the previous director's contract in mid-2005. This new appointment marked the beginning of a very dynamic and constructive phase, which was characterised not only by a considerable increase in scientific performance but also by a meaningful reform of structures, the development of a new infrastructure, intensified co-operation and a significant increase in external funds. As such, the IGB has become increasingly attractive to scientists, including those at the threshold of their careers. The Institute was also able to recruit outstanding scientists for open management positions. The IGB's potential to become a research institute with global visibility in the area of freshwater ecology has significantly increased during the course of this renewal process, which has proved to be extremely successful. In this process of renewal, the director was, and is, strongly supported by the employees and the advisory board, as well as by the funding bodies.

However, this gratifying, as well as necessary, process is not yet complete. In order to adjust to its new, respectively expanded tasks before entering into a phase of consolidation, the Institute must further improve its status concerning personnel, infrastructure and technology. Priorities should be clearly indicated and reflected in the financial planning submitted to the supervisory and funding bodies. Recommendations will be given in detail regarding this.

Overall, the Institute can attest to very good work results; in some areas the results are rated as merely good, in others, however, as excellent. A marked qualitative increase in publication performance can be noted, when compared with the Institute's last evaluation. The consultation and services performed by the IGB, as well as the results of knowledge transfers and public relations, correspond to and meet current demands. They are comprehensive and of high quality.

The IGB pursues an ambitious, consistent and focused research programme which is well implemented with an appropriate department structure. Since 2010, this structure has been augmented and loosened up by cross-cutting research domains (CCRD) which allow for ample flexibility in developing innovative ideas and work on current issues and problems. The IGB's basic and application-orientated research, as well as the research-based services and consultation, are well-balanced corresponding with the Institute's mission.

The IGB's co-operations are large scale and successful on the local, national and international levels. The Institute is not only an attractive partner for academic institutions but also for agencies and application-orientated organisations.

The IGB devotes special care and attention to the education and supervision of its junior scientific staff, who receive outstanding support. This applies to doctoral researchers – whose numbers have greatly increased – and to those in postdoctoral positions. Unfortunately, the IGB has not yet succeeded in hiring women for executive positions. This needs to change.

The IGB examined the recommendations of the last evaluation in great detail and has implemented most of them.

Specifically, the following points and recommendations from the evaluation report should be especially considered in regard to the IGB's further development. In the following detailed report, they are highlighted in **bold face**:

#### General Research Concept and Departments (Chapter 2)

1. The IGB's high commitment to socially relevant topics such as the protection of the climate and environment, or the preservation of biodiversity, is manifestly evident. An intensified commitment to application-orientated issues that could be jointly worked on with commercial or industrial partners is also conceivable. Work on such issues and questions could also have a positive effect on the Institute's finances. The IGB is therefore encouraged to examine possibilities leading to the establishment of appropriate co-operations, especially in the areas of inland fisheries and aquaculture.
2. For the future, the recommendation is systematically to expand the strategic function of the cross-cutting research domains (CCRD) and use them further to strengthen the development of interdisciplinary as well as disciplinary work in the individual departments and to promote new topics and issues flexibly. In order to achieve this expansion, the IGB should make more resources from institutional funding available and raise additional third-party funding.

#### Co-operation (Chapter 3)

3. The IGB's active efforts to participate in the *Water Science Alliance* activities, which are bundled at the Helmholtz Centre for Environmental Research, are considered meaningful and are welcomed. The IGB is encouraged to continue with this commitment in order actively to help shape the strategic setting of priorities for German aquatic research.

#### Work Results (Chapter 4)

4. Despite obvious improvement, the IGB has the potential to increase its publication performance further and should use this to expand further the Institute's relevance and visibility at a national as well as international level.
5. With its limnological long-term data, the IGB has valuable material at its disposal which should be analysed more comprehensively. It is recommended that this material is made available also to external researchers.
6. The Institute is encouraged to promote and further the transfer and utilisation of its research work. At the same time, it should be mindful of a proportionate relationship between cost and benefit.
7. The workshops and conferences organised by the IGB are very important to its perception domestically and abroad. The Institute should therefore intensify its commitment to host important international meetings.

### Financial Resources and Use Thereof (Chapter 7)

8. Owing to the intensive renewal process, the institute's operational costs have increased significantly, but an adequate adaptation of institutional funding has not taken place. Therefore, it is recommended that (1) the IGB in co-operation with its supervisory bodies examine to what extent the additional needs accrued during this ongoing renewal can be covered with funding from the 5% increase provided by the "Pact for Research and Innovation", and that (2) additional funds will be applied for if needs cannot be covered in this framework.
9. The most urgent need at the moment is space. Additional work space for scientific staff is an absolute necessity, as is storage space for instruments and equipment, room for seminars and lectures, as well as for the encouragement and promotion of informal academic exchange between colleagues and guests. The addition of a wet lab on Lake Stechlin is also needed.
10. The plans by Department 3 (Limnology of Stratified Lakes) to establish mesocosm facilities find strong approval and would most likely attract a high level of international co-operation.
11. The IGB plans to expand theoretical research in terms of modelling of systems and processes, as well as corresponding foundations in bioinformatics, which is highly welcomed and considered necessary. This not only requires appropriate investment in IT infrastructure but also the strengthening of personnel.
12. The IGB plans to balance its budget at a ratio of two-thirds institutional funding and one-third external funding; this is considered reasonable. In this respect, the IGB should further increase its fundraising – with special emphasis on funds from the DFG.

### Personnel (Chapter 8)

13. The IGB's plans to strengthen work in the fish departments (Departments 4 and 5) are strongly supported, as is the co-operation between these departments through the additional scientific position of a metabolic physiologist.
14. The creation of at least one additional scientific position to advance theoretical and numeric modelling work is also considered necessary.
15. The relation between the academic, technical and administrative personnel has shifted during the expansion of the past few years. The IGB has increased the number of scientific positions, while the numbers of technical and administrative staff have remained the same. Therefore, an appropriate increase in numbers of technical and administrative personnel is necessary. It is recommended that the IGB together with its supervisory and funding bodies consider the measures which can be taken in order to achieve this, in addition to increasing the flexibility of the staff appointment scheme which would be possible from 2012. Additional personnel are urgently needed especially in the area of IT, owing to a broadening and increase in duties.
16. Only one employee possesses the license required to captain the research vessel, which represents a risk. The IGB should implement safeguards to ensure smooth operation irrespective of a specific person.

17. The IGB must find ways in the future to encourage applications from women well in advance of replacement needs, in order to achieve gender balance also at the management level.
18. The IGB should increase efforts to prepare its own junior female scientists specifically for scientific careers. It should consider whether more attractive positions at appropriate levels where women are underrepresented can be offered to women to offset the phenomenon of the “leaky pipeline”<sup>1</sup>. Parents’ access to adequate childcare facilities should be supported.

## 2. General Research Concept and Departments

The IGB’s key research topics are freshwater ecosystems and the scientific bases of sustainable water management and fish farming. The Institute focuses on scientifically challenging and highly relevant societal topics and problems, which are examined through a broad interdisciplinary approach and with the help of the latest experimental facilities and infrastructures. In order to fulfil its mission, it synergistically performs basic and application-orientated research coupled with research-based consultation and services, thereby achieving a meaningful, proportionate relationship between these tasks.

The Institute’s scientific objectives are an improved understanding of freshwater ecological systems, evolutionary processes and changing biodiversity in inland waters, as well as the support of sustainable water management through research-based services and consultation.

The IGB pursues an ambitious, consistent and focused research programme in order to implement its goals. These ranges from the long-term collection, evaluation and supply of basic data (in a scientific regard, the limnological long-term data are especially valuable and provide the IGB with a valuable characteristic) to highly relevant basic and application-orientated research. Current topics of societal relevance are integrated as well.

The IGB’s structure is helpful in the implementation of its research programme. In each of its six departments, specific issues and problems are worked upon which are wisely coordinated and interlocked in a complementary way. Departmental integration is supported by the cross-cutting research domains (CCRD), which were introduced in 2010. With these domains, a matrix structure was created which has increased the flexibility to develop innovative ideas and process current issues and problems.

The IGB’s basic and application-orientated research, as well as research-based services and consultation, are well-balanced with the activities of the Institute. **The IGB’s high commitment to socially relevant topics such as the protection of the climate and environment, or the preservation of biodiversity, is manifestly evident. An intensified commitment to application-orientated issues that could be jointly worked on with commercial or industrial partners is also conceivable. Work on such issues and questions could also have a positive effect on the Institute’s finances. The IGB is therefore encouraged to examine possibilities leading to the establishment of appropriate co-operations, especially in the areas of inland fisheries and aquaculture.**

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<sup>1</sup> Over-proportionate decrease in positions occupied by women, the higher the achieved position.

The following comments and recommendations are made in regard to the IGB's individual departments:

**Department 1 “Ecohydrology”** focuses on complex feedback mechanisms between physical, biogeochemical and ecological processes in coupled eco-systems. A number of interesting and scientifically convincing projects are currently being pursued, including several ones of distinct, innovative character. However, an essential theme to link the Department's projects, as well as a strategic objective, must be worked out more systematically in the future.

The group focuses on modelling both surface water and groundwater systems and is engaged in the interpretation of data collected in field and laboratory studies. Overall, the Department is very convincing in its modelling capabilities and achievements. It is desirable that modelling activities are intensified, as the unique blend of expertise among researchers in the various IGB departments qualifies the Institute as a world-leading organisation for the development of cutting-edge, integrated hydro-ecological models.

While interactions with other IGB departments are very good, some improvement is needed, particularly in contributing to the development of a new generation of models that tightly couple physical, biogeochemical and ecological functioning processes across groundwater-surface and water-terrestrial interfaces. According to the IGB, this activity is intended to be a major research thrust over the next three to five years. The Department is encouraged to intensify this process, as this topic is vigorously pursued at other research institutions and universities.

Although the Department has improved its record for scientific publications since the last evaluation, it is still somewhat behind expectation. Overall, the publication record is rated as good. International co-operations have also improved and are further encouraged.

As is the case with the IGB in general, Department 1 lacks adequate space (office, lab and meeting rooms). This is not conducive for day-to-day operations and interaction. There is also a lack of computer resources which could enable complex CFD-type lake circulation dynamics modelling. As a consequence, external computer clusters must be used, which is less than ideal.

Overall, the work of Department 1 is evaluated as good to very good.

The topics of **Department 2 “Limnology of Shallow Lakes and Lowland Rivers”** are processes and mechanisms that control biodiversity and ecosystem processes in linked river-lake ecosystems at different scales. The Department's focal points are nutrient and phytoplankton relationships, benthic animal communities and long-term trends, as well as the effects of climate change. At the same time, numerous relevant topics and issues are dealt with. As a result, the Department is rated as producing good scientific results and in some cases, very good.

Overall, however, the projects are quite diverse, which has hindered sufficient development of a stringent, thematic focus, in spite of commendable efforts made by the Department. The range of topics has strongly diversified in the past years to include nutrient and catchment modelling, stream and other processes – particularly using molecular methods to characterise the organisms concerned – and alternative states approaches. However, these aspects have not yet been sufficiently integrated, which, to some extent, may be attributed to the

availability of technical and experimental possibilities rather than to major issues and thematic objectives.

In order to counteract the heterogeneity, a clear-cut, thematic positioning within the IGB through focus on a few major issues such as long term change, biodiversity and ecosystem processes or catchment-river-lake relationships appears to be especially important. Issues such as these should also lead to a more suitable designation of the Department, where appropriate.

A change in the Department's scientific leadership is currently underway, so that new approaches to these recommendations are expected from the incoming head of department. Increased modelling processes especially related to nutrient emission should be pursued in the future. The location of the Department's modelling group in Adlershof hampers the academic exchange between scientists. Therefore, a consolidation of offices and work space is desirable.

The Department fosters productive internal co-operations; there is good co-operation on streams with Department 1, and the experimentation facility on the Spree River will allow for interesting work linking the mesocosms used in Department 3. The decidedly high relevance of the Cross-Cutting Research Domain II "*Aquatic Boundaries and Linkages*" is also very positive for the Department since catchment, flowing water and lake systems are basic units of investigation and analysis in limnology. Seen against this background, the relationship to this domain should be strengthened. Productive co-operations exist with other groups within the scope of international EU projects. The Department's publication record, which is rated good to very good, has established output visibility at an international level.

Overall, the work of Department 2 is evaluated as good to very good.

The research work carried out by **Department 3 "Limnology of Stratified Lakes"** deals with biodiversity and biogeochemical cycles of freshwater ecosystems, in particular in response to environmental change. Special attention is devoted to the study of microorganisms. An additional focus which has proved to be very successful is lake management and restoration, whereby the Department effectively employs the availability of unique data stemming from long-term investigation. This provides recourse to measurement series which encompass more than fifty years. A suitable designation for the Department should be considered which incorporates its current topics and objectives, as the name that is presently used does not adequately reflect these.

The Department's publication record is very convincing. The development of state-of-the art experimental methods and innovative concepts for the study of microbial diversity and processes, the results of which have appeared in some of the best journals in the field, is especially impressive. Accordingly, there are several scientists of international reputation in the Department who collaborate with scientists abroad. In the future, these international connections will additionally be strengthened by the integration of research carried out on Lake Stechlin with the Global Lake Ecological Observatory Network (GLEON).

Activities have developed in a very positive manner since replacement of the Department's leadership (2011). They focus on the distinctly relevant topics and clearly formulated goals of experimental limnology. The Department has developed experimentation facilities (mesocosms) for this purpose which are optimally maintained, owing to the number of highly quali-

fied technical staff available. The facilities are excellent, also when compared with international standards.

The Department on Lake Stechlin has a well-equipped lab but lacks work and office space. Therefore, the IGB's plans for expansion are explicitly supported. The addition of a wet lab at the station would also be a wise decision as laboratories become increasingly specialised, and the needs for clean space in molecular and genetic work conflict with the processing of raw samples from the field. There is thus a need for separation of these functions, so as not to compromise the molecular and fine analytical work. Moreover, if organisms could be kept under laboratory conditions, a clear comparison with the large field mesocosm system would be extremely helpful. This translation could work in both directions and would be important for scaling up studies. Without such lab facilities, the excellent staff, facilities and compelling research agenda cannot be fully capitalized on. Such facilities would have an exponential impact on the productivity of this department and its international recognition and possibilities to expand collaboration.

The Department is currently engaged in a major effort to establish a new, state-of-the-art mesocosm facility on Lake Stechlin, at a scale that so far does not exist anywhere. The evaluation group strongly supports the project, in spite of the high estimated costs, as it would allow manipulation of ecosystems on a scale that almost bridges whole-lake experiments but with greater possibilities for replication and control. This endeavour carries with it the potential to provide the IGB with a rare facility that will attract a large amount of international attention and co-operation.

Although the Department is spread out, the internal co-operations and co-operations with other groups belonging to the IGB are intensive and productive. Good communication with the colleagues based at the headquarters on Lake Müggel is very important; therefore, it is recommended that the technical requirements necessary for video conferences be improved.

Overall, the work of Department 3 is evaluated as very good to excellent.

**Department 4 “Biology and Ecology of Fishes”** focuses on ecological and evolutionary processes which structure freshwater fish communities and affect their functions. The Department's goal is to improve management and conservation of wild fish populations based on this.

The Department has made considerable progress within the past few years and has turned its focus to fish ecology and evolution. This can be attributed to the new leadership (2009) and to the consequent implementation of the recommendations made by the last evaluation and the audit by the advisory board. Open positions have also been successfully filled and will strengthen the behavioural and theoretical expertise of the group. The new team has needed some time to adjust but it is now evident that the Department has the potential to become cutting edge. It is dynamic, integrative and deals with behavioural questions and approaches in an innovative way. It builds bridges between basic and applied work, between empirical and theoretical approaches, as well as between individual behaviour and the consequences for diversification and fisheries. The entire lake 3D telemetry system has been well conceptualized and promises some very interesting results.

The integration of behavioural types and decision making in evolutionary and ecological diversity and in questions of recreational fisheries should prove fruitful. The Department is en-



couraged to continue development in this direction. Moreover, strengthening evolutionary and ecological work through the integration of theory and behaviour is regarded as very positive.

A main strength of the Department is its contribution to the fields of management and fishery policy and aquatic ecosystems through the integration of basic science. This integration has already proved successful in the domain of recreational fisheries and sturgeon restoration, and it bears a big potential for future activities. Not least because of diminishing resources of fisheries, expansion of the work area to include other fisheries (including commercial fisheries) that may have been important to Germany in the past is desirable.

The Department has a very good publication record that is in keeping with the mission of the IGB and the focus of the Department. There is a differentiation between publications targeted at specialized groups and publications intended for a broader, scientific audience. The overall publication performance has improved over the past few years, and even though the numbers have declined slightly, the proportion of peer reviewed publications has increased. For the future, it is desirable that the findings reach a broader, high level scientific audience and that more publications appear in the top journals in ecology, evolution, behaviour, and fisheries. The Department shows significant growth in external funding but there is potential for a further increase.

Department 4 and other internal groups at the IGB maintain very successful co-operations at the local, national and international level and also serve as coordinator for some of these projects. Participation by the Department in the activities of cross-cutting research domains (especially in regard to the use of mesocosms) should be strengthened. Since Department 4 is involved in re-stocking, a natural link with surrounding commercial providers could offer a source of future collaborations. Moreover, further conferences such as the 2009 meeting on the “evolutionary ecology of fish and fisheries” would facilitate additional co-operations and increase the Department’s visibility. Finally, establishing stronger connections to the Genome Centre for Research in Biodiversity (see Chapter 3) is recommended. Overall, the Department should increase international collaboration within and outside of Europe. An exchange fellowship programme for IGB scientists and students would help attract external scientists to the IGB.

In the future, more students and graduate students should profit from the exceptional education and advising services provided by the Department. An increase in postdoctoral researchers would also be a positive development. In this respect, it is important to note that the plans to hire a metabolic physiologist should be pursued, as this expertise will not only greatly facilitate the integration of individual behaviour and adaptive change to fisheries but also benefit Department 5 (Ecophysiology and Aquaculture) and co-operation with it.

Overall, the work of Department 4 is evaluated as very good to excellent.

The main research aim of **Department 5 “Ecophysiology and Aquaculture”** is to understand the mechanisms that underlie the impact of multiple environmental stressors on aquatic vertebrates in order to improve the scientific basis for sustainable aquaculture development.

Following the recommendations of the last evaluation (2005) and the audit of the advisory board (2008), Department 5 has been renamed and has established a clear profile with very

good single projects in sturgeon restoration, genetics, endocrine disruption, ecotoxicology and sustainable aquaculture systems (aquaponics).

Whereas basic ecophysiology should continue with a possible emphasis on endocrine disruption and ecotoxicology, a more concentrated approach to aquaculture may be more productive. A sustainable aquaculture system (aquaponics) has almost reached commercial application, and the sturgeon project – while an important task for both Departments 4 and 5 – occupies a large amount of space in the aquaculture facilities. However, it is long-term and directed at restoration, not specifically at aquaculture. Therefore, it should be investigated if co-operations with, for example, commercial partners or the Institute for Inland Fisheries in Potsdam could make space available in the Institute's aquariums, which could then be utilised for aquaculture research.

Although the group is rather heterogeneous, there are some common themes which make the Department coherent in terms of their research focus. The interest in innovative themes and methods within the group is impressive, and there is a good balance between basic and applied research. Department 5 would also profit from the installation of a wet lab on Lake Stechlinsee.

The Department's publication record is convincing. Works have appeared in very reputable peer-reviewed journals and the average number of publications per scientist has increased compared with the last evaluation.

Co-operation within the IGB is good, especially with Department 4. As already mentioned in the remarks about that Department, co-operation would be substantially strengthened by the appointment of a metabolic physiologist whose focus is on ecophysiology; this is explicitly recommended.

The Department also maintains productive co-operations at a national as well as international level, with the sturgeon restoration programme playing an especially important role. Since some externally funded research projects have come to an end, now is the time to strengthen international collaborations by applying for EU funded or other international research projects, especially in sustainable aquaculture.

Overall, the work of Department 5 is evaluated as very good.

In **Department 6 “Central Chemical Laboratory”**, service and research are tightly interlinked and well balanced. In regard to service, Department 6 aims at developing and adapting methods to meet the multiple requirements of the other departments, whereas the main aim of research is to advance the understanding of biochemical transformation processes in aquatic and semi-aquatic boundaries.

Department 6 has developed in a very productive way, from a mainly service division to a more research-orientated scientific unit with a clearly recognizable research profile. In view of the large amount of service and routine work done by this unit, the scientific productivity measured in refereed publications is impressive and shows that the scientists have developed to a respected level of national and international visibility.

Approximately half of the Department's capacity is devoted to routine water analysis of several water bodies, which are analysed at regular intervals. Its specific strength is the analysis and characterization of dissolved organic matter in lake waters. In addition, it covers all chemical analyses needed by the various research projects in other departments. In doing

so, the Department collects very important data, also on large scale. These services are of high quality and very important to the entire Institute. The laboratory equipment is of an excellent standard.

Scientists in the chemical laboratory also fulfil an important function by offering the IGB staff training and specific advice on sampling, sampling preparation and basic knowledge of analytical methods. In addition, the laboratory staff maintain their own research projects and also participate in other projects. A current research activity which seems very promising deals with small-scale redox transformations of iron, sulfur and carbon compounds at the redox transition zone in waters and sediments.

Due to its expertise in the analysis of redox-active chemical compounds and the modelling of chemical redox processes, a closer co-operation between the chemical laboratory and Department 1 could foster scientific development in this area. Especially the biogeochemical section of Department 1 could efficiently connect with the analytical activities of the chemical laboratory. Another avenue of co-operation could be developed in the context of the Cross-Cutting Research Domain II "Aquatic Boundaries and Linkages".

In addition, more intense co-operation between Departments 1, 2 and 6 is encouraged in order to improve the understanding of the hyporheic zone, which plays a key role in the stream ecosystem. More profound knowledge about its functioning would have extensive practical implications, especially for the management of river ecosystems. Study of the hyporheic zone, however, needs to be an integrated interdisciplinary venture based on the expertise of chemists, geomorphologists, hydrogeologists, biogeochemists, invertebrate and microbial ecologists and modellers. As these competences are available at the IGB, the Institute should greatly profit from this and effectively use it to this end.

Overall, the work of Department 6 is evaluated as very good.

### **Cross-Cutting-Research Domains**

With the establishment of three cross-cutting research domains (CCRD: I Aquatic Biodiversity, II Aquatic Boundaries and Linkages and III Human-Freshwater Ecosystem Interaction), the IGB has created a promising, integrative matrix which breaks open department structures and makes room for the development of innovative approaches. The topics addressed by the CCRDs raise interesting questions and, in principle, represent a good basis for the future development of IGB research areas. It is appreciated that this is a flexible instrument which tests the validity of new topics and concepts in order to build upon or consolidate them, modify them or, should the expectations not be met, reject them.

Scientists at the IGB were involved in the CCRDs to differing degrees of intensity at the time of the evaluation visit. This is understandable, since they were only introduced in 2010. **For the future, the recommendation is systematically to expand the strategic function of the cross-cutting research domains (CCRD) and use them further to strengthen the development of interdisciplinary as well as disciplinary work in the individual departments and to promote new topics and issues flexibly. In order to achieve this expansion, the IGB should make more resources from institutional funding available and raise additional third-party funding.**

### 3. Co-operation

The IGB co-operates successfully at large scale at the local, national and international level. The Institute is not only an attractive partner for academic institutions but also for agencies and application-orientated organisations.

This is exemplified by the active role the IGB plays in the Genomic Centre for Biodiversity, a research platform jointly used by three Berlin-based Leibniz Institutes (IGB, Leibniz-Institute for Zoological and Wildlife Research and the Natural Science Museum) and two universities (Free University Berlin and University of Potsdam).

#### Co-operation with Universities

The IGB closely co-operates with the three universities in Berlin. This manifests itself particularly through joint appointments. In addition, there is a joint appointment with the University of Potsdam. The Institute's contribution to proposals under consideration for research funding in the framework of the second round of the Initiative of Excellence of the Federal State and the Länder has intensified the degree of collaboration. The numerous modern infrastructures the IGB has at its disposal provide a very attractive basis for complementary and productive co-operations (also see Chapter 7).

The IGB makes a valuable contribution to the teaching, educating and supporting of young scientists. In particular, its contribution to the application-orientated Masters programme "Fisheries Science and Aquaculture" offered at the Humboldt University of Berlin has been significant both in terms of quantity and quality of teaching.

#### Co-operations with Leibniz Association Institutions

The IGB is very well-connected within the Leibniz Association. The collaboration with other Leibniz institutions to gain funding within the framework of the SAW process, which awards resources from the Research and Innovation Pact in a competitive procedure to member institutions of the Leibniz Community, was particularly successful.

#### Further National and International Co-operations

Numerous interest groups, agencies and research institutions of ministries regard the IGB as a highly esteemed partner for co-operations on specific, typically application-orientated questions and problems which serve a mutual benefit.

**The IGB's active efforts to participate in the *Water Science Alliance* activities, which are bundled at the Helmholtz Centre for Environmental Research, are considered meaningful and are welcomed. The IGB is encouraged to continue with this commitment in order actively to help shape the strategic setting of priorities for German aquatic research.**

#### Visiting Scholars

The IGB is very attractive to visiting scientists from Germany and abroad. As such, it has welcomed a growing number of foreign guests over the past years – in particular within the framework of a fellowship programme that was introduced in 2009. The IGB could benefit even more from these visits if there was space available at the institute for a cafeteria or dining facilities, which would significantly enhance the opportunities for informal academic exchange.

## 4. Work Results

At the IGB, the balance between basic research, application-orientated research and scientific service consistently meets the objectives of the institute.

### Scientific Publications

Qualitatively, the IGB has significantly increased its publication performance as compared with the last evaluation. Many of the scientists at the IGB enjoy an excellent reputation in Germany and abroad, thanks to their contributions to current issues. **At the same time – and despite obvious improvement – the IGB has the potential to increase its publication performance further and should use this to expand further the Institute’s relevance and visibility at a national as well as international level.**

**With its limnological long-term data, the IGB has valuable material at its disposal which should be analysed more comprehensively. It is recommended that this material is made available also to external researchers.**

### Scientific Consulting, Services, and Knowledge Transfer

The IGB’s extensive consulting, information services and tools are of high quality. They include reports, evaluations, up-to-date data supply, guidelines, handbooks and software models, among others. These are provided to various interest groups, agencies, commissions, institutes, political decision-makers, but also to companies.

In addition, the IGB holds nineteen patents, has applied for several more, and also has registered patents abroad. However, financial income has not yet been derived from these sources. **The Institute is encouraged to promote and further the transfer and utilisation of its research work. At the same time, it should be mindful of a proportionate relationship between cost and benefit.**

**The workshops and conferences organised by the IGB are very important to its perception domestically and abroad. The Institute should therefore intensify its commitment to host important international meetings.**

It is appreciated that the IGB emphasizes the role of its press and public relations office and recruits very competent personnel in this area. The strategies the Institute follows in conveying its topics and research results, which are of great social relevance to the public, have been very successful.

## 5. Promotion of Junior Academics and Non-Academic Staff

### Call for Junior Scientific Staff

The success of the IGB’s educational efforts is evident in the young academic talent that has successfully been trained and which receives very good employment offers. Since the last evaluation, two junior professorships have been positively assessed. The two professors were appointed to universities abroad (in the USA and in Denmark). In addition, three scientists employed by the IGB have received their habilitation.

### Education and Support of Doctoral Researchers

Doctoral researchers receive excellent training and support at the IGB. All of them are supervised on the basis of a set of clearly defined guidelines by a committee consisting of three persons. The IGB has also established a half-time position in charge of co-ordinating and administering the structured graduate programme, which is regarded as very positive.

As the institute offers very attractive conditions to doctoral researchers, it is able to select qualified candidates from among the best and consider international applications, as well. In addition, the fellowship programme provides the annual opportunity for two to four young scientists from abroad to undertake research at the IGB. Thus, a stimulating, international atmosphere prevails at the Institute.

The IGB has significantly increased the number of doctoral researchers at the Institute over the past several years, even though this is not yet mirrored by the number of degrees awarded. The plans of the Institute to increase slightly the number of degrees in order to reach a phase of consolidation are well-grounded. However, the realization of these plans is hindered by the acute lack of space, which includes not only office facilities but also space for informal meetings and communication (cf. the recommendation to increase space in Chapter 7). The IGB is encouraged to continue efforts to reduce the average duration of the doctoral programme and to support doctoral researchers financially until they have completed their dissertations.

### Training of Non-academic Staff

The IGB offers numerous training opportunities to its non-academic staff. This is acknowledged and appreciated as a positive contribution to human resource development efforts.

## **6. Structure and Management**

### Management

The IGB is excellently managed by its director. Since his appointment in December 2007, the Institute has undergone a remarkably positive development; this follows a two and a half-year management vacancy. The director has created a new sense of motivation and a growing degree of commitment among the staff members by implementing new ideas and measures, such as the introduction of the cross-cutting research domains. Based on a quality-orientated and participatory approach, the given strengths are intelligently mobilized and new potentials are realised, which creates the best conditions for new, ambitious paths.

The Institute's leadership is supported in its efforts by a very efficient and service-orientated administration, as well as by a dedicated advisory board. As was recommended, four departing members of the board were replaced by scientists from internationally leading research institutions. The advisory board's intensive support of the restructuring process in the two fish Departments 4 (Biology and Ecology of Fishes) and 5 (Ecophysiology and Aquaculture) has contributed to very convincing results. By the next evaluation, the advisory board should have carried out an audit of the entire Institute.

### Internal Quality Management

The IGB's internal scientific quality management functions very well and leads to convincing results. This is particularly obvious in the case of external fundraising. Before submitting proposals, a committee charged with external funding issues discusses which proposals have the highest chances of succeeding and to what extent they reflect the overall strategy of a department or the IGB as a whole.

Furthermore, available resources from institutional funding are allotted according to an internal set of rules and criteria related to performance and quality. In addition, the working groups benefit from a portion of the overhead funding for projects they have successfully secured.

Finally, the IGB follows the performance-related payment structure (LOB) designated by the public sector labour agreement (TVöD), which is based on scientific-related performance indicators and employs various instruments to create incentives for quality optimisation.

## **7. Financial Resources and Use Thereof**

In the past few years, the IGB has undergone an extremely dynamic development. The directorship had been long vacant, scientific results were lagging, third-party funding was moderate, necessary investments had not been made and additional personnel were urgently needed.

Against the background of these circumstances, the new director correctly realised that a renewal based on intensive restructuring, increased external funding, an expanded staff and new infrastructure was necessary in order to maintain and develop the IGB sustainably. A large part of the necessary expansion has been successfully completed, and the IGB has used the provided financial resources in an extremely prudent and goal-orientated way.

### Facilities and Infrastructures

The IGB has numerous sophisticated experimental facilities and complex infrastructures at its disposal, which enable researchers to perform their work at the highest level. Since 2007, twenty-eight facilities, instruments and equipment have been purchased, each at a cost of over 30,000 Euros, while the largest investment, the research vessel "Paul Schiemenz", has accounted for approximately 450,000 Euros. In total, a sum of more than three million Euros has been invested.

In addition to this research vessel, the fish tank hall, the aquaponic infrastructures, the mesocosm experimental hall, the long-term monitoring logging facility and the unmanned helicopter for landscape research are of particular importance to the IGB. All of these research facilities are necessary to perform tasks that enhance the international visibility of the IGB. They are the basis of attractive co-operations. Certain facilities enable the researchers to gather and evaluate long-term data.

### Continuation of the Renewal Process

This necessary renewal process has not yet been completed. The IGB has presented further plans in consultation with its committees; these plans are to expand the office and laboratory

space, replace out-dated equipment and infrastructures, increase personnel (see Chapter 8) and adjust running costs. Investment need for building projects has been declared in the Institute's programme budget for 2014 and 2015, which also includes an updated programme designed to identify space requirements. These plans are considered useful and goal-orientated and in principle represent a realistic portrayal of the increased demand.

**Owing to the intensive renewal process, the institute's operational costs have increased significantly, but an adequate adaptation of institutional funding has not taken place. Therefore, it is recommended that (1) the IGB in co-operation with its supervisory bodies examine to what extent the additional needs accrued during this ongoing renewal can be covered with funding from the 5% increase provided by the "Pact for Research and Innovation", and that (2) additional funds will be applied for if needs cannot be covered in this framework.**

**The most urgent need at the moment is space. Additional work space for scientific staff is an absolute necessity, as is storage space for instruments and equipment, room for seminars and lectures, as well as for the encouragement and promotion of informal academic exchange between colleagues and guests. The addition of a wet lab on Lake Stechlin is also needed (cf. Chapter 2, section on Department 3).**

**The plans by Department 3 (Limnology of Stratified Lakes) to establish mesocosm facilities find strong approval and would most likely attract a high level of international co-operation.**

**The IGB plans to expand theoretical research as the modelling of systems and processes, as well as corresponding foundations in bioinformatics, which is highly welcomed and considered necessary. This not only requires appropriate investment in IT infrastructure but also the strengthening of personnel (cf. Chapter 8).**

#### Third-Party Research Funding

Over the past few years, the IGB has increased the amount of competitively secured third-party funding in a singular way. The particular success in securing EU funding underlines the high quality of its academic performance. Since 2007, the IGB has secured two large EU projects that it coordinates. In addition, it has been or still is involved in seven other projects.

**The IGB plans to balance its budget at a ratio of two-thirds institutional funding and one-third external funding; this is considered reasonable. In this respect, the IGB should further increase its fundraising – with special emphasis on funds from the DFG. The Institute seems very well prepared to face this challenge.**

## **8. Personnel**

The IGB employees are highly motivated and very committed to their work. Satisfaction with the work place was confirmed in the course of interviews which took place during the evaluation. It is regrettable, however, that an institute of the size of the IGB, which employs more than 200 people and hosts regular guests, does not have a cafeteria, dining facilities, or anything comparable. This should be rectified.



### New Appointments

The IGB and each of the participating universities have made excellent choices in the appointment of two new department heads who joined in 2009 (Department 4) and in 2011 (Department 3), respectively. It is very good that the IGB imposes the requirement of excellent qualifications in terms of content-orientated and leadership competencies for the position which is currently to be filled in Department 2.

### Scientific Personnel

As was mentioned in the Chapter 2, **the IGB's plans to strengthen work in the fish departments (Departments 4 and 5) are strongly supported, as is the co-operation between these departments through the additional scientific position of a metabolic physiologist.**

**The creation of at least one additional scientific position to advance theoretical and numeric modelling work is also considered necessary.**

### Relation between Academic, Technical and Administrative Personnel

**The relation between the academic, technical and administrative personnel has shifted during the expansion of the past few years. The IGB has increased the number of the scientific positions – in particular those funded by secured third-party funding –, while the numbers of technical and administrative staff have remained the same. Therefore, an appropriate increase in technical and administrative personnel is necessary.** Against this background, it is positively noted that the funding bodies intend to repeal the binding nature of the staff appointment scheme from 2012 on to allow the IGB greater flexibility in human resources planning. This measure alone, however, will not suffice to reestablish an appropriate relation. **It is recommended that the IGB together with its supervisory and funding bodies consider additional measures which can be taken in order to achieve this. Additional personnel are urgently needed especially in the area of IT, owing to a broadening and increase in duties.** This also includes an intensification of modelling work which is especially recommended for Departments 1 and 2.

The IGB's non-academic personnel are highly qualified and support the scientific work extremely well. However, **only one employee possesses the license required to captain the research vessel, which represents a risk. The IGB should implement safeguards to ensure smooth operation irrespective of a specific person.**

### Gender Equity and Compatability of Family and Profession

It is lauded that issues concerning family and profession, and gender equity, play a prominent role at the IGB. However, the IGB has not yet succeeded in hiring women for executive positions. **The IGB must find ways in the future to initiate applications from women well in advance of replacement needs, in order to achieve gender balance also at the management level.**

In addition, **the IGB should increase efforts to prepare its own junior female scientists specifically for scientific careers.** In this context, it is positively noted that the IGB graduate programme includes a module that has been designed to address women in particular. Female scientists must also be intensively supported, in particular during the crucial phase following the doctoral studies. **The IGB should consider whether more attractive posi-**

**tions at appropriate levels where women are underrepresented can be offered to women to offset the phenomenon of the “leaky pipeline”<sup>2</sup>. Parents’ access to adequate childcare facilities should be supported.**

## 9. Recommendations of the last Evaluation

The recommendations by the Leibniz Association Senate from 2006 (cf. status report pgs. A-13 to A-15) have been successfully implemented by the IGB to a large extent; this has been confirmed by the advisory board:

1. As recommended, a new director has been appointed. He initiated and propelled a very positive development of the Institute.
2. The research programme was modified as recommended to include a stronger focus. This process was supported by the introduction of the cross-cutting research domains, which improve the coherence and integration of the research programme (cf. Chapter 2).
3. The introduction of the cross-cutting research domains also strengthened interdisciplinary research approaches in the individual departments and between departments.
4. Regarding the modelling activities, Department 1 has made substantial progress and reached a remarkable level of performance. However, an essential theme to link the Department’s projects, as well as a strategic objective, must be worked out more systematically in the future.
5. The modelling expertise at the IGB was significantly expanded. However, a modelling concept for the Institute as a whole has not been introduced (despite recommendations from the last evaluation). This is plausible, since the IGB employs a useful and need-specific variety of modelling approaches, instead.
6. Scientists now teach a variety of modelling methods for different qualification levels, as was recommended.
7. As recommended, the IGB has intensified its press and public relations work. Since February 2009, a full-time public relations officer supports the Institute in improving its visibility in Germany and abroad. She is doing a remarkable job. In addition, the number of invitations extended to scientists as keynote and plenary speakers at national and international conferences has increased (cf. Chapter 4).
8. Following the recommendations of the last evaluation (2005) and of the audit (2008), the IGB has successfully restructured the two fish departments (Departments 4 and 5). Both departments have sharpened the focus of their research, while still benefitting from their complementary expertise. The open leadership position in Department 4 (2009) was successfully filled (cf. Chapter 2).
9. As recommended, the IGB has intensified its international co-operations and increased the number of publications written by IGB scientists in collaboration with researchers from co-operating foreign institutes. The participation in numerous EU projects has strengthened co-operations on a European level. In addition, the IGB receives an increasing number of international guests (cf. Chapter 3).

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<sup>2</sup> Over-proportionate decrease in positions occupied by women, the higher the achieved position.

10. The IGB has, as recommended, noted a significant increase in its competitively secured external funding, as well as in the quality of its publication performance with a stable rate of the number of annual publications (cf. Chapter 4).
11. The IGB has strengthened its advisory board, as recommended. Four departing members have been replaced by scientists from internationally leading research institutes. The advisory board is very successful. In the future, however, it should perform an institution-wide audit to take place between two evaluations (cf. Chapter 6).
12. Since the last evaluation, the IGB funding bodies have significantly improved the Institute's facilities, as has been recommended. This supported an intensive renewal process and sustainably enhanced the IGB's international competitiveness. As has been noted in Chapter 7, this renewal process has not yet been completed.
13. As recommended, the access to electronic journals at the IGB was significantly improved. A number of further measures, for example the improved co-operation with other academic libraries, also allow IGB personnel to make optimal use of academic literature.
14. Following recommendation, the IGB has differentiated and improved the instruments of its performance-orientated allotment of funding through the introduction of new criteria (cf. Chapter 6).
15. During the course of general improvement in the education and support of the junior scientific staff (cf. Chapter 5), the IGB has – as recommended – also incorporated specific measures to support career development into its programme to foster young talents.
16. The IGB could not implement the recommendation to fill leadership positions (management / department heads) with women. The IGB must find ways in the future to initiate applications from suitable female candidates well in advance of replacement needs in order to achieve gender balance also on the management level (cf. Chapter 8).



## 2. Review Panel Guests

### *Representative of the responsible Federal Government Department*

Dr. Helmut **Löwe** Federal Ministry of Education and Research, Germany

### *Representative of the responsible State Department*

Dr. Katharina **Spiegel** Berlin Senate Department for Education, Science and Research, Germany

### *Representative of the Joint Science Conference (GWK)*

MinR'in Rebekka **Kötting**

### *Representative of the Leibniz Association*

Prof. Dr. Heribert **Hofer** Leibniz Institute for Zoo and Wildlife Research, Berlin, Germany

### *Representative of the Scientific Advisory Board*

Prof. Dr. Janet **Hering** Head of the IGB Scientific Advisory Board; EAWAG Swiss Federal Institute of Aquatic Science and Technology, Switzerland

## 3. IGB Co-operating Partners (only present for a one hour interview on Sept. 2<sup>nd</sup> 2011)

Prof. Dr. Thomas **Borsch** Botanic Garden and Botanical Museum Berlin-Dahlem, Freie Universität Berlin, Germany

Prof. Dr. Martin **Jekel** Department of Water Quality Control, Technical University Berlin, Commission on Water Research (KOWA), Germany

Prof. Dr. Otto **Kaufmann** Faculty of Agriculture and Horticulture, Humboldt-University Berlin, Germany

Dr. Fritz **Kohmann** German Federal Institute of Hydrology (BfG), Germany

January 16<sup>th</sup>, 2012

**Annex C: Statement of the Institution on the Evaluation Report**

**Leibniz-Institute of Freshwater Ecology and Inland Fisheries (IGB),  
Berlin**

The Leibniz-Institute of Freshwater Ecology and Inland Fisheries, IGB, is most grateful for the very thorough, professional, and fair evaluation process conducted by the members and guests of the evaluation committee and supported by the coordination office of the Leibniz Association. We greatly appreciate the well-balanced report that clearly recognizes the major achievements of IGB during its renewal process over the past years and provides very helpful advice for the future development of the Institute.

We are delighted that the research carried out at IGB is considered highly innovative and relevant, and that its overall quality is rated as very good with parts rated as excellent. This assessment will provide strong motivation to the Institute's staff in its endeavor to advance the scientific performance of IGB beyond the high level already achieved.

The report strongly encourages the Institute to become actively involved in the process of setting strategic priorities for German aquatic research, particularly within the framework of the *Water Science Alliance*. IGB is well prepared to meet this challenge by assuming leadership with a focus on freshwater ecology and inland fisheries as a crucial and integral part of water research and management.

As proposed by the evaluation committee, the Institute will continue to strengthen its cross-cutting research domains in order to flexibly promote new and important topics. Furthermore, the Institute is poised to facilitate use of its unique long-term data sets by external researchers. This will primarily be achieved through international co-operations and networks of long-term environmental observatories such as GLEON and GEO BON and metadata posting on the Institute's homepage.

IGB embraces the strong statement by the evaluation committee that an adequate adjustment of institutional funding is absolutely required in order to improve its status concerning personnel, infrastructure and technology. Otherwise, IGB will be unable to fulfill its expanded and new tasks, as strongly requested by the evaluation committee.

The Institute also welcomes the evaluation committee's assessment that work space is our most pressing limitation and that our most urgent needs are: more work space for scientific and technical staff; increased storage space; more lecture, seminar and meeting rooms to foster intellectual exchange; and the remodeling of buildings at the Lake Stechlin laboratory to make currently unusable space fit for purpose. The construction of a large-scale mesocosm facility, viewed very favorably by the evaluation committee, has already begun in the winter of 2011, thanks to strong financial support received from the Federal Ministry of Science and Education (BMBF).

The evaluation committee also recommended that the Institute and its supervisory and funding bodies devise measures to increase the number of technical and administrative staff. In

response, IGB will revise its development plan for personnel, together with the scientific advisory board, and discuss the identified options with the main funding bodies of the Institute.

Finally, IGB will make a strong effort to recruit top scientists, primarily at the junior level, in fields such as theoretical, numerical, and statistical modeling, bioinformatics, or metabolic physiology, as recommended in the evaluation report. The profiles will be defined in coordination with IGB's supervisory bodies. Special emphasis will be placed on attracting female scientists. IGB is fully aware of its inadequate female representation in leading positions at present, as emphasized in the evaluation report. The Institute is already taking bold measures to change this situation and will vigorously continue these efforts.