

**Stellungnahme zu den
Senckenberg Forschungsinstituten und Naturmuseen (SFN)
Frankfurt/M., Wilhelmshaven, Dresden, Görlitz, Müncheberg**

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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.¹

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 die Senckenberg Forschungsinstitute und Naturmuseen (SFN) am 16. September 2013 in Dresden sowie am 23. bis 25. September 2013 in Frankfurt am Main. Ihr stand eine von Senckenberg 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). Senckenberg nahm dazu Stellung (Anlage C). Der Senat der Leibniz-Gemeinschaft verabschiedete am 17. Juli 2014 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.

In den *Senckenberg Forschungsinstituten und Naturmuseen* (SFN), die Bund und Länder als Leibniz-Einrichtung gemeinsam fördern, sind die wissenschaftlichen und musealen Aktivitäten des Trägervereins *Senckenberg Gesellschaft für Naturforschung* (SGN) zusammengefasst. Ihrem **Auftrag** entsprechend untersuchen die Institute und Museen die Zusammenhänge zwischen dem Geosystem Erde und dem Leben auf der Erde. Ziel der Senckenberg-Forschung ist, dessen Vielfalt, die Biodiversität, zu erfassen und zu ihrer Erhaltung beizutragen. Die wissenschaftlichen Sammlungen, die von Senckenberg gepflegt und zur Verfügung gestellt werden, bilden hierfür eine wesentliche Grundlage. In den Museen, über Sonderausstellungen und Publikationen vermittelt Senckenberg seine Forschungsergebnisse in die Öffentlichkeit.

Senckenberg hat seit der letzten Evaluierung eine sehr dynamische **Entwicklung** genommen. Seit dem Jahr 2008 trägt hierzu das *Biodiversität und Klima Forschungszentrum* (BiK-F), das Senckenberg gemeinsam mit der Universität Frankfurt am Main und anderen Kooperationspartnern im Rahmen der hessischen *Landesoffensive zur Entwicklung wissenschaftlich-ökonomischer Exzellenz* (LOEWE) eingeworben hat, maßgeblich bei. Einer Empfehlung des Senats der Leibniz-Gemeinschaft folgend erweiterten Bund

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

und Länder die institutionelle Förderung Senckenbergs im Jahr 2009 um das *Deutsche Entomologische Institut* in Müncheberg, die *Staatlichen Naturhistorischen Sammlungen Dresden* und das *Staatliche Museum für Naturkunde Görlitz*. Damit umfasst die Leibniz-Einrichtung heute fünf Institute (Frankfurt am Main, Wilhelmshaven, Dresden, Görlitz und Müncheberg) sowie vier an diese Institute angegliederte Einrichtungen (Messel, Gelnhausen, Weimar, Hamburg).

Angesichts des Wachstums von Senckenberg und der Verteilung auf mittlerweile neun Standorte führte die Leitung eine grundlegende Reorganisation der Einrichtung durch. Der Senat begrüßt, dass mit standortübergreifenden Programmen eine schlüssige Organisationsform entwickelt wurde, die die projektbezogene Kooperation zwischen den Abteilungen und Sammlungen in angemessener Weise befördert. Dies muss nun konsequent weitergeführt werden. Die **Forschungsleistungen** in den vier Forschungsbereichen bzw. deren zwölf wissenschaftlichen Untereinheiten sind im Durchschnitt sehr gut. Im Einzelnen werden drei Einheiten als „exzellent“ und fünf als „sehr gut“ bewertet. Jeweils eine Einheit ist „sehr gut bis exzellent“, „gut mit Potential zu sehr gut“ und „gut“. Bei einer weiteren guten Einheit ist das Konzept für Langzeitstudien zu verbessern.

Das **Biodiversität und Klima Forschungszentrum** (BiK-F) ist eine konsequente Fortentwicklung der Senckenberg-Forschung und ergänzt die Arbeiten zur biologischen Vielfalt sowie die Analyse der Folgen ihres Verlustes in hervorragender Weise um den Aspekt Klimawandel. Das Programm ist äußerst anspruchsvoll und erfolgreich. Es ist maßgeblicher Bestandteil eines der vier Forschungsbereiche und sowohl organisatorisch als auch wissenschaftlich und infrastrukturell hervorragend in die neue standortübergreifende Programmstruktur eingebunden. Auch innerhalb der Leibniz-Gemeinschaft ist BiK-F bestens anschlussfähig. Der Senat empfiehlt Bund und Ländern im Hinblick auf die besondere Bedeutung für die weitere Entwicklung der Einrichtung, BiK-F im Rahmen der Senckenberg-Förderung zu verstetigen.

Senckenberg kommt seinen Aufgaben in der **Sammlungspflege und -entwicklung** sehr gut nach. Seit der Integration der neuen Standorte umfassen die Sammlungen über 38 Millionen Objekte (Pflanzen, Tiere, Fossilien und Gesteine aus aller Welt). Sie gehören damit zu den größten Europas, müssen allerdings noch deutlich sichtbarer werden. Die wissenschaftliche Verfügbarkeit der Sammlungsdaten muss deshalb verbessert und ihre digitale Erschließung mit Nachdruck vorangetrieben werden. Es ist ausgesprochen erfreulich, dass die drei naturkundlichen Forschungsmuseen der Leibniz-Gemeinschaft in diesen wichtigen Fragen zusammenarbeiten werden.

Die **Vermittlung** hat bei Senckenberg einen hohen Stellenwert. In diesem Bereich werden viele Veranstaltungen und andere Aktivitäten durchgeführt. Der Senat begrüßt, dass eine Stabsstelle zur zentralen Museumsentwicklung eingerichtet wurde, so dass im Museumsbereich Verbesserungen zu erwarten sind; denn derzeit entspricht die Dauerausstellung in Frankfurt am Main nicht aktuellen museologischen Standards. Die Senckenberg-Leitung hat das Problem erkannt und gemeinsam mit dem Trägerverein Lösungsansätze erarbeitet. Diese müssen nun intensiv und zügig weiterverfolgt werden.

Die **Zusammenarbeit** mit Universitäten hat sich seit der letzten Evaluierung maßgeblich verbessert. Derzeit sind 17 Wissenschaftlerinnen und Wissenschaftler gemeinsam

mit Universitäten in Deutschland (Frankfurt am Main, Bremen, Oldenburg, Halle) berufen, davon elf im Rahmen von BiK-F. Darüber hinaus arbeitet Senckenberg in einem großen Forschungsvorhaben (*Human Evolution and Palaeoenvironment*, HEP) intensiv und äußerst erfolgreich mit Gruppen an der Universität Tübingen zusammen. Die wissenschaftlichen Einheiten sind international sehr gut vernetzt. Vor dem Hintergrund der dynamischen Entwicklung der vergangenen Jahre sollte Senckenberg anstreben, international als Institution noch mehr Präsenz und Sichtbarkeit zu entwickeln.

Das wissenschaftliche **Personal** hat sich seit der letzten Evaluierung nahezu verdreifacht. Der Senat begrüßt, dass dieses Wachstum sehr überzeugend für Verbesserungen genutzt wurde: Während beispielsweise die Promovierenden 2004 lediglich auf Stipendienbasis bei Senckenberg tätig waren, sind heute 56 Doktorandinnen und Doktoranden angestellt. Der Frauenanteil beim wissenschaftlichen Personal stieg von 15 % auf 40 %. Der Anteil von Wissenschaftlerinnen auf Leitungsebene muss allerdings nach wie vor deutlich erhöht werden.

Das Aufkommen an Drittmitteln hat sich ebenfalls sehr positiv entwickelt. Die **Ausstattung** von Senckenberg ist in weiten Teilen sehr gut. Die Infrastruktur-Defizite in Görlitz wurden allerdings bislang nicht beseitigt, obwohl der Senat bereits bei der letzten Evaluierung nachdrücklich eine Verbesserung durch die zuständigen staatlichen Geldgeber anmahnte. Insbesondere in Bezug auf die räumliche Unterbringung besteht hier dringender Handlungsbedarf. Die Planungen zu einer Ersatzbeschaffung für den **Forschungskutter** Senckenberg konnten nicht überzeugen. Zusätzliche Mittel für diese Beschaffung werden nicht empfohlen.

Der Generaldirektor leitet Senckenberg ausgezeichnet. Er hat der Einrichtung seit seinem Amtsantritt 2005 deutliche Impulse gegeben und die Wachstumsphase umsichtig gesteuert. Bei der **Leitung** wird er von einem fünfköpfigen Direktorium sehr gut unterstützt. Seit 2011 ist ein neuer Verwaltungsleiter im Amt, dem eine weitergehende Professionalisierung der Verwaltungsabläufe gelungen ist. Der eingeschlagene Weg zur organisatorischen, administrativen sowie inhaltlichen Integration muss nun konsequent weiterverfolgt werden. In den nächsten Jahren sollte auch verstärkt auf die Einbindung des Standorts Wilhelmshaven geachtet werden.

Senckenberg ist inzwischen in sieben Bundesländern präsent. Die Einrichtung hat es geschafft, durch standortübergreifende Programme eine gemeinsame wissenschaftliche Struktur zu erzeugen. Für die weitere Integration und **Steuerung** wäre es sehr hilfreich, wenn Entscheidungen über die Mittelverwendung nicht mehr an Landesgrenzen gebunden wären. Die staatliche Seite sollte hierfür die Voraussetzungen schaffen. Darüber hinaus sollte geprüft werden, ob vor dem Hintergrund des starken Wachstums der institutionellen Förderung in den vergangenen Jahren eine Vereinfachung der Gremienstrukturen innerhalb der *Senckenberg Gesellschaft* möglich ist.

Der **Wissenschaftliche Beirat** nimmt seine Aufgaben engagiert wahr, sollte sie allerdings zukünftig stärker auch im Sinne einer strategischen Beratung auf Ebene der neu gestalteten Gesamteinstitution verstehen.

Senckenberg erfüllt die Anforderungen, die an eine Einrichtung von überregionaler Bedeutung und gesamtstaatlichem wissenschaftspolitischem Interesse zu stellen sind. Im Zu-

sammenspiel von Forschungs-, Sammlungs- und Vermittlungsauftrag erbringt Senckenberg Leistungen, die in dieser Form von einer Hochschule nicht erbracht werden können. Die Eingliederung in eine Hochschule wird daher nicht empfohlen.

2. Zur Stellungnahme der SFN

Der Senat begrüßt, dass Senckenberg 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, die Senckenberg Forschungsinstitute und Naturmuseen als Einrichtung der Forschung und der wissenschaftlichen Infrastruktur auf der Grundlage der Ausführungsvereinbarung WGL weiter zu fördern.

Annex A: Status Report

Senckenberg Forschungsinstitute und Naturmuseen (SFN) Frankfurt/M., Wilhelmshaven, Dresden, Görlitz, Müncheberg

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1. Structure, Tasks and Institutional Environment

Development and Funding

The Senckenberg Gesellschaft für Naturforschung (SGN) was founded in Frankfurt in 1817 as a civil society of dedicated citizens interested in nature. The Society's task is nature research and to make the results of this research accessible to the public. Today, the scientific and museum activities of the Society are bundled in the **Senckenberg Research Institutes and Nature Museums** (Senckenberg Forschungsinstitute und Naturmuseen, SFN).

Since 1954 Senckenberg has received joint public funding by the Federal and *Länder* Governments (Königsteiner Abkommen). In 1977 it became one of the institutions on the "*Blaue Liste*" (which subsequently developed into the Leibniz Association). Senckenberg was evaluated by the German Council of Science and Humanities in 1997 and by the Senate of the Leibniz Association in 2006/2007. Following the last evaluation, Senckenberg grew considerably. Today, joint public funding according to AV-WGL¹ applies to the following institutes and research centres:

- Senckenberg Forschungsinstitut und Naturmuseum Frankfurt (SF, Hesse), including:
 - Senckenberg Forschungsstation für Gewässerökologie und Naturschutzforschung in Gelnhausen (Hesse, part of Senckenberg since 1969)
 - Senckenberg Forschungsstation Grube Messel in Messel (Hesse, part of Senckenberg since 1992)
 - Senckenberg Forschungsstation für Quartärpaläontologie Weimar (Thuringia, part of Senckenberg since 2000)
- Senckenberg am Meer in Wilhelmshaven (SaM, Lower Saxony, part of Senckenberg since 1928), including:
 - Arbeitsstelle des Deutschen Zentrums für Marine Biodiversitätsforschung Hamburg (Hamburg, part of Senckenberg since 2001)
- Senckenberg Deutsches Entomologisches Institut Müncheberg (SDEI, Brandenburg, part of Senckenberg since 2009)
- Senckenberg Naturhistorische Sammlungen Dresden (SNSD, Saxony, part of Senckenberg since 2009)
- Senckenberg Museum für Naturkunde Görlitz (SMNG, Saxony, part of Senckenberg since 2009)

Responsible departments at *Länder* level:

- Hesse State Ministry for Research and Arts (Hessisches Ministerium für Wissenschaft und Kunst)

¹ Administrative Agreement between the Federal and *Länder* Governments with regard to the joint funding of member institutions of the Leibniz Association.

- Thuringia Ministry for Education, Science and Culture (Thüringer Ministerium für Bildung, Wissenschaft und Kultur)
- Saxonia State Ministry for Research and Arts (Sächsisches Staatsministerium für Wissenschaft und Kunst)
- Lower Saxony Ministry for Science and Culture (Niedersächsisches Ministerium für Wissenschaft und Kultur)
- Hamburg Senate Department for Science and Research (Senatsbehörde für Wissenschaft und Forschung Hamburg)
- Brandenburg Ministry for Science, Research and Culture (Ministerium für Wissenschaft, Forschung und Kultur des Landes Brandenburg)

Responsible department at federal level: Federal Ministry of Education and Research (Bundesministerium für Bildung und Forschung, BMBF)

Legal form and organisation

The Senckenberg Gesellschaft für Naturforschung (SGN), a non-profit civil society, is the so-called “Trägerverein” of the Senckenberg Forschungsinstitute und Naturmuseen (SFN). The number of Senckenberg Society members increased from 3,900 in 2004 to almost 5,000 in 2012. The Society’s organs and bodies are the Members Assembly (Mitgliederversammlung), the Administration Board (Verwaltungsrat) with its Executive Committee (Präsidium) and the Board of Trustees (Kuratorium).

The operational body of both the Society (SGN) and SFN is the Board of Directors (Direktorium). It consists of the Director General as its chair and up to five elected members (for their specific responsibilities see Appendix 1: Organisational chart), including the Administrative Director. The Board of Directors meets about once a month. The Scientific Committee (Wissenschaftsausschuss) supports and advises the Board of Directors on all scientific matters. It consists of the department heads and up to nine members elected by all Senckenberg scientists.

The supervisory body of SFN is the SFN-Board. It is a subcommittee of the Administration board and consists of the members of the Präsidium, of three representatives from the responsible *Länder* departments (Hesse, Saxonia and one of the other, following a rotational system) and one representative from the responsible Federal department (holding three votes). The SFN-Board supervises the work of the management by the Board of Directors (concerning SFN). For example it approves the business plans and annual accounts, proposes the leading researchers (Director, department heads) and the members of the Scientific Advisory Board to the Administration Board. The SFN-Board normally meets three times a year.

The Scientific Advisory Board (SAB) of SFN consists of up to nine external scientists, including international expertise. Its duty in particular is to assess Senckenberg’s research programmes, to monitor their success and to consult with the Board of Directors and the SFN-Board on all strategic scientific issues. Advisory Board members are elected for four years. Re-election is possible once. The Advisory Board meets twice a year. The chairperson of the SAB is a permanent guest of the SFN-Board.

Mission and Research structure

Senckenberg's mission is

- to perform integrative natural history research (1),
- to maintain and develop natural history collections as research infrastructures for the international scientific community (2),
- to communicate the results of its research to the public through its museums, exhibitions and publications (3),
- to educate in the fields of natural history research and scientific collection management (scientists and technicians) (4).

Senckenberg sees its distributed structure (with institutes, research centres and departments in six of Germany's *Länder*) as a strategic advantage, supporting region-specific research, development of collections, and public outreach.

On the organisational level Senckenberg adopted a matrix structure. The institutes, research centres and their departments form the operational, logistic units with managerial and infrastructural tasks, while the "products" delivered by Senckenberg are organised in three programmes: Research (corresponding to mission 1), Infrastructure (corresponding to mission 2), and Science and Society (corresponding to missions 3 and 4). This matrix structure, according to Senckenberg, enhances flexibility and synergy concerning the products, while at the same time allowing to maintain and cultivate the expertise, regional traditions and competencies of the institutes. In the matrix structure, the public funds are allocated to the programmes and then distributed to the operational units (institutes, departments) according to their contribution to the programmes and their subunits. The review process is organised along these three programmes and their 14 subunits.

The Research Programme comprises four research fields (RF), each containing between two and four research activities (RA; for more detailed information see Chapter 3):

Research Field I: Biodiversity and Systematics with Research Activities 1) Taxonomy and Systematics, 2) Evolution and Biogeography, 3) Morphology and Function

Research Field II: Biodiversity and Ecosystems with Research Activities 4) Long-term Ecosystem Research, 5) Applied Ecosystem Research

Research Field III: Biodiversity and Climate with Research Activities 6) Evolution and Climate, 7) Biodiversity Dynamics and Climate, 8) Adaptation and Climate, 9) Ecosystem Services and Climate

Research Field IV: Biodiversity and Earth System Dynamics with Research Activities 10) Deep Time – Evolving Earth and Paleoenvironments, 11) Marine (Bio-)sedimentary Systems, 12) Human Evolution and Paleoenvironment

The Science and Society Programme (13) comprises the focus fields "Museums", "Scientific Service" and "Knowledge Transfer".

The Infrastructure Programme (14) includes four focus fields linked to the maintenance and appropriation of collections, central laboratories (incl. data and modeling centre), large scale experimental facilities (incl. research vessel) and libraries.

Senckenberg has four central departments (“staff departments”): Service and Administration, Communications, IT-Services and Central Museum Development.

National and international scientific environment

According to Senckenberg, its peers are the major national and international Natural History Museums (such as Museum für Naturkunde Berlin and Zoologisches Forschungsmuseum König Bonn in Germany, The Natural History Museum London, The American Museum of Natural History New York or the Field Museum Chicago) and also other research institutions that follow an earth system approach similar but complementary to Senckenberg. In Germany, these are the Alfred-Wegener Institut Bremerhaven (AWI), GEOMAR Kiel, the Umweltforschungszentrum Halle-Leipzig (UFZ), the Geoforschungszentrum Potsdam (GFZ), and the Max-Planck-Institut für Meteorologie in Hamburg. With respect to these peers, Senckenberg sees itself as unique because of

- The explicit geobiodiversity approach for analysing biodiversity and its interactions with the other components of the earth system
- The interdisciplinary research field “Biodiversity and Climate,” including BiK-F
- Its efforts in developing the field of “Human Evolution and Paleoenvironment”
- Research disciplines that are, according to Senckenberg, not (or only marginally) integrated in other German peer institutions, such as botany, mycology, soil biology, environmental protection, marine research, isotope geochemistry
- Modeling approaches (from species to coupled ocean-biosphere-atmosphere modeling)
- Social-ecological research through cooperation with the *Institute for Social-Ecological Research* (ISOE) Frankfurt
- Marine and continental long-term biodiversity data series
- Its infrastructure including the largest natural history collections in Germany and a research vessel.

National interest and justification for funding as a non-university institution

Senckenberg sees its supra-regional significance and relevance for national science policy in the broad research programme responding to scientific and societal needs and addressing major international challenges such as biodiversity loss and protection in a changing climate. Correspondingly, major national and international research projects have been initiated and coordinated by Senckenberg. The rationale for funding Senckenberg as a non-university institution is, according to Senckenberg, its mission that differs from a typical university mission; with its organism-, collection- and long-term field-based approach Senckenberg states that it acts in an interdisciplinary way and complements university research.

2. General concept and profile

Development of the institution since the last evaluation

In 2009, Senckenberg grew considerably when it merged with the Deutsches Entomologisches Institut Müncheberg, the Staatliche Naturhistorische Sammlungen Dresden, and the Museum für Naturkunde Görlitz. According to Senckenberg, this has resulted in about a doubling of the research staff and increased the number of collection items from about 22 to 38.5 million collection units (specimens and series).

A further impetus for growth started in July 2008 with the establishment of the LOEWE Biodiversität und Klima Forschungszentrum Frankfurt (BiK-F), employing about 150 staff members today. In 2009, based on a cooperation in palaeoanthropology, Senckenberg and Tübingen University established a joint research centre to study the evolution and interaction of humans and their environments using the approaches of both natural and cultural sciences (HEP Tübingen).

Linked with these various growth phases, Senckenberg has adopted a matrix structure (see above) as well as a new governance structure distinguishing more clearly between operational and supervisory bodies. A major building and infrastructure programme was established (see below).

Senckenberg has broadened and “modernised” its methodological spectrum (see Chapter 3.14 Infrastructure). A hierarchical lab concept was developed, ranging from the “central laboratories” providing specific support to the entire Senckenberg institution to “site laboratories” offering support for the various Senckenberg sites, and “group laboratories” primarily used by single working groups.

The growth of the collections necessitated to standardise collection management and coordinate collection strategies. The SeSam database is important in this respect. Two new collections have been established at Senckenberg over the past years: a DNA archive (located at Senckenberg Frankfurt) and a Tissue Bank (at Dresden).

In 2005, at the time of the last evaluation, Senckenberg operated one museum in Frankfurt with about 6,000 m² exhibition space. With the Wolfgang Steubing building in Frankfurt (an additional 800 m²) and the museums in Dresden (ca. 500 m² for special exhibitions in *the Japanische Palais*) and in Görlitz (1,200 m² of exhibition space) Senckenberg operates nearly 9,000 m² exhibition space today allowing for the development of more and larger special exhibitions.

Results

Research: During the reporting period 2010-2012, on average, just under 900 publications by Senckenberg scientists appeared annually. Some 440 papers per year were published in ISI listed peer-reviewed journals, including 23 papers in the top research journals (five in *Nature*, five in *Science*, nine in *PNAS*, two in *Nature Geoscience*, one each in *Nature Climate Change* and *Nature Chemical Biology*). Another 150 papers per year appeared in peer-reviewed non-ISI listed journals (see Appendix 2 for details).

After the integration of the institutes in Dresden, Görlitz and Müncheberg, Senckenberg decided to restructure its publication portfolio. It established international editorial

boards, relaunched three journals and discontinued another five that had the same or a similar scope. Currently, Senckenberg publishes nine scientific journals, three of which have impact factors and two further ones are registered for impact factor tracking. One journal (Arthropod Systematics & Phylogeny) ranges among the top ten of its ISI category (Entomology). All journals (except for the two journals published by Springer) offer Open Access format.

Senckenberg scientists were invited to give numerous keynote lectures at conferences, congresses or workshops and they served as members in the scientific committees of conferences. 36 major conferences were hosted at Senckenberg locations and organised by Senckenberg staff.

According to Senckenberg, essentially all scientists are engaged in scientific societies, review panels of funding organisations, as well as in scientific advisory boards of research institutions.

Infrastructure: The number of guest researchers working with the collections averages 500 visitors per year. A major issue in recent years has been (and will be) the digitisation of collection data and specimens and the online availability of these data. The Senckenberg collection database SeSam serves this purpose and also makes the collection data available via GBIF. From the 38 million collection units, approx. 5.6 million units (15%) are catalogued and 0.7 million units (2%) are available through “SeSam”. Additional online databases have been created (e.g., edaphobase, VegDa, Flora West African Plants). Senckenberg tries to link databases to important data portals (e.g., through a cooperation with Yale University under the framework of Map of Life (MoL)).

About 500 external visitors work in the Senckenberg laboratories each year. The research vessel is used by internal (90%) and external (10%) users. In the reporting period, it had, on average, 160 operating days per year.

Science and Society: In 2010-2012, the three Senckenberg museums had, on average, about 540,000 visitors per year. The museums place particular emphasis on the educational service. In the reporting period, it had just under 60,000 guided visitors per year. Also, Senckenberg put particular effort into broadening the spectrum of visitors. For instance, for a programme designed for women from immigrant families and their children, Senckenberg received the “Integration Award” of Frankfurt in 2011.

The Senckenberg museums produced 18 special exhibitions that attracted between 100,000 and 200,000 visitors per year. Most of the exhibitions were subsequently shown in non-Senckenberg museums. The exhibition “Unter unseren Füßen” (“Beneath our feet”, 2004-2010), for instance, produced by Senckenberg Görlitz, travelled through 19 cities in six countries and was seen by more than 500,000 visitors.

Senckenberg knowledge transfer covers a wide range of activities, such as stakeholder workshops, user-group oriented publications and reports. The main target groups are national and governmental bodies, companies and internationally active organisations. Classical consultancy fields include field mapping of flora and fauna and nature conservation.

Senckenberg refers to two spin-off companies, one of them specializing in histological analysis. As the plan is to further develop application-oriented basic research and product-oriented applied research, first steps have been undertaken in cooperation with small and medium local enterprises, such as GenXPro (molecular genetics), ECT (analysis of multiple stressors in nature) and MESOCOSM GmbH (development of mesocosms).

In 2012, 202 press releases were published. Media monitoring for the same year collated 8,800 print articles and 6,900 online articles mentioning Senckenberg (2010: 3,900 and 3,800, respectively). The website was relaunched in 2010. In 2012, it was frequented by more than 720,000 visitors (IP address counts). Social media play an increasing role in Senckenberg's public outreach: In two years, more than 3,000 people receive Senckenberg's Facebook postings and more than 1,500 people follow the Senckenberg tweets.

Senckenberg regularly participates in local or regional events, such as "long nights of science" or "long nights of museums" and organises family days, exhibition openings or awards ceremonies. Scientific lectures aiming at the interested public continue to be popular, particularly in Dresden, Görlitz and Frankfurt. E.g. the Königswald lecture held by a high-ranking palaeoanthropologist attracts more than 200 listeners each year.

Strategic work planning for the next few years

"Senckenberg 2020" is the strategic work planning programme for the near future. It was developed in a bottom-up/top-down process, led by the speakers of the research fields and the Board of Directors, and involved the Scientific Committee, the Scientific Advisory Board and the supervisory boards. "Senckenberg 2020" comprises the three programmes (Research, Science and Society, Infrastructure) and addresses ten major challenges:

- Consolidate the research programme in geobiodiversity and develop the four research fields into sustainable Senckenberg Research Centres (including BiK-F, HEP, see below)
- Develop application-oriented research (e.g. in biodiversity and health, parasitology, biotechnology, bionics or nature conservation)
- Expand important bottleneck methodologies (e.g. bioinformatics and biodiversity informatics) and implement relevant new technologies
- Improve the accessibility and use of the collections and data (i.e. increase the proportion of digitised objects to 20% within the next seven years)
- Secure a backup for Senckenberg's 35 year old research vessel (see below)
- Make the Senckenberg museums more attractive, relevant and research driven
- Expand the science-society interaction and making it more visible (e.g. knowledge transfer will play a considerably larger role)
- Manage the ongoing construction programme and completing it by 2020 (e.g. masterplan I and II)
- Develop the national and international partnerships (e.g. within Leibniz Association, with Yale University, the Institute of Tibetan Plateau Research)

- Improve Senckenberg's institutional management, administration and culture (e.g. by establishing a scientific coordination office, improving human resources development)

Senckenberg plans to integrate the LOEWE Biodiversität und Klima Forschungszentrum Frankfurt BiK-F (see Chapter 3.6-9), a joint venture project of Senckenberg, Goethe University Frankfurt, the *Institute for Social-Ecological Research (ISOE)*, and several other partners into the joint public funding framework of AV-WGL. BiK-F is currently funded through the LOEWE Initiative for the Development of Scientific and Economic Excellence of the *Land Hesse* (22.2 million EUR for 2011-2014). Senckenberg is requesting a long-term increase in its institutional funding of 7.5 million EUR per year in its 2015 Programme Budget in the context of a "Ausbaumaßnahme" (in accordance with the Leibniz Association's budget drafting procedures).

Moreover, Senckenberg refers to existing plans to further develop and extend the Research Activity Human Evolution and Palaeoenvironment (see Chapter 3.12) by establishing a Senckenberg Centre for Human Evolution and Palaeoenvironment at Tübingen University. For this, Senckenberg estimates additional joint funding of about 2.5 million EUR per year. To date, the core of RA 12 is the research centre ROCEEH (The Role of Culture in Early Expansions of Humans), carried out in cooperation by Senckenberg with Tübingen University and supported by the Heidelberg Academy of Sciences and the German Academy Programme with about 800,000 EUR per year. It is projected for 20 years (2008-2027). With the founding of the *Centre for Human Evolution and Palaeoenvironment* at the University Tübingen (HEP Tübingen) in 2009, this collaboration was expanded and intensified. It is financed by Senckenberg, as of 2012 together with the Ministry of Science, Research and the Arts Baden-Württemberg. In June 2013, Senckenberg, University and Ministry signed a cooperation agreement concerning the foundation and operation of HEP Tübingen.

The Research Vessel Senckenberg enables long-term monitoring of biodiversity and coastal zone changes. Due to its advanced age, Senckenberg sees it as necessary to replace the vessel within the next ten years. According to Senckenberg, a new vessel costs approx. 25 million EUR. The vessel has undergone a major refitting over the course of the past three years.

Appropriateness of facilities, equipment and staffing

In 2012, the total revenue of Senckenberg was approx. 67 million EUR. The joint institutional funding by the Federal and *Länder* Governments was 31 million EUR. The share of revenue from project funding grants in relation to joint institutional funding was 31 percent (13 million EUR) in 2012. For detailed information see Appendix 3.

For third-party funds, Senckenberg aims at an average ratio of 30 to 40 percent of the core institutional funds. A department is expected to raise an average of annual funds that equals the number of its scientists (FTE) paid by institutional funding times 50,000 EUR. As further encouragement to apply for additional funds, Senckenberg has set incentives (e.g. a bonus equivalent to about 50 percent of the overhead for DFG grants).

In addition, Senckenberg has income from entrance fees and donations and it receives means for building operations. The Senckenberg Society contributes between 1 and 2 million EUR per year. Thus, Senckenberg sees its facilities and infrastructure as very good to excellent, with the following exceptions:

Buildings:

Frankfurt: Completion of Masterplan I will improve the building infrastructure for research and collections (increase from 14,000 m² to 24,000 m², climatisation for collections). Funding has been secured (117 million EUR) and the planning phase is nearly completed. Construction work is scheduled to begin in 2014 and expected to last until 2018. In order to realise Masterplan II (annex building to the Frankfurt museum), a major fundraising campaign will be launched to raise about 35 million EUR. To date, about 20 million of the required total cost of 55 million EUR is already available through the Senckenberg Gesellschaft für Naturforschung.

Dresden: For Senckenberg it is essential to keep access to the *Japanisches Palais* for special exhibitions and to obtain additional space for permanent exhibitions. A corresponding museum concept has been developed.

Görlitz: Senckenberg sees the actual conditions for research and collections as inadequate; a new building is necessary. Resulting from the integration of the Naturhistorische Museum Görlitz in Senckenberg in 2009, the *Land Saxony* has reserved a sum of 19 million EUR for a new research and collection building. According to Senckenberg, a decision by the *Land Saxony* on the construction site is overdue.

Müncheberg: Although the building is rather new, it lacks modern lab facilities (including molecular labs). Senckenberg suggests to resolve this problem in the context of the appointment of the new Director.

Research Equipment:

All four research fields in the research programme require the expansion of bioinformatics, biodiversity informatics and modeling expertise and infrastructure. Senckenberg sees it as a major challenge to cope with the rapid development in these fields.

Both the IT and Data Centre require major investments in order to meet the growing needs of scientists and research programme. For Senckenberg, the further development of SeSam has high priority.

At present, Senckenberg assesses its lab and research infrastructure, which was made possible through third-party funding, as excellent. The challenge is to secure the necessary funds for regular reinvestments in order to maintain and further develop this standard.

3. Subdivisions of Senckenberg

Research Field I: Biodiversity and Systematics represents Senckenberg's core competence and remains the largest of the four research fields. It reflects the organismic, field- and collection-oriented approach to explore fossil and recent biodiversity as characteris-

tic of Senckenberg. In addition to maintaining expertise in morphology and anatomy, molecular studies, in particular concerning phylogenetic and biogeographic relationships and identification of cryptic species, were made an integral part of the Research Field, including the development of a DNA and tissue collection.

Taxonomy and Systematics (47.2 FTE) are the sciences of discovering, describing, naming and cataloguing organisms and understanding the evolutionary relationships between them. **Research Activity 1** investigates both fossil and extant species from all major habitats around the world. Since the last evaluation, the following strategic research areas have been reinforced: Marine Taxonomy, Molecular Taxonomy, Soil Fauna, Botany, Herpetology, Entomology, Mammalogy.

Taxonomy draws on a variety of methods, including characteristics of the genome using molecular technologies, morphology using multiple tools for character identification (e.g., SEM, TEM, cLSM), bioacoustics, abundance and habitat data, and data on the geographical location of collecting sites. There is an increasing demand for accurate species identification for the monitoring of ecosystem status and functions. In addition, applications concerning human health, such as identification of vectors and parasites, require the development of methodologies for rapid and accurate species identification. From 2010 to 2012, the scientists described a total of 751 new species, both fossils and living organisms. Descriptions of new genera, higher taxa and revisions for a wide variety of organism groups have been produced, ranging from comprehensive studies to revisions of type material etc. Examples include extensive re-descriptions of the type specimens of fishes.

Due to personnel changes and updates in methodology and infrastructure during past years, RA1 will be restructured into Basic Taxonomy and Systematics, Method development for Taxonomy and Systematics, Applied Taxonomy and Systematics (starting in 2013).

In **Research Activity 2: Evolution and Biogeography** (17.8 FTE) morphological and molecular methods are used across a broad range of taxa to elucidate the evolution of the observed diversity of life and to explain the observed distribution patterns. Investigations on hybridisation and on the evolution of new species (speciation) used molecular genetic tools, such as population genetic and phylogeographic approaches.

RA2 has contributed phylogeographic studies (in slow- and fast-dispersing terrestrial organisms), insights in hybridisation processes (e.g. in botany and zoology) and in the evolution of symbiotic interactions and systems (in lichen-forming fungi). Much work has been devoted to the problem of biogeography and the latitudinal diversity gradient, i.e. the observation that local species diversity decreases from the equator toward the poles. The RA is involved in compiling classic species distribution data (e.g. Burkina Faso). These are managed in databases and GIS applications and analysed with various statistical tools.

The advancement of aDNA techniques will place a new emphasis on the use of historical museum specimens for phylogeographic studies. Next-generation sequencing in combination with DNA extracted in the aDNA laboratory is a promising path to follow. How-

ever, this approach will also require the development and refinement of minimally invasive sampling techniques for maintaining and preserving museum specimens.

Research Activity 3: Morphology and Function (7.4 FTE) combines morphological projects to uncover structural patterns, from anatomy to cell structure, in numerous vertebrate, arthropod, and invertebrate taxa, both extant and extinct. Besides structure, the core questions concern function, comparison, change in ontogeny, and change in evolution.

In one of the major research topics on hard anatomy in mammals, teeth were of particular interest. Extensive research on primates stimulated the development of new methods, such as the Occlusal Fingerprint Analyser (OFA). A series of papers explored the morphology of the ear region in fossil bats in relation to their ability to fly. Another major research topic focuses on the comparative anatomy of higher insect taxa. An example were the studies on the postabdomen of insects, in particular female genitalia.

In the next few years, RA3 will aspire to build bridges to rising research branches, such as epigenetics and bionics.

Research Field II: Biodiversity and Ecosystems focuses on two activities to make maximum use of Senckenberg's core competence (see RF I above), complementing it with ecological research.

Research Activity 4: Long-term Ecosystem Research (12.5 FTE) conducts Senckenberg's long-term studies in terrestrial (e.g., City of Frankfurt, West Africa), freshwater (Rhine-Main-Observatory), and marine ecosystems (e.g., North Sea, Arabian Seas, Japan Sea). In the last few years, the expertise was expanded to soilzoological studies (e.g., floodplains of the Rhine River, re-cultivated soils in Upper Lusatia), as well as to deepwater coral studies along continental margins. These long-term ecosystem studies (over several decades) cover both biotic and abiotic parameters.

The main goal of the studies is to detect and explain long-term trends in biodiversity patterns and ecosystems. Senckenberg's long-term studies are defined as those that last over a period of at least ten years and that ensure the continuity and comparability of sampling designs, dates and methods. The data are compiled in a meta-database, as well as in individual databases.

In the next few years the group aims at enhancing the comparative analyses of long-term data across terrestrial, freshwater and marine systems.

Research Activity 5: Applied Ecosystem Research (21.9 FTE) works on the conservation, monitoring and management of species and ecosystems. The research focus is on biodiversity and ecological processes, based on taxonomic and species distribution knowledge.

The group is involved in administrative and political advisory boards, foundations and NGOs, and various national and international capacity-building activities, as well as in national, European and global legislation related to biodiversity issues. With its research projects, monitoring activities, and regional biodiversity assessments it contributes e.g. to the *German Conservation of Nature and Landscapes Act* and the *German Federal Soil*

Protection Act. In the EU *Marine Strategy Framework Directive* RA5 is working on the development of new indicators and monitoring concepts for the German Bight.

In the next few years, the group will work on the development of new methods and standard protocols for ecosystem assessments and biodiversity monitoring. It will further intensify the work on the construction and extension of biodiversity databases (e.g. Edaphobase) and the use and management of large-scale datasets.

Research Field III: Biodiversity and Climate has grown most strongly among the four research fields in recent years and presently corresponds to the LOEWE Biodiversity and Climate Research Centre (BiK-F; for funding and integration plans see Chapter 2) and the Quaternary Research Station Weimar.

Research Activity 6: Evolution and Climate (23.1 FTE) addresses how Earth Surface processes interact with climate, biodiversity, and ultimately the evolution of the genome on geological timescales (10^3 to 10^6 years). The group focuses on biotic (adaptation, speciation, species turnover rates) and geologic processes (proxy-based [palaeo-]temperature and rainfall reconstructions) and associated ecosystem changes in marine and terrestrial environments.

The expertise of RA 6 in earth surface processes (e.g. stable isotope palaeo-altimetry) led to results on the impact of landscape development and mountain building, on atmospheric circulation and rainfall patterns, species' range shifts, and the development of terrestrial ecosystems, in particular of the Quaternary. In genomics/phylogenetics, e.g. a population genomic study in brown and polar bears demonstrated that hybridisation affected their evolution, for decades leading to misinterpretation of their history. In palaeoenvironmental reconstructions, e.g. palaeobotanical investigations provided information on natural vegetation changes, climate variations and human activities on the Asian continent during the Late Pleistocene and Holocene.

One major challenge and task for RA 6 will be to integrate time-calibrated phylogenetic and phylogenomic trees with data on earth surface modifications and climate histories and detect cause-effect relationships between landscape and climate change, as well as evolutionary patterns.

Research Activity 7: Biodiversity Dynamics and Climate (32 FTE) addresses the influence of climate on the abundance and geographic ranges of species, ecological communities and ecosystem functions over ecological timescales (10^0 to 10^3 years) in the terrestrial, freshwater, and marine realm. Investigated ecosystem functions include feedbacks from the biosphere on climate dynamics.

RA 7 develops and tests models for projecting potential impacts of climate change on biodiversity and ecosystems. As one example, analysis of the long-term time series on the abundance of marine benthos organisms revealed that species with northern distributions are becoming increasingly rare, and that species with southern distributions are becoming more abundant. To quantify the dispersal ability of plant species, RA 7 combined movement data of birds with data on the gut passage times of seeds to model seed dispersal distributions in habitat types with a different degree of human disturbance.

In the next few years RA 7 will focus on the integration of different fields of empirical research (e.g. community ecology, analysis of collection data and long-term time series) with different types of models from the biological and geosciences (e.g. modelling of the abundance and geographic distributions of species, ecosystem and climate modelling).

Research Activity 8: Adaptation and Climate (17.3 FTE) addresses the issue of evolutionary and phenotypic adaptation at the level of individuals, populations, species, and ecological communities. It has a strong focus on research involving experimentation under controlled conditions (e.g., in terrestrial model ecosystems), and development of genetics and genomics tools to address adaptation and the adaptive potential of organisms. This research activity has greatly expanded with the foundation of BiK-F in 2008. The corresponding experimental systems were established during the past 5 years.

RA 8 established and published a multitude of genetic, genomic and experimental results – including whole genome sequences and transcriptomes – for a range of non-model organisms, including water-fleas, insects, molluscs and vertebrates. Also, the influence of past and present climate on the distribution of genetic diversity within species has developed into a productive part of the research activity. The foremost result in RA 8 was the establishment of reliable and fast methods to assess the community composition under different climate conditions.

In the next few years, the group aims at developing genomic tools for assessing adaptation, integrating molecular diversity assessment and modelling, and analyzing high resolution community metabarcoding data with the latest approaches in ecological community analysis.

Research Activity 9: Ecosystem Services and Climate (3.3 FTE) fosters a social-ecological perspective on climate-driven biodiversity change. This research field is new at Senckenberg. Its intellectual capacity lies mainly with the *Institute for Social-Ecological Research* (ISOE), one of the partners of LOEWE-BiK-F.

For analysing the complex interactions between nature and society, the group developed a research framework that relies on the concept of social-ecological systems (SES). The application of the SES model was tested e.g. in a case study on plant species (providing economically important Non-Timber Forest Products) in Benin in which economic household data were combined with species distribution modelling to predict the potential impact of future climate change on household income.

One element of the work planning for the next few years is to develop recommendations for policies and practice in order to support a sustainable management of ecosystems under climate change. Here, the focus will be on non-monetary values of ecosystem services and governance aspects.

The **Research Field IV: Biodiversity and Earth System Dynamics** has a long tradition at Senckenberg, but it recently expanded its scope through the integration of Senckenberg Dresden and Görlitz (2009) and the establishment of the ROCEEH programme and HEP-Tübingen (see RA 12).

The recently established **Research Activity 10: Deep Time – Evolving Earth and Palaeoenvironments** (17.7 FTE) combines two major research topics: The early abiotic evolution of the earth system, starting with the formation of the solar system, and the analysis of pre-Quaternary ecosystem dynamics considering both abiotic and biotic processes. The group focuses on climatically critical periods of the distant geological past, related to greenhouse or icehouse conditions that can be studied in sedimentary archives and through Senckenberg collections.

Parts of RA10 attained scientific impact through two UNESCO-hosted International Geoscience Programme projects (IGCP 497, 499) under the leadership and coordination of Senckenberg. Palaeozoic projects lead to the perception that fire appears to have played a major role in ecosystem disturbance during the Permian transition from global icehouse to greenhouse climate. Also, results obtained in cooperation with international research groups regarded the petrology, mineralogy and chemical and isotopic composition of meteorites. Worth mentioning are also two major Sino-German cooperation projects (DFG Priority Programme 1372 TIP, BMBF programme CAME) under the leadership of Senckenberg scientists.

For the next few years, the main focus will be on the abiotic evolution of the early earth and on the evolution of selected groups of organisms and palaeoecosystems during the Palaeozoic, the Cretaceous and the Palaeogene in relation to geological processes. One aim is to understand the vulnerability of different ecosystems to changing geodynamic boundary conditions.

Research Activity 11: Marine (Bio-)sedimentary Systems (8.0 FTE) analyses modern marine sedimentary systems and processes including human impact. The main targets are clastic and biosedimentary environments in coastal seas, shelf seas and continental margins.

The major research topics are long-term coastal evolution and short-term morphodynamics, linking physical properties of sediment grains and bodies with the hydraulic tidal regime in order to identify sediment transport processes and to quantify budgets of sediment accumulation versus erosion along the German Wadden Sea coast. Another research topic, which received strong funding support (EC, DFG) are cold-water coral (CWC) reefs.

Research in the next few years will focus on hydroacoustic, terrestrial and airborne-based technologies to interpret the morphodynamics and habitat patchiness in extreme shallow water and adjacent terrestrial area. In Research on cold-water corals, a focus will be on sedimentary processes, sclerochronology and ultra-structures.

The goal of **Research Activity 12: Human Evolution and Palaeoenvironment** (10.3 FTE) is to identify and disentangle the interdependent processes driving the biological and cultural evolution of humans and their ancestors in the context of changing palaeoenvironments. Thus, the basic research question is similar to that of RA 10, but focused on human-environment interaction and considerably shorter time scales; it is therefore also closely connected to RA 6.

In RA 12, in order to integrate expertise in the fields of cultural and physical anthropology, palaeogenetics and palaeoenvironmental reconstruction, Senckenberg closely cooperates with Tübingen University. The interdisciplinary research project ROCEEH (The Role of Culture in Early Expansions of Humans), funded by the Heidelberg Academy of Sciences and Humanities, occupies a central position in this cooperation. In 2009, the foundation of the *Centre for Human Evolution and Palaeoenvironment* at the University Tübingen (HEP Tübingen) expanded and intensified it.

For Senckenberg's integration and development plans see chapter 2. The work planning of RA 12 for its research in human evolution includes environmental impact and culture, adaptation, subsistence and health, and behaviour.

Science and Society programme (13; 67.1 FTE)

With its three **museums** and now almost 9,000 m² of exhibition space, Senckenberg regularly attracts more than 500,000 visitors per year (for more information see Chapter 2). The target group of the museums is the general public, with a clear focus on families with children ("family museum"). The museum exhibits are based on Senckenberg's research and collections. The didactic concept focuses on objects and originals. It is planned to put on at least one larger special exhibition per year in Frankfurt and Dresden. The near future will be characterised by the building project to enlarge the Frankfurt museum by about 6,000 m². This "Masterplan II" is based on a new museum concept, comprising the four key topics, "Cosmos – Earth – Man – Future", and will also include a planetarium (for more information on the building situation see Chapter 2).

The **scientific service** component comprises a number of different activities, including education and "The Senckenberg School" (for more information see Chapter 6), Senckenberg publications (see Chapter 2), links to Natural History Societies and Citizen Science and support for marine biodiversity expeditions.

The focus field **Knowledge Transfer and Social-ecological Dimensions** develops knowledge for action and implementation from Senckenberg research and provides policy advice on various national or international levels. It was first developed and implemented in 2008 within the Biodiversity and Climate Research Centre through the strategic cooperation with the *Institute for Social-Ecological Research* (ISOE) and has now been expanded to all Senckenberg research fields. Internal knowledge transfer represents a new activity in Senckenberg, developed since the last evaluation. It strives to convey and disseminate newly developed in-house ideas, concepts and methodologies into all Senckenberg institutes.

Infrastructure programme (14, 116.1 FTE)

The scientific **collections** represent the key infrastructure for investigating changes in bio- and geodiversity in space and time. According to Senckenberg, with about 38 million collection units (specimens and series), it houses the largest natural history collection in Germany, ranking among the top five worldwide. The oldest Senckenberg collections date back to the 16th century. The type specimens which define the name of a systematic

group (e.g., a species) represent special scientific treasures. The number of such type specimens in the Senckenberg collections is estimated at far over one hundred thousand. The large differences in collection materials and organisms require a broad range of collection and conservation types, e.g., preservation in alcohol, glycol, at ca. -80 °C, as skins, skeletons or just as dried specimens. This necessitates adequate building, climatisation, and monitoring infrastructure. Appropriate storage and development of scientific collections must be paralleled by thorough scientific and technical curation.

An important effort centres around online access to specimen data and digital imagery, which is provided already for a part of the Senckenberg collections through the collection database SeSam. The collections are searchable online, and samples (including DNA samples) can be ordered under special conditions.

The Senckenberg **laboratories** include:

- The Geochronology lab at Senckenberg Dresden, determining the timing and rates of orogenic processes. For Senckenberg it is an important tool in placing firm age constraints on reconstructions of palaeobiodiversity
- The BiK-F Laboratory Centre (established in 2009), providing service in high-throughput Sanger-DNA sequencing and fragment analysis, automated DNA/RNA/protein extraction, and genomics.
- The Goethe University-BiK-F stable isotope facility (established in 2011), providing an important link between biological and geological sciences (e.g. measuring the “clumping” of CO₂ isotopologues as a proxy for palaeotemperatures in carbonates)
- The Data and Modeling Centre (DMC) has been installed as part of BiK-F. It cooperates closely with Senckenberg IT and gives access to high speed computing, allows data storage of biodiversity and climate data and offers methodological support (e.g. the database SeSam).

Senckenberg runs several **Large-Scale Experimental Facilities**, such as

- The research vessel Senckenberg, specially equipped to facilitate research in the North and Wadden Seas
- The long term ecological research (e.g. LTER Rhine-Main Observatory) and mesocosm laboratory, offering technology to test hypotheses gained from field observations and modelling in an experimental setup
- The Messel fossil site (declared a UNESCO World Heritage Site) and other biological research stations (excavation sites, field stations)
- The DFG Biodiversity Exploratories (since 2013)

Libraries: According to Senckenberg, the distributed structure of institutes requires local library solutions that permit direct access to pertinent literature at the level of the individual departments. In Frankfurt, to optimise access and minimise costs, Senckenberg joined forces with Goethe University to establish the joint library *Johann Christian Senckenberg*. The libraries at Dresden, Görlitz and Müncheberg constitute important

regional centres of information with different scientific foci (zoological and geoscientific, entomological and soil biological).

4. Collaboration and networking

Since the last evaluation, **cooperation with universities** intensified considerably. In 2005 Senckenberg had three joint appointments with Goethe University Frankfurt. Today, it supplies partial or full funding to 17 institutionalised cooperation professors, who are established at 4 universities:

	University	Senckenberg location
1	Bremen	Wilhelmshaven
1	Oldenburg	Wilhelmshaven
1	Halle	Müncheberg (position to be filled)
3	Frankfurt	Frankfurt
11	Frankfurt	Frankfurt/BiK-F

In addition, three professors are part of the cooperation project *Human Evolution and Paleoenvironment* (HEP) with Tübingen University (see chapter 2 and 3.12). The cooperation agreement signed in June 2013 provides for joint appointment procedures in the future.

Nine Senckenberg researchers have been appointed as extraordinary (außerplanmäßiger) professor or honorary professor:

	University	Senckenberg location
2	Frankfurt	Frankfurt
2	Dresden	Dresden
2	Leipzig	Dresden, Görlitz
1	Jena	Weimar
1	Zittau	Görlitz
1	Tübingen	Frankfurt

A further 10 scientists have passed the Habilitation and are appointed as Privatdozent (Universities Frankfurt, Tübingen, Berlin, Halle, Erlangen, Mainz, Oldenburg).

The professors' teaching load per semester ranges from 2 to 4 (rarely up to 8) weekly teaching hours. Thus, Senckenberg provides considerable teaching input to universities (about 509 contact hours per year).

With Goethe University Frankfurt, Senckenberg cooperates in EU-, BMBF- and DFG-funded research programmes, e. g. BIOTA Africa (2000-2010), SUN (2009-2011), UNDESERT (2009-2015). Senckenberg Dresden is a partner in the *DRESDEN concept network* of the Excellence University TU Dresden. At Senckenberg Görlitz, close cooperation exists with the Universities Halle and Leipzig. It became a founding member of the new *German Centre on Integrative Biodiversity Research* (Forschungszentrum iDiv).

Senckenberg maintains many **international collaborations** with universities (e.g. in Brazil, Mongolia, Venezuela, Burkina Faso, Iran, Saudi Arabia, Panama, Turkey), which are usually based on cooperation agreements between the institutions. These cooperations result in joint applications, exchange of scientists and doctoral students, and joint field work and are funded by organisations such as EU, German Academic Exchange Service (DAAD), Alexander von Humboldt-Stiftung, the BMBF, and others. The universities and research collections in countries of high biodiversity are the most alluring partners for Senckenberg, and colleagues from these countries have a strong interest in cooperation with Senckenberg to educate and train biodiversity researchers and collection curators. According to Senckenberg, there is a long tradition of supervision and training of doctoral students from these countries. A particularly strong collaboration exists with Yale University within the framework of the *Map of Life initiative*.

The cooperations with **other domestic and international institutions** include, among others, Helmholtz Centres (AWI, GFZ, UFZ, GEOMAR), Max Planck Institutes (MPI-BGC, MPI-EVA, MPIO), the marine research networks and the *Long Term Ecological Research – Germany network* (LTER-D). Close cooperation exists with institutions of the Leibniz Association, which has led to joint research projects and applications, e. g., with the natural history museums (MfN, Berlin, and ZFMK, Bonn), the Leibniz Institute for Zoo and Wildlife Research Berlin (IZW), and the Bernhard Nocht Institute for Tropical Medicine (BNI). Senckenberg is part of the *Leibniz Research Group Biodiversity* (Leibniz Verbund Biodiversität, LVB).

Senckenberg is represented in various **associations and networks** that intensify contact and coordination between similar institutions and with stakeholders and politicians. On the national level, these include the *Consortium of German Scientific Natural History Collections* (DNFS), the *German Association of Museums* (DMB) and the Society for Biological Systematics (GfBS). Important international organisations in this context include the *Consortium of European Taxonomic Facilities* (CETAF), DIVERSITAS, the *International Council of Museums* (ICOM).

Important aspects of internationalisation at Senckenberg are the accessibility of the collections and the working conditions in the collections. In 2010-2012, approx. 320 **guests** came to the institutes and research centres for more than a week and 200 Senckenberg staff stayed at other institutions.

5. Staff development and promotion of junior researchers

Personnel structure and staff development

At the end of 2012, Senckenberg employed 745 staff, corresponding to 523 full-time equivalents (FTE). Of the 253 staff involved in research and scientific services (210 FTE) 93 were doctoral candidates (on staff positions and scholarships). A further 198 staff (175 FTE) work in science support positions (laboratory, preparation, library). At the end of 2012, just over 60 percent of research and scientific staff had fixed-term employment contracts. 50 percent of the working contracts are based on third-party funding, 30 percent within the LOEWE framework (see Appendix 4 for details).

From 2010 to 2012, nine full professors were newly recruited. Senckenberg established 7 Junior Research Group Leader positions. In appointment procedures for professorships (which are governed by the rules and regulations of the associated universities), Senckenberg equally participates in the respective appointment committees. Recruitment of department heads is discussed and finally decided on at the level of the Administration Board of SGN (proposed by the SFN-Board).

Staff development lies within the responsibilities of the department heads and is handled individually at Senckenberg's various locations. The development of a coherent framework for staff development mandatory for all Senckenberg institutes is planned.

Promotion of gender equality

At the end of 2012, the share of women in Senckenberg's research and scientific services was 40 percent. Just above 60 percent of PhD students were female (including scholarship holders). The proportion of women in leading positions was, however, considerably lower (12.5 percent). Within the Programme Budget 2013, Senckenberg has declared target agreements that aim at increasing the proportion of women at specific qualification levels (according to the "cascade model"). In the near future, Senckenberg will specifically focus the gender equality activities on upcoming retirements/vacancies at the level of department heads. To foster women in Science, Senckenberg takes part in several programmes (mentoring, career support, dual career networking). Since July 2013, two of the six members of the Board of Directors are female.

In 2012, Senckenberg has acquired the basis certification of the audit *berufundfamilie* to strengthen and foster the compatibility of work and family life. As of now, Senckenberg has established several measures for increasing family friendliness (e.g. a parent-child room, an emergency care funds) and plans a childcare facility in cooperation with another Leibniz Institute (German Institute for International Educational Research, DIPF). Arrangements and regulations for flexible working time conditions, mobile work and measures to allow parental leave are in preparation. In 2013, the first full-time equal opportunities officer of Senckenberg was elected.

Promotion of junior researchers

By 31 December 2012, a total of 93 PhD students with a Senckenberg contract were working at the institution. Of these, 56 held an employment contract, 14 held internal scholarships and 23 were externally funded (scholarships from e.g. DAAD, A.v. Humboldt Foundation). During the last three years, 56 students have finished their PhD at Senckenberg.

Senckenberg strongly supports participation in coordinated graduate programmes. As one of the outcomes of its 2005 evaluation, it has been instrumental in founding GRADE, the Goethe Graduate Academy at Goethe University Frankfurt. Senckenberg's Director General serves as the head of GRADE. It is open to all Senckenberg PhD students, even from non-Frankfurt locations and offers a specialised programme (GRADE SUSTAIN) that is adapted to the topical interests of Senckenberg PhD students.

The GRADE education and training programme is also available for Senckenberg post-doctoral scientists. At present, Senckenberg offers three types of postdoctoral employment opportunities:

- For Post-doctoral scientists on tenure track positions, employment is initially on a temporary basis. Based on positive evaluation after five years, Senckenberg strives for permanent employment.
- In December 2012, Senckenberg employed 79 post-doctoral scientists on non-tenure track positions, typically financed through third-party funding (mostly LOEWE BiK-F-funded).
- Junior Group Leaders (JGL) are non-permanent scientific staff who manage scientifically independent research groups (six groups funded within LOEWE BiK-F, one through BMBF at DZMB Wilhelmshaven). They are filled for 3+3 years, following a mid-term evaluation.

During the reporting period, three young Senckenberg researchers accepted offers for positions at other research institutions. Another two declined to go elsewhere but accepted professorships at Goethe University/Senckenberg instead.

Vocational training for non-academic staff

The *Senckenberg School for Technical Assistants* was founded in 1961. Every other year, 20 candidates are admitted to the school that follows a dual-study concept: theoretical classes are combined with on-the-job training in various departments and collection types. The granted final degree (Museumstechnische Assistenten) is state-approved. Besides the Senckenberg School in Frankfurt, two additional apprentices (qualifying for media and information services specialist and a qualified IT specialist) obtain their vocational training at Senckenberg Görlitz.

Senckenberg Naturhistorische Sammlungen Dresden and the Senckenberg Naturkundemuseum Görlitz employ scientific trainees (Volontäre) in taxonomy, systematic and geosciences. In 2010-2012, just above 200 pupils and 330 students benefitted from work experience placements at Senckenberg.

6. Quality assurance

Internal quality management

Based on DFG recommendations concerning rules of good scientific practice, Senckenberg has developed its own rules of conduct. They regulate the binding character of the rules of good scientific practice, the organisational structure needed to assure quality control, the storage of primary and secondary data, the determination and responsibilities of the ombudsman and the procedures applicable in case of suspected scientific misconduct.

An important and highly recognised instrument for tracking the performance of the different Research Activities is a set of science and research infrastructure-driven performance indicators (publications, third-party funding, media reports, guest scientists

visiting the respective collection, number of samples processed) that are compiled annually to comply with the reporting needs of the Leibniz Association target agreement and budget plan (Programme Budget).

Senckenberg's collection rules define the best practices for the acquisition of new specimens and collections, maintenance and management of collections, accessibility, transfer and elimination of collection items. At regular intervals, selected collections are evaluated by external experts.

Quality management by the Scientific Advisory Board

The Scientific Advisory Board (SAB) meets twice a year. In 2008, an additional SAB for BiK-F was established. After the first evaluation of BiK-F in the spring 2011, the BiK-F and Senckenberg SAB were united. The Scientific Advisory Board (see also Chapter 2) is a key element in:

- developing and acquiring major new research projects or altering major projects already in place,
- developing and acquiring major infrastructure or investing major funds into existing infrastructure,
- adapting the "Science and Society" and "Research" programmes,
- hiring personnel of strategic relevance (typically department heads and higher organizational levels),
- changing or adapting Senckenberg's structure.

The SAB performs a so-called mid-term review (Audit) that is communicated to the Board of Directors, to the supervisory boards and to the ministries. To obtain a clearer view of the work performance, the chair of the SAB visits the different locations and talks to the scientists; about 5 to 10 of these visits occur every year.

Implementation of recommendations from the last external evaluation

The aim of the last evaluation of the Senate of the Leibniz Association in 2006/2007 was to establish whether the Museum met the requirements for receiving joint funding from Federal and *Länder* Governments and whether the Staatliche Naturhistorische Sammlungen Dresden (SNSD) and the Staatliche Museum für Naturkunde Görlitz (SMNG), evaluated at the same time, should be integrated into Senckenberg. The evaluation report was positive on both issues. The numerous recommendations of the last evaluation were considered by Senckenberg as follows:

Research profile

Senckenberg states having taken up more *overarching themes*, having covered issues across different working groups and research areas and having published conceptual ideas and review articles in high-impact journals. According to Senckenberg, the hypothesis-driven research dominates in the research fields Ecology, Climate, and Earth System Dynamics.

Senckenberg states having followed the recommendation ***not to neglect morphological approaches*** in favour of molecular biology, but to strive for a comprehensive view of the organism and its evolution, taking into account as many feature areas as possible.

As recommended, ***integrative geo-biodiversity research*** in the sense of an Earth system approach now represents the core of Senckenberg's research programme.

Structure and organisation

According to Senckenberg, the ***integration of the numerous divisions into the existing comprehensive topics of the research fields*** has been completed and has led to significant synergies, e.g., in the fields of molecular systematics, soil biology and geosciences.

As recommended, the ***integration of SNSD and SNMG into Senckenberg*** followed the successful role model of the integration of the research station *Quaternary Paleontology* in Weimar.

Senckenberg states that, according to the recommendations, the integration of SNSD and SNMG took place against the background of a strong thematic focus on corporate research priorities and with the aim of creating synergies.

The last evaluation did not support the transfer of the ***Botanical Garden of Frankfurt University*** to Senckenberg. The Botanical Garden is now attached to the Palmengarten of the City of Frankfurt.

Research infrastructure

As recommended, both a ***DNA and tissue archives*** have been established.

The last evaluation report recommended ***establishing a molecular laboratory and molecular evolution research as a separate central facility***. According to Senckenberg, this is to be seen in the context of the new hierarchical lab concept (see Chapter 2). Now, there are central molecular laboratories in Frankfurt, in addition to smaller units in Dresden, Gelnhausen and Wilhemshaven.

The last evaluation regarded the establishment and operation of the ***web application database SeSam*** as positive and necessary. According to Senckenberg, SeSam II is in preparation. Collection managers were employed at several key sites.

The last evaluation report confirmed the necessity of a ***replacement for the research vessel*** and recommended to determine the operating costs in a feasibility study. Senckenberg states that a new vessel would cost approx. 25 million EUR.

Research units/institutes

With the engagement of the new Head of the Division of Marine Botany, the recommendations to have ***marine botany*** represented by a suitable scientist and to quickly and adequately fill the position of the head of the Dinoflagellates division at DZMB have been fulfilled.

The ***relocation of the Department of Limnology and Nature Conservation Research*** into new premises in Gelnhausen was completed in 2006.

In order to better exploit the *Messel Pit* in regard to international visibility in Palaeobotany, Senckenberg states having created two new scientist positions.

The last evaluation recommended the *relocation of the division of Meteorite Research to Dresden*. According to Senckenberg, relocation of the meteorite section to Dresden was considered neither necessary (because of the matrix structure) nor possible (because of contracts with the Max-Planck Gesellschaft and close cooperation with Goethe University). By now, the section Meteorite Research is integrated into the research field Earth system dynamics and has established close cooperation with the geochronology group at Dresden. Within the context of closer collaboration between Senckenberg and the Museum für Naturkunde Berlin, impact and meteorite research have started to develop common research strategies.

Publications, third-party funding

In accordance with the last evaluation, Senckenberg states that a *publication concept* has been developed and quality control has been improved. The number of high-profile publications has gone up and quality/impact of publications is measurably higher (see Chapter 2).

Following a recommendation, a *new concept for the in-house journals* was developed. Publication of five journals was abandoned, another five journals are now SCI-listed. International editorial boards have been established (see chapter 2).

Senckenberg states having achieved a significant increase in *third party funding* (2004: 3.1 million EUR; 2012: 13.3 million EUR).

Collaboration

As recommended, the *Conference of Directors of the Natural Science Research Collections Germany* (DNFS) and the *Consortium of European Taxonomic Facilities* (CETAF) have become institutionalised.

In accordance with the recommendations, Senckenberg drafted a *MSc programme with Goethe University* which has not yet been implemented by the faculty of biosciences. Alternative discussions are being held with TU Dresden. Moreover, Senckenberg states that BiK-F professorships today constitute almost 50% of the MSc “Ecology & Evolution” at Goethe University.

Staff development and promotion of junior researchers

The last evaluation declared the *proportion of women* too low, particularly in leading positions. Senckenberg states having made progress at the post-doctoral level and at the Board of Directors level. At executive scientist level there is still need for improvement (see Chapter 5).

The last evaluation report located *unemployed PhD students*. Senckenberg states that, today, most PhD students are third-party funded. Furthermore, it was recommended to provide additional funding possibilities for PhD students after submission of the dissertation. According to Senckenberg, ensuring the publication of dissertations lies within the responsibility of the heads of departments and divisions.

In accordance with the recommendations, **doctoral seminars and summer schools on a regular basis** are organised in the institutes and research groups. PhD students have access to GRADE and its courses (see chapter 5). Meetings of all Senckenberg PhD students are now being organised by the Young Scientists at Senckenberg.

Concerning the integration of Görlitz and Dresden:

As recommended, the integration of SNSD and SNMG into Senckenberg followed the successful role model of Weimar. According to Senckenberg, the strong corporate identity and tradition of Dresden and Görlitz have been maintained and supported and were framed with a Senckenberg identity. Senckenberg states that meanwhile, both SNSD and SNMG have developed into important assets bringing in not only new expertise but also strong traditions and networks.

According to Senckenberg, both SNSD and SMNG adapted easily to the introduction of the “Programmbudget” and the scientific controlling linked with it.

Research infrastructure

As recommended, the **palaeontological collection** was strengthened with an additional scientist and a modern geochronology laboratory for Uranium-Lead age determinations on rocks and minerals.

In accordance with the recommendations, the **molecular laboratory facilities** have been improved and expanded, including Dresden and Görlitz. The DNA bank and tissue bank were developed in Frankfurt and Dresden, respectively, DNA sequencer as well as lab facilities for aDNA (clean room) were established in Dresden.

The last evaluation welcomed the plans to have a **phylogenetics department**. Senckenberg developed a molecular genetics laboratory concept (see chapter 2). Expertise in bioinformatics is available through contacts to partner universities and through a joint Goethe University and BiK-F/Senckenberg professorship in bioinformatics. Furthermore, via the *DRESDEN-concept network*, the Senckenberg institute at Dresden has access to the Dresden Genome Centre.

In accordance with the recommendations, the chemical and ecological approaches have been strengthened (e.g. through the EDAPHOBASE project). The **chemical lab facilities** have been improved (e.g. a CNS analyzer is now available); however, the building situation in Görlitz prevents the installation of more high-tech lab facilities.

The last evaluation report stated that the **infrastructure of SMNG** is unsatisfactory and that an improvement of the facilities is urgently needed. According to Senckenberg, with the integration of SMNG into Senckenberg in 2009 the *Land* Saxony agreed to provide a new research building for SMNG for which a sum of 19 million Euros was reserved. But until now, no decision was made on the construction site (see Chapter 2).

Senckenberg’s laboratory concept ensures that all sites have access to **molecular lab facilities** (see Chapter 2). As recommended, now at Görlitz, there is a medium sized category I lab actually used by 12 out of 17 sections for their research. However, with a new building for SMNG Senckenberg would further expand the facilities there.

Staff

As recommended, **new section leader positions** for relevant taxa of soil animals (Nematoda, Oribatida) were established, reflecting micro- and mesofauna.

As a result of the last evaluation, a **lichenology curator** could be hired on a permanent basis. According to Senckenberg, his rather ecological research complements the research topics of the Frankfurt lichenologist, who focuses on phylogenetic, phylogeographic and systematic topics, and also includes molecular approaches. The search for a new division head for “mycology” is currently underway; all invited candidates have a strong record in molecular methods.

The last evaluation report recommended **new structures or consolidation of expertise for the geology/mineralogy/palaeontology groups in Görlitz and Dresden** (e.g. the relocation of the department of geology from Görlitz to Dresden). Because of the matrix structure of the Senckenberg research programme, a relocation was not considered necessary nor useful. The geology/palaeontology section in Görlitz has been enforced by two technicians and has developed a focused research agenda which is integrated into the research programme of the Dresden geochronology lab focusing on zircon crystals.

Following a recommendation, according to Senckenberg, the **number of research positions** has been increased by one curator with responsibility for collections (palaeontology) and one population geneticist in Dresden and by 3 curators in Görlitz.

The problem of **one-person-working groups** has been solved through the matrix structure of the research programme. All scientists are integrated into at least one research activity operated by several Senckenberg scientists.

For the **gender issue** see Chapter 5 and above. At SNSD 3 out of 14 and at SMNG 5 out of 17 permanent scientist positions are held by women.

As recommended, the **internships** (“Volontariate”) have been maintained both in Dresden and Görlitz but have been adapted to comply with most recent federal and *Länder* laws. This implies that “Volontariate” should be linked with a training and education programme which is under development.

Following a recommendation, the number of **technical positions** has been increased (plus 9 in Dresden and plus 7 in Görlitz).

Results, publications, third-party funding

Senckenberg states that, as recommended, both SNSD and SMNG have increased their **third-party funding** as well as their **publication record** in peer-reviewed English-language journals (e.g. the EDAPHOBASE project coordinated by SMNG was funded with about 1 million EUR/year for three years).

The last evaluation report recommended **refocusing research** from being primarily descriptive towards more fundamental questions. Senckenberg states, that in this respect, significant progress has been achieved (e.g. via the matrix structure and the integration of SNSD and SMNG into major research projects). Moreover, the increased third-party funding also reflect a move towards more fundamental questions.

Collaboration

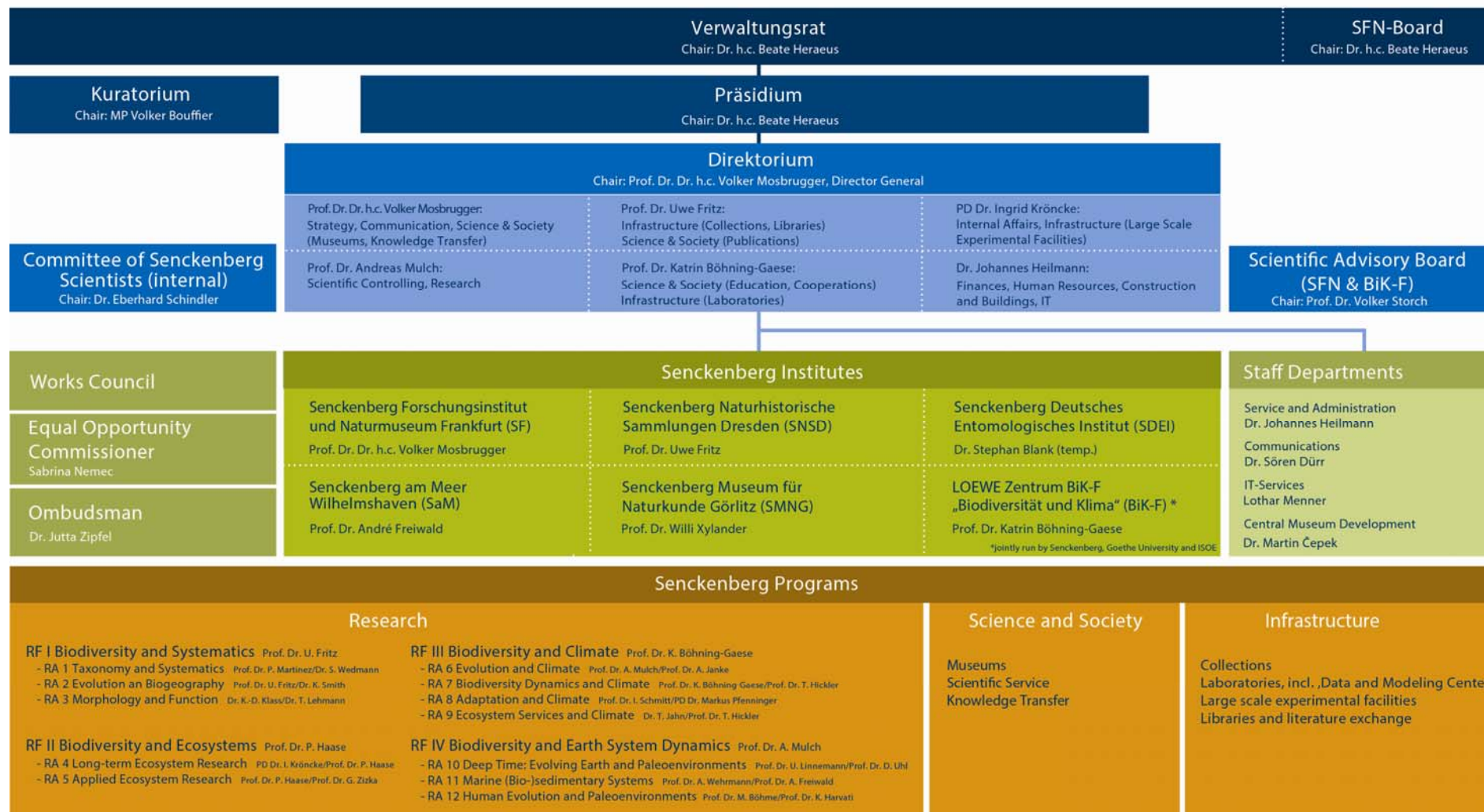
The last evaluation report recommended intensifying **collaborations** with universities (joint appointments). Senckenberg states that by now, all department heads and institute directors of SNSD and SMNG hold a honorary or extraordinary professorship with a university or are “Privatdozent” at a university and thus are involved in university teaching. SNSD is part of *DRESDENconcept* and SMNG is part of the *DFG-Research Centre for Integrated Biodiversity Research (iDiv)* in Halle/Jena/Leipzig (see Chapter 4).

The recommendation to continue to be the contact for **scientists and amateur researchers** is part of the challenges of the Science and Society programme. According to Senckenberg, SMNG and SNSD remain deeply rooted in their societal environment in Görlitz and Dresden, and have been very successful in developing Citizen Science as well as public outreach. Collections in Dresden and Görlitz profit from this linkage with amateur scientists. Regional scientists and amateurs may also attend national and international symposia and workshops held and organised by SNSD and SMNG.

Appendix 1

Organisational Chart

SENCKENBERG world of biodiversity



Appendix 2

Publications and patents

Type of publication	2010	2011	2012 (2013)
Total number of publications	847	943	886 (198)
Monographs	22	7	12 (3)
Individual contributions to edited volumes	94	144	98 (11)
Articles in ISI-reviewed journals	397	450	477 (155)
Articles in peer-reviewed, non-ISI journals	142	153	156 (20)
Articles in other journals	187	183	140 (8)
*Work and discussion papers	28	20	25 (1)
Editorship of edited volumes	5	6	3 (1)
Number of publications (excluding *) per FTE "Research and scientific services" (without Doctoral students, according to Annex 4)	4.7	5.2	4.9 (1.1)

Appendix 3

Revenue and Expenditure

Revenue		2010			2011			2012 ¹⁾		
		K€	% ²⁾	% ³⁾	K€	% ²⁾	% ³⁾	K€	% ²⁾	% ³⁾
Total revenue (sum of I., II. and III.; excluding DFG fees)		50244			61256			66668		
I.	Revenue (sum of I.1., I.2. and I.3)	33520	100 %		45422	100 %		43623	100 %	
1.	Institutional funding (excluding construction projects and acquisition of property)	25148	75%		28672	63%		30279	69%	
1.1	Institutional funding (excluding construction projects and acquisition of property) by Federal and <i>Länder</i> governments according to AV-WGL	25148			28672			30279		
1.1.1	<i>Proportion of these funds received through the Leibniz competitive procedure (SAW procedure) ⁴⁾</i>	234			0			0		
1.2	Institutional funding (excluding construction projects and acquisition of property) not received in accordance with AV-WGL	0			0			0		
2.	Revenue from project grants	8372	25%	100 %	16750	37%	100 %	13344	31%	100 %
2.1	DFG	880		11%	1034		6%	1848		14%
2.2	Leibniz Association (competitive procedure) ⁴⁾			0%	155		1%	402		3%
2.3	Federal, <i>Länder</i> governments	6045		72%	14288		85%	8740		65%
2.3.1	LOEWE BiK-F Research funding	4498			12140			5860		
2.3.2	Miscellaneous project funding (Federal, <i>Länder</i> governments)	1547			2148			2880		
2.4	EU	295		4%	122		1%	543		4%
2.5	Industry	10		0%			0%	3		0%
2.6	Foundations	415		5%	404		2%	941		7%
2.7	Other sponsors	727		9%	747		4%	867		6%
3.	Revenue from services	0	0%		0	0%		0	0%	
3.1	Revenue from commissioned work									
3.2	Revenue from publications									
3.3	Revenue from exploitation of intellectual property for which the institution holds industrial property rights (patents, utility models etc.)									
3.4	Revenue from exploitation of intellectual property without industrial property rights									
3.5	<i>Revenue from other services</i>									
II.	Miscellaneous revenue (e.g. membership fees, donations, rental income, funds drawn from reserves)	12995			5974			9259		
1.1	Absorption of costs by the Senckenberg Society	3395			1406			1341		
1.2	Own revenue ⁵⁾	875			530			2372		
1.3	Reserves (for perennial construction projects)	4855			1350			5524		
1.4	Miscellaneous (e.g. energetic reconstruction, maintenance in the Messel mine)	3870			2688			22		
III.	Revenue for construction projects (institutional funding by Federal and <i>Länder</i> governments, EU structural funds, etc.)	3729			9860			13786		

Expenditures		K€	K€	K€
Expenditures (excluding DFG fees)		50244	61256	66668
1.	Personnel	25342	29542	29168
2.	Material resources	18521	16661	13001
3.	Equipment investments and acquisitions	2001	3296	1549
4.	Construction projects, acquisition of property	1713	6233	12457
5.	"Reserves" (e.g. cash assets, unused funds)	1350	5524	10493
6.	Miscellaneous items	1317		

DFG fees (if paid for the institution – 2.5% of revenue from institutional funding)	564.5	684.8	738
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¹ Preliminary data: no

² Figures I.1, I.2 and I.3 add up to 100 %. The information requested here is thus the percentage of "Institutional funding (excluding construction projects and acquisition of property)" in relation to "Revenue from project grants" and "Revenue from services".

³ Figures I.2.1 to I.2.7 add up to 100 %. The information requested here is thus the percentage of the various sources of "Revenue from project grants".

⁴ Competitive procedure of the Leibniz Association: until 31 December 2010, funds allocated through this procedure were designated as institutional funding. Since 1 January 2011, the Leibniz Association has granted these funds as project grants.

⁵ Own revenue is mostly made up of entrance fees and miscellaneous revenues of the museum (i.e. guided tours, education department), allowances by the city of Frankfurt, revenues from rent and lease and additional earnings and reimbursements.

Appendix 4

Staff

(Basic financing and third-party funding / proportion of women (as of: 31 December 2012))

	Full time equivalents		Employees		Female employees	
	Total	on third-party funding (LOEWE)	Total	on temporary contracts	Total	on temporary contracts
	Number	Percent	Number	Percent	Number	Percent
Research and scientific services	210.1	50.1 (29.7)	253	63.6	100	75.0
Professors / Direct. (C4, W3 or equivalent)	11.0	45.5 (45.5)	11	0	4	0
Professors / Direct. (C3, W2, A16 or equi.)	7.0	57.1 (57.1)	7	42.9	0	0
Academic staff in executive positions	10.5	4.8 (0)	11	9.1	1	0
Junior research group leaders / junior professors	6.3	100.0 (84.0)	7	100.0	2	100.0
Scientists in non-executive positions	145.9	44.8 (24.3)	161	58.4	56	64.3
Doctoral candidates (under contract)	29.4	82.1 (42.9)	56	100.0	37	100.0
Service positions	174.8	20.5 (10.9)	198			
Laboratory, preparation, secretary of working groups (upper-mid-level service)	72.8	24.4 (13.7)	81			
Laboratory, preparation, secretary of working groups (mid-level service)	92.6	19.5 (9.7)	105			
Laboratory, preparation, secretary of working groups (lower-level service)	1.0	0	2			
Animal care (mid-level service)	1.0	0	1			
Workshops (mid-level service)	2.0	0	2			
Library (upper-mid-level service)	2.8	0	3			
Library (mid-level service)	2.8	0	4			
Administration	113.5	10.1 (5.8)	131			
Head of the administration	1.0	0	1			
Staff positions (senior service)	19.5	10.0 (0)	20			
Staff positions (upper-mid-level service)	17.0	17.7 (5.9)	18			
Internal administration (financial administration, personnel etc.) (senior service)	1.8	44.4 (44.4)	2			
Internal administration (financial administration, personnel etc.; upper-mid-level s.)	20.1	8.7 (8.7)	21			
Internal administration (financial administration, personnel etc.) (mid-level service)	37.0	8.1 (8.1)	42			
Building service	17.2	5.8 (0)	27			
Assistants	24.3	26.8	163			
Student assistants	6.4	43.8	62			
Scientific assistants	5.5	60.0	50			
Assistants, other	12.5	3.2	51			
Trainees	2	0	2			
Scholarship recipients at the institution	24.0	97.9 (26.0)	43		23	
Doctoral candidates (internal scholarship)	6.8	92.6 (92.6)	14		7	
Doctoral candidates (external funding)	11.8	100.0 (0)	23		14	
Post-doctoral researchers	5.5	100.0 (0)	6		2	

Annex B: Evaluation Report

Senckenberg Forschungsinstitute und Naturmuseen (SFN) Frankfurt/M., Wilhelmshaven, Dresden, Görlitz, Müncheberg

Contents

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Appendix:

Members of Review Board and guests; representatives of collaborative partners

1. Summary and main recommendations

The Leibniz institution “Senckenberg Research Institutes and Nature Museums” (SFN, also referred to as “Senckenberg”) bundles the scientific and museum activities of the “Senckenberg Gesellschaft für Naturforschung” (SGN). Since the last evaluation, this Leibniz institution has grown significantly: in accordance with the recommendations made at that evaluation, in 2009, the German Entomological Institute Müncheberg (DEI), the Staatliche Naturhistorische Sammlungen Dresden (SNSD) and the Museum of Natural History Görlitz (SMNG) became part of Senckenberg, which now comprises five institutes (Frankfurt, Wilhelmshaven, Dresden, Görlitz and Müncheberg) and four associated research centres (Messel, Gelnhausen, Weimar and Hamburg). Senckenberg has been very successful in acquiring third-party funding. With the Biodiversity and Climate Research Centre (BiK-F), which is funded by the *Land* Hesse in the framework of the Initiative for the Development of Scientific and Economic Excellence (LOEWE), Senckenberg initiated an innovative research project that greatly benefits the institute. The collaboration with groups at the University of Tübingen has also developed extremely positively and dynamically.

Due to the integration of the institutes in Dresden, Görlitz and Müncheberg as well as the acquisition of BiK-F the number of scientific staff at Senckenberg has almost tripled. Whilst in 2004 there were 92 people employed in research and scientific services at Senckenberg, by the end of 2012, this figure had risen to 253. Senckenberg has used this growth very convincingly to make structural improvements: the number of joint professorships has increased from three to 17. Whilst in 2004, Senckenberg’s doctoral students were all on fellowships, today, 56 doctoral candidates have employment contracts. The percentage of women on the academic staff has risen from 15% to 40%. In leadership positions, however, still only 20% of staff are female.

Given this growth and the current distribution over nine sites, the most important task during the last few years has been to develop an overarching, coherent organisational form. Following fundamental reorganisation, Senckenberg has now found a very convincing structure and is well on the way to implementing it. The organisation of research into cross-locational programmes (with Research Fields and Research Activities) facilitates project-related collaboration between the departments and collections at the various locations.

Senckenberg conducts research in biological and geosciences, focusing on biodiversity and ecosystem research as well as Earth system research. The results of this work are both relevant and mostly of very high quality. On average, the research performance of the 12 Research Activities is very good. Three units are rated as “excellent”, five as “very good” and one as “good”; one is “very good to excellent”, one “good with the potential to be very good” and one “good to satisfactory”.

As a consequence of integration the collections have now attained a new quality and quantity and, with a total of 38.5 million collection units, are now one of the largest in Europe. The collections are also distributed across almost all the Senckenberg sites. Thus

the task of applying the same standards and procedures to similar collections and recording them digitally is of core importance.

Both nationally and internationally Senckenberg is very well connected but should continue to enhance its international visibility. The institution is linked with universities in Germany by 17 joint professorships. Furthermore, collaboration is documented by a wealth of joint research projects.

Senckenberg's Director General heads the institution excellently. Under his leadership the growth phase was managed with a remarkably high degree of expertise and social competence. He is supported very well by a five-person Board of Directors.

Special consideration should be given to the following main recommendations in the evaluation report (highlighted in **bold face** in the text):

General concept

1. Senckenberg has accomplished the tasks associated with the major growth of the last four years very well. The new organisational structure is coherent and has largely been implemented. However, not all the organisational, administrative and content-related processes that have been initiated to drive integration have been completed. As Senckenberg itself intends, it is particularly important to achieve in-depth consolidation. For this purpose, the path that has already been adopted to integrated, cross-locational programmes should be rigorously pursued. The operations at the institute in Wilhelmshaven which are mainly relevant for Research Activities 4 and 11 must be integrated considerably better than before.
2. A great deal of strategic thinking has gone into the key questions that have been elaborated for each Research Activity. This constitutes a major step. It is recommended to continue refining the working and research programmes in the Research Activities and, in particular, to continue developing their complementary focus.
3. Senckenberg carries out its collection maintenance and development tasks very competently. The availability and accessibility of collection data on the other hand urgently needs to be improved. To achieve this, digitisation is fundamental. Work on this considerable task is only progressing slowly. It is essential that it is stepped up vigorously.
4. The permanent exhibitions on offer in Frankfurt fall below current museum standards and urgently require modernisation. This will allow Senckenberg to improve its public communication of science, further increase its number of visitors and thus retain its public visibility.
5. Anchoring BiK-F within the framework of Senckenberg funding is essential both in terms of content and structure. It is positive that the Federation and the *Land Hesse* are seeking to continue financing the research centre, which is funded by the *Land* until 2014, within the framework of joint institutional funding.
6. Collaboration with groups at the University of Tübingen in the context of Human Evolution and Palaeoenvironment is also outstanding and of benefit to both parties. It is producing excellent scientific results and should be continued and intensified.

7. The plans presented to the Review board for the scientific use of a replacement for the research cutter SENCKENBERG were not convincing. No strategic priorities were articulated. It is recommended to search for alternative solutions and to coordinate the search intensively with the bodies responsible for German research vessels.
8. The infrastructure in Görlitz was already judged to be unsatisfactory at the last evaluation. The Senate thus urged the *Land* Saxony to provide well-equipped facilities and laboratories for scientific work and to build a new, central, air-conditioned collection building. This has not happened so far. An improvement of the situation is thus urgently needed.

Collaboration and networking

9. In order to enhance international visibility, Senckenberg should strive for more leadership roles in international bodies and international collaborative projects.

Staff development and promotion of junior researchers

10. Senckenberg must continue its efforts to increase the proportion of women in scientific leadership positions.

Quality assurance

11. Senckenberg has sites in seven *Länder*. The institution has managed to create a common scientific structure by implementing cross-locational programmes. But the funding is still based on the "Sitzlandprinzip" (i.e. the *Land* which hosts the respective institution provides for a higher percentage of funding). The Federal and *Länder* Governments must ensure that the Senckenberg management has the flexibility to set clear priorities (i.e. with consequences for the distribution of funding across locations).
12. Senckenberg has a performance-related funding policy based on publications in refereed journals and the acquisition of third-party funds. It is recommended to take account of the entire spectrum of activities in a research museum and also to reward achievement in the collections sector in particular.
13. The Scientific Advisory Board is committed to its role but it should see its task more in terms of providing strategic advice. In general, the critical distance required of the Scientific Advisory Board should be more pronounced. To achieve this, the item in the statutes stating that membership of the Advisory Board should not exceed eight years should be implemented.

2. General concept and profile

The "Senckenberg Gesellschaft für Naturforschung" is a non-profit civil society organisation and the so-called *Trägerverein* of the Leibniz institution, Senckenberg Research Institutes and Nature Museums. According to its statutes, the Society's mission is to conduct research into natural history and to communicate the results of its research to the public in publications, lectures and at its museums. The Leibniz institution, which is funded by the Federation and the *Länder*, bundles the Society's scientific and museum

activities. Since the last evaluation, the Leibniz institution has grown significantly. In 2009, the German Entomological Institute Müncheberg (DEI), the Staatliche Naturhistorische Sammlungen Dresden (SNSD) and the Museum of Natural History Görlitz (SMNG) became part of the Senckenberg Research Institutes and Nature Museums.

Senckenberg thus comprises five institutes (Frankfurt, Wilhelmshaven, Dresden, Görlitz and Müncheberg) and four associated research centres (Messel, Gelnhausen, Weimar and Hamburg). Given this growth and the current distribution over nine sites, the most important task during the last few years has been to develop a coherent, overarching, organisational form. Following fundamental reorganisation, Senckenberg has now found a very convincing structure and is well on the way to implementing it. The institutes with their departments and/or collection units form the logistic/infrastructural units. Senckenberg's scientific tasks are carried out in the three programmes: Research (with Research Fields and Research Activities), Infrastructure, and Science and Society. The central departments (or Staff Departments), Service and Administration, Communications, IT-Services, and Central Museum Development, are all located in Frankfurt and provide services for each of the individual locations.

Senckenberg has accomplished the tasks associated with the major growth of the last four years very well. The new organisational structure is coherent and has largely been implemented. However, not all the organisational, administrative and content-related processes that have been initiated to drive integration have been completed. As Senckenberg itself intends, it is particularly important to achieve in-depth consolidation. For this purpose, the path that has already been adopted to integrated, cross-locational programmes should be rigorously pursued. The operations at the institute in Wilhelmshaven which are mainly relevant for Research Activities 4 and 11 must be integrated considerably better than before.

Development of the institution since the last evaluation / results

The inclusion of Dresden, Görlitz and Müncheberg into Senckenberg was strongly endorsed by the last evaluation. It was implemented by the Federation and the *Länder* on 1 January 2009. The Senckenberg collections have thus become much more comprehensive and valuable. With a total of 38.5 million collection units, they are now one of the largest in Europe. This development saw a significant increase in human resources and – due to the museum in Görlitz – in museum space as well. The inclusion of the new sites was conducted with circumspection and due regard for regional networks.

In addition, with the Biodiversity and Climate Research Centre (BiK-F), which is funded by the *Land* Hesse in the framework of the Initiative for the Development of Scientific and Economic Excellence (LOEWE), Senckenberg acquired an innovative research venture. BiK-F was launched in 2008 and achieved a positive interim evaluation result in 2010. The project, which was initiated jointly with Goethe University Frankfurt and other research institutes, marked a new quality in university cooperation that was accompanied by large increases in the number of collaborative professorships (see Chapter 4) and scientific personnel. In 2012, just under 30% of SFN staff were financed by LOEWE. Furthermore, since 2010, Senckenberg has been working together on a joint

project on Human Evolution and Palaeoenvironment with three groups in Tübingen, which also receives considerable third-party funding. Both these extensive projects substantially contribute to Senckenberg's extremely positive and dynamic scientific development.

Beyond this, Senckenberg should not expand in the foreseeable future. Against the backdrop of the dynamic development of the last few years, smaller institutions and collections are interested in becoming part of Senckenberg. Rightly, Senckenberg and its committees examine external proposals of this kind very critically.

Research

Senckenberg conducts research in biological and geosciences, focusing on biodiversity and ecosystem research as well as Earth system research. The results of this work are both relevant and mostly of very high quality. On average, the research performance of the 12 Research Activities is very good. The publication record is also largely very good. Some Research Activities are recommended to publish in higher impact journals (see Chapter 3).

A great deal of strategic thinking has gone into the key questions that have been elaborated for each Research Activity. This constitutes a major step. It is recommended to continue refining the working and research programmes in the Research Activities and, in particular, to continue developing their complementary focus.

The organisation of research into cross-locational programmes (Research Fields and Research Activities, see Chapter 3) facilitates project-related collaboration between the departments and collections at the various locations. The point of departure for collaborations is the infrastructure and knowledge of methods at other sites. The BiK-F-Data and Modelling Unit or the Geochronology Lab are, for example, excellent instances of integration. In order to enhance cross-locational collaboration at project level further incentives could be introduced into the existing internal performance-related funding system (see Chapter 6).

The restructuring of in-house journals is greatly welcomed. The impact of the taxonomic journals produced by Senckenberg is at the appropriate level. The goal for the future should be to make all journals open access. Senckenberg publishes very important, fundamental work in the form of monographs. This work should be made freely available in countries with great biodiversity.

Collections

The Senckenberg collections with more than 38.5 million collection units include minerals and other geological items, meteorites, and fossils as documents of palaeobiodiversity, as well as extensive collections of animals, plants, and fungi. The oldest collections date back to the 16th century. It is one of Senckenberg's core tasks to maintain and develop these comprehensive, important collections as well as to make them accessible to the entire scientific community. This is especially true of the more than one hundred thousand type specimens in the Senckenberg collections, which define the name of a taxon and constitute particular scientific treasures.

Accordingly, the collections are the basis of the taxonomic, systematic, ecological and biogeographic research. The 32 sections of the collections are maintained by scientific curators who are very involved in research. The challenge is now to encourage staff proximity to research whilst guaranteeing optimum collection maintenance.

At the last evaluation, the Leibniz Association Senate expressed the expectation that the integration of Dresden, Görlitz and Müncheberg would significantly enhance Senckenberg's standing (and particularly that of the scientific collections), both nationally and internationally. It is still the case that Senckenberg needs to attain a higher international recognition. The collections, in particular, have not yet reached the level of international visibility they deserve.

The collections are distributed across almost all Senckenberg locations. Even the individual collection taxa are mostly located at several sites (e.g. the Botany – Herbarium Senckenbergianum collection group in Frankfurt, Görlitz, Weimar and Wilhelmshaven). Thus the task of applying the same standards and procedures to similar collections and recording them digitally is of core importance. **Senckenberg carries out its collection maintenance and development tasks very competently. The availability and accessibility of collection data on the other hand urgently needs to be improved. To achieve this, digitisation is fundamental. Work on this considerable task is only progressing slowly. It is essential that it is stepped up vigorously.** It is welcomed that the three natural history museums in the Leibniz Association will also cooperate on this important issue (see Chapter 4).

The connection and harmonisation of collection databases as well as the integration of Senckenberg databases in international networks and portals is becoming ever more vital. Senckenberg is involved in important national collection and database initiatives, such as GBOL and GBIF-D. In the context of collaboration with Yale, Senckenberg is trying to link its databases to the important data portal, Map of Life (MoL). It is a member of the Consortium of German Natural History Collections (DNRS) and the Consortium of European Taxonomic Facilities (CETAF), however, unfortunately, not involved in the EU-funded Integrated Activities Grant SYNTHESYS which aims to create a shared, high quality approach to the management, preservation, and access to European natural history collections.

Against the backdrop of growing technical and scientific demands as well as dwindling resources consideration should be given to the benefits of potential synergies in the collections sector. The amalgamation of similar collections from different locations (e.g. by exchanging collections) would, for example, have a very positive impact on international visibility. Senckenberg should examine whether amalgamation is a viable option despite federal structures.

Communication (exhibitions, transfer of knowledge)

Senckenberg exhibitions are based on its research and collections. The exhibition strategy focuses on the use of original objects. **The permanent exhibitions on offer in Frankfurt, however, fall below current museum standards and urgently require modernisation. This will allow Senckenberg to improve its public communication of**

science, further increase its number of visitors and thus retain its public visibility. The recently established staff department Central Museum Development is expected to generate new ideas in the museum sector. Senckenberg is also planning to build a new annex from private donations which will extend the exhibition space significantly. Improvements would, however, be desirable before this work is completed. It is, therefore, welcomed that the museum is already working on an exhibition strategy at the present time, which can be appropriately integrated into the building plans. It is essential to test the implementation of the exhibition strategy in experimental pilots and thus to modernise the existing permanent exhibition progressively.

The transfer of knowledge to schools and a broader public plays an important role. Many ambitious events and activities are held. Senckenberg has organised major international conferences, which in some areas have generated a very high degree of visibility, such as the outstanding Messel conference.

Strategic work planning for the next few years

The Biodiversity and Climate Research Centre (BiK-F) is a logical progression in terms of Senckenberg's research. It excellently complements the work on biodiversity (as well as on analysing the impact of its loss) by the aspect of climate change. The programme is ambitious and is rated very positively. In terms of content, BiK-F has been integrated into Senckenberg successfully to the mutual benefit of the Research Activities (see Chapter 3, Research Field III). Furthermore, BiK-F fits well into the Leibniz Association as a whole. **Anchoring BiK-F within the framework of Senckenberg funding is essential both in terms of content and structure. It is positive that the Federation and the Land Hesse are seeking to continue financing the research centre, which is funded by the Land until 2014, within the framework of joint institutional funding.**

Collaboration with groups at the University of Tübingen in the context of Human Evolution and Paleoenvironment is also outstanding and of benefit to both parties (see Chapter 3, Research Activity 12). It is producing excellent scientific results and should be continued and intensified.

At the last evaluation, it was recognised that there was a need for a replacement for the research cutter SENCKENBERG. The recommendation was "to determine the operating costs in a feasibility study." Senckenberg's requirements with regard to this vessel have since changed and the predicted funding requirement has increased many times over (from 7 million EUR to 25 million EUR). Despite repeated recommendations made by the Scientific Advisory Board, no concrete strategy was presented at the evaluation. **The plans presented to the Review board for the scientific use of a replacement for the research cutter SENCKENBERG – insofar as pointed out – were not convincing. No strategic priorities were articulated. It is recommended to search for alternative solutions and to coordinate the search intensively with the bodies responsible for German research vessels.** It is indisputable that RA 4 and RA 11 need a research cutter for their current research and service activities (including long-term monitoring) in shallow waters. However, at present, neither of the two Research Activities is ideally in-

egrated in the Senckenberg institution as a whole (see Chapter 3). Their work is only rated as “satisfactory to good” and “good”.

Appropriateness of facilities, equipment and staffing

Third-party funding for research and scientific infrastructure has increased considerably since the last evaluation. In 2012, it accounted for 31% of the revenue (institutional funding and revenue from project grants, see page A-29).

Funding for the Biodiversity and Climate Research Centre (BiK-F), which Senckenberg acquired jointly with Goethe University Frankfurt in 2008, has made a significant contribution to the increase in third party funding. During two funding periods of three years respectively from 2008 to 2014, BiK-F funding by the *Land* Hesse in the framework of the Initiative for the Development of Scientific and Economic Excellence (LOEWE) was approximately 44 million EUR. This is a huge success. In 2012, LOEWE funding accounted for some 44% of the third-party funding acquired by Senckenberg. This was complemented by infrastructure investments (institute building renovated by the *Land* Hesse for just under 21 million EUR, experimental Mesocosm Hall financed under the German Economic Stimulus Package II). Thus, in many respects Senckenberg is very well equipped and must take care to maintain this level in future as well. Senckenberg also benefits significantly from the contributions of the Senckenberg Society.

The infrastructure in Görlitz, however, was already judged to be unsatisfactory at the last evaluation. The Senate thus urged the *Land* Saxony to provide well-equipped facilities and laboratories for scientific work and to build a new, central, air-conditioned collection building. This has not happened so far. An improvement of the situation is thus urgently needed.

3. Subdivisions of Senckenberg

Research Field I: Biodiversity and Systematics investigates the fossil and recent diversity of the Earth’s organisms, their evolution and evolutionary relationships as well as the morphology, formal and functional relationships of organisms. This important museum-related work is based on the Senckenberg collections which continue to grow as a result of research projects in this field. The Research Activities in Research Field I (RA 1, 2 and 3) are closely interrelated. Their work creates the foundations for the rest of the biodiversity research as well as further ecological and applied research.

Research Activity 1: Taxonomy and Systematics (38.0 full-time equivalents [FTE] in research and scientific services [including doctoral candidates], 9.3 FTE service staff) conducts fundamental museum-specific research work relating to the recording and classification of the collections. This group records recent and fossil biodiversity and uses a convincing spectrum of taxonomic, molecular and morphological methods (integrated taxonomy) which they supplement with biogeographical data and bioacoustic findings.

With its methodological and technological expertise, the group deserves its core position within Senckenberg. It is a coveted collaborative partner and thus plays an integrating

role. Its knowledge of molecular systematics is in very great demand. The group is involved to a considerable extent in training junior researchers. It is welcomed that it wishes to devote more attention to method development in future.

The group's taxonomic work is excellent; it has, for example, produced some outstanding papers on copepods. With the *World Catalog of Symphyta (Hymenoptera)* it produced a comprehensive monograph that resets the baseline of research. The work on systematics, by contrast, does not enjoy quite the same level of recognition. The group is recommended to gear its publication strategy to higher-ranking publications. By intensifying work in systematics this should be easily achievable. The overall performance of the group is "very good."

Research Activity 2: Evolution and Biogeography (14.9 FTE in research and scientific services, 3.0 FTE service staff) has produced very interesting, competitive studies. Methodologically, work focuses on population genetic and phylogeographic approaches. In this Research Area, too, interaction across locations via methodology and infrastructure (Molecular Lab Dresden) is very successful. Particular mention should be made of the work on hybridisation, such as the project on hybridisation as a significant factor for speciation and environmental adaptation in animals.

RA2 covers a broad spectrum of time and space. In this context, the connection to palaeontology is seen as an interesting addition. It is, for example, necessary to include consideration of fossils or ancient DNA if there are not enough samples for population research. However, in future, too, special attention should be paid to the coherence of projects and/or the research focus. The performance of the group is "very good."

In **Research Activity 3: Morphology and Function** (7.0 FTE in research and scientific services, 0.5 FTE service staff) a small group conducts excellent, detailed, thorough morphological studies. The work on echolocation in ancient bats and the postabdomen of female insects is excellent: elegant, beautiful, classical morphology. It has been possible to publish some of this work in high-ranking journals, whilst some has been published below value. In future, the group should seek to publish more ambitiously.

The group would have the potential to consider more comparative aspects and to include metaanalyses. Great potential is seen in cooperation with the Data and Modelling Centre (e.g. for morphology, evolution of functional traits, scan functional traits). The group should be more involved in training junior researchers. Its performance is "very good."

Research Field II: Biodiversity and Ecosystems investigates the organismic composition, structure and functioning of selected habitats. Both Research Activities in Research Field II (RA 4 and 5) address common issues and, to a considerable extent, involve the same staff. However, they use different approaches, whereby RA 5 constitutes the experimental project side. Cooperation between the two groups would be very meaningful and should necessarily be intensified. At present, the connections are not sufficiently recognised.

Research Activity 4: Long-term Ecosystem Research (8.0 FTE in research and scientific services, 4.5 FTE service staff) bundles the various long-term studies which have been conducted at Senckenberg sites in the last decades. The individual studies produce

valuable and interesting data and use modern, state-of-the-art techniques. In some cases, they are of great scientific value due to the length of the studies (e.g. marine benthic long-term series). The service side of RA 4 is good, although the demand for these services and their integration into Senckenberg are unclear. The area has not made enough of a mark in research. The findings have been poorly published and meta-analyses are lacking.

Long-term studies have become more important in the last few years. They are, however, very costly, with a lot of resources going into marine data. Thus a strategic discussion should be held across the entire institution to determine the significance of the individual long-term studies for Senckenberg as a whole. In this context, the individual studies should also be analysed with regard to input and output, possibly with the aim of achieving greater focus. Generally, it is recommended to develop an overarching strategy for the sampling system and to involve more external expertise in strategic development by recruiting scientists with an LTR background, for example. The overall performance of RA 4 is “good to satisfactory.”

In **Research Activity 5: Applied Ecosystem Research** (15.4 FTE in research and scientific services, 6.6 FTE service staff) Senckenberg conducts its scientific outreach to policy makers. Methods and strategies are elaborated in diverse projects which help to implement national and international environmental protection regulations. These include, for example, genetic (wildlife) monitoring to keep track of elusive species, evaluation of river restoration measures and the marine habitat assessment.

The projects, which are strongly application-related, are interesting, the approaches and methods necessarily diverse. Publication performance could, however, be enhanced even though the application aspect makes it difficult to publish in high profile journals. RA 5 is “good with the potential to be very good.”

Research Field III: Biodiversity and Climate, largely corresponding to the Biodiversity and Climate Research Centre (BiK-F), investigates the impact of natural and anthropogenic climate change on, amongst other things, biodiversity, organisms, species distribution and ecosystem functions. Work is based to a considerable extent on the collections or contributes to the Senckenberg collections. BiK-F's infrastructures are used intensively by Senckenberg, and the Data and Modelling Centre has developed into an important integrating element in Senckenberg as a whole. The Mesocosm Hall is also seen as a very important investment (see Chapter 2). In terms of content BiK-F has been very successfully integrated into Senckenberg to the mutual benefit of the Research Activities.

Research Activity 6: Evolution and Climate (17.9 FTE in research and scientific services, 5.2 FTE service staff) has an impressive research agenda which excellently connects geological and biological expertise with climate data for highly-integrated research. The group uses a broad spectrum of methods, has a highly-sophisticated isotope lab (together with Goethe University Frankfurt) and the expertise to interpret the data generated.

The projects, which have produced really excellent publications, are of very high quality. In one project on the Geobiodiversity of the Eastern Mediterranean, drilling cores in

Greece are being investigated with the help of which the relation between vegetation development and climate will be elaborated (palaeovegetation/palaeoclimatology). High-impact studies involving brown bears and polar bears have produced important knowledge on genetic adaptation to extreme climate conditions. Various projects on the evolution in geological time make use of the palaeontological collections (especially the Quaternary flora and fauna to be found in Weimar).

The group leadership is excellent. Doctoral candidates benefit from their complementary expertise in adaptive genomics and palaeoenvironmental dynamics. The overall performance of Research Activity 6 is rated as “excellent”.

In **Research Activity 7: Biodiversity Dynamics and Climate** (26.8 FTE in research and scientific services, 5.1 FTE service staff) scientists employing empirical approaches, statisticians and modellers work closely together to investigate the impact of climate change on terrestrial, fresh water, as well as marine biodiversity.

The core activity is Ecosystem Modelling which is crucially supported by the BiK-F Data and Modelling Centre (together with Goethe University Frankfurt). Expertise in this area is a tremendous asset for Senckenberg, one of the feathers in the cap of the institution. It is of major interest to other groups and to the collections as well and thus plays an integrating role in the institution as a whole. In this context, special mention should be made of the species distribution modelling under future climates (e.g. of marine benthos, in European stream macroinvertebrates).

This is a very competent group which has achieved much in a short time. Its publication output is impressive. In addition to LOEWE funding, the group has acquired extensive third-party financing for extra scientific staff. The group should be expanded further to make the modelling service available to Senckenberg across the board. Research Activity 7 is rated as “excellent”.

Research Activity 8: Adaptation and Climate (15.0 FTE in research and scientific services, 2.3 FTE service staff) investigates the effects of climate change on individual organisms, species, populations and ecological communities, right through to the signature that environmental changes leave in the genome. In the new Mesocosm Hall the group uses the latest cutting-edge experimental research facility to examine the impact of multiple stressors on the organisms (e.g. the adaptation of fungal communities to temperature and humidity change). At the same time, it also has collection experience and knowledge of methods for the acquisition of community composition data (development of universal barcode markers, metabarcoding with next-generation sequencing techniques).

This young group has the complementary expertise to take the field forward. The work is new, ambitious and very promising, albeit parts are risky. Both the group’s publication record and its supervision of doctoral candidates are very convincing. Cooperation with the private sector (ECT Oekotoxikologie GmbH) is also positive. RA 8 is rated as “very good”.

With its social-ecological components, **Research Activity 9: Ecosystem Services and Climate** (3.3 FTE in research and scientific services) constitutes an important and inter-

esting addition to the BiK-F research area. For Senckenberg it is also a new field in which only few groups are active in Germany. The social-science components are provided by the Institute for Social-Ecological Research (ISOE). This collaboration is greatly welcomed. At present, however, it is conducted on the basis of individual research assignments. In order to guarantee continuity, more effective ways of organising collaboration on a permanent basis should be examined. It should also be investigated whether synergies with Goethe University Frankfurt could be exploited to greater effect.

The group has made convincing progress in method development, producing a research framework (concept of social-ecological systems) and implementing it for analysing interactions between nature and society. In this way, it has, for example, conducted work on non-timber forest products (wild plant products such as fruits, bulbs and leaves) and their contribution to the rural household income in West Africa. The publication strategy is appropriate. Research findings are frequently published in the form of contributions to edited volumes and discussion papers whilst the transfer of knowledge takes place in knowledge papers and expert reviews. A report for the World Bank and the Yemen Environment Protection Authority, for example, deals with fishing and the concomitant strategic environmental assessment of coastal zone management. The group benefits from the Senckenberg field station in Socotra, Yemen, and is well connected to the collections. It should aspire to integration on a higher level. Research Activity 9 is rated as “very good”.

Research Field IV: Biodiversity and Earth System Dynamics investigates the role of the biosphere in Earth history. The aim is not only to reconstruct the development of the Earth’s history but to gain fundamental insights into Earth system dynamics. The inclusion of Dresden and Görlitz, as well as collaboration with Tübingen, have widened its scope. RA 10 and 12, which are strongly collection-based and, in the broadest sense, palaeontological projects, are very well integrated into Senckenberg, whilst the analysis of modern marine sedimentary systems in RA 11 is not quite so suitable for connections.

Research Activity 10: Deep Time – Evolving Earth and Paleoenvironments (12.5 FTE in research and scientific services, 5.2 FTE service staff) investigates the interaction between geodynamic processes and the development of life on Earth. The work spans a very long period from pre-Quaternary to recent times, covering, for example, geochronology and the provenience of rocks as well as minerals and the taxonomy of Devonian fossils. A wide range of appropriate methodological and analytical approaches is employed.

The palaeontological collections are used excellently and complemented by targeted field research. The Messel Pit, in particular, is an extraordinary resource. The work fits very well into Senckenberg, and the integration of various disciplines (botany, palaeontology, geology and taxonomy), Senckenberg sites and the climate aspect generate outstanding new results. Care should be taken in future to maintain the coherence of the group to ensure the continuation of such fruitful exchange of concepts. Doctoral students are very competently supervised. RA 10 is rated as “very good to excellent”.

Research Activity 11: Marine (Bio-)sedimentary Systems (4.5 FTE in research and scientific services, 3.6 FTE service staff) is a small unit dealing with biotic and abiotic interactions in the off-shore part of the coastal area (Wadden Sea.) The group is thus active in a very specialised area. They also work on cold water coral reefs.

The group investigates interesting research ideas and the individual projects are convincing. However, the integration and relevance of the work in the Senckenberg context are not sufficiently clear, which means the group's contribution to the Senckenberg institution as a whole is hardly apparent.

Third-party funding is largely acquired from the Federal Ministry of Education and Research for monitoring projects and the *Land* of Lower Saxony for work on the Wadden Sea and the *Jadebusen*. In the last three years, five dissertations have been completed. Currently only one doctoral candidate is being supervised in the group. Overall, RA 11 is rated as "good".

Research Activity 12: Human Evolution and Paleoenvironment (14.2 FTE in research and scientific services, 3.1 FTE service staff) investigates the influence of changing climate and environmental conditions on the evolution of humans and their ancestors in close cooperation with three jointly-financed working groups (Early Prehistory and Quaternary Ecology, Palaeoanthropology and Terrestrial Palaeoclimatology) at the University of Tübingen.

This collaboration is of mutual benefit. Thus the human osteological collections at Tübingen have benefited significantly from Senckenberg's collection expertise, whilst the new imaging techniques from Tübingen (high resolution CT laboratory) have made it possible to examine the very important Koenigswald Collection at Frankfurt. This fruitful cooperation was very visible during the evaluation visit. It is also becoming increasingly obvious in joint publications. The publication performance, both in terms of quantity and quality, is outstanding. The highly engaged colleagues in Tübingen contribute to the group's high visibility. The numerous doctoral candidates are supervised very well.

Furthermore, the collaboration with Tübingen opens up a cultural studies perspective for Senckenberg. The current option to take on Irenäus Eibl-Eibesfeldt's film archive (human ethologic film library) should be grasped. The archive offers potential for research in human behaviour. Overall, RA 12 is rated as "excellent".

4. Collaboration and networking

Collaboration with universities

Collaboration with universities has improved significantly since the last evaluation. In 2005, only three of Senckenberg's leading scientists had joint appointments (all at Goethe University Frankfurt). Currently, 17 scientists work at Senckenberg who also have appointments at universities in Germany (see Status Report, p. A-17), 11 of them in the framework of BiK-F. Furthermore, Senckenberg also collaborates very intensively and successfully with three groups at the University of Tübingen in the context of Human Evolution and Paleoenvironment (see Chapter 3, Research Activity 12).

Collaboration with universities in Germany is documented by a wealth of joint research projects. The focus of cooperation with Goethe University Frankfurt is the Biodiversity and Climate Research Centre (BiK-F), financed through LOEWE. With 11 collaborative professorships the university has set its strategic long-term perspectives on biodiversity and geobiodiversity, which is highly welcomed. Six additional university professorships are also involved in BiK-F. Furthermore, the university has provided human resource funding and infrastructure (isotope laboratory). Both partners benefit greatly from this cooperation which is also important for the international visibility of the location. Establishing BiK-F firmly at Senckenberg would be an enormous asset for the university as well. Thus it is highly desirable that the university should continue to engage with Senckenberg and that future professorships should be filled to complement Senckenberg.

Senckenberg scientists are very involved in university teaching. They contribute significantly to Frankfurt's Master's degree programme in Ecology and Evolution. Plans for a Master's programme in Biodiversity Collections, which will either be implemented with Goethe University Frankfurt or TU Dresden, or as a joint venture with both universities, are highly welcomed.

Other collaborations and networks

Senckenberg is very well connected both nationally and internationally. Staff carry out joint research projects with partners at universities and museums at home and abroad for which third-party funding is acquired. They are involved, for example, in the EU collaborative projects SUN (2009-2011) and UNDESERT (2009-2015) with various European, African and South American partners as well as in the DFG Priority Programme "Tibetan Plateau" with Chinese partners. Consequently, Senckenberg hosts many international guests.

With its ecosystem research Senckenberg is part of the national and international Long-Term Ecosystem Research (LTER) Network as well as important national collection and database initiatives (e.g. GBOL, GBIF-D; see also Chapter 2). Senckenberg's involvement in capacity building in countries with great biodiversity is highly welcomed. **In order to enhance international visibility, Senckenberg should strive for more leadership roles in international bodies and international collaborative projects.** Also, Senckenberg should be more actively represented in international programmes and organisations at the interface of ecology, earth science and socio-economics (e.g. on global change). It is recommended to develop national and international partnerships strategically.

Senckenberg is active within the Leibniz Association. With 20 other partners, the institution is involved in the Leibniz Biodiversity Research Alliance and works on several projects with other Leibniz institutes, financed through the competitive SAW procedure. It is highly welcomed that the three natural history research museums in the Leibniz Association (Senckenberg, MfN Berlin and ZFMK Bonn) plan to establish a Leibniz Alliance of Natural History Research Museums with coordinated and aligned research programmes.

5. Staff development and promotion of junior researchers

Staff development and personnel structure

Since the last evaluation, Senckenberg's personnel structure has changed significantly. Due to the integration of the Dresden, Görlitz and Müncheberg locations as well as the acquisition of BiK-F the number of scientific staff has almost tripled. In 2004, there were 92 scientists at Senckenberg; this figure had increased to 253 (210 FTEs) by the end of 2012. This growth has led to structural improvements: in 2004, there were only three joint professorships (today: 17, see Chapter 4) and no doctoral students on employment contracts (today: 56). The proportion of female scientists was 15% (today: 40%). Many volunteers are still involved in activities, and the volume of staff conducting museum tasks has also grown significantly (see Status Report, Appendix 4 under Administration).

Approximately half of the scientific staff is third-party financed. Consequently, at 64%, the proportion of employees on fixed-term contracts is high. Despite the major growth and the necessity of integrating different locations the staff present themselves as a united team. The degree of work satisfaction expressed in discussions was remarkable.

It has been possible to recruit excellent new scientists to work at the museum. Senckenberg should continue to recruit from the global pool. So far, there is only a small proportion of scientists from abroad.

Promotion of gender equality

On 31 December 2012, 66% of doctoral candidates and 35% of scientific staff in non-leadership positions were female. However, in leadership positions (including junior research group leaders and junior professors) only 20% of staff were female. As of July 2013, two of the six members of the Board of Directors are female.

In the 2013 programme budget, objectives were formulated in the framework of a cascade model to increase the proportion of women in leadership positions appropriately by 2017. In the recent past, Senckenberg introduced, amongst other things, a family-friendly working environment. In 2012, it was awarded the *berufundfamilie* certificate and, in 2013, the first ever full-time equal opportunities officer was elected. Together with another Leibniz institution Senckenberg is planning to set up childcare facilities.

Senckenberg must continue its efforts to increase the proportion of women in scientific leadership positions. At present, the institution actively addresses female candidates for Junior Group Leader positions. This pro-active recruitment strategy should be extended to embrace all scientific leadership positions. Also, a more formalised internal mentoring system would be considered useful.

Promotion of junior researchers

At the end of 2012, 93 doctoral candidates were employed at Senckenberg institutions (including 14 internal and 23 external fellows). In the reporting period, 56 doctorates were completed.

The incumbent Director General has been very active in founding GRADE, the Goethe Graduate Academy at Goethe University Frankfurt, and is the Director. Doctoral candi-

dates from all Senckenberg locations can participate in training courses at GRADE, such as scientific writing. In future, a sub-unit, GRADE SUSTAIN, will offer a special thematic programme for Senckenberg doctoral students. It should be examined whether there is a possibility of introducing compulsory courses in the framework of the graduate school. In the Leibniz Competition, Senckenberg has acquired funding for a graduate school that will be launched in the first half of 2014.

It is welcomed that Senckenberg concludes supervision agreements with doctoral candidates. The latter are very satisfied with their supervision and identify with the institution. They are very involved and have got together to form a cross-locational Young Scientists Group, which holds an annual meeting for junior researchers. To strengthen location integration a rotation programme could be developed for doctoral students.

Postdocs are also appropriately supported at Senckenberg. In the reporting period, four junior researchers completed their *Habilitation* and five were offered professorships at other research institutions or universities.

Vocational training for non-academic staff

It is welcomed that Senckenberg actively supports vocational training through the Senckenberg School for Technical Assistants.

6. Quality assurance

Internal quality management

Senckenberg's Director General heads the institution excellently. Since assuming office in 2005, he has made his very positive mark on the institution. Under his leadership the growth phase was managed with a remarkably high degree of expertise and social competence. He is supported very well by a five-person Board of Directors. The high level of collegiality amongst the leading scientists is very positive.

Senckenberg has sites in seven *Länder*. The institution has managed to create a common scientific structure by implementing cross-locational programmes. But the funding is still based on the "Sitzlandprinzip" (i.e. the *Land* which hosts the respective institution provides for a higher percentage of funding). The Federal and *Länder* Governments must ensure that the Senckenberg management has the flexibility to set clear priorities, i.e. with consequences for the distribution of funding across locations.

In order to be able to set priorities, Senckenberg quality management has to monitor the performance of the single locations. This is especially necessary to assure integration of the institute in Wilhelmshaven (see chapter 2).

In view of the size the institution has now reached and the number of locations, it was necessary to professionalise administrative procedures. A new Administrative Director was appointed in 2011. His management of change is very convincing. Budgeting is conducted on the basis of a programme budget. Cost and performance accounting has been introduced but is still being fully implemented. It is also necessary to enhance the trans-

parency of the use of funds which, at present, is hindered by the current legal structure of the Leibniz institution, Senckenberg. It is, therefore, highly welcomed that the funders (öffentliche Zuwendungsgeber) commissioned an expert opinion to review the organisational, administrative and control functions. The funders should take appropriate account of the results in pursuing Senckenberg's structural development.

Senckenberg has a performance-related funding policy based on publications in refereed journals and the acquisition of third-party funds. It is recommended to take account of the entire spectrum of activities in a research museum and also to reward achievement in the collections sector in particular.

Quality management by the Scientific Advisory Board

The Scientific Advisory Board meets twice a year. In 2010, it presented an audit in which it addressed the individual recommendations made at the last evaluation. **The Scientific Advisory Board is committed to its role but it should see its task more in terms of providing strategic advice. In general, the critical distance required of the Scientific Advisory Board should be more pronounced. To achieve this, the item in the statutes stating that membership of the Advisory Board should not exceed eight years should be implemented.** At present, some members have held the position for more than ten years. It is welcomed that the Senckenberg and BiK-F advisory boards have amalgamated to form a common body. This, however, means that the Scientific Advisory Board is currently significantly larger than stated in the statutes.

Implementation of recommendations from the last external evaluation

In the opinion of the Scientific Advisory Board, Senckenberg has largely implemented the recommendations made by the Senate of the Leibniz Association in 2006 (see Status Report, p. A-21 ff.) with considerable success.

One of the core recommendations at the last evaluation was to integrate the Staatliche Naturhistorische Sammlungen Dresden, the Museum of Natural History Görlitz and the German Entomological Institute Müncheberg into the Senckenberg association. At the time, the aim of the Leibniz Association Senate in driving the integration of the individual locations was to create synergies against the backdrop of common research focus areas. For this purpose, Senckenberg developed a convincing overall strategy and must now continue to pursue the path it has chosen to carry on integrating cross-locational programme areas (see Chapter 2).

Senckenberg has addressed most of the individual recommendations generated by the last evaluation meaningfully in the framework of newly-created, overarching structures (cross-locational research programmes, lab concept, collection management). Despite positive advances, the recommendation to increase the percentage of women in leadership positions (see Chapter 6) is still valid. The infrastructure at Görlitz was judged to be unsatisfactory at the last evaluation. Unfortunately, nothing has changed with regard to this assessment (see Chapter 2).

2. Guests

Representative of the relevant Federal Government Department

Angelika **Willms-Herget** Federal Ministry of Education and Research,
Bonn, Germany

Representative of the relevant Land Government Department

Susanne **Eickemeier** Hessen State Ministry of Higher Education,
Research and the Arts, Wiesbaden, Germany

Joachim **Linek** Saxon State Ministry for Higher Education, Re-
search and Arts, Dresden, Germany

Representative of the Scientific Advisory Board

Volker **Storch** Centre for Organismal Studies, Heidelberg Uni-
versity, Germany

Representative of the Leibniz Association

Heribert **Hofer** Leibniz Institute for Zoo and Wildlife Research
(IZW), Berlin, Germany

Representative of the Joint Science Conference, Bonn, Germany

Rebekka **Kötting**

3. Representatives of collaborative partners (one-hour interview)

Herbert **Müther** University of Tübingen, Germany

Werner **Müller-Esterl** Goethe University Frankfurt, Germany

Georg **Teutsch** Helmholtz Centre for Environmental Research
UFZ, Halle-Leipzig, Germany

Johannes **Vogel** Museum für Naturkunde Berlin – Leibniz Insti-
tute for Research on Evolution and Biodiver-
sity, Berlin, Germany

Christian **Wirth** German Centre for Integrative Biodiversity
Research iDiv, Leipzig, Germany

1 April 2014

Annex C: Statement of the Institution on the Evaluation Report

**Senckenberg Forschungsinstitute und Naturmuseen (SFN)
Frankfurt/M., Wilhelmshaven, Dresden, Görlitz, Müncheberg**

First and foremost, Senckenberg would like to thank the review committee and the members of the SAE office for their tremendous efforts in an evaluation process that comprised different Senckenberg institutes and locations. Senckenberg appreciates the very good overall rating and is pleased to learn that the review committee considered that the matrix and governance structure, the Senckenberg work program, the integration of the institutes in Dresden, Görlitz and Müncheberg, and the collaboration with universities and the “Institut für sozial-ökologische Forschung” are very successful and convincing. Similarly, the strategic recommendations to integrate the Biodiversity and Climate Research Centre (BiK-F) into Senckenberg and to further develop the Research Activity “Human Evolution and Palaeoenvironment”, in collaboration with the University of Tübingen, are highly welcomed. We value the more specific suggestions of the review committee and for most of these we have already started to take appropriate measures.

We realize that there are a few comments where our perspective differs from that of the reviewers, partly because some of the information provided in our documents may have been misleading or lacking clarity:

- We would like to reiterate that the evaluation, and hence the accompanying documents, were designed to evaluate programs and research activities, rather than individual Senckenberg institutes or Senckenberg locations. Hence, we feel that the recommendation “the operations at the institute in Wilhelmshaven which are mainly relevant for Research Activities 4 and 11 must be integrated considerably better than before” may have been biased by lack of clarity in our - admittedly complex - evaluation documents. As an example, scientists in Wilhelmshaven contribute to Research Activities 1, 2, 4, 5, 7, and 11. Nevertheless, we value this recommendation and foresee this as an important structural element in the future.
- Senckenberg adopted an object-oriented approach for its museums, and advocates for a close interaction between in-house research and objects on display in the museums. In that framework, we see the permanent exhibitions on offer in Frankfurt well on-track to comply with our current museum development plan. At the same time we appreciate the endorsement and support of the review committee to continue and accelerate our plans for a modular modernization of the Frankfurt museum.

Since the last evaluation, Senckenberg has experienced an important growth phase that considerably enhanced in-house synergies and overall productivity, both visible in the scientific evaluation parameters. We are very grateful that, in its report, the review committee appreciates and supports this development of the Senckenberg Institution and encourages us to move forward in this direction, whilst still consolidating our current programs.