Koninklijk Museum voor Midden-Afrika

Verslagen van het departement Biologie

Musée royal de l'Afrique centrale

Rapports du département de Biologie

Royal Museum for Central Africa

Reports of the Biology department

2016

KONINKLIJK MUSEUM
VOOR MIDDEN-AFRIKA
MUSÉE ROYAL DE
L'AFRIQUE CENTRALE

Africa

TERVUREN

Invertebrates

NOTA: dit jaarverslag omvat zowel de activiteiten van de personeelsleden van de dienst invertebraten als deze van een aantal projecten die administratief onder de dienst invertebraten vallen maar die activiteiten uitoefenen in naam van het departement biologie. Het betreft hier voornamelijk de activiteiten van JEMU en van BopCo. Daarnaast zijn ook een aantal activiteiten van de liaison officer opgenomen waar het specifiek activiteiten betreft die de dienst invertebraten en/of het departement biologie betreft.
De activiteiten van deze eenheden en personen zijn apart vermeld (onder de titel 'departementaal') voor de verschillende rubrieken behalve personeelsbewegingen.
Het focus project is voorzien van een algemene inleiding (in blauw aangeduid) bruikbaar voor publicatie in het gepubliceerd jaarverslag

Personeelsbewegingen

In dienst:
Maarten De Cock: SYMDIV BRAIN pioneer project (1 april 2016)
Zoë De Corte: JEMU (1 november 2016)

Transfer:
Nathalie Smitz: transfer van JEMU naarBopCo (1 september 2016)

Cost and resource sharing:
Patricia Mergen: actief voor 25% voor Botanische Tuin Meise, 75% voor KMMA

BELSPO POSTDOCTORAL FELLOWSHIPS

Dr. M. Barson (University of Zimbabwe): Belspo postdoc voor de periode 11/07-11/09/2016 The role of southern African bulinid snails in transmission of human and animal schistosomiasis and other trematode infections (2016-2017)

Projecten: onderzoek, tentoonstellingen, educatieve activiteiten, communicatie

DEPARTEMENTALE PROJECTEN DIE ADMINISTRATIEF ONDER DIENST INVERTEBRATEN VALLEN

JEMU collaborative projects 2016

Nine proposals for collaborative research were received in 2016:
Project 1 – Ilse De Mesel (RBINS) 'ancient mollusc collections'
Project 2 - Pauly (RBINS) 'Halictidae Africa & Europe'
Project 3 – VandenSpiegel & Samyn (RMCA/RBINS) 'Echinodermata'
Project 4 – Samyn (RMCA) 'Microbial diversity Lewis Glacier'
Project 5 - Jordaens (RMCA) 'mitogenomics Syritta'
Project 6 – Jorissen & Huyse (RMCA) 'Nile Tilapia'

Project 7 - Van Steenberge & Vanhove (RMCA/RBINS) 'population genomics Lake Taganyika'
Project 8 - Hendrickx (RBINS) 'dimorphism dwarf spider'
Project 9 – Deryke (RBINS) 'microbiomics cichlids'
Of these, two projects are accepted as they stand, and selected for full support (Project 3 and Project 8). Project 7 was envisaged pending co-funding and complementary input through other sources. For Project 1, a feasibility study was conducted (JEMU - RBINS) and, basing on the negative results obtained, the project was discarded from further consideration. The JEMU is currently considering Project 2 as a possible alternative to the originally planned Project 1. Project 5 was rejected as a new project. However, since there was a substantial budget remaining from the previous project by KJ, it was proposed that the balance of the budget could be used to address this proposal. As such, there are two full and standalone projects currently ongoing: one NGS (Project 8), one DNA barcoding and Sanger sequencing (Project 3) and a number of complementary activities (Projects 7, 1, 2, 5) that have been considered. Below an overview of the three currently ongoing projects started in the second half of 2016:

Projet 1	
Nom (et acronyme)	Barcoding Echinodermata
Financement	Source : JEMU Budget : JEMU
Partenaires	Responsable interne : JEMU RMCA / JEMU RBINS Collaborateurs internes : Didier Vanden Spiegel (RMCA) / Yves Samyn (RBINS) Collaborateurs externes : Dr. Gustav Paulay: senior curator at the Florida Museum of Natural History (Dickinson Hall), U.SA. – collaboration on the systematics of the Holothuriidae through a yet to be submitted US NSF project proposal (preproposal accepted) Dr. Tim O'Hara: curator at the Museum Victoria, Australia – collaboration on systematics of Ophiuroidea (brittle stars) Dr. Marc Eleaume: curator at the Museéum national d'Histoire naturelle, France – collaboration on integrative taxonomy of crinoids
URL site web	
Dates	Début : Sept 2016 Fin : currently ongoing
Description générale du projet	This project aims at molecularly identify five classes of echinoderms through DNA barcoding and at comparing the obtained sequences with those available in public sequence repositories as well as those of selected international partners (see external collaborators). DNA barcoding will not only allow to cross-check the identifications done on the basis of morphological characters, but will also flag cryptic species and help in fine-tuning the

	echinoderm Tree of Life. Specimens that were tackled were sampled in previous RMCA /RBINS expeditions to S. Africa and now deposited in the collections of the two institutions.
Évolution et résultats pour l'année écoulée	Protocol setting, DNA extraction, Sanger sequencing and preliminary DNA barcoding identification of approximately: - 150 Holothuridaea (JEMU - RMCA) - 100 Ophiuroidea (JEMU - RBINS) - 50 Asteroidea (collaboration with BoPCO - RMCA) - 150 Crinoidea (collaboration with BoPCO - RMCA)

Projet 2	
Nom (et acronyme)	Dimorphism dwarf spider (*Erigoninae*, *Araneae*).
Financement	Source JEMU Budget : JEMU
Partenaires	Responsable interne : : JEMU RBINS (+ input JEMU RMCA) Collaborateurs internes : Frederik Hendrickx (RBINS) Collaborateurs externes : /
URL site web	
Dates	Début : Nov 2016 Fin currently ongoing
Description générale du projet	This study will attempt to unravel the genomic basis of male dimorphism of the dwarf spider *Oedothorax gibbosus*.
Évolution et résultats pour l'année écoulée	- libraries for whole genome resequencing prepared - HT sequencing performed

Projet 3	
Nom (et acronyme)	Population genomics of the lake Tanganyika sardine (*Clupeiformes*, *Clupeidae*)
Financement	Source : JEMU Budget : JEMU + possible cofinancing RBINS, NTNU
Partenaires	Responsable interne : JEMU RMCA / JEMU RBINS Collaborateurs internes : Maarten Van Steenberge (RMCA) / Maarten Vanhove (RBINS)

	Collaborateurs externes : Jos Snoeks (RMCA), Filip Volckaert (KU Leuven), Joost Raeymaekers (NTNU, Norway), Nikol Kmentová (Masaryk University, Czech Republic)
URL site web	
Dates	Début : Dec 2016 Fin : currently ongoing
Description générale du projet	This study aims at describing the population structure of the Tanganyika sardine (*Limnothrissa miodon*). This will provide the necessary background information for fishery management of in the lake.
Évolution et résultats pour l'année écoulée	- General experimental design discussed. - Sample list drafted and samples recovered and available at RMCA. - Cost estimates for GBS and RAD sequencing obtained. - Extent of co-financing from RBINS, NTNU to be discussed (meeting 22 Dec. 2016).

BopCo collaborative projects 2016

Projet 1	
Naam (en acroniem)	Barcoding and identification of forensically important rovebeetles (Staphylinidae) in Belgium. (BIFIR)
Financiering	Bron: Belspo Budget: BopCo
Partners	Intern verantwoordelijke: Kenny Meganck Interne medewerkers: Marc De Meyer Externe medewerkers: Stijn Desmyter, Wouter Dekoninck
URL website	
Data	Begin: 12/04/2016 Einde: 2017
Algemene beschrijving van het project	Aan de hand van op naam gebrachte referentie collecties van Belgische kortschildkevers in het KBIN en ULiège (Gembloux) wordt een databank van DNA-barcodes gemaakt. Deze databank wordt dan getest en gebruikt bij de identificatie van onbekende kevers, in verschillende levensfases, die over de jaren werden gevonden en verzameld bij forensische zaken van het NICC.
Evolutie en resultaten voor het afgelopen jaar	Contact werd opgenomen met geïnteresseerde partners in het KBIN, NICC en Gembloux. Ondertussen is ook een gedeelte van de referentie collectie geselecteerd en van het KBIN ontleend naar het KMMA om de voucher informatie over te nemen. Een deel van de ontleende collectie is onderworpen aan labo technieken en resulteerden reeds in bruikbare

	DNA barcodes voor identificaties. Voorlopige resultaten werden voorgesteld op het Entomology Symposium (KBIN) en het Zoology Congress (UAntwerpen). Verder werd contact met NICC opgenomen over aanleg nieuwe collecties na verlies van hun collectie.

Project 2	
Naam (en acroniem)	Tephritidae CRI Samples (ERAfrica)
Financiering	Bron: RMCA Budget: AFRFF
Partners	Intern verantwoordelijke: Marc De Meyer Interne medewerkers: Externe medewerkers: Citrus Research International (CRI, South Africa)
URL website	
Data	Begin: 11/01/2016 Einde: Begin maart
Algemene beschrijving van het project	A DNA barcoding assessment of fruitfly plant pests found in fruit tree crops in South Africa.
Evolutie en resultaten voor het afgelopen jaar	DNA barcoding werd uitgevoerd op 62 aangevraagde stalen, waarvan 58 succesvol geïdentificeerd werden.

Project 3	
Naam (en acroniem)	Publicatie BopCo website
Financiering	Bron: / Budget: /
Partners	Intern verantwoordelijke: Kenny Meganck Interne medewerkers: Externe medewerkers: Yoo Ree Van Bourgonie, Sophie Gombeer
URL website	http://bopco.myspecies.info
Data	Begin:18/01/2016

	Einde: 25/02/2016
Algemene beschrijving van het project	Het aanvragen, opbouwen en invullen van de website voor onze dienst. Hierbij is ook een aanvraag-formulier opgesteld dat de communicatie en toegankelijkheid van het publiek moet vereenvoudigen.
Evolutie en resultaten voor het afgelopen jaar	De website is momenteel 'online' en actief, in de loop van het jaar werden nog talloze wijzigingen en aanpassingen gemaakt, naar gelang de noden.

Project 4	
Naam (en acroniem)	Identificaties
Financiering	Bron: Budget:
Partners	Diverse
URL website	
Data	Begin: / Einde: /
Algemene beschrijving van het project	BopCo biedt aan belanghebbende de mogelijkheid om stalen te identificeren die van beleidsbelang zijn.
Evolutie en resultaten voor het afgelopen jaar	Dit jaar ontvingen we ca. 10 birdstrike stalen van de luchtmacht, en onbekende huid staal en fruitvlieg stalen.

Projet 5	
Nom (et acronyme)	Study of the population genetic structure of wild cats in Luxembourg
Financement	Source : ULg Budget : Luxembourg government
Partenaires	Responsable interne : Nathalie Smitz Collaborateurs internes : BopCo

	Collaborateurs externes : Johan Michaux (ULg), François Gillet (ULg)
URL site web	
Dates	Début : 15/11/2016 Fin : mid 2017
Description générale du projet	The aim of this project is to study the population genetic structure of wild cats in Luxembourg and to identify hybrids with domestic cats using the Genotyping-by-Sequencing methodology (Next-Generation Sequencing). This will be performed by identifying thousands of SNP molecular markers distributed on the whole genome.
Évolution et résultats pour l'année écoulée	Extraction of DNA from hair samples on progress (more than 500 samples available- selection of 95 samples will be done in function of the quality and quantity of DNA that could be extracted from the non-invasive sampling).

Projected via liaison officer

Projet 1 (RMCA and BGM)	
Nom (et acronyme)	Man and Biosphere Reserves Network (MAB-NET)
Financement	Source :BELSPO Budget : 40 000 euro (total) will be distributed among partners to organize 2 workshops and a session at an UNESCO related event. Design of a website, some functioning funds and overheads for the coordination. No staff funds.
Partenaires	Responsable interne : Promoter Patricia Mergen Collaborateurs internes : Responsable scientifiques : Hans Beeckman, Claire Delvaux, Nils Bourland Collaborateurs externes : -Meise Botanic Garden : Steven Janssens, Piet Stoffelen, Steven Dessein - Ghent University ISOFYS ; Pascal Boeckx, CAVElab : Hans Verbeeck - University of Liège, Gembloux Agro-Bio Tech : Cédric Vermeulen - Ecole Régionale Postuniversitaire d'Aménagement et de Gestion intégrés des Forêts et Territoires tropicaux (ERAIFT) Baudouin Michel
URL site web	TBD
Dates	Début : Accepted in Jan 2016, Start date March 2016 Fin : 3 year project

Description générale du projet	The UNESCO's Man and the Biosphere Program (MAB), with 631 reserves in 119 countries, is an Intergovernmental Scientific Program to establish a scientific basis to improve relationships between people and their environments. Biosphere Reserves (BR) have 3 zones where scientists, NGOs, local communities work together (the core is mainly for long-term conservation and research, the buffer zone is for activities like environmental education, monitoring eco-tourism and research, the transition zone allows sustainable activities (agriculture, settlements) The concept of BRs is interesting to model sustainable development and to monitor ecosystem responses to global changes. Well-known as sensitive areas some tropical forest are already classified as BR. Recognizing the importance of this ecosystem across the world, in 2009, 3 institutions signed a MoC representing, Brazil, Indonesia and DR Congo addressing mainly capacity building, however the exchange of scientific information and joint trans-continental publications remains limited. The main objective of our project is to explore the various strategies and research priorities within the BRs and to facilitate knowledge and experience exchanges in order to become a model for sustainable development in ecosystem research. In MAB context, the partners are already active in the reserves of Luki and Yangambi in DR Congo. Due to their international collaborations and competences, they form a good basis to setup a wider MAB scientific experts networking platform to overcome the fragmentation in knowledge exchange. It is the ambition of this proposal to go however beyond Africa by including participation from other MAB areas. Particularly relevant, would be the comparison between the Congo and Amazonas Basins. Collaboration with Brazil is targeted. The Indonesian component will also be addressed, the UNSESCO MAB office agreed to support the participation of an Indonesian representative. Unless additional funding would be mobilized a visit to Indonesia is not foreseen. The platform has a multidisciplinary scientific and socio-economical scope : Conservation, biodiversity and habitat loss, climate change, carbon intake, ecosystem services, land use and urbanization and involvement of the local communities. The workpkan reads as follow: - A group of multidisciplinary experts is set up (year one) - The criteria to assess and analyze the functioning of MAB areas will be defined by the expert group together with the relevant stakeholders (year one)

	- A delegation of experts will perform local assessments in the selected MAB areas in Congo and Brazil and organize expert workshops (year 2 and 3) - Production of assessment, strategic planning and sustainability reports (Year 3) - Session organized during a MAB program event to outreach a worldwide audience and gather their input. The UNESCO MAB office is very positive on this idea and has already given its agreement in principle for such a session. The MAB Council meets annually at in Paris or in a MAB ICC Member State. Expected results are a better understanding and visibility of the research performed in the MAB areas. The networking platform will establish links between stakeholders active in the MAB reserves with the aim to facilitate exchanges and transfer of information. Scientific outputs will be enhanced by joint publications and more collaborative activities. The final goal is to convince UNESCO to sustain and manage this scientific networking platform, thus good use cases and proofs of concepts are needed. The partners of this proposal believe that the Belgian and Congolese partners can achieve this goal. The partners have already identified different hypothesis: - What are the research activities primarily conducted in the different MAB areas and the priorities expressed by the population, the scientists, of the governments and the UNESCO - Has the size of the MAB reserve an influence - How accessible are the MAB areas to the different users. Here the impact of the new ABS Nagoya protocol needs to be analyzed - Dissemination and capacity building activities will be assessed The adequacy of the consortium is illustrated here: . - The Royal Museum for Central Africa has experience in developing various research projects (in collaboration with national and international universities/partners) in Luki and Yangambi notably with PhDs and via several BELSPO projects (COMBINFO, BIOSPHERETRAITS,..). The section of wood biology is specialized in the development of non-destructive methods to collect wood sample (growth, carbon intake, dendrochronology), forest inventories, management of non-timber tree product, management of wood collection (the third largest collection in the world). - The Botanic Garden Meise is active in DR Congo and Brazil, where they study the evolutionary history of tropical Atlantic rainforests. Meise hosts the private collection of Von Martius and has made the

	information about 8 families of this collections available online (http://projects.bebif.be/enbi/martius/text?vol=3&p=1&page=107). The Von Martius' private botanical contains ca. 300,000 specimens representing 65,000 species from all over the world. Approximately half of them came from the Amazon Basin. - The Universities of Ghent and Liège have a large expertise in forest management, climate change, assessing Carbon intake (using Flux towers), study of endemic or invasive species. It is the aim to compare whether these topics are also investigated in other MAB areas, and to find out what approaches and priorities have to be set up to obtain quality results and a proper information flow within the network - The African partner (ERAIFT) is specialized in training numerous students and young researchers in forest ecology and conservation and will act as channel to outreach the local stake holders in the MAB areas. They will organize the travel and transit of the visiting experts on site. - The partners participate to the above mentioned projects jointly and many of the PhD thesis are conducted with promoters from the participating universities. Brazilian and Indonesian institutions are due the limit of 5, not direct partners, but they will be actively involved. The partners of the projects have several contacts in Brazil for example with the Centro de Referência em Informação Ambiental (CRIA), the Global Biodiversity Information Facility (GBIF) delegation, the representative of Biodiversity Information Standards (TDWG) and via UNESCO/BELSPO, contacts exist with the University of Para in Bélem, which is acting as UNESCO Chair for South-South cooperation for sustainable development. UNESECO MAB (secretariat of Paris) have committed to support the participation of Indonesia. The funding asked to BELPSO covers the setting up of the network and the costs of the local assessment campaigns and events. The final session back to back with an UNESCO MAB conference will be co-sponsored by UNESCO.
Évolution et résultats pour la période écoulée	There have been several coordination meetings with the partners (physically and remotely). Currently the negotiation are ongoing to draft and sign the contract with BELSPO. The partners have produced together a folder which highlights their past, current and future collaboration in MAB reserves in D.R. Congo. The folder is announcing the MAB network project. The content is a joint collaboration of the partners of the project, the folder and design has been produced by the publication services of the RMCA (Mara-Flore Dubois (design), Divinagracia Emily (proof reading) Quadt Michèle (printing), Isabelle Gerard (coordination).
<u>Projet 2 (RMCA, collaboration BGM and KBIN)</u>	
Nom (et acronyme)	Developing new genetic tools for bioassessment of aquatic ecosystems in Europe (DNAqua-Net)

Financement	Source :COST Budget : Managed by the Coordinator, funds to be used by the partners for network activities, no staff
Partenaires	Responsable interne : Patricia Mergen Collaborateurs internes : JEMU is kept informed, but they do not participate directly for the time being. Depending on the topic of the networking events, other staff members of RMCA may participe. Collaborateurs externes : **Coordinator**: University of Duisburg-Essen, Germany : Florian Leese **Canada** Dr Dirk Steinke (University of Guelph [Biodiversity Institute of Ontario]) **Switzerland** Prof Jan Pawlowski (UNiversity of Geneva) Prof Florian Altermatt (Eawag) **Germany** Dr Vera Fonseca (Museum Alexander Koenig - Museum Alexander Koenig/ Bonn University) Dr Jonas Zimmermann (Freie Universität Berlin - Botanic Garden and Botanical Museum) **Estonia** Prof Urmas Kõljalg (University of Tartu) **France** Dr BOUCHEZ Agnès (INRA) Dr Pierre Taberlet (Centre National de la Recherche Scientifique - CNRS) Dr Alice Valentini (SPYGEN) **Finland** Dr Kristian Meissner (Finnish Environment Institute SYKE - Finnish Environment Institute) Prof Craig Primmer (University of Turku) **United Kingdom** Dr John Jones (Queen Mary University of London - River Communities Group) Prof Alfried Vogler (Imperial College London) **Greece** Dr Costas Tsigenopoulos (Hellenic Centre for Marine Research - Institute of Marine Biology,Biotechnology and Aquaculture) **Hungary** Prof Judit Padisák (University of Pannonia - Institute of Environmental Science) **Italy** Dr Diego Fontaneto (CNR - Institute of Ecosystem Study) Dr Angela Boggero (National Research Council - Institute of Ecosystem Study) **Norway** Prof Torbjorn Ekrem (Norwegian University of Science and Technology (NTNU) – NTNU, University Museum)

	Netherlands Dr Arjen Speksnijder (Naturalis NBC) **New Zealand** Dr Jeremy Jay Piggott (University of Otago) **Poland** Prof Roman Wenne (Institute of Oceanology, Polish Academy of Sciences) **Romania** Dr Ion Navodaru (Institutul National de Cercetare-Dezvoltare Delta Dunarii) **Slovakia** Dr Fedor Čiampor (Slovak Academy of Sciences) **United States** Dr Kristy Deiner (University of Notre Dame) Dr Andrew Mahon (Central Michigan University) **Georgia** Prof Bella Japoshvili (Ilia State University [Lab of Hydrobiology and Ichthyology])
URL site web	http://dnaqua.net/ http://www.cost.eu/COST_Actions/ca/CA15219?parties
Dates	Début : Accepted in Feb 2016, start date October 2016 Fin :4 year project.
Description générale du projet	The protection, preservation and restoration of aquatic ecosystems and their functions is of global importance. For European states it became legally binding mainly through the EU-Water Framework Directive (WFD). In order to assess the ecological status of a given water body, aquatic biodiversity data are obtained and compared to a reference water body. The quantified mismatch thus obtained determines the extent of potential management actions. The current approach to biodiversity assessment is based on morpho-taxonomy. This approach has many drawback such as being time consuming, limited in temporal and spatial resolution, and error-prone due to variation of individual taxonomic expertise of the analysts. Novel genomic tools can overcome many of the aforesaid problems and could complement or even replace traditional bioassessment. Yet, a plethora of approaches are independently developed in different institutions, thereby hampering any concerted routine application. The goal of this Action is to nucleate a group of researchers across disciplines with the task to identify gold-standard genomic tools and novel eco-genomic indices for routine application for biodiversity assessments of European water bodies. Furthermore, DNAqua-Net will provide a platform for training of the next generation of European researchers preparing them for the new technologies. Jointly with water managers, politicians and other stakeholders, the group will develop a conceptual framework for the standard application of eco-genomic tools as part of legally binding assessments.
Évolution et résultats pour l'année écoulée	This project is part of the activities to continue with the EC-Barcoding of Life network (http://www.ecbol.org/). Since the acceptance of the project, contributed to the drafting of the MoU, submitted application to Belspo COST contact to sit on the Belgian Management committee of this COST action. Collaboration with the coordinator on answering to the review

	(specially on the point to collaborate more with taxonomists and morphological approach. Liaise as vice-chair of the Belgian Committee for the International Water Association (B-IWA). Present the project at the upcoming B-IWA general meeting at Botanic Garden Meise in form of posters and folders.

PROJECTEN SPECIFIEK VAN DE DIENST INVERTEBRATEN

Focus Project 1 (partim)	
Naam (en acroniem)	Detection methods for fruit flies of economic significance to fruit and vegetable production in African and Indian Ocean Islands (ERAfrica FRUITFLY)
Financiering	Bron: Budget:
Partners	Intern verantwoordelijke: De Meyer, M. Interne medewerkers: Virgilio, M., Meganck, K. Externe medewerkers: Manrakhan, A. (CRI), N'Klo, H. (CNRA); Delatte, H. (CIRAD)
URL website	
Data	Begin: Einde:
Algemene beschrijving van het project	De dienst heeft financiële steun bekomen via een ERAfrica oproep voor het uitwerken van netwerken tussen Europese en Afrikaanse partners. In dit kader is het project 'FRUITFLY netwerk' gestart in samenwerking met Citrus Research Institute (coördinator, Zuid Afrika), CIRAD (Frankrijk) en CNRA (Ivoorkust). De taak van de dienst is het uitwerken van ID tools (cf WEBFLY project) en ondersteunen van identificatie van target soorten.
Evolutie en resultaten voor het afgelopen jaar	Dit project ging in 2014 van start. Tijdens 2016 werden de volgende activiteiten verder gezet: - Samenwerking met CRI en CNARC voor uittesten van de digitale identificatiesleutel die ontwikkeld zijn geworden in een ander project. - Ontwikkelen van methodes voor populatiegenetische en identificatie van pestsoorten (in het kader van lopende

	projecten van JEMU) - Participatie in TEAM symposium In het kader van dit project werd ook extra financiering bekomen voor de partner van Ivoorkust, via het RAAC.

Focus Project 2 (partim)	
Naam (en acroniem)	Monitoring network for fruit flies in Southeast Africa (FRUITFLYNET)
Financiering	Bron: BELSPO Budget: 40000
Partners	Intern verantwoordelijke: De Meyer, Marc Interne medewerkers: Virgilio, M.; Externe medewerkers: Addison, P; Mwatawala, M; Cugala, D
URL website	
Data	Begin: Einde:
Algemene beschrijving van het project	De dienst heeft financiële steun gekregen van BELSPO in het kader van een oproep voor het bevorderen van netwerken tussen FWI's en andere onderzoekspartners in het buitenland. In dit kader is het project 'FRUITFLYNET' gestart in samenwerking met Sokoine University (Tanzania), E. Mondlane University (Mozambique) en Stellenbosch University (Zuid Afrika). Het project voorziet uitsluitend in financiële middelen om geregeld bijeenkomsten te organiseren voor de partners. De taak van de dienst is algemene coördinatie en het uitwerken van een plan voor regionaal netwerk voor monitoring van fruitvliegpesten. Het is vooral bedoeld as versterking van de samenwerking die reeds bestaat met deze buitenlandse partners.
Evolutie en resultaten voor het afgelopen jaar	Dit project werd opgestart in 2014. Tijdens 2016 werden twee bijkomende vergaderingen georganiseerd, telkens als satelliet activiteit aan internationale symposia (TEAM3 meeting in Stellenbosch, Zuid Afrika; TAAO meeting in Kuala Lumpur, Maleisië). Verschilende activiteiten verlopen ook in samenwerking met het ERAfrica FRUITFLY project (zie verder)

Project 3	
Naam (en acroniem)	Symbiont Diversity and Feeding Strategies in Insect Agricultural Pest (SYMDIV)
Financiering	Bron: Belspo Budget: € 146956
Partners	Intern verantwoordelijke: Marc De Meyer, Massimiliano Virgilio Interne medewerkers: Maarten De Cock Externe medewerkers: Anne Willems, Peter Vandamme
URL website	/
Data	Begin: 1 April 2016 Einde: 31 Maart 2018
Algemene beschrijving van het project	Insecten zijn instaat tot het exploiteren van een zeer grote variëteit aan nutritionele niches. Dit is mogelijk niet door een grote metabolische flexibiliteit maar door een zeer intense relatie tussen insecten en hun geassocieerde endosymbionten. Darmbacteriën spelen een fundamentele rol in het eetbaar maken van verschillende soorten plantmateriaal en promoten hierdoor de relatie tussen fytofagen insecten en hun host planten. Dit project zal focussen op de relatie tussen insect-endosymbionten en de insect-host interacties in tephritidae (diptera). Het doel is het beschrijven en vergelijken van de darmbacteriën in verschillende, nauw verwante tephritidae soorten met verschillende diëten. Hiervoor zal gebruik worden gemaakt van de nieuwste metagenomische technieken waarmee de volledige darmbacterie gemeenschap in kaart zal worden gebracht.
Evolutie en resultaten voor het afgelopen jaar	Activiteiten (M. De Cock): – Persoonlijke educatie : Literatuur studies over relevante onderwerpen Bijwonen cursussen, seminars en webinars omtrent NGS en data analyse – Praktische voorbereiding toekomstige experimenten : Larve dissectie tests Larve preservatie tests Opstellen experimentele opstelling Opzetten netwerk voor inzameling – Methodologisch (pilot) experiment (in samenwerking met het IAEA, Wenen): Fruitvlieg darm dissecties (in het IAEA) Fruitvlieg darm microbioom DNA extracties (in het IAEA) Voorbereiding verdere staal verwerking in het RMCA – Hoofd experiment: Opzetten van het experimenteel design Coördinatie van staalnames

	– Schrijven van een PhD voorstel ('Development of probiotics for the improvement of mass rearing African fruit fly (Diptera: Tephritidae) species') als een potentiele voortzetting van het SymDiv project. – Voorbereiding verdediging PhD voorstel – Voorbereiding barcoding : Proof of concept barcoding van gut extracten + vergelijking met barcoding restant extracten – Barcoding van ongeïdentificeerde tephritide larven (lopend) Inzameling : 24 groepen (soort/locatie/host) Identificatie : 113 ind. van 6 groepen Schatting inzameling nog te doen : 40 groepen Schatting identificatie nog te doen : 600 ind. – Pilot experiment : DNA extracties van larven en adulten van gepreserveerd kolonie materiaal (lopend) Inzameling : 70 groepen (compleet) Extractie : 60 groepen (10 nog te doen)

Project 4	
Naam (en acroniem)	TILAPIA- "Traceren van Introducties van vissen en Laterale ParasietenTransfer naar Inheemse Aquatische fauna"
Financiering	Bron: Bron: Belspo Budget: 149.000€
Partners	Intern verantwoordelijke: Tine Huyse, Jos Snoeks Interne medewerkers: Michiel Jorissen
URL website	
Data	Begin: 01/10/2013 Einde: 31/13/2017
Algemene beschrijving van het project	In dit project willen we de invloed van visintroducties op de inheemse vispopulaties in het Congobekken bestuderen. De nijltilipia (*Oreochromis niloticus*) werd in de Democratische Republiek Congo op grote schaal ingevoerd voor aquacultuur-doeleinden, maar is een sterk invasieve soort die in competitie treedt met lokale vissoorten. Daarenboven kunnen visintroducties ook leiden tot introducties van nieuwe parasieten die de lokale fauna kunnen bedreigen. Doel van dit project is om een beter inzicht te verkrijgen in de geschiedenis van deze

	introducties en hun impact op de lokale tilapia soorten. De parasietenfauna van historische tilapiacollecties van het KMMA zal vergeleken worden met nieuwe collecties uit het Congobekken. Naast uitgebreide morfologische analyses zullen er ook moleculaire analyses uitgevoerd worden.
Evolutie en resultaten voor het afgelopen jaar	Afgelopen jaar heeft er een veldexpeditie plaatsgevonden in Bas-Congo waarop verse stalen werden verzameld. Het merendeel van deze stalen is verwerkt (morfologische analyse/genetische staalname). Ook bijkomend materiaal, zoals kieuwen uit de museumcollectie die dienen als referentiemateriaal, werd verzameld. De stalen die vorig jaar in Katanga werden verzameld zijn intussen volledig verwerkt en geanalyseerd. De resultaten zijn verwerkt in een manuscript dat bijna klaar is voor submissie. Dit manuscript omvat een morfologische analyse en de eerste records van kieuwparasieten van inheemse cichliden uit de Lower Luapula. Ook genetische verificatie via barcoding (COI en/of 18S en/of 28S en/of ITS rDNA) van parasiet en/of gastheer werd uitgevoerd. In het manuscript wordt buiten aan taxonomie ook aandacht besteed aan gastheerspecificiteit en welke factoren hier een rol in spelen. Ook werd getoetst dat er bepaalde regio's zijn waar laterale parasietentransfer gestimuleerd/gefaciliteerd wordt door omgevingsfactoren, veranderingen in gedrag van gastheer en/of introductie van nieuwe vissoorten.

Project 5	
Naam (en acroniem)	Renforcement des capacités locales pour une meilleure évaluation biologique des impacts miniers au Katanga (RD Congo) sur les poissons et leurs milieux aquatiques
Financiering	Bron: VLIR Budget:
Partners	Promotoren : Auguste Cocha Manda (Univ Lubumbashi); Jos Snoeks (KUL) Co-promotoren : Filip Volckaert (KUL); Lieven Bervoets (U Antwerpen) Interne medewerkers : Emmanuel Vreven, Tine Huyse. Externe medewerkers: Maarten Vanhove (KBIN), Vera Verhaert (U Antwerpen)
URL website	
Data	Begin: /2014 Einde: /2016

Algemene beschrijving van het project	Dit project bestudeert de impact van vervuiling door mijnbouw op het aquatisch milieu in Katanga, en omvat een luik visdiversiteit, ecotoxicologie en parasitologie.
Evolutie en resultaten voor het afgelopen jaar	Zie rapport dienst Vertebraten

Project 6	
Naam (en acroniem)	The Study of Plant-Insect Interactions introducing next generation sequencing techniques (SYRPINTINE)
Financiering	Bron: Belspo Budget: 149326 €
Partners	Intern verantwoordelijke: Kurt Jordaens Interne medewerkers: Yannick De Smet Externe medewerkers:
URL website	
Data	Begin: 15/12/2014 Einde: 15/03/2017
Algemene beschrijving van het project	
Evolutie en resultaten voor het afgelopen jaar	In het afgelopen jaar werd de taxonomie en systematiek van de genera Eristalodes en Eristalinus verder uitgewerkt. Tijdens drie verzamelcampagnes (Benin/Togo, Malawi, Kenya) werd nieuw materiaal van beide genera verzameld en toegevoegd aan de collecties van het KMMA. Een recent ontwikkelde identificatiesleutel voor beide genera werd verder verbeterd en afgewerkt en de bestaande DNA-barcode referentie databank werd aanzienlijk uitgebreid. De resultaten van het onderzoek worden momenteel uitgewerkt in wetenschappelijke publicaties.

Project 7	
Naam (en acroniem)	Spatio-temporal population dynamics of fruit fly populations and

	optimization of IPM program in Manica Province, Mozambique
Financiering	Bron: RAAC Budget:
Partners	Intern verantwoordelijke: Marc De Meyer Interne medewerkers: Massimiliano Virgilio Externe medewerkers: Domingos Cugala, Maulid Mwatawala, Luis Bota, Laura Canhanga
URL website	
Data	Begin: Einde:
Algemene beschrijving van het project	Binnen het kader van het Raamakkoord heeft de dienst sinds 2012 een vijfjarig institutioneel samenwerkingsproject met Sokoine University (Tanzania) en E. Mondlane University (Mozambique). Dit project kadert in de North-South-South filosofie waarbij de expertise die in de voorbije jaren is opgebouwd bij één van de partners in het Zuiden (Sokoine) wordt overgedragen aan een andere partner in het Zuiden (Mondlane). De dienst heeft hierin een algemene coördinerende rol maar is ook actief betrokken bij de trainings- en onderzoekcomponenten. Het project centraliseert zich op de ontwikkeling van een IPM systeem tegen fruitvlieg pestsoorten en optimalisatie van het systeem door een aparte spatio-temporale studie.
Evolutie en resultaten voor het afgelopen jaar	**Result 1:** Different control components that are part of the IPM implemented in a number of selected orchards Activity 1.3: evaluation of impact and effectiveness of control measures Subactvity 1.3.2.: data gathering trapping and rearing programs. Traps were set up under activity 1.2. in three different orchards. One of them will be used as control site with no IPM measures implemented. At two other sites, SUA IPM package will be implemented. Different lures will be set up in the selected orchards and emptied at regular intervals (during high season at least once a week). Fruits will be collected from the selected orchards and brought to the fruit fly research centre for rearing. Data will be analysed in order to establish the species diversity, their relative abundance and the infestation rate on the fruits cultivated in the orchards. **Result 2:** Spatio-temporal changes in fruit fly populations documented Activity 2.3: monitoring of spatio-temporal changes Subactivity 2.3.1: seasonal abundance fluctuations. Traps will be emptied at regular intervals, and fruits collected (based upon experience gathered through subactivity 2.2.3) in order to monitor any changes in occurrence and abundance of the target fruit flies in the orchards.

	Subactivity 2.3.3. analysis spatio-temporal changes. Data from the two annual cycles of sampling will be analysed in order to establish the spatio-temporal patterns in the occurrence and spread of the fruit flies in the orchard. These results will be implemented from Y4 onwards in activity of result 3. **Result 3:** Re-evaluating IPM programme using spatio-temporal data Activity 3.1: selection of adjustment measure of IPM package Subactivity 3.1.1: spatio-temporal impact on relative abundance. Based on the analysis under subactivity 2.3.3. the impact of spatio-temporal differences throughout the experimental site, a space and time differentiated IPM program will be developed. Activity 3.2: evaluation of impact and effectiveness of adjusted control measures. Subactivity 3.2.1: From the two sites under SUA IPM under subactivity 1.3.2., one will be selected for an improved IPM package, based upon the first findings of spatio-temporal information under activity 2 and the subsequent analysis under subactivity 3.1.1. As in subactivity 1.3.2., different lures will be set up in the selected orchards and emptied at regular intervals (during high season at least once a week). Fruits will be collected from the selected orchards and brought to the fruit fly research centre for rearing. Data will be analysed in order to establish the species diversity, their relative abundance and the infestation rate on the fruits cultivated in the orchards. **Result 4:** Training of Mozambican staff accomplished Activity 4.2: engagement PhD student Subactivity 4.2.3: PhD student conducts research in the field. Detailed work plan will be developed for student, deciding upon active periods in the field, assistance provided by technician and supervision by EMU and SUA co-ordinators. Student will participate in activity 1.3 and 3.1. and will visit SUA in 2016. Activity 4.3: engagement MSc student Subactivity 4.3.3: MSc student conducts research in the field. Detailed work plan will be developed for student, deciding upon active periods in the field, assistance provided by technician and supervision by EMU co-ordinator. Student will participate in activity 2.3.

Andere activiteiten

DEPARTEMENTAAL:

LIAISON OFFICER EXTERNAL RELATIONS FOR RESEARCH (P. Mergen)

(alleen activiteiten uitgevoerd voor KMMA of gemeenschappelijke activiteiten met Botanische Tuin Meise)

Ongoing implementation of activities

- **New Wood Museum at BGM:** Liaison in collaboration with the Wood Biology section for the new Wood Museum in BGM. Coordination meeting between RMCA and BGM. **[RMCA and BGM**]
- **Prelude database :** Coordination of the sustainability of the medical plant database Prelude. Updating the draft agreement between RMCA and Prof Lehman and his wife together with our ICT and Lutgard. Negotiating and approval of the signature of the contract with the Lehman family. First analysis of the database. Organizing meeting with RMCA and BGM direction. Draft plan for the next steps for the involvement of BGM in the sustainability of the database**.[RMCA and BGM]**
- **Biospheretraits:** Follow up of the payment of the due funds to BGM, Amendment at Belspo to the contract. Updating of the agreement between RMCA and BGM and have it signed by both directions. **[RMCA and BGM]**
- **Man and Biosphere collaborations:** Coordination of the production of a folder to present the joint activities of RMCA, BGM, University of Ghent, University of Liege and ERAIFT.**[RMCA and BGM]**
- **European Conference of Tropical Ecology (2017):** Follow up of the organization of the Conference with ULB in collaboration with RBINS, BGM and RMCA. **[RMCA and BGM]**
- Article about the new RIO Pensoft journal for the Museum News **[RMCA]**
- Following up of all the collaborations and projects as listed in the 3 Months report from the previous period**:** Brussels Environment, Vito, Botanical field books exhibition, New Wood museum, Biosphertraits, Mab-Net, Nagoya protocol, Prelude medicinal plants database, Organising and scientific committee of the European Tropical Ecology conference 2017 at the VUB … **[BGM and RMCA]**

International associations and projects

EU BON : Follow up of the Steering Committee tasks, participation to the e-meetings of the different WPs. Proof reading of the reports and deliverables. Preparing a publication in the RIO journal of the Deliverables. Participation to PROBA V meeting in Ghent on Satellites and Remote sensing and reporting back. Liaise for the organization of the final event in Belgium in 2017 with the project leader. Checking the financial reporting. **[RMCA]**

SYNTEHSYS 3: Contributing to task NA3 on preparing the European Roadmap for Sustainability of the collection management in Europe. Participation to the workshop in Prague to agree on the outline for the documents needed for May 2016. The Roadmap is to prepare SYNTENSYS 4 proposal and ESFRI EU COLL re-submission **[RMCA and BGM]**

SYNTEHSYS 4: Collaboration with the preparation of the proposal together with the partners. Coordination by London and Leiden **[BGM and RMCA (pending decision)]**

ESFRI EU COLL: Drafting of the proposal together with Leiden, London and CETAF. Participation to the information kick off workshop in Leiden. Taking of the minutes and writing the report on the

outcomes. Contact for BELSPO and Flemish government to support EU COLL on the European Roadmap for Research infrastructures. Collaboration in BGM with Henry Engledow and Quentin Groom. Synergies with RBINS (Carole Paleco and Patrick Semal). **[BGM and RMCA (pending decision)]**

CETAF: Following up on the activities of the Executive, of the working groups and preparation of the documents in view of the upcoming general meeting in Budapest and Madrid. [**RMCA and CETAF]**

TDWG: Participation to the tasks of the executive, since 2016 representative for Europe and chair of the Time and Place Committee. Preparation of the upcoming General Meetings **[RMCA and TDWG]**

CoL: Preparation of the Expert Global team meeting and follow up of the activities of the group. **[RMCA and CoL]**

BHL: Follow up of the activities with regular e-meetings. European content to transit via the Global BHL hub and not anymore via the European system. **[RMCA and BGM]**

B-IWA: organization of a visit of the restoration of the Zenne in Brussels, with Brussels environment. Preparing a conference about Water Awareness for the B-IWA annual symposium in form of a Nocturne and member of the Jury for the B-IWA awards selection **[B-IWA]**

SciColl : Scientific Collection International following up to participation of Belgium to the Association, became member of the executive end of 2016. Negotiating Belgian participation for the transitional 4th year with interested stakeholders and Belspo. Participation to the workshop on collections and food security, publication in preparation [**mainly BGM, with input from RMCA and RBINS]**

Follow up of the international associations and projects activities as listed in the previous report, notably EU BON, SYNTEHSYS 3, participation to the General assemblies of CETAF (Budapest) and Catalog of Life (Crete). Preparation of the ESFRI collections management infrastructure, SYNTHEYS 4 proposals. Contributing to the tasks and management of TDWG (Biodiversity Information Standards, Biodiversity Heritage Library (BHL), B-IWA, Royal Zoology Society of Belgium, DARIAH (Digital Platform for Art and Humanities … **[BGM and RMCA]**

Following up the start of the COST action “Developing new genetic tools for bioassessment of aquatic ecosystems in Europe”, as Member Committee member for Belgium and participation to the WG on the European Water Framework Directive and legal aspects **[RMCA, BGM]**

Contribution to the writing of the DISSCO (Distributed System of Scientific Collections) to be submitted to the ESFRI 2018 roadmap **[RMCA, BGM]**

Follow up on exhibition about botanical field note books for 2017 in Meise **[RMCA, BGM]**

GBIF African Grants contributing as mentor **[RMCA; BGM]**

The participation to BELSPO working groups such as International collaborations, e-infrastructure, Science Diplomacy on behalf of **RMCA and BGM**.

Participation to the evaluation steering committee with UNESCO on the Biospheretraits BELSPO project

Liaison between RMCA and BGM around the faith of the *Pericopsis elata* **[RMCA and BGM]**

Participation to the CETAF annual meeting, including the EJT and CPB. Follow up on RRI and CETAF passport for RMCA updating, figures on our collections. **[RMCA and BGM]**

Support to project proposals submission

(only those accepted listed)

- Follow up and support to Brain proposals (expression of Interest due 15th June 2016)
    - Axe 1/2 :
        - Biodiversity and Ecosystem functioning Pioneer on Health/zoonoses [RMCA],
    - Axe 3/6:
        - Crowdsourcing for federal heritage [Lead BGM, with FSIs who wish to join, so far
- Management of digital data/collections: interface and interoperability; Proposal to implement DARWIN at Be-Taf level [Lead RBINS, RMCA, BGM, CETAF]
- Analysis of FNRS and FWO calls
- Analysis of JRS Biodiversity Calls

Visiteurs (chercheurs, utilisateurs de bibliothèques, nombre de stagiaires, etc.)

- Kristjan Adojaan (Tartu, Estonia), future common PhD student on Pluto F with the University of Tartu, for traits and descriptive data, to be hosted at BGM **[BGM]**
- Jean-François Flot (ULB) substitute MC for Belgium of the COST action DNAquanet
- Florian Leese (University of Duisburg-Essen), chair of the COST action DNAquanet

Communications lors de conférences, séminaires, congrès

- 9-17 April: co-organisation of the Catalogue of Life Global team and mini-symposium. Presentation on “Reflection on an African Hub for the Catalogue of Life” and “Prelude, a database on traditional medicinal plants”(Jean Lehmann and Martine Baerts-Lehmann, Patricia Mergen)
- 2-4 May: Co-organisation of CETAF 39 general assembly and executive meeting.
- 17 May Castel of Bouchout, Meise : Networking workshop with VITO Local Environmental Monitoring : presentation of activities of Meise and RMCA
- 18 May Castel of Bouchout, Meise: Organisation of the the nocturnal of the Belgian Committee of the International Water Association (B-IWA), presentation of Poster on the new COST action DNA Aquanet
- AGORA 3D: establishing digitisation protocols for natural and cultural heritage - at Dariah-EU Annual Event, 10-13 October, 2016, Ghent University Conference Centre Het Pand.
- DOE! Poster at Dariah-EU Annual Event, 10-13 October, 2016, Ghent University Conference Centre Het Pand.
- Applying TDWG Standards to assess the Ecosystem Value of UNESCO Man and Biosphere Reserves in Africa.Patricia Mergen, Hans Beeckman, Claire Delvaux, Doriane Desclee, Baudouin Michel, Quentin Groom, Steven Janssens, Henry Engledow, Piet Stoffelen, Filp Vandelook, Jérôme Degreef, André De Kesel, Hidvég Franck, Christine Cocquyt, Steven Dessein, Trefon Théodore, Smirnova Larissa, Cédric Vermeulen, Pascal Boeckx, Hans

Verbeeck, Noéline Raondry Rakotoarisoa at TDWG 2016, Annual meeting, CETEC, Santa Clara, Costa Rica and chairing session of Inventories.

JEMU

Other JEMU projects (calls 2014-2015)

Genotype by Sequencing (GBS) *Bulinus truncatus* (Gastropoda, *Pulmonata*) (JEMU - RMCA, JEMU - RBINS, collaboration with Tine Huyse, RMCA). Data collection, quality check and analysis completed.

GBS *Syncerus caffer* (Artiodactyla, Bovinae)
(JEMU - RMCA, collaboration with ULg, CIRAD, IGF, UCPH). Data collection and quality check completed. Data analysis ongoing.

Phylogeny of dolichopodid flies (Diptera, Dolichopodidae) (JEMU - RMCA, collaboration with Patrick Grotaert, RBINS). Phylogenetic tree reconstructions completed and delivered. Project closed.

Mitogenomics of syrphid flies (Diptera, Syrphidae) (JEMU - RMCA, JEMU RBINS, collaboration with Kurt Jordaens, RMCA). Data analysis completed (alignment, editing and annotation of the mitocondrial genomes of five Syrphid species).

DNA barcoding of forensically important flies of La Réunion (France) (Diptera: Calliphoridae, Fannidae, Muscidae, Sarcophagidae) (BoPCO RMCA, JEMU - RMCA, collaboration with Kurt Jordaens, RMCA). Input to data collection and analysis.

GBS *Ceratitis capitata* (Diptera, Tephritidae). Data collection and quality check completed. Data analysis ongoing.

Organization workshops

BeBol workshop organisation: "New methods for old DNA" (Royal Belgian Institute of Natural Sciences, Brussels, 2 - 3 June 2016)

Multimedia

Smitz N.: 20 minutes movie on the workshop "Extraction of old DNA from teeth- protocol adapted from Dabney et al. 2013" (RBINS, June 2016) presented by Katerina Guschanski and Tom van der Valk (Uppsala University).

Collection management

Integration of about 900 dried *Syncerus caffer* DNA samples into the museum collections (Smitz N.)

Integration of about 300 DNA extracts of *Bulinus truncatus/B. globosus* and about 1150 DNA extracts of *Syncerus caffer* to the museum DNA dry collection (Smitz N.)

Reorganisation of the tephritid DNA barcodes deposited on the Barcoding of Life Data Systems (BOLD, http://boldsystems.org): rearrangement of projects RMCA_Tephritidae, JEMU_Tephritidae, TBI_Virgilio_Public. Submission of DNA barcodes from six newly described *Ceratitis* species (ms in preparation) and of approximately 50 new *C. cosyra* DNA barcodes (Project ERAfrica 2015). (Virgilio M.)

Pilot project on the informatisation of the Tephritid DNA and voucher collection according to the DaRWIN standards (collaboration with Franck Theeten and Son Du, ICT-RMCA and Marc De Meyer). (Virgilio M.)

Missions

Virgilio M.: Targeted & Genome Wide Haplotyping' meeting, Leuven, BE, 28th Apr 2016.

Virgilio M.: SETAC/iEOS Joint Focused Topic Meeting, 12-15 September 2016, Ghent, Belgium (Environmental and (eco)toxicological Omics and Epigenetics: Science, Technology and Regulatory Applications)

Virgilio M.: Tephritid Workers of Europe, Africa and the Middle East - 3rd International Symposium. 11-14 April 2016. Stellenbosch, South Africa

Virgilio M.: Sampling of *Ceratitis capitata* in Lecce and Brindisi Provinces (Italy, 6-9 July 2015) (SYMDIV Project)

Virgilio M.: Sampling of *Ceratitis capitata* in Lecce and Brindisi Provinces (Italy, 7-10 November 2016) (SYMDIV Project)

Smitz N.: Workshop: 19-21/09/2016: "NGS data analysis" course organized by the University of Antwerp (Belgium)

De Corte, Z.: "Genomics Computing at the Flemish Super Computer Center (VSC) - Hands-on Workshop" (Leuven, 18/11)

De Corte Z.: "Zoology congress 2016" (Antwerp, 16-17/12). Attending and giving a presentation about the parallel radiation of the wolf spiders on the Galapagos.

Collaborations

Smitz N, Virgilio M.: Collaboration with Frank Theeten (RMCA): Stage "Optimisation, test et étalonnage de l'outil d'analyse génétique Open-Source "Tassel" - Master 2 Informatique. Informatique Avancée Et Applications (Ctu) - Université de Franche-Comté (Besançon, France)

De Corte, Z.

Data analysis

Processing and analyzing data of RAD libraries of the Hogna spiders of the Galapagos.

Virgilio, M.

Data collection:

Project ERAfrica: DNA barcoding and analysis of cryptic speciation in *C. cosyra* (Diptera, Tephritidae). Collaboration with Kenny Meganck, (BoPCO-RMCA) and Aruna Manrakhan (Citrus Research International, South Africa).

Tests for the microsatellite diagnosis of female *Ceratitis rosa* - *C. quilicii* (collaboration with Aruna Manrakhan - Citrus Research International, South Africa).

Data analysis:

Ceratitis FAR complex (RAD data cleaning and filtering, STACKS and PYRAD pipelines).

Analysis trapping data project ERAfrica (collaboration Dr. Aruna Manrakhan, Citrus Research Internatioknal, South Africa).

Multimedia:

Updates and optimisation of the online multi-entry identification keys to African frugivorous flies (Diptera, Tephritidae) (https://fruitflykeys.africamuseum.be/). Collaboration with Franck Theeten, Du Son, Benoît Hardy and André de Mûelenaere (RMCA).

Prize Digital for Development (D4D): Presentation of the multi-entry ID key for African Tephritids.

Editorial Activity and publishing:

Appointed Subject Editor of the Bulletin of Entomological Research (IF 1.91). Twelve manuscripts processed.

Reviewer of manuscripts for scientific journals including Molecular Ecology Resources, Scientific Reports, Genetica, Biological Journal of the Linnean Society, Bulletin of Entomological Research.

External Reviewer for a PhD Thesis of the Queensland University of Technology (Brisbane, AU) entitled "Natural variation and biogeography of the melon fruit fly, *Zeugodacus Cucurbitae* (Diptera: Tephritidae), in Southeast Asia and the West-Pacific"

Publications of four ms on scientific journals with impact factor, two book chapters, nine abstracts (see intranet).

BOPCO

Kenny Meganck

Verdere ondersteuning van het 2015 project op vliegen van La Reunion met Kurt Jordaens .
Drogen, labelen en opslaan van DNA extracties als vouchers in de collectie uit voorgaande projecten
Frequente zendingen naar KBIN voor info-sessies en overleg met BopCo partners aldaar.
Aanmaak van een officieuze BopCo lijst van interessante (taxonomische) doelgroepen die mogelijk als onderzoek-topics zouden dienen (geannuleerd).
Opstellen BopCo jaarverslag voor Belspo opvolgingscomité.
Webseminars ThermoFisher (e.g. *Precision & Power for the highest success in PCR'*)
14/04 (KBIN): Synthesis lezing: Fungus gnats and their unexpected biodiversity on the outskirts of Brussels.
14/04 (KBIN): Bruge collectie bezoek ter ontlening van specimens voor BIFIR project.
29/04 (Liège): Thesis verdeding Nathalie Smitz.
12/05 (KBIN): BopCo introductie en verdediging tijdens zelf georganiseerde evolunch.
12/05 (KBIN): Synthesis lezing: The Late Pleistocene biodiversity from Marie Jeanne cave in Hastière (Belgium).
19/05 (KBIN): Bruge collectie bezoek ter ontlening van specimens voor BIFIR project.
20/05 (KBIN): 1001 Ideeën voor Biodiversiteit congres.
02-03/06 (KBIN): Workshop 'New methods for old DNA'
06/09 (Antwerpen): collecting fresh reference samples African mammals.
29-30/09 (Brussels): Science and Policy-Making: towards a new dialogue.
Testing alternative extraction kits (Qiamp Micro) and methods (CTAB).
02/12 (KBIN): Entomology Symposium congress; presenting current state of the BIFIR project.
15-17/12 (Antwerp Zoo): Zoology Congress; incl. presenting current state of the BIFIR project.
Communicatie functies:

- Facebook posting of birdstikes en BopCo activiteiten.
- BopCo via twitter en het opstellen van flyers.
- Publicatie lijsten aanbieden via africamuseum
- Preparing an MoU for collaboration with NICC.

Nathalie Smitz

07-08/11/2016: ELEXIR workshop (Linux, R, Cytoscape), organized by Belspo (Brussels)
Laboratory introduction sessions to different student and senior groups in the frame of the "Science and Collection" project.
15-17/12/2016: Zoology Congress; presenting last population genetic structure results obtained on European otters (France) and African Lion (Tanzania).
09/11/2016: Gembloux Agro-bio Tech : seminar entitled "Gestion de la grande faune en milieu tropical, eco-ethologie et conservation de la faune" – presented population genetic structure results obtained on African buffalo (Southern Africa) and African lion (Tanzania).
29/04: PhD defense at the University of Liège: "Study of the genetic structure of the African buffalo populations (*Syncerus caffer*): Impact of its high mobility and of the population fragmentation on its distribution and its interactions with humans" supervised by Dr. Johan Michaux.
Pilot project: GBS analyses of European otter samples distributed in West and Central France- in collaboration with Lise-Marie Pigneur of the University of Namur.
Master thesis supervision: Olivia Jouvenet from the University of Liège: "Etude de la structuration génétique des populations de lions de Tanzanie à l'aide d'outils génomiques".

DIENST INVERTEBRATEN **(per personeelslid)**

M. De Cock

Zendingen
13 April 2016 : **Meeting**: Next Generation Sequencing at Ugent; Gent
26 April 2016 : **Deelname symposium** Ilvo: Genomics in Agriculture, Fisheries and Food; Melle
18 Mei 2016 : **Meeting**: NGS in de praktijk; Gent
25 Mei 2016 – 27 Mei 2016 : **Doctoral school**: Getting started with High-Performance Computing (part 1)
27 Mei 2016 : **Bijwonen doctoraatsverdediging** Bart Mesuere: Unipept Computational Exploration of Metaproteome Data
1 Juni 2016 – 3 Juni 2016 : **Doctoral school**: Getting started with High-Performance Computing (part 1)
30 Juni 2016 : **Infosessie**: "Funding for applied PhD research (FWO)", Gent
15 Juli 2016 : **Vergadering**: "Library preparation", Gent
24 – 30 Juli 2016 : **Dissecties en DNA extracties in het IAEA**, Wenen
16 Augustus 2016 : **Vergadering** : "PhD proposal", Gent
12 – 15 September 2016 : **Deelname symposium** : "Environmental and (eco)toxicological Omics and epigenetics: Science, Technology and Regulatory Applications", Gent
21 September 2016 : **Ophalen diplomasuplemmenten** (voor PhD voorstel) bij Ugent, Gent
28 Oktober 2016 : **Deelname symposium** BSM : "Microbiome and Host Metabolism", Brussel
3 November 2016 : **Test-verdediging PhD voorstel** in het Koninklijk Belgisch Instituut voor Natuurwetenschappen (KBIN), Brussel
7 November 2016 : **Test-verdediging PhD voorstel** bij het Laboratorium voor Microbiologie (Ugent), Gent
10 November 2016 : **Verdediging PhD voorstel** voor het Fonds Wetenschappelijk Onderzoek (FWO), Brussel
24 November 2016 : **DNA Sequencing** in het KBIN voor de barcoding van tephritide larven, Brussel

Andere
Begeleiding en trainen van Alessandro De Sciscio : Vrijwillige stage (1/12/2016-heden).

M. De Meyer

Departementale en algemene activiteiten
Opstellen strategisch plan onderzoek departement biologie
Opstellen Memorandum of Understanding voor gemeenschappelijk Centre of Excellence (Molecular Systematics and Biodiversity) tussen KMMA en KBIN
Opvolg FEDtWIN modaliteiten en contacten met universiteiten
Deelname uitwerken strategisch plan onderzoek KMMA

Wetenschappelijke activiteiten
Revisie KMMA collectie Gastrozonini: identificatie en herordening materiaal

Bijeenkomsten en zendingen
Co-organisatie 3rd International Meeting Tephritid Workers of Europe, Africa and the Middle East (TEAM), Stellenbosch, Zuid Afrika
1st Symposium of Tephritid Workers of Asia, Australia and Oceania (TAAO), Putrajaya, Malaysia 15-15.VIII.2016
3rd International Meeting of the Tephritid Workers of Europe, Africa and the Middle East, Stellenbosch, South Africa 11-14.IV.2016
Vergadering scientific committee of CORAF/WECARD Support Project of the Regional Plan for Control and Monitoring of the Fruit Flies in West Africa (SPRMF) (Ouagadougou, Burkina Faso)
Deelname First National Coordinators meeting, FAO/IAEA regional project RAF5074 'Enhancing Capacity for Detection, Surveillance and Suppression of Exotic and Established Fruit Fly Species through Integration of Sterile Insect Technique with Other Suppression Methods' (Juli, Maputo, Mozambique)

Trainingen en opleidingen
Lid examencommissie doctoraatsthesis Mze Hassani (Comoren) en Abir Hafsi (Tunesië) in samenwerking met CIRAD (La Réunion)
Deelname als docent Regional Postgraduate Certificate Programme in Sterile Insect Technique for Fruit Fly Management, University of Mauritius, Reduit, Mauritius (module fruit fly biology and systematics)

Editoriale en Reviewer taken
Editoriale opdracht boek 'Fruit Flies Research and Development in Africa – Towards a Sustainable Management Strategy to Improve Horticulture' Springer Verlag, in samenwerking met ICIPE.
Editoriale taken voor Journal of Insect Science, ZooKeys en Journal of East African Natural History
Reviewer opdrachten voor manuscripten ingediend bij: Journal of Applied Entomology (3x), Fruits (2x), Studia Dipterologica, Oikos, BionInvasions records, Zootaxa (2x), Pest Management Science.

Media en publieksgerichte activiteiten
Deelname vergaderingen voor nieuwe permanente tentoonstelling, partim landschappen & biodiversiteit. Uitschrijven scenografie taxonlab, in het kader van de renovatie

Y. De Smet

Zendingen

17-30 Januari 2016: Veldwerk in Benin en Togo

-Inzamelen *Eristalinus* / *Eristalodes* voor DNA en pollen extractie.

-Identificatie specimens in IITA, aanvragen loans voor verdere studie in het KMMA.

Wetenschappelijke activiteiten

Moleculair

-Selecteren en sequeneren van 5 regio's bruikbaar voor onderzoek op populatie-niveau.

-Opstellen van een representatieve staalname (150 specimens) voor onderzoek naar soortsgrenzen.

-DNA extractie voor capillaire en whole mitochondrial genome sequencing.

Morfologisch

-Uittesten en aanpassen morfologische identifiactie-sleutel *Eristalinus* / *Eristalodes*.

-Identificatie specimens op bruikleen van verschillende collecties, teneinde een representatief staal aan putatieve soorten te verzamelen voor het moleculaire luik van het project.

Analyses:

-Analyseren van de verkregen sequentie-data aan de hand van verschillende algoritmen voor soortsafbakening.

-Bepalen fylogenetische relaties binnen *Eristalinus* s.s.

Andere

Voorbereiden publicaties:

-Moleculaire studie naar soortsgrenzen binnen *Eristalinus* s.s.

-Beschrijven nieuwe soorten, en belangrijke morfologische (diagnostische) kenmerken.

Arnaud Henrard

Recherche scientifique 2016

L'analyse phylogénétique globale de la famille des Zodariidae (comprenant au total 620 séquences moléculaires pour 5 marqueurs génétiques et plus de 150 caractères morphologiques) ont permis de découvrir certains traits morphologiques jusqu'ici passé inaperçu et de mettre en lumière certains taxon tout à fait inédit et encore non décrit. Ainsi dernièrement un genre remarquable et endémique de Madagascar incluant 12 espèces nouvelles (dont une partie du matériel type a été placé dans les collections du MRAC) a été décrit (sous presse) de manière à être inclus dans l'analyse globale. Cette dernière découverte a également fait l'objet d'une communication orale lors de la réunion ARABEL (Arachnologia Belgica) qui s'est tenu le 29.04.2016 à l'Institut royal des Sciences naturelles de Belgique (Bruxelles).

La rédaction du manuscrit de la thèse est en cours et la défense doit être programmée en accord avec les promoteurs (pour début de l'année 2017).

La recherche sur les Ctenidae du Mont Nimba (principalement) en Guinée avait révélé 5 genres nouveaux et 8 espèces nouvelles pour la science avec le soutien d'analyses phylogénétiques (morphologiques et moléculaires), un travail enfin publié avec succès dans un journal scientifique.

Le matériel étudié pendant la thèse a également fait l'objet d'une digitalisation (principalement le matériel venant de la collection du MRAC) et viendra enrichir la base de données digitale.

Encadrement de visiteurs

Du 03 Juin au 15 Août 2016: Hector Gonzalez Filho, étudiant en Master, "Laboratório Especial de Coleções Zoológicas - Instituto Butantan, São Paulo - SP - Brasil". Assistance dans l'examination des collections Mygalomorphes (Araneae) du MRAC et dans l'utilisation de l'automontage LEICA.
Du 03 au 15 Octobre: Ren-Chun Cheng, Post doc, Slovénie, "Institute of Biology, Scientific Research Centre of the Slovenian Academy of Sciences and Arts". Assistance dans l'examination des collections Nephiliidae et Argiopinae (Araneae) du MRAC et dans l'utilisation de l'automontage LEICA.

Mission

27/10/2016: Invité à l'école Vie de Wavre: Sensibilisation et familiarisation au monde des araignées chez les élèves et professeurs.

Tine Huyse

- Commisaris zone Landschappen en Biodiversiteit van de permanente tentoonstelling

Expedities

- Expeditie DR Congo (Kimpese) verzamelen zoetwaterslakken en Schistosoma parasietstadia ism ITM Antwerpen en INRB Kinshasa (28/2-09/03/16)

Wetenschappelijke studiebezoeken

- Natural History Museum London (09-18/04/2015): EC Synthesis beurs

Wetenschappelijke dienstverlening binnen het domein

- Jury bachelor werk Ruben Schols KU Leuven (21/12/2016)
- Jury PhD commissie Abwe Rega Instituut KU Leuven (18/10/2016)
- Jury Msc verdediging Marlies Monnens KU Leuven (02/09/2016)
- Jury PhD commissie Edward Netherlands, KU Leuven (24/09/2016)
- Jury bachelor werk Hans Carolus, KULeuven (juni 2016)

CiMonoWeb: Hosting the monogenean parasites of cichlids online (Raamakkoord, KMMA): D**igitaliseren** van de microscopische **collectie** van Afrikaanse monogenea platwormen en samenbrengen van alle literatuur (deels verzameld in het kader van het TILAPIA project; Maarten Vanhove, Tine Huyse, Jos Snoeks en Didier Van den Spiegel). De literatuurstudie over alle Afrikaanse publicaties is door Wouter Fannes (vrijwillige medewerker) uitgevoerd en afgewerkt.

Algemene wetenschappelijke dienstverlening voor een groter publiek

- Voorstelling renovatieproject op Departementale lunch Biologie (25/10/2016)
- Voorstelling renovatieproject voor gidsen en cel communicatie (25/10/2016)
- Organisatie workshop en lezing over citizen science op 'Kom naar Buiten' georganiseerd door FWO en VLIR-UOS (14/11/2016)
- Workshop "Citizen Science: hoe betrek je burgers bij wetenschappelijk onderzoek?" voor Scriptie vzw (voor de wetenschapscommunicatoren van de universitaire associaties) in Odisee, Brussel (20/12/2016)

Referee en editoriale opdrachten

Referee artikel voor Infection, Genetics and Evolution, Parasites & Vectors

Lesgeven

Lesgeven aan de universiteit in Rabat over molecular parasitology, fish diseases, phylogeny and barcoding tijdens een VLIR-UOS Short Training Initiative 'Building an African network for sustainable management of aquatic biological resources supported by genetics and parasitology' 14-21/09/2016

Lid van comités of adviesraden

- Lid van de Jonge Academie (http://www.jongeacademie.be), een denktank voor en door jonge onderzoekers van de Vlaamse universiteiten waarin interdisciplinariteit, wetenschapscommunicatie en wetenschapsbeleid aan bod komen.
- Lid van adviesraad EOS
- Lid van cel interne communicatie KMMA

Communicatie met de pers

- Persbericht over publicatie Bilharzia in Corsica in Lancet Infectious Diseases in De Standaard, het Nieuwsblad, Le Vif en Gazet van Antwerpen. Juni 2016
- Artikel voor Eos geschreven: Tropische ziektes veroveren Europa. Juli 2016

Externe financiering

- Belspo fellowship voor Dr. M. Barson (University of Zimbabwe): The role of southern African bulinid snails in transmission of human and animal schistosomiasis and other trematode infections (2016-2017)
- ESEB Outreach grant: Human impact on parasite evolution (ism Dr. I. Pom)
- OCA type II beurs: The role of bulinid snails in disease transmission in Zimbabwe (ism Dr. M. Barson)
- BRAIN pionieer project: TRojan snAILS: the role of gastropod snails in disease transmission revealed by state-of-the-art molecular techniques (ism Dr. B. Van Bocxlaer en Dr. C. Albrecht)

Congressen en symposia

- MEEGID internationale conferentie in Antwerpen: Global change and tropical infectious disease in Europe: the emergence of urinary schistosomiasis in Corsica (11-13/05/2016)
- EMOP XII the 12th European Multicolloquium of Parasitology, Turku, Finland: Snails and schistosomes: a comparative analysis between Corsican and African isolates in order to infer migration pathways (20-24/07/2016)
- One Health symposium Brussel: impact of dam construction works on disease outbreaks (07/10/2016)
- FAME: *Tropical infectious disease in Europe: reconstructing the emergence of urinary schistosomiasis in Corsica (France)* Universiteit Gent (19/12/2016)
- Deelname user meeting NGS techieken Gasthuisberg 18/03/2016

Kurt Jordaens

Wetenschappelijke activiteiten

Onderzoek in het kader van het Belspo Brain-pioniersproject SYRPINTINE.: lopend onderzoek naar de taxonomie en systematiek van de genera *Eristalinus* en *Eristalodes*.

Onderzoek naar de hogere fylogenie van Syrphidae: van alle Afrotropische zweefvliegensoorten worden recent verzamelde exemplaren geselecteerd en bewaard op ethanol. Van al deze individuen worden DNA barcodes bepaald
Onderzoek naar het gebruik van DNA barcoding voor de identificatie van Afrotropische zweefvliegen: lopend onderzoek naar het opstellen van een referentie gegevensbank van DNA barcodes van Afrotropische zweefvliegen.

Bijeenkomsten en zendingen
Buitenlandse zending: Benin (17-31 januari)
Buitenlandse zending: Malawi (7-21 november)
Buitenlandse zending: Kenya (7-23 december)
26 april: Les "DNA-Barcoding in Conservation Genetics" (MaNaMa – Universiteit Antwerpen)
2 juni: deelname aan de workshop "New Methods for Old DNA" aan het KBIN.

Editoriale opdrachten
Editoriële taken : Belgian Journal of Zoology, Journal of Molluscan Studies en European Journal of Taxonomy

Referee opdrachten
Review activiteiten: Bulletin de la Société entomologique de France, Journal of Insect Science, Journal of Molluscan Studies, Nature Scientific Reports,

Media activiteiten
26 juni: infolunch KMMA: "DNA unravelled: why DNA identification of organisms is useful for our society".

Michiel Jorissen

Organisatie en deelname congressen/workshops
Wetenschapsdag: 27.11 Vanuit Connecterra Maasmechelen (Nationaal Park Hoge Kempen) in het pas gebouwde Veldstudiecentrum (UHasselt) een aantal experimenten opgesteld rond bodeminvertebraten en het belang van biodiversiteitsstudies aangetoond aan het grote publiek. Verder werd er ook een kijk genomen in de Ecotron en was er een wetenschapsmarkt.

17 december: Zoology Congress of the Benelux: **Jorissen et al.** - A hitchhiker's guide to tilapia: How parasites take a ride on introduced Nile tilapia in the DR Congo

Bezoekers: onderzoekers, gebruikers van bibliotheken, stagiairs, enz.

DIENST INVERTEBRATEN
- **3 nov:** Thomas Kusters voor een tekensessie (illustreren nieuwe soort aan de lichtbak + digitale bewerking). Algemene vergadering en planning van het bachelorproject.
- Prof T. Scholz, Institute of Parasitology, Czech Republic, Synthesis bezoeker van collecties parasitaire platwormen (Synthesis beurs, 15-23/2/2016).

- Drs Nikol Kmentova, University of Brno, Czech Republic, bezoeker van collecties parasitaire platwormen (Synthesis beurs, 06-23/06/16).
- Prof Christian Albrechts, Giessen University en en Dr. Bert Van Boxclaer, Giessen University/UGent collectie gastropoden (14/07/2016).
- Drs Dieu Ne Dort (Cameroon) van 5/11-5/12/16 (bij Ichtyologie en Invertebraten)
- Ximo Mengual (ZFMK):
- Trevor Burt (ZFMK):
- Lore Geeraert (KULeuven): 28 april, 9 juni en periode 1 – 31 augustus
- Axel Ssymank: 17 oktober

Voordrachten tijdens conferenties (inclusief posters)

Zie abstracts Intranet Publicaties

Aanwinsten voor de collecties

500+ specimens van de genera *Cichlidogyrus*, *Scutogyrus* (Dactylogyridae: Monogenea) en *Gyrodactylus* (Gyrodactylidae: Monogenea) uit Bangweulu-Mweru (Z-O DRC) en het Karibameer. Deze worden momenteel ingeschreven (door Christophe).

- Monogenea platwormen van Centraal Afrika (Tanganyika meer en Congo bassin):

microscopische preparaten van ongeveer 1500 specimens en DNA extracten en weefselstalen voor genetisch onderzoek van 500-tal specimens.

- Gastropoden van Afrika:

DNA extracten en schelpen van 500-tal Bulinus specimens (257 met barcode nummer) en 2000tal volledige specimens op ethanol.

Diptera:

- Inzameling en preparatie van Tephritidae (Diptera) via verschillende Afrikaanse partners en in het kader van bovenvermelde projecten.
- Syrphidae: 600 exemplaren uit Malawi; 1200 exemplaren uit Benin en Togo; 70 exemplaren uit Ethiopië
- Muscidae + Calliphoridae + Sarcophagidae: 800 exemplaren uit Benin; 1200 exemplaren uit Ethiopië

Follow-up van thesissen en verdediging ervan

Doctorant 1	
Prénom et nom	Arnaud Henrard
Titre doctorat	Systematics, phylogeny and biogeography of ant-eating spiders (Zodariidae) with special reference to forest dwelling Afrotropical taxa
Université	UCL
(Co-)Promoteur(s) (MRAC et externes)	Rudy Jocqué (RMCA) & Thierry Hance (UCL)
Date défense de thèse	2017

Doctoraatsstudent 2	
Voornaam en naam	Nele Boon
Titel doctoraat	Schistosomiasis: the role of parasite genetics in human infection and disease
Universiteit	KU Leuven
(Co)promotor (KMMA en externen)	KMMA: Tine Huyse KU Leuven: Filip Volckaert ITG: Katja Polman
Datum verdediging thesis	2016

Doctoraatsstudent 3	
Voornaam en naam	Laura Jose Canhanga
Titel doctoraat	Improved IPM programme for fruit fly (Diptera: Tephritidae) control in Central Mozambique
Universiteit	Sokoine University of Agriculture (Morogoro, Tanzania)
(Co)promotor (KMMA en externen)	SUA: M. Mwatawala EMU: Domingos Cugala KMMA: M. De Meyer
Datum verdediging thesis	Nog te bepalen

Doctoraatsstudent 4	
Voornaam en naam	Michiel Jorissen

Titel doctoraat	Visintroducties in Africa en de impact op de parasieten fauna
Universiteit	U Hasselt
(Co)promotor (KMMA en externen)	KMMA: Tine Huyse UHasselt: Tom Artois KBIN: Maarten Vanhove
Datum verdediging thesis	najaar 2019

Doctoraatsstudent 5	
Voornaam en naam	Yannic Wachel
Titel doctoraat	Modeleren verspreiding schistosomiasis
Universiteit	UCL
(Co)promotor (KMMA en externen)	UCL: Niko Speybrouck (promotor) KMMA: Tine Huyse (co-promotor)
Datum verdediging thesis	

Masterstudent 1	
Voornaam en naam	Bruno Kanage
Titel masterverhandeling	Moleculaire en morfologische identificatie van Bulinus truncatus, de tussengastheer van Schistosoma parasieten
Universiteit	KU Leuven
(Co)promotor (KMMA en externen)	KMMA: Tine Huyse KU Leuven: Filip Volckaert
Datum verdediging thesis	juni 2017

Masterstudent 2-4	
Voornaam en naam	Lauren Declercq, Fien Parmentier, Roos De Busschere
Titel masterverhandeling	Educatief parcours doorheen het museum van Midden-Afrika (Zone Landschappen en biodiversiteit)
Universiteit	KH Leuven
(Co)promotor (KMMA en externen)	KMMA: Tine Huyse KH Leuven: Heleen Bossuyt
Datum verdediging thesis	juni 2017

Masterstudent 5	
Voornaam en naam	Ofentse Sithole
Titel masterverhandeling	Geographic distribution, morphology and taxonomic identification of fruit flies in Botswana
Universiteit	University of Botswana (Gaborone, Botswana)
(Co)promotor (KMMA en externen)	Univ Botswana : M. K. Ditlhogo KMMA: M. De Meyer Univ Botswana: H. Coetzee
Datum verdediging thesis	Nog te bepalen

Bachelorstudent 1	
Voornaam en naam	Kusters Thomas
Titel thesis	Morfologische studie van Monogenea uit Bas-Congo
Universiteit	UHasselt
(Co)promotor (KMMA en externen)	KMMA: JORISSEN Michiel UHasselt: Artois Tom KBIN: Vanhove Maarten
Datum verdediging thesis	Juni 2017

Vertebrates

Personeelsbewegingen

- Eva Decru contract Cobafish van 01/01 tot 31/03/2016; contract vanaf 01/04/2016 part-time op begeleidingsfondsen MbiSa-Congo-project en vanaf 01/05/2016 ook part-time op het HIPE-project (Brain project); moederschapsverlof vanaf 21/11/2016
- Dimitri Geelhand de Merxem heeft het FishBase-team verlaten op 30/04/2016. Luis Da Costa werd gerekruteerd vanaf 01/05/2016 tot 31/212/2016.
- Jonas Merckx werd gerekruteerd van 07/09 tot 31/12/2016 op begeleidingsfondsen MbiSa-Congo-project.

Projecten: onderzoek, tentoonstellingen, educatieve activiteiten, communicatie

Project 1: 'Focus'-project	
Naam (en acroniem)	Het Congobekken: van carbon tot vissen (Cobafish)
Financiering	Bron: Belspo SSD-project) Budget: 122.369 € voor KMMA
Partners	Intern verantwoordelijke: Jos Snoeks Interne medewerkers: Jolien Bamps, Eva Decru, Tuur Moelants. Externe medewerkers: Erik Verheyen, coördinator van het Koninklijk Belgisch Instituut voor Natuurwetenschappen, Brussel; Alberto Borges, partner van de Université de Liège; Steven Bouillon, partner van de KU Leuven; Christine Cocquyt, partner van de Plantentuin Meise.
URL website	http://www.belspo.be/belspo/ssd/science/projects/COBAFISH.E.pdf
Data	Begin: 01/12/2010 Einde: 31/03/2016
Algemene beschrijving van het project	Het COBAFISH-project omvat een studie van de biodiversiteit, het biogeochemisch functioneren, en de ecosysteemdynamiek van het Congobekken, gebaseerd op een multidisciplinaire aanpak en het gebruik van bestaande en nieuwe biologische, ecologische en biogeochemische gegevens. Het project heeft als doelstelling om tot een beter begrip te komen van de interacties tussen (botanische en zoölogische) biodiversiteit en het functioneren van het Congobekken, en vormt aldus een basis voor toekomstige studies rond ecosysteemdiensten in de context van milieu- en klimaatsveranderingen. De resultaten van

	COBAFISH vormen hopelijk een belangrijke basis om de impact van antropogene (incl. klimaats-) veranderingen in te schatten. Tot slot bouwt dit project expliciet op de aanwezige lokale wetenschappelijke expertise voor het tot stand komen en de uitvoering ervan.
Evolutie en resultaten voor het afgelopen jaar	Tijdens dit project werden staalnames verricht in drie delen van het Centrale Congobekken stroomafwaarts van Kisangani: een grote zijrivier, de Lomami; een kleiner, de Lobilo; en de Congo hoofdstroom zelf. Alle vissen van de drie expedities (2809 specimens) werden geïdentificeerd. In totaal werden 132 soorten gevonden. De Lobilo had het hoogste aantal unieke soorten (31), meer dan het dubbele van het aantal in de twee andere systemen, een resultaat dat het bijzondere karakter van deze rivier illustreert. Het unieke karakter van de Lobilo bleek ook uit de fysisch-chemische parameters. De Lobilo is een zogenaamde zwart-water rivier met een zeer lage (zure) pH en conductiviteit. Het water heeft de kleur van thee door de opgeloste humuszuren. Tijdens dit project werden zeer vele taxonomische problemen ontdekt. Sommige er van werden uitgewerkt in samenwerking met Tuur Moelants en Eva Decru tijdens hun doctoraatstudie. Tijdens dit proces werden verschillende nieuwe soorten gevonden. De beschrijving van enkele nieuwe *Distichodus*-soorten is in voorbereiding en die van een nieuwe *Brycinus*-soort werd reeds gepubliceerd. Andere resultaten hebben betrekking op het verschil in morfologie tussen *Synodontis decorus* en *S. nummifer*; een revisie van de soorten van *Marcusenius* met kleine schubben; en een revisie van een aantal problematische *Labeo*-groepen. De genetische barcode [COI] van 620 specimens werd bepaald. Samen met datasets van andere projecten werd zo een database van 1440 sequenties gecreëerd met vissen uit de regio. Het relatief lage identificatie-succes in vergelijking met andere barcoding-studies op vissen toont aan dat de visfauna van het onderzochte gebied relatief slecht gekend is, wat zich uitte in talrijke discrepanties tussen de op literatuur gebaseerde identificaties van soorten en de groepen die door DNA-barcoding werden bekomen. Bovendien werden duidelijke aanwijzingen gevonden voor de aanwezigheid van cryptische soorten en het voorkomen van hybridisatie in deze regio. Een van de meest interessante resultaten van de combinatie van morfologische en moleculaire technieken werd gevonden in het genus *Enteromius*. In deze groep kleine karperachtige vissen, werden 23 genetische groepen (COI, mtDNA) gevonden binnen de vier op basis van de beschikbare literatuur geïdentificeerde soorten. Uit later uitgevoerde analyses bleken de meeste genetische groepen ook morfologisch van elkaar te verschillen, wat zou kunnen betekenen dat de meeste van deze groepen aparte soorten zouden zijn die nog niet wetenschappelijk beschreven werden. Een maaginhoud-analyse en een stabiele isotopenanalyse werd uitgevoerd op de stalen van de derde expeditie in samenwerking met de KU Leuven. Het algemene beeld dat we verkregen uit de maaginhoud analyses is dat omnivore vissoorten de vissenfauna in de drie bestudeerde rivieren domineren, gevolgd door de vissoorten die zich met allerlei ongewervelden voeden, wat het voornamelijk generalistische karakter van de visfauna van de regio illustreert. Eén van de belangrijkste bevindingen van dit project is dat de visfauna in de streek afhankelijk lijkt te zijn van voedsel van terrestrische oorsprong. Voor niet minder dan 61% van de vissen die 37% van de vissoorten vertegenwoordigen bleek dat ze zich voeden met prooien van

	terrestrische oorsprong. Dit benadrukt dat het belang van oevervegetatie en habitats niet alleen belangrijk is als toevluchtsoord en broedplaats voor vissen, maar tevens als bron van voedsel van terrestrische oorsprong. Het aquatisch milieu is dus in belangrijke mate afhankelijk van een energie-influx vanuit het nabijgelegen terrestrische milieu. Eén van de aanbevelingen is dan ook om bij ontbossing voor landgebruik, de oevervegetatie te handhaven als bron van voedsel voor de lokale visfauna. Dit is niet enkel noodzakelijk voor het behoud van deze uiterst soortenrijke fauna, maar ook om een duurzaam beheer van de visserij mogelijk te maken.

Project 2	
Naam (en acroniem)	Het genus *Tropheus* van het Tanganyikameer
Financiering	Bron: extern Budget: extern
Partners	Intern verantwoordelijke: Jos Snoeks Interne medewerkers: Maarten Van Steenberge Externe medewerkers: Stephan Koblmüller, Universiteit van Graz, Department of Zoology
URL website	
Data	Begin: 01/09/2009 Einde:
Algemene beschrijving van het project	*Tropheus* neemt een sleutelpositie in, in het evolutionaire onderzoek op gewervelde dieren. De taxonomie is echter problematisch. Dit multidisciplinair project omvat een morfometrische analyse (klassiek en geomorfometrisch), een analyse van kleurpatronen, moleculaire analyses en aspecten van parasitologie en kadert in het doctoraats- en psotdoctoraatsonderzoek van Maarten Van Steenberge.
Evolutie en resultaten voor het afgelopen jaar	In 2016 werd een barcoding studie van Tanganyikacichliden gepubliceerd. Een manuscript over de revisie van het genus is in voorbereiding.

Project 3	
Naam (en acroniem)	FishBase
Financiering	Bron: Raamakkoord

	Budget: ± 190.000€/jaar
Partners	Interne verantwoordelijke: Jos Snoeks Interne medewerkers: Gert Boden, Tobias Musschoot, Dimitri Geelhand de Merxem en Luis Moreira da Costa Externe medewerkers: FishBase Consortium-leden
URL website	www.fishbase.org; http://fishbase.africamuseum.be; www.fishbaseforafrica.org
Data	Begin: 2001 Einde:
Algemene beschrijving van het project	FishBase (www.fishbase.org) is de grootste en meest succesvolle online encyclopedie over vissen ter wereld. De databank bevat allerlei informatie over vissen (o.a. taxonomie, morfologie, ecologie, verspreiding, populatiedynamica,...) en links naar andere websites zoals GenBank, de IUCN Rode Lijst van bedreigde diersoorten en de Catalog of Fishes. Daarnaast bevat FishBase ook verschillende tools om bijvoorbeeld vissen te identificeren, voedselpyramides op te stellen en ecologische parameters en visserijstatistieken te analyseren. FishBase is een uiterst nuttig werkinstrument voor ichthyologisch onderzoek en visserij-, aquacultuur- en biodiversiteitsbeheer wereldwijd. Als lid van het internationale FishBase Consortium, is het Koninklijk Museum voor Midden-Afrika (KMMA) verantwoordelijk voor de informatie over de Afrikaanse zoet- en brakwater vissen in FishBase. Het KMMA organiseert ook jaarlijks een drie maand durende stage over vistaxonomie en het gebruik van FishBase voor vijf Afrikaanse wetenschappers.
Evolutie en resultaten voor het afgelopen jaar	Het team zorgde voor de continue update van informatie over Afrikaanse zoet- en brakwatervissen in de database, waarbij de vissen van het Congobekken prioritair werden behandeld. Een speciale inspanning werd gedaan om enkele belangrijke faunale gidsen te integreren. Dit jaar werd een Franstalige 'FishBase en vistaxonomie' stage georganiseerd met de volgende deelnemers: Yao Aristide Konan (Côte d'Ivoire), Mulongaibalu Mbalassa (Congo DR), Deo Mushagalusa Cirhuza (Congo DR), Modou Thiaw (Senegal) and Siefo Parfait Gnoumou (Burkina Faso). Een beurs voor een terugkeerstage werd toegekend aan Benie Rose Danielle Aboua (Côte d'Ivoire). Verder werd de tweede editie van de lokale 'FishBase en vistaxonomie' stage georganiseerd in Kenia in samenwerking met Dorothy Wanja Nyingi (National Museum Kenya), een oud-stagiaire. Een vernieuwde ecosysteemstructuur voor Afrika is nu aanwezig in FishBase. Er zijn nu bijna 1000 vissoorten toegewezen aan de Congorivier; 550 hiervan werden al toegewezen aan de subbasins in de nieuwe ecosysteemstructuur. In het kader van een project van IUCN, werd verder gewerkt aan de evaluatie van de Rode Lijst status van de vissen uit het Victoriameer en werd ook een matrix ingevuld i.v.m. intrinsieke eigenschappen en klimaatsveranderingen. Verder werd er gestart met een update van het standaardwerk 'The fresh and brackish water fishes of West Africa'. De portaalsite (www.fishbaseforafrica.org) en de projectwebsite

	(http://fishbase.africamuseum.be) werden onderhouden.

Project 4	
Naam (en acroniem)	Mbisa-Congo
Financiering	Bron: Raamakkoord Budget: ± 1 000.000€
Partners	Interne verantwoordelijke: Emmanuel Vreven (promotor), Jos Snoeks (co-promotor) Interne medewerkers: medewerkers ichthyologie Externe medewerkers: ichthyologen van de volgende instellingen Université de Kisangani Institut Supérieur Pédagogique, Mbanza-Ngungu Université de Lubumbashi Centre de Recherche en Hydrobiologie / C.R.H. - Uvira Université du Burundi Université Marien Ngouabi Muséum des Sciences Naturelles de Belgique, DO Taxonomie et Phylogénie, Vertébrés Collection zoologique d'État de Munich, Département d'Ichtyologie (Allemagne)
URL website	
Data	Begin: 2014 Einde: Einde 2018
Algemene beschrijving van het project	Le projet Mbisa-Congo comprend une étude de la faune ichtyologique de 10 aires protégées situées dans le bassin du Congo [(1) Parc marin des Mangroves (RDC); (2) Réserve de la Luki (RDC); (3) Réserve de la Lésio-Louna (République du Congo); (4) Réserve de Yangambi (RDC); (5) Réserve de faune d'Okapi (RDC); (6) Parc national de la Ruzizi (Burundi/RDC); (7) Réserve de la Malagarazi (Burundi); (8) Parc national de Kahuzi-Biega (RDC); (9) Parc national d'Upemba (RDC); (10) Parc national de Kundelungu (RDC). Ce projet a comme objectives: (1) de compiler une faune pour chacune des aires protégées et de contribuer à la mise en place des propositions pour une meilleure conservation et gestion durable des ressources naturelles encore méconnues ; et (2) de développer, renforcer et consolider les capacités des partenaires locaux en matière de recherche sur les poissons du bassin du Congo, entre autres, par la formation de quatre experts en ichtyologie de niveau doctorat et de cinq de niveau de DEA, et de la mise en place d'une collection de référence locale au niveau de chacune des institutions partenaires en Afrique.

Evolutie en resultaten voor het afgelopen jaar	De drie Congolese studenten hebben hun doctoraatsonderzoek (KU Leuven) verder gezet en ondernamen daarbij een studiebezoek aan het ZSM in Duitsland voor het genetische luik van hun doctoraatsonderzoek. De vijf Congolese DEA-studenten werkten verder aan hun DEA; drie er van brachten een studiebezoek aan het KMMA. Emmanuel Vreven bezocht de UNILU (Lubumbashi), de UNIKIS (Kisangani) en het ISP Mbanza-Ngungu en nam deel aan het veldwerk; hij leidde de partners verder op in het maken van veldfoto's van specimens en besprak het verdere verloop van de activiteiten. Eva Decru werkte tussen april en december halftijds verder aan de familiebeschrijvingen en ondersteunde het identificatie- en redactiewerk van de partners. Daarnaast heeft Jonas Merckx van oktober tot eind december voltijds meegewerkt aan het opstellen van familiesleutels, aan het beschrijven van een aantal families en genera ,en heeft hij meegeholpen om de nieuwe viscollecties te conditioneren voor lange-termijn-opslag en onderzoek. Een eerste publicatie, de beschrijving van een nieuwe olifantsnuitvis, werd gepubliceerd: Kisekelwa Tchalondawa, Gert Boden, Jos Snoeks and Emmanuel Vreven (2016). *Marcusenius kaninginii*, a new species of elephantfish from the Lowa River basin, Democratic Republic of the Congo (Osteoglossiformes: Mormyridae). Ichthyological Explorations of Freshwaters, 26: 289-384. Twee bijkomende publicaties werden afgewerkt en zullen begin 2017 ingediend worden voor publicatie.

Project 5	
Naam (en acroniem)	Genomische en gedragsaspecten van soortvorming bij cichliden (GenBas)
Financiering	Bron: Belspo Budget: 188 768 € voor KMMA
Partners	Intern verantwoordelijke: Jos Snoeks Interne medewerkers: Maarten Van Steenberge Externe medewerkers: Erik Verheyen (coördinator) en Sofie Derycke, KBIN; Jeroen Van Houdt, Gregory Maes en Koen Herten, KU Leuven, Genomics Core Facility; Pascal Poncin, Eric Parmentier en Loïc Kéver, Université de Liège
URL website	http://genbas.be/
Data	Begin: 01/12/2013 Einde: 28/02/2018
Algemene beschrijving van het project	Sinds de publicatie van Darwins '"The Origin of Species" kan het onderzoek naar het ontstaan van soorten op een zeer ruime en continue interesse rekenen. Oorspronkelijk kreeg het belang van geografische isolatie in soortenvorming de meeste aandacht omdat de ruimtelijke scheiding van populaties de belangrijkste barrière vormde

	voor reproductie. Het is nu echter duidelijk dat ook andere factoren, zoals seksuele selectie en veranderingen in de omgeving, een rol spelen in speciatie. Alhoewel het belang van externe processen in soortenvorming reeds sterk is onderzocht blijft de genetische basis van het speciatieproces grotendeels onbekend. De cichliden van de grote Afrikaanse meren worden vaak geciteerd als het ultieme model om adaptieve radiatie en soortenvorming te onderzoeken omdat ze radiaties vertonen die onafhankelijk zijn gebeurd in verschillende meren, ze een grote fenotypische diversiteit bezitten en omdat deze groep zowel oude als recente soorten omvat. Bovendien zijn er recent verschillende genomen van cichliden gepubliceerd, waardoor evolutionaire wijzigingen in het genoom bestudeerd kunnen worden via geavanceerde technieken zoals RNA sequeneren (RNAseq) en "Genotyping By Sequencing" (GBS). De hoofddoelstellingen van GENBAS zijn (1) het karakteriseren van de genomische differentiatie die het soortvormingsproces drijft en (2) nagaan of, en in welke mate, deze genomische veranderingen betrokken zijn bij het behoud van de genetische integriteit van zustersoorten. Deze doelstellingen zullen onderzocht worden in het cichliden genus *Opthalmotilapia* uit het Tanganyika-meer. Dit genus bevat vier soorten die voorkomen in ondiepe kusthabitats en die een vergelijkbare ecologie hebben. De vier soorten hebben een verschillende maar gedeeltelijk overlappende verspreiding in het Tanganyika-meer. Hun reproductief gedrag, taxonomie, fylogenie en hybridisatie zijn goed gedocumenteerd. Hybridisatie tussen sympatrische soorten is reeds waargenomen en gebeurt grotendeels unidirectioneel *Ophtalmotilapia* vormt dus een ideaal system om de genetische basis van speciatie te onderzoeken.
Evolutie en resultaten voor het afgelopen jaar	Akoestische communicatie gedurende paring blijkt niet echt belangrijk te zijn bij *Ophthalmotilapia*. Het paringsgedrag van *O. nasuta* en *O. ventralis* is sterk gelijkend. Het bewegingspatroon van mannetjes en wijfjes (hetero- en conspecifiek) warden via een 'data tracking software' geanalyseerd. Fylogenetische stambomen gebaseerd op mitochondriaal en nucleair DNA wijzen op een nog niet beschreven diversiteit binnen *O. nasuta*. De clusters komen grotendeels overeen met geografisch gescheiden kleurvormen. Het verschil tussen *O. ventralis en O. heterodonta* wordt relatief weinig ondersteund door deze gegevens. Een gecombineerde morfologische en moleculaire studie op 334 specimens toonde aan dat, in tegenstelling tot wat momenteel in de literatuur gesuggereerd wordt, het genus *Cyathopharynx* toch monospecifiek is. Voor de 'Genotyping by Sequencing' benadering werden een eerste reeks van 192 vissen geanalyseerd. Daaruit werd al duidelijk dat de populaties van *Ophthalmotilapia* in het meer een sterke geografische structuur vertonen.

Project 6	
Naam (en acroniem)	Polymorfisme en hybridisatie in de grote barbelen van Afrika

	(PolHyBarb)
Financiering	Bron: ad hoc Budget:
Partners	Interne verantwoordelijke: Emmanuel Vreven Interne medewerkers: Eva Decru, Tobias Musschoot, Jos Snoeks Externe medewerkers: Uli Schliewen (Zoologische Staatssammlung München, externe verantwoordelijke); Emmanuel Abwe (DRC, Lubumbashi), Albert Bulimwengu Walanga (DRC, Kisangani), Albert Chakona (Zuid Afrika, SAIAB), Bauchet Katemo Manda (DRC, Lubumbashi), Kise Kisekelwa Tchalondawa (DRC, Bukavu), Frederic Schedel (ZSM);Paul Skelton (Zuid Afrika, SAIAB), Soleil Wamuini Lunkayilakio (DRC, Mbanza Ngungu).
URL website	
Data	Begin: 2011 Einde: onbepaald
Algemene beschrijving van het project	Het genus *Labeobarbu*s (Cyprinidae: Torini) omvat een 125 valide soorten van grote, voornamelijk Afrikaanse, karperachtigen en is daarmee een van de soortenrijkste genera van zoetwatervissen in Afrika. Tot voor kort werden de soorten van dit genus onderbracht in twee verschillende genera op basis van een sterk verschillende mondmorfologie, waarbij de soorten met vlezige lippen en een mentale lob werden ondergebracht in het genus *Labeobarbus* daar waar soorten met een hoornige en gekamde onderlip werden ondergebracht in het genus *Varicorhinus*. Recentelijk genetisch onderzoek heeft echter aangetoond dat deze soorten tot één en hetzelfde genus moeten gerekend worden. Onderzoek aan het KMMA, in samenwerking met het ZSM, heeft aangetoond dat hybridisatie tussen soorten met verschillende mondvormen, in bepaalde gevallen, verantwoordelijk is voor het generen van intermediaire mondvormen. Hybridisatie lijkt bovendien een hoogst wijdverspreid maar rivier-gebonden gegeven te zijn. Het doel van dit project bestaat erin: (i) deze patronen op pan-Afrikaanse schaal, verder in kaart te brengen; (ii) verder te peilen naar de manier(-en) waarop dit gegenereerd wordt; en (iii) het evolutionaire potentieel ervan te bestuderen.
Evolutie en resultaten voor het afgelopen jaar	Een eerste review-publicatie werd gepubliceerd: Emmanuel J.W.M.N. Vreven, Tobias Musschoot, Jos Snoeks, and Ulrich K. Schliewen (2016). The African hexaploid barbines (Cypriniformes: Cyprinidae): review of a tumultuous history. Zoological Journal of the Linnean Society, 177: 231-305. Een tweede publicatie met een uitgewerkte 'case-study' is in voorbereiding. Twee Congolese KU Leuven doctorandi, Kise Kisekelwa Tchalondawa en Bauchet Katema Manda (MbiSa Congo project), werken aan een gedetailleerde morfologische studie van de *Labeobarbus*-soorten van het Kahuzi-Biega Nationaal Park (DRC) en het Upemba Nationaal Park (DRC) respectievelijk. Genetisch onderzoek in samenwerking met het ZSM is aan de gang en is verder voorzien voor 2017.

	Een studiebezoek aan SAIAB heeft toegelaten om samen met Albert Chakona het mondpolymorfisme bij *Labeobarbus natalensis*, een Zuid-Afrikaanse endeem met niet minder dan 11 junior synoniemen verder te onderzoeken. Bijkomend veldwerk in 2017 door A. Chakona is voorzien met het oog op verdere staalnames. Dit studiebezoek heeft eveneens toegelaten om de *Labeobarbus* verzamelingen van SAIAB van de Quanza Rivier in Angola te bestuderen en heeft een tot nog toe ongekende mond-fenotypische variatie aan het licht gebracht die nu verder dient onderzocht te worden.

Project 7	
Naam (en acroniem)	HIPE: Menselijke impact op de ecosysteemgezondheid en de natuurlijke rijkdommen van het Edwardmeer
Financiering	Bron: Belspo Budget: 287.352 € voor KMMA
Partners	Interne verantwoordelijke en promotor KMMA: Jos Snoeks Interne medewerkers: Eva Decru, Maarten Van Steenberge Externe medewerkers: Coördinator: BORGES Alberto (ULg) Promotoren: BOUILLON Steven (KULeuven), DE MERODE Emmanuel (Institut Congolais pour la Conservation de la Nature, Parc National des Virunga), OKELLO William, ODONGKARA Konstantine (National Fisheries Resources Research Institute, Jinja)
URL website	
Data	Begin: 15/12/2015 Einde: 15/03/2020
Algemene beschrijving van het project	The Virunga National Park (ViNP) is a hot-spot of biodiversity both regionally and globally, and as such, it was designated as a World Heritage Site by the United Nations Educational, Scientific and Cultural Organization (UNESCO), and is recognized for its ecological significance under the UNESCO Man in the Biosphere Programme (MAB). Lake Edward, an integral part of ViNP, is designated as Outstanding Universal Value by the UNESCO. Yet, the ViNP is also designated World Heritage in Danger by the UNESCO, since 1994. As a consequence, the sustainable management and conservation of the biodiversity of the ViNP (including Lake Edward) is of the utmost importance and urgency. Lake Edward is a large (2325 km²), deep (max depth = 112 m), weakly stratified tropical lake, draining the Virunga volcanoes and the Ruwenzori Mountains. It is presently mesotrophic but was eutrophic a few decades ago. In the 1980's, the potential annual fish catch of Lake Edward was estimated at 16,000 tons. Lake Edward has not been subject to comparative examination of limnological properties for over 4 decades, despite changes in population growth, land use, fisheries exploitation and regional climate. HIPE (**H**uman **i**m**p**acts on ecosystem health and resources of Lake **E**dward) is a multi-disciplinary project bringing together research teams

	from 3 Belgian Institutions (University of Liège, KU Leuven and Royal Museum for Central Africa [RMCA]) and 2 International Institutions (Institut Congolais pour la Conservation de la Nature [DR of the Congo] and National Fisheries Resources Research Institute [Uganda]). HIPE combines the expertise of researchers in biology, ecology, biogeochemistry, limnology, fisheries and socio-economics. The main objective of HIPE is to test the causal relationship between the recent environmental changes and the drastic reduction of fisheries productivity using innovative paleo-proxies coupled to a study of the present lake functioning. Assessing the validity of the various hypotheses, linked to a better understanding of ecosystem function and a thorough estimation of the socio-economic benefits, will help to develop appropriate management actions to mitigate present and future impacts. Our working hypothesis is that several environmental pressures in the ViNP have disrupted the biogeochemical, structural and functional links between the terrestrial and aquatic ecosystems of the ViNP, leading to a collapse of the main ecosystem service (ES) provided by Lake Edward. HIPE relies on new *in situ* sampling but also on the valorization of existing collections hosted e.g. in Belgian Federal Scientific Institutions (RMCA and the Royal Belgian Institute of Natural Sciences [RBINS]), and on a field socio-economic survey allowing to quantify ecosystem goods and services of Lake Edward and its relevance for society, in view of a better conservation by managers and policy makers. HIPE relies on scientific, technical, and methodological capabilities developed during past BELSPO initiatives. HIPE is structured into 5 workpackages (WPs). WP1 will investigate the changes and drivers of change of ecosystem functioning during the recent past (<100 years) based on the analysis of sediment cores, archived bivalve shells and fish specimens using paleo-proxies such as carbon ($\delta^{13}C$), nitrogen ($\delta^{15}N$), oxygen ($\delta^{18}O$), stable isotope analysis, Sr:Ca, Mn:Ca, and Ba:Ca ratios, biogenic silicon, carbon:nitrogen and carbon:phosphorus ratios, fossil diatoms, preserved phytoplankton pigments, ^{210}Pb, ^{137}Cs. WP2 is based on new field measurements of standing stocks and ecological processes to describe ecosystem energy and matter flows, and trophic flows through the food web. Data from WP2 will be used to understand the biology and ecology of fish studied by WP3 that will also quantify the fish biodiversity and evaluate the impacts of the pressures on their biodiversity. Classical taxonomical identifications of fish species will be assisted with deoxyribonucleic acid (DNA) barcoding, making use of Fish Barcode of Life Initiative (FISH-BOL) database. The food regime of the 6 most economically important fish species but also of haplochromine cichlid species (that are becoming important in sustaining fish catch due to overfishing on other species) will be determined based on gut content analysis in parallel to the stable isotope analysis. The biology of both tilapia species (*O. niloticus* and *O. leucostictus*) will be further investigated. Population structuring of the economically important fish species stocks will be evaluated with microsats. WP4 will evaluate the ES mainly focusing on fisheries. WP4 will compile recent and historical fish catch data (data rescue) that will be used in

	addition to data also provided from WP1, WP2 and WP3, as input data to an ecosystem-based fisheries model (Ecopath coupled to Ecosim). WP5 will ensure the integration and coordination of the different WPs, and will play a major role in the dissemination of the results and knowledge to the end-users.
Evolutie en resultaten voor het afgelopen jaar	A first field trip to the Lake Edward system was organised. Because of security issues, we worked only on het Ugandan part of the system. Collecting was very successful. An inventory has already been made for the fishes of the system. Taxonomic studies were started on the piscivorous and pelagic *Haplochromis* species, and on the eco-morphological group with thick lips. A study on the *Enteromius* species and *Clarias* catfishes has been prepared.

Project 8	
Naam (en acroniem)	Identification of bird strike remains
Financiering	Bron: Luchtmacht Budget:
Partners	Interne verantwoordelijke: Jos Snoeks Interne medewerkers: : Alain Reygel, Bopco-medewerkers Externe medewerkers: Belgische luchtmacht
URL website	
Data	Begin: 2000 Einde: onbepaald
Algemene beschrijving van het project	Identificatie van vogelresten na botsing met vliegtuigen en helikopters, aangeleverd door de Belgische luchtmacht.
Evolutie en resultaten voor het afgelopen jaar	Er werden tien aanvraagformulieren met vogelresten ontvangen. Alle resten werden zowel morfologisch (indien mogelijk) en genetisch (DNA-barcodes) bestudeerd.

Project 9	
Naam (en acroniem)	Wetenschappelijke samenwerking ornitologie
Financiering	Bron: intern
Partners	Interne verantwoordelijke: Jos Snoeks Interne medewerkers: : Alain Reygel Externe medewerkers: ad hoc

URL website	
Data	Begin: onbepaald Einde: onbepaald
Algemene beschrijving van het project	Wetenschappelijke dienstverlening op vraag van externe ornitologen en wetenschappelijke valorisatie van de collectie ornitologie
Evolutie en resultaten voor het afgelopen jaar	Dario Zuccon (MNHN, Parijs) verifieert de collectie Lijsterachtigen (Turdidae) van RDC in het kader van een globaal onderzoek naar deze familie van zangvogels. Brani Igic en Mathew Shawkey (RUGent) testen nieuwe spectrometrische methodes uit op onze collectie Honingzuigers (Nectariniidae) in het kader van een onderzoek naar de glans (iridisering) in de veren van deze vogels. Nigel Collar en Lincoln Fishpool (Birdlife International) verifiëren de identificatie van een aantal soorten zangvogels uit onze collectie van RDC voor de publicatie van het deel Passeriformes van de 'Checklist of the Birds of the World' (Birdlife-Lynx Editions). Kim Peterse (Universiteit van Wageningen) doet morfologisch onderzoek op onze collectie Sperwers (Accipitridae) voor een studie op de morfologie en fenologie van de Accipitridae van de wereld. Robert Dowsett en Françoise Dowsett-Lemaire (Frankrijk) checken onze collectie vogels van Togo in het kader van de publicatie van een nieuwe veldgids voor de vogels van deze regio.

Andere activiteiten

Andere projecten en samenwerkingsverbanden

Samenwerking in het kader van een VLIR Zuid Initiatief (2014-2016): « Renforcement des capacités locales pour une meilleure évaluation biologique des impacts miniers au Katanga (RD Congo) sur les poissons et leurs milieux aquatiques ».
Promotoren : Auguste Cocha Manda (Univ Lubumbashi); Jos Snoeks (KUL)
Co-promotoren : Filip Volckaert (KUL); Lieven Bervoets (U Antwerpen)
Interne medewerkers : Emmanuel Vreven, Tine Huyse.
Externe medewerkers: Maarten Vanhove (KBIN), Vera Verhaert (U Antwerpen)
Dit project bestudeert de impact van vervuiling door mijnbouw op het aquatisch milieu in Katanga, en omvat een luik visdiversiteit, ecotoxicologie en parasitologie. Het werd officieel beëindigd eind november2016.

Doctoraatsstudenten (academisch jaar 2015-2016 en 2016-2017)
Emmanuel Abwe (KU Leuven, co-promotor Emmanuel Vreven, promotor Jos Snoeks)
Tshalondawa Kisekelwa (KU Leuven, co-promotor Emmanuel Vreven, promotor Jos Snoeks)
Bauchet Katemo Manda (KU Leuven, co-promotor Emmanuel Vreven, promotor Jos Snoeks)

Masterstudenten (academisch jaar 2015-2016)
Jonas Merckx (KU Leuven, begeleiding Maarten Van Steenberge, promotor Jos Snoeks)

Masterstudenten (academisch jaar 2016-2017)
Nathan Vranken (KU Leuven, begeleiding Maarten Van Steenberge en Eva Decru, promotor Jos Snoeks)
Annelies Heylen (KU Leuven, begeleiding Maarten Van Steenberge en Eva Decru, promotor Jos Snoeks)

Bachelorstudenten (academisch jaar 2015-2016)
Julie Borghs (KU Leuven, begeleiding Maarten Van Steenberge, promotor Jos Snoeks)
Kim Ost (KU Leuven, begeleiding Maarten Van Steenberge, promotor Jos Snoeks)

Bachelorstudenten (academisch jaar 2016-2017)
Sara Vandersteen (KU Leuven, begeleiding Eva Decru, promotor Jos Snoeks)
Amber Mertens (KU Leuven, begeleiding Eva Decru, promotor Jos Snoeks)
Annelies Kayenbergh (KU Leuven, begeleiding Maarten Van Steenberge, promotor Jos Snoeks)

Zendingen in buitenland
Emmanuel Vreven
- 13– 26/02/2016, Zoologisches Staatssammlung München, Duitsland: samenwerking vissen Katanga en MbiSa-Congo project.
- 09/04 – 08/05/2016, South African Institute for Aquatic Biodiversity, Grahamstown, South Africa,: studie van de collecties Afrikaanse vissen, voornamelijk de grote barbelen (*Labeobarbus*) en samenwerking met Albert Chakona
- 17/07 – 14/09/2016, D.R. Congo (Lubumbashi, Kinshasa, Kisangani): Veldwerk en coördinatie MbiSa-Congo project.
- 11– 17/12/2016, Zoologisches Staatssammlung München, Duitsland: samenwerking vissen Katanga en MbiSa-Congo project.

Jos Snoeks
- 07-12/02/2016, Cotonou (Benin). Lessenreeks “FishBase et taxonomie des poissons” in het kader van de nieuw opgestarte « Master régional en Monitoring des Ressources aquatiques et en Aménagement des Pêches continentales (MoRAP)”, een ARES-project, gecoördineerd door de Universiteit van Luik en de Université d’Abomey-Calavi (Benin).
- 05-09/09/2016, Parijs, Frankrijk, deelname aan de FishBase Consortium meeting en FishBase symposium.

Maarten Van Steenberge
- 17/10-23-11/2016, Uganda, eerste veldexpeditiie naar het bekken van het Edwardmeer in het kader van het HIPE-project “Human impacts on ecosystem health and resources of Lake Edward”

Gert Boden
- 05-09/09/2016, deelname aan FishBase Consortium meeting en FishBase symposium, Parijs

Luis Moreira da Costa
- 05-09/09/2016, deelname aan FishBase Consortium meeting en FishBase symposium, Parijs
- 22/09 – 01/10/1016, National Museums Kenya, medewerking lokale FishBase-stage in Nairobi, Kenia

Tobias Musschoot
- 05-09/09/2016, deelname aan FishBase Consortium meeting en FishBase symposium, Parijs

- 23-26/10/2016, Swedish Museum of Natural History; Stockholm; opleiding nieuwe medewerkster FishBase in RDE.

Bezoekers: onderzoekers, gebruikers van bibliotheken, stagiairs, enz.

Lijst bezoekers
Zie dienst Biologische collectie- en databeheer voor de occasionele bezoekers

Langdurig studiebezoek van Pedro Bragança, Universidade Federal do Rio de Janeiro van 09/07/2015 tot 31/03/2016.
Langdurig studiebezoek van Prof. Dr. Wilson J. E. M. Costa, Lab. Sistemática e Evolução de Peixes Teleósteos, Universidade Federal do Rio de Janeiro, van 07/01/ tot 17/06/2016.

Dieu ne dort Bahanak (Université Yaounde, Caméroun) van 05/11 tot 05/12/2016

Professionele stage van Lorin Raats van 08/02 tot 10/06/2016, ichthyologie

Stages FishBase (07/03 – 27/05/2016)
Konan, Yao Aristide, Côte d'Ivoire, UFRB-UCA - Unité de Formation et de Recherche Biosciences, Université de Cocody-Abidjan
Mbalassa, Mulongaibalu, DR Congo, UOB - Université Officielle de Bukavu
Mushagalusa Cirhuza, Deo, DR Congo, CRHU - Centre de Recherche en Hydrobiologie, Uvira
Thiaw, Modou, Senegal, ISRA - Institut Sénégalais de Recherches Agricoles
Gnoumou, Siefo Parfait, Burkina Faso, UO(LBEA) - Université de Ouagadougou, Laboratoire de Biologie et d'Ecologie Animales

Terugkeerstages FishBase
July 2016: Benie Rose Danielle Aboua (Côte d'Ivoire)

Studiebezoeken binnen project MbiSa-Congo:
Micheline Kasongo Ilunga Kayaba en Christian Mulelenu Mukweze (UNILU), MbiSa-Congo-project van 03/04 tot 25/06/2016.
Soleil Wamuini (Mbanza-Ngungu) partner in MbiSa-Congo-project van 01/05 tot 30/06/2016.
Taylor Mambo (UNIKIS); MbiSa-Congo-project van 05/12/2016 - 28/02/2017
Kisekelwa Tchalondawa (Université Bukavu, DRC), Bauchet Katemo Manda & Emmanuel Abwe (UNILU, DRC); March – June 216.
Muzumani Risasi Mbuya (CRH, Uvira, DRC); november 2015 tot en met januari 2016.
Albert Bulimwengu Walanga (UNIKIS, DRC); november 2015 tot en met januari 2016.

Stages ABIC
Paul N'Lemvo (ICCN, RDC; 02/10 – 12/11/2016)
Djiman Léderoun (Université d'Abome Calavi, Cotonou, Bénin; 01/11 – 23/12/2016)

Voordrachten tijdens conferenties (lezingen en posters)

- Snoeks, J., Musschoot, T, Geelhand de Merxem, D, Boden, G. 2015. FishBase for Africa: fish, data and ecosystems. 14th FishBase Symposium, Paris, France. 07/09/2016.

- Derycke, S., Herten K., Van Steenberge M., Kéver L., Maes G., Snoeks J., Poncin P., Parmentier E., Verheyen E., Speciation genomics of cichlids (*Ophthalmotilapia*) from Lake Tanganyika. Benelux Zoological Congress, 15-17/12/2016.
- Kmentová N., Gelnar M., Van Steenberge M., Raeymaekers J., Koblmüller S., Hablützel P., Muterezi Bukinga F., Mulimbwa N'sibula T., Masilya Mulungula P., Vanhove M. Pelagic freshwater fish parasites in Lake Tanganyika: do the monogeneans mirror host origin? Benelux Zoological Congress, 15-17/12/2016.
- Decru E., Van Steenberge M., Bouillon S., Borges A., Snoeks J. HIPE: Human impacts on ecosystem health and resources of Lake Edward; exploring a poorly known ichthyofaunal. Benelux Zoological Congress, 15-17/12/2016.
- Derycke, S., Kéver L., Herten K., Van Houdt, J., Maes G., Van Steenberge M., Snoeks J., Parmentier E., Poncin P. & Verheyen E. Pinpointing behavioral responses during mating using differential gene ex- pression in the female brain of cichlid fish. Flanders Annual Meeting of Ecology (FAME), 19/12/2016.
- Derycke, S., Herten K., Kéver L., Van Houdt, J., Van Steenberge M., Snoeks J., Parmentier E., Poncin P., Verheyen E. Comparison of genome wide SNP signatures within and between four *Ophthalmotilapia* species (Pisces, Cichlidae): speciation unveiled

Follow-up van thesissen en verdediging ervan (alleen doctoraatsthesissen vermeld)

Doctoraatsstudent 1	
Voornaam en naam	Kisekelwa Tchalondawa
Titel doctoraat	The fish fauna of the Kahuzi-Biega National Park Region (DR Congo): taxonomy and ecology
Universiteit	KU Leuven
(Co)promotor (KMMA en externen)	Jos Snoeks, promotor; Emmanuel Vreven, co-promotor
Datum verdediging thesis	2018

Doctoraatsstudent 2	
Voornaam en naam	Bauchet Katemo Manda
Titel doctoraat	The fish fauna of the Upemba National Park (DR Congo): diversity, ecology, conservation and sustainable management
Universiteit	KU Leuven
(Co)promotor (KMMA en externen)	Jos Snoeks, promotor; Emmanuel Vreven, co-promotor
Datum verdediging thesis	2018

Doctoraatsstudent 3

Voornaam en naam	Emmanuel Abwe
Titel doctoraat	The fish fauna of the Kundelungu National Park (DR Congo): diversity, ecology, conservation and sustainable management
Universiteit	KU Leuven
(Co)promotor (KMMA en externen)	Jos Snoeks, promotor; Emmanuel Vreven, co-promotor
Datum verdediging thesis	2018

Doctoraatsstudent 4	
Voornaam en naam	Yitayal Alemu Taffere
Titel doctoraat	**Aspects of the fishery of Lake Awassa, Southern Ethiopia**
Universiteit	KU Leuven
(Co)promotor (KMMA en externen)	Jos Snoeks, co-promotor; Luc Brendonck (KU Leuven), promotor
Datum verdediging thesis	Stopgezet in 2016

Wood biology

Personeelsbewegingen

- Nils Bourland, in dienst op 01/02/2016 , project N3GeForCo
- Sam Van Holsbeeck, uit dienst op 29/02/2016
- stagiaire Sara Moroni - uit dienst op 07/08/2016
- John Tshibamba (project Afriford - KongoKing) - in dienst op 27/08/2016)
- John Tshibamba (project Afriford - KongoKing) - uit dienst op 31/10/2016
- Mélissa Rousseau - uit dienst op 31/12/2016
- Mélissa Rousseau - in dienst op 01/01/2017
- vrijwilliger Richard Shut - in dienst op 01/12/2016

Projecten: onderzoek, tentoonstellingen, educatieve activiteiten, communicatie

Project 1: 'Focus'-project	
Naam (en acroniem)	Biospheretraits & MABNET
Financiering	Bron: Budget:
Partners	Intern verantwoordelijke: Interne medewerkers: Externe medewerkers:
URL website	
Data	Begin:

	Einde:
Algemene beschrijving van het project	Wood science finds its justification in the prominence of lignified plant tissues in both living nature and material culture. The interest is growing, driven by the understanding that forests play a key role in the climate regulation of the planet. The carbon stock of the world's forests is indeed huge: they contain 861 Pg carbon, with 55 % in tropical forests. Interestingly the largest part of the forest biomass consists of wood and bark: above ground this rises up to 98 %, but also below ground much of the carbon is kept in woody materials. Globally 400 Pg of carbon is stored as wood in tree stems. A rainforest is extremely diverse: there are very small next to gigantic organisms and populations of many species. The question arises how this biome will respond to substantial changes that will stimulate certain species and threaten others. Divergent reactions result from morphological, anatomical, biochemical, physiological and phenological differences. Knowledge of these so called traits is the basis for understanding forest dynamics and eventually for predictions of ecosystem reactions following climatological changes and anthropogenic disturbances. It is the topic of trait-based ecology. The Biospheretraits project ("*Functional traits derived from collections and ecosystem inventories in Central African Biosphere Reserves to study the resilience of tropical forests*") aims at studying traits along environmental gradients in the Central African rainforest. We studied short term and long term variation of traits in two Biosphere reserves with a different rainfall periodicity: Luki in the western rainforest of the Congo and Yangambi. We also organized trainings and produced educational material to assure that the project is maximally relevant for development and Unesco priorities. MABNET (Patricia)
Evolutie en resultaten voor het afgelopen jaar	Biospheretraits (Claire) MABNET (Patricia)

Project 2

Naam (en acroniem)	Xylaredd & Herbaxylaredd
Financiering	Bron: BRAIN, Belspo Budget: 875 063 €
Partners	Intern verantwoordelijke: Hans Beeckman Interne medewerkers: Maaike De Ridder Externe medewerkers: Samuel Vandenabeele (Plantentuin Meise), Dakis Ouédraogo (ULg), Victor De Klerck (UGent)
URL website	
Data	Begin: 15/03/2015 Einde: 15/03/2019
Algemene beschrijving van het project	Worldwide, the federal Xylarium (Royal Museum for Central Africa, RMCA) and Herbarium (Botanic Garden Meise) are by far the most important reference collections for Central African forests. In order to strengthen their reference value, HERBAXYLAREDD aims at generating knowledge, through analysis of specimens' traits and meta-data, on Central African forest ecosystems and forest products. Newly generated data will allow exploring functional strategies, growth and the genetic structure of tree species, an optimized distribution map of tree species, technological aspects of lesser used timber species, carbon stocks of forests and energy content of Central African woody species. Given the high diversity, we will focus on target groups: dominant forest species, lesser used timbers and species for bio-energy. The study of each of these target groups involves specific scientific questions and will provide quantitative data needed for policy-making. HERBAXYLAREDD combines collections that are often directly linked

	because herbarium vouchers and wood samples of the same tree were collected and separately stored in the Herbarium and Xylarium. The two research institutes with collections cover the fields of wood anatomy, dendrochronology, genetics and botany, but knowledge on plant ecology (ULg), wood technology (UGent), metabolites of wood (FWS) and cartography (ERAIFT) would substantially improve the data than can be obtained based on the collections. Thus, the network of HERBAXYLAREDD includes 6 partners with complementary skills. All Belgian partners have a prolonged record of research in Central Africa and mutual bilateral collaborations running. The first international partner is a regional African research institute (ERAIFT) that has joint PhDs with the Belgian federal institutions and extended expertise in cartography, management and conservation issues of the Central African region. The American partner (FWS) runs a highly specialized laboratory with lots of experience on metabolites of wood in the context of enforcing laws and regulations of timber trade, including CITES. The project is structured in work packages (WP), encouraging interaction between scientific partners working on the same plant material but with different and complementary approaches. First, the number of herbarium and xylarium samples in common within the Congo Basin will be determined by screening both collections. Herbarium vouchers can be used for the botanical validation of the wood specimens and the combined 'voucher-wood' dataset will be structured in a standardized way (WP1). Once this framework is set, the implementation of the renewed database can start (WP2). Within this work package, all partners will be involved in the measurements and analyses of traits on samples from the Herbarium and/or the Xylarium. The results of WP1 and 2 will be used for the analysis of the functional ecology of African tree species (WP3), the mapping of species' distributions (WP4), the study of wood technological aspects of lesser used timber species (WP5) and the development of identification keys/atlases (WP6). Next to these research activities, two transversal WP's are present throughout HERBAXYLAREDD for the project coordination (WP7) and the dissemination of results to all stakeholders like policy-makers, enforcement officers, collection curators and the international research community (WP8). In the end, a complete description of a considerable number of tree species will be available and offers direct perspectives for further projects or PhDs in several disciplines. The resulting data, set in a region where the lack of data is still persistent and fieldwork is difficult, will also be used to produce policy underpinning tools that help the enforcement of

	conservation mechanisms (e.g., wood density data for the estimation of carbon stocks in a REDD+ context) and certification systems (e.g., the distribution of species and their growth performance for the estimation of sustainable production). Moreover, identification keys will particularly be developed for use by, e.g., customs in such a way that they will be able to separate material that needs to be send for analysis in specialized laboratories. International conservation mechanisms and conventions like CITES are in need of quantitative data on protected or endangered tree species that can be delivered in a comprehensive way by this project. Finally, both the Xylarium and Herbarium have an open access online database that will be adapted to insert all newly generated data whereas existing specialized databases (e.g., DRYAD) will also be provided with the newly generated information on specific traits. Thus, a unique reference collection on African tree species traits will be available, encouraging (African) scientists to study new case-studies, to expand the number of tree species, to gain more insight in the Central African forest ecosystem and to transform the knowledge from integrative databases into (national) strategies for sustainable forest management, forest conservation and financial compensation for carbon stocks.
Evolutie en resultaten voor het afgelopen jaar	Maaike De Ridder played - together with Hans Beeckman, project coordinator - an active role in the following tasks: • Wood anatomical traits. Based on the XYLAREDD data, priorities were distilled and lists of wood anatomically non-described species were made for upcoming group trainings. One overlooked functional trait could be 'tree-ring distinctness'. The RMCA team guided Yegor Tarelkin during the classification of tree rings on an anatomical basis, with variations linked to species and sites in the DRC. More details in the full paper that is part of a complete special edition of IAWA on wood anatomical traits, supervised by Hans Beeckman and online since April 2016. • Growth analyses. Classical growth ring analyses were performed on *Pericopsis elata* (afrormosia), *Milicia excelsa* (iroko). Both species are important Congolese timber trees. Tree rings of afrormosia were sampled to study wood metabolites with a climate link (collaboration with UGent and FWS). Tree rings of iroko were studied microscopically to analyze variable tree-ring distinctness and macroscopically to test their potential for crossdating and the construction of diameter growth models (PhD Cédric Ilunga, Kisangani University, DRC). • Wood identification. Next to trait analyses, there is still a dire need to better identify tropical African wood species. In this context, the RMCA took part in three different projects: the development of guidelines in tracking illegal timber logging (UNODC), the development of ID keys based on texture analysis and the development of a visual ID key to recognize macroscopically the

commercial timber species of the DRC. Concerning the UNODC guidelines, the RMCA provided expert knowledge on wood anatomical and dendrochronological identification methods and offered the use of reference collections (resulting from (HERBA)XYLAREDD). The texture-based ID key was developed for about 70 commercial species in collaboration with Nùbia Rosa da Silva (University of São Paulo, Brazil) and the UGent team. The resulting publication was reviewed and resubmitted in December 2016. Next to microscopy and texture analysis, Sara Moroni (Tuscia University, Italy) joined our lab from February to September 2016 to describe the same commercial species macroscopically, comparing with microscopical features and creating a visual key using Xper3 open source software.

- Preparation and selection of samples for technological parameters: the valorization of xylarium wood samples in terms of wood technological parameters looks promising thanks to the development of a readily available semi-automatic method to determine dimensional stability and the new set-up proposed for fungal testing that uses less material than the current standardized tests. The determination of chemical profiles for several specimens at the FWS contributes to the online database of the museum and might hold a lot of new information/variables that are not yet studied in tropical wood.

LINK WITH THE AGORA XYLAREDD PROJECT:

An important basis for wood analyses within HERBAXYLAREDD is the XYLAREDD database including comprehensive data and images on 3719 (botanically verified) wood samples of the xylarium, belonging to 1128 different African tree species. Density data, anatomical images, sample pictures, high-resolution scans and thin sections are available for a high number (if not all) species. Two of the derived XYLAREDD-collections are the databases of low magnification anatomical images for texture analyses and high-resolution scans of all Congolese commercial species (resp. work of Nùbia Rosa da Silva and Sara Moroni in close collaboration with the RMCA).

In the meantime (April-July 2016), Jean-Paul Tasi and Michel Opelele (both University of Kinshasa) finished their wood anatomy training at the RMCA and studied resp. tree-ring distinctness of 930 XYLAREDD samples and vessel features of 350 to 650 XYLAREDD samples, providing interesting data on variations in the anatomy of understudied species. Additionally, the data on tree-ring distinctness of the mentioned study of Tarelkin et al. are also available for further analyses.

Project 4	
Naam (en acroniem)	Congo basin integrated monitoring for forest carbon mitigation and biodiversity (COBIMFO)
Financiering	Bron: Belspo (SD/AR/01A) Budget: 909 796 €
Partners	Intern verantwoordelijke: Hans Beeckman Externe medewerkers: Thalès de Haulleville
URL website	http://www.belspo.be/belspo/ssd/science/projects/COBIMFO.FR.pdf
Data	Begin: 01/12/2010 Einde: 31/12/2016
Algemene beschrijving van het project	This project fits in the context of the United Nations Collaborative Programme on Reducing Emissions from Deforestation and Forest Degradation in Developing Countries program. UN-REDD+ will create a financial value for sustainable forest management actions that enhance carbon storage in forests, but the effect of UN-REDD+ on biodiversity remains elusive. The forests of D.R. Congo are chosen as a study area as: (1) D.R. Congo is one of nine pilot UN-REDD+ countries; (2) there is a lack of information on current and future C stocks and fluxes in forests of D.R. Congo, leading to uncertainties in the global C budget; (3) Central African tropical dense rainforest are an unexplored and endangered biodiversity hotspot; (4) potential vulnerability of nonprotected areas in D.R. Congo to forest degradation, and (5) the success of UN-REDD+ in D.R. Congo will strongly depend on its impact on biodiversity. The general objective is to get baseline reference data on the C balance and biodiversity in pristine and intervened dense tropical forests of the Congo Basin and to increase our understanding in the relationship

	between both variables as a function of forest management and degradation. We will measure aboveground and belowground soil carbon stocks and biodiversity indices along a forest productivity gradient (ca. 15 sites) in the Yangambi Man and Biosphere reserve (Y-MaB) and investigate direct effect relationships between forest carbon stocks and biodiversity along this productivity gradient (PG-CB). The different sites, located along a forest productivity gradient, will be tentatively selected using remote sensing techniques and validated on the ground. Carbon stocks will be investigated in the forest core and edges zones. We will bring forward a set of biodiversity indices related to lichens, fungi, higher vascular plants, ants and termites, spiders, flies, bees, arthropods and rodents. The work will be brought into practice using a set of six complementary work packages (study site selection, baseline carbon inventory, biodiversity monitoring, integration of carbon and biodiversity monitoring, and conclusions and suggestions for sustainable policies).
Evolutie en resultaten voor het afgelopen jaar	The aim of the 2016 research was to develop allometric models for height, diameter and wood density in 5 major species in Yangambi reserve, and to assess the extent of the impact of edge effect on theses allometies. In 2015 data were collected in Yangambi reserve, on tree located in core forest and along the forest edge. Data included diameters at breast height (DBH), total tree height (H), and wood density (WSG, measured trough the collection of wood samples). The data collection was focus on 5 major species (*Panda oleosa*, *Tridesmostemon claessensii*, *Strombosiopsis tetrandra*, *Scorodophloeus zenkeri and Petersianthus macrocarpus*). Allometric models were produced, based on the data. We first developed the DBH-H models for each species, using a two parameter Michaelis-Menten model. We calculated 4 models for each species : ● m_0 without any edge effect ● $m_{A,Hmax}$ with an edge effect on both parameter (A and Hmax) ● m_A with an edge effect on the A parameter ● H_{max} with an edge effect on the Hmax parameter. Model selection was done using Akaike Information Criterion. Results indicated that Hmax was affected by an edge effect for *Panda oleosa*, *Scorodophloeus zenkeri* and *Tridesmostemon claessensii*. While the

	diameter to height growth rate remained similar with and without exposition to edge for theses species, the highest trees in the forest core were higher than the highest trees along the forest edge, probably due to competition, mortality and/or lower exposition to winds. For *Petersianthus macrocarpus* and *Strombosiopsis tetrandra* only the A parameter was affected by the edge effect: the diameter to height growth rate was affected, although trees reached similar heights. The diameter to height growth rate for trees in edge was proportionally slower to the rate observed in cores, again probably due to competition, mortality and/or lower exposition to winds. We then developed the DBH-WSG models for each species, using a two parameter linear model. As for DBH-Height, we calculated 4 models for each species: ● m_0 without any edge effect ● m_{AB} with an edge effect on both parameter (A and B) ● m_A with an edge effect on the A parameter (slope) ● m_B with an edge effect on the B parameter (intercept) Model selection was done using Akaike Information Criterion. Results indicated no edge effect on the diameter to WSG growth rate, except for *Panda oleosa*, where an edge effect was observed on the A parameter (slope). This confirmed the results found in literature, where WSG is linked only to tree age, not life history. However, the edge effect on *Panda oleosa* tend to indicated that this specie may be an exception to this general rule, as it then to have a slower diameter to WSG growth rate in core forest than in forest edge.

Project 5	
Naam (en acroniem)	**AFRIFORD** **Genetic and paleoecological signatures of African rainforest dynamics:** **pre-adapted to change?**
Financiering	

	Bron: BELSPO BRAIN (01/12/20013-28/02/2018) Budget: 272 295,- €
Partners	Intern verantwoordelijke: Hans Beeckman (promotor) Interne medewerkers: ➔Wannes Hubau ➔John Tshibamba Externe medewerkers: - L'Université libre de Bruxelles : Olivier Hardy - Universiteit Gent : Dirk Verschuren - Université de Liège : Louis François
URL website	http://www.ulb.ac.be/facs/sciences/afriford/
Data	Begin: 30/04/2014 Einde : 28/02/2018
Algemene beschrijving van het project	Tropical rainforests are the terrestrial biome with the greatest diversity of plant and animal species. Long-term stability against environmental change has been considered for long as a prime cause of this remarkable

	biodiversity. However, paleoecological evidence of substantial change in the vegetation of tropical regions resulting from global climate fluctuation during the Quaternary, as well as evidence of significant ecological perturbation by humans in the last few thousand years, call for a reassessment of the temporal dynamics of biodiversity in tropical rainforests, and how this may influence their resilience and/or adaptation to rapidly accelerating human impact. The evolutionary and environmental history of the Central African rainforest, in particular, is barely known while its remarkable biodiversity is severely threatened. The general objective of AFRIFORD is to understand how past climate changes and the activities of ancient indigenous societies have shaped the current distribution and composition of African rainforests and the genetic diversity of their constituent tree species. This knowledge is essential for forecasting how the forest will respond to current and future environmental impacts, because the way tropical forests have responded to past climatic and human perturbation reveals their resilience, or innate adaptive capacity, to current and future perturbations resulting from massive ongoing deforestation, forest degradation and anthropogenic climate change. The specific scientific objectives of this project are to: 1) Understand the processes leading to the diversification/differentiation of African rainforest tree biodiversity at inter-specific and intra-specific levels, in particular the respective roles of (i) past population fragmentation and the associated genetic drift (neutral stochastic process) and (ii) differential selection leading to adaptation to different habitats along environmental gradients (deterministic process).

	2) Document the main climatic and anthropogenic perturbations which affected the past vegetation dynamics in the Congo basin for a range of relevant time scales, with particular emphasis on (i) the last glacial-interglacial cycle, (ii) the late Holocene where traces of forest fire become abundant, and (iii) the last two centuries when current tree communities were established. 3) Develop and calibrate a vegetation model able to simulate reliably the changes in (i) vegetation, (ii) productivity, and (iii) species distribution ranges in response to environmental forcing, in order to make predictions under scenarios of climate and anthropogenic environmental changes. These objectives will be achieved through multi-disciplinary research integrating paleoecological analyses (palynology, anthracology) on lake and soil sediments, dendrochronology, vegetation modelling and population genetics. Phylogeographic patterns and molecular signatures of past differential selection and demographic events (population fragmentation, expansion) in characteristic tree species will be interpreted in relation to (i) reconstructions of vegetation at critical time periods, (ii) soil anthracological data documenting the intensity and extent of Holocene fire disturbance events, and (iii) climate-vegetation model simulations of the environmental processes controlling rainforest distribution and productivity. This conjunction of genetics, paleoecology and vegetation modelling will, for the first time, allow to build a cross-validated scenario of tree species response (distribution range, adaptation) to environmental change in the Central African rainforest.

	This project has great societal relevance for local populations, regional governments and the international community by its generation of key new knowledge on the sustainability and resilience of African rainforest biodiversity and the diverse ecosystem services it provides. Project results will directly support Belgian government policy in the context of the international programmes CITES, FLEGT, MAB and REDD+, among others, by transforming this knowledge into projective tools for sustainable management of African rainforest. The AFRIFORD network includes 4 Belgian institutions and 2 foreign partners with complementary expertise and an excellent network of collaborators that ensures close interaction with complementary projects at national (BIOSERV, COMBINFO, CLANIMAE) and international (C3A, AGORA, IGBP-PAGES regional-2k) levels.The project is structured inwork packages (WP) favouring close interactions between researchers from different scientific domains. Three WP' will valorise existing data sets and acquire complementrary data on Population dynamics (WP1: tree dispersal, age structure), Evolution (WP2: phylogeny, phylogeography, divergence dating), and Paleoenvironments (WP3: palynology, anthracology, stable-isotope dendroclimatology). WP4 will provide a projective tool through Vegetation modelling. The project' scientific objectives will be reached within the integrative WP5 in which data and tools from WP' 1 to 4 will be combined. Implications of our research for the maintenance of rainforest ecosystem services and strategic policy for biodiversity conservation will be addressed in WP6. Finally, two transversal WP' are dedicated to project coordination (WP7: network meetings, follow-up committee meetings including end-users) and the diffusion of results (WP8: scientific publications, workshop) to ensure a good coordination of activities as well as the

	emergence of novel ideas and opportunities. The fieldwork for this project will mostly occur on four study sites of established forest plots in Cameroon, Gabon and DR Congo, thus drawing North-South and East-West transects across the Central African forest block where different forest types are found (evergreen, semi-evergreen and mixed moist semi-evergreen). Species-specific studies in the different WP' (WP1 dispersal and dendrochronology, WP2 population genetics and phylogeography, WP3 anthracology and dendroclimatology, WP4 species distribution modeling) will focus on a common list of 15 tree species, ensuring the best integration of the highly complementary specialties of each partner. The selected species include representatives of three major functional groups (short-living pioneers, long-living light-demanding species and shade-tolerant species) because the latter are expected to show contrasting responses to past perturbations. Since high-quality paleoenvironmental archives are scarce in the core of the Central Africna rainforest, high-resolution paleo-environmental reconstruction (WP3) will be accomplished on lake-sediment cores from its more peripheral areas in Cameroon and western Uganda. All partners have well-established research experience in Central Africa and all have already been involved in successful bilateral collaborations. By coordinating their respective efforts through this multi-disciplinary network, each partner will highly benefit from the evidence brought by other partners to interpret his own data, and create significant added value to answer the overarching research questions. Moreover, state-of-the-art technologies for dendrochronology, paleo-environmental

	reconstruction, anthracology and genetics, often developed for African contexts by the partners of this project, will allow more detailed inferences than has been previously possible. Most partners are involved in teaching for MSc or PhD training programs in Africa, ensuring effective transfer of highly qualified competences and the commitment of locals into the research programs. **The Wood Biology Department of the RMCA focuses specifically on history of forest fires and the unique added value of soil anthracology :** Charcoal from woody plants is valuable for palaeobotany and archaeology because it remains in soil profiles for a long period (Scott & Glaspool 2007) and it is datable through 14C analysis. Moreover, because the original wood anatomical structure is preserved, charcoal remains can be identified botanically based on diagnostic wood anatomical features (Di Pasquale et al. 2008; Braadbaart & Poole 2008). The most important challenge for Central African charcoal identification is coping with the extreme diversity of woody species. A charcoal identification protocol of Central African woody species has been developed recently by Partner 3 (Hubau et al. 2012). Soil anthracology complements palynology because it is directly applicable to local forest stands (Scott & Glaspool 2007; Di Pasquale et al., 2008) and allows for more precise identification of taxa than is the case for pollen: it can both confirm the presence of insect-pollinated plant taxa which tend to be under-represented in pollen spectra and constrain the real abundance of overrepresented taxa. Hence, combination of palynology and pedo-anthrocology as proposed in this project produces more informative reconstructions of past vegetation change. On-going investigations by partners P1 and P3 in the Central

	African forest show that charcoal is often abundantly found in soil pits, a majority of them dating from between 1550 and 2300 years BP. This indicates that fires were historically concentrated during certain periods, creating temporal dynamics in forest composition. **Secondly, the Wood Biology Department of the RMCA contributes to a better understanding of recent (last 30 years) biomass dynamics using replicated measurements of permanent forest plots.** The central African rainforest constitutes one of the most important terrestrial carbon sinks on Earth. Pan et al. (2011) showed that the African forest has sequestered about 482 Tg carbon per year during the period 2000-2007, an amount in the order of the entire temperate zone (Europe + North America + Asia). However, it is still unclear how this sink will evolve in the future under changing climate conditions. Brienen et al. (2015) showed that the carbon storage capacity of the Amazon region during the period 1990 to 2011 systematically decreased to the half its original capacity. Current odds are that the carbon storage capacity of the Amazon will disappear completely in the near future. The Amazon region will therefore turn from a carbon "sink" into a "source". This drastic decline in carbon storage capacity is probably caused by a complex interaction of three factors: 1. rising temperatures hamper tree growth (respiration becomes more important than photosynthesis), 2. more intense droughts favor tree mortality and 3. a complex internal demographic feedback mechanism between tree growth (productivity) and tree mortality. Specifically, higher productivity in the 90s (due to atmospheric carbon 'fertilization') is now thought to be internally offset by

	higher mortality. African rainforests are on average one degree cooler than the Amazon and the trees have developed a higher drought resistance because they receive less rainfall per year than in the Amazon. As a result, the carbon storage capacity in Africa did not decrease during the last decades, in contrast to the Amazon (Hubau et al, in prep.). Yet it is not certain whether these benefits will continue to outweigh the threats of climate change. It is likely that rising temperatures and drought in Africa will reach a certain "threshold", so that the carbon storage capacity will decrease as is the case in the Amazon. The RMCA is currently investigating how the African sink behaved over the last 30 years using replicated measurements of 245 permanent forestplots. Furthermore, the combined Amazon+Africa dataset will be used to sort out what the drivers were (human disturbance, climate, internal demographic feedbacks).
Evolutie en resultaten voor het afgelopen jaar	***1. Reconstructing Central African fire and vegetation and history using soil charcoal analysis*** ***1.1 a fast charcoal identification procedure using R*** Direct evidence for Central African vegetation history is mostly derived from palynology and palaeolimnology. Although anthracology has proven worthwhile for palaeovegetation reconstructions in temperate regions and South America, charcoal analysis has hardly been applied for Central Africa. One of the most important reasons was the lack of a transparent charcoal identification procedure using large databases and well defined characters. Prior to 2010, the few attempts for Central African pedoanthracology were based on personal expertise that did not make use of formal protocols, well defined characters and large wood anatomical databases (Dechamps et al., 1988; Hart et al., 1996; Schwartz

	et al., 1990). The most important challenge for Central African charcoal identification is coping with the extreme diversity of woody species. The species-richness in tropical regions such as Central Africa contrasts significantly with the relatively poor species diversity in temperate regions such as Europe or arid regions such as North Africa, where anthracology has been developed and applied regularly (FAO, 2005; Figueiral and Mosbrugger, 2000; Hön and Neumann, 2012; Mutke and Barthlott, 2005). Therefore, the wood Biology Department of the RMCA presented a Central African charcoal identification protocol within an umbrella database of species names and metadata, compiled from an on-line database of wood-anatomical descriptions (InsideWood), the database of the world's largest reference collection of Central African wood specimens (RMCA, Tervuren, Belgium) and inventory and indicator species lists (published by Hubau et al., 2012). However, this identification protocol was mostly performed in excel, using complex filtering structures and time-consuming calculation procedures. We therefore recently wrote an R-script that can perform the same and even more than the old identification procedure. Using an easily runnable R-code, we are now able to identify wood and charcoal specimens from any African country. The script is based on the full extent of : (1) The InsideWood database which provides coded anatomical descriptions of >1000 African species, (2) The Tervuren Xylarium Wood Database which provides information on available anatomical reference wood sections, (3) The African Plants Database which provides a near-to-full list of accepted African plant names and their synonyms, (4) the African data of the Global

Biodiversity Information Facility (GBIF) database which provides extensive checklists of species occurrence for any region in the world. The R-script is fed with a simple .csv file containing an anatomical description of the sample using IAWA standard codes (IAWA, 1989), plus a specification of the region where the sample was found (the script distinguishes between 11 large ecoregions in Africa). This script is now used to finalise identification of all charcoal samples analysed at the RMCA. The script and some of its results will be published by the end of 2016.

1.2. Applying the R-script : first results from Senegal

The R-script for charcoal/wood identification has booked a first success through the identification of two 8000-year old fossil wood disks from Syzygium guineense. The disks were sampled in Senegal by the team of IP1 (the lab of Anne-Marie Léine). More samples are on their way and we will collaborate to use the identification and radiocarbon dating results to complement palynological vegetation reconstructions of the early Holocene in Western Africa.

1.3. fire and vegetation and history of Pericopsis elata stands

Using records of identified charcoal fragments extracted from soil in the Yangambi and Yoko forests (Province Orientale, DR Congo), the Wood biology team of the RMCA revealed the origin of forest stands dominated by Pericopsis elata. These forest patches are famous among environmentalists, timber companies and policy makers because they provide the world's best timber (afrormosia), while the species is also

critically endangered due to its limited occurrence and because it does not easily regenerate after exploitation.

Past natural and anthropogenic perturbations are thought to be at the origin of present-day Central-African forest mosaics. This is particularly the case for forest stands dominated by long-lived pioneers such as Pericopsis elata. The distribution pattern of this species is particularly patchy: it occurs in relatively small forest pockets (a few ha) within a matrix of more mature forest types, such as forests dominated by Gilbertiodendron dewevrei or Scorodophloeus zenkeri. This limited distribution pattern, together with a prominent lack of regeneration has raised significant awareness about the survival of the species. The patches are today reaching a point beyond maturity, with an abundance of majestic individuals but without significant numbers of recruits.

Success of future conservation strategies is highly dependent on answering the question of how the species was able to establish the patches that are today on the brink of disappearance. Current odds are that P. elata is a light-demanding long-lived pioneer that took advantage of a wave of intense slash-and-burn activity during the centuries before the Yangambi and the Yoko reserves were gazetted as protected areas. To evaluate this hypothesis, we analyzed charcoal fragments sampled in 14 soil profiles under P. elata stands. Charcoal is a sign of former disturbance and identifications give insights in former forest compositions. We compared our findings with those from 3 regular Central African forest types: forests dominated by Gilbertiodendron dewevrei (10 profiles), Maranthaceae forests (10 profiles), and old-growth rainforests (18 profiles). Pedoanthracological profiles were excavated using standard methods (e.g. Hubau et al. 2013, 2014, 2015) in fully inventoried forest stands in the Yoko reserve (8 x 2 contiguous hectares) and in a partially inventoried forest stand in the Yangambi reserve (20 ha).

Charcoal analysis has been organised bearing in mind 5 major research questions:

Q1 : Are Pericopsis elata stands always present on spots that have been disturbed by fire during the last centuries?

	Q2 : Is this most recent period of disturbance through fire significantly younger than traces of fire found under other forest types? Q3 : Was P. elata present before the fire events? Q4 : What was the vegetation composition before the disturbance events? Q5 : Could the fire history under Pericopsis elata stands be of anthropogenic origin? In order to answer these questions, we selected charcoal fragments from the top charcoal layer of 24 profiles so far (18 in Yoko and 6 in Yangambi) and sent them for radiocarbon dating. Results reveal that the most recent forest fires under P. elata are always younger than 700 cal yr BP (Q1), while the most recent fires under other forest types are often older (Q2). This suggests that P. elata stands are indeed younger than other forest types and that they share a similar recent fire history. More than 6000 charcoal fragments from the radiocarbon dated top layers were identified and classified in >70 charcoal types. Most of the sample preparation was performed by **John Tshibamba Mukendi** during a training period at the RMCA funded by Accord Cadre and Afriford. P. elata is absent from the charcoal record in all but one profile. This confirms the hypothesis that the species was probably very scarce before disturbance through fire (Q3) but became locally abundant afterwards as shown by the high proportion of Basal Area occupied by P. elata in some of the inventoried forest blocks. This indicates that P. elata indeed needs disturbance, perhaps in the form of large slash-and-burn clearings, prior to massive colonisation or regeneration. Furthermore, charcoal identifications reveal that the forests that were burned on the spot of the current P. elata stands were characterised by an abundance of pioneer and secondary forest species. On the contrary, the older fire events recorded under other forest types mostly burned primary rainforest species. This indicates that forest

composition prior to disturbance was significantly different in current-day P. elata patches as compared to other forest types (Q4).

Finally, the presence of pottery sherds in one charcoal assemblage under P. elata indeed points at a human origin of disturbance (Q5), although the evidence is less abundant than previously expected. However, the results described above strongly suggest that the fire and vegetation history under P. elata patches was human-driven for the following reasons :

● The P. elata patches are larger than the usual surface of forest burned by lightning strikes;

● Former vegetation was always dominated by pioneers and secondary forest stands, which are preferred by humans for slash-and-burn activities as these species often have low wood densities and are therefore softer and easier to cut.

We therefore believe that our results clearly show that P. elata stands are indeed a legacy of a relatively recent wave of slash-and burn activity in Central Africa. In the course of 2016, identifications will be finalised using an updated version of the charcoal identification protocol published by Hubau et al. (2012) (see “ntermediary Results”. Publication of the results is expected by the end of 2016.

2. 30 years of biomass dynamics using replicated measurements of permanent forest plots.

2.1. Detailed assessment of Central African forest responses on the 2015-

2016 El Nino

The central African rainforest constitutes one of the most important terrestrial carbon sinks on Earth. Pan et al. (2011) showed that the African forest has sequestered about 482 Tg carbon per year during the period 2000-2007, an amount in the order of the entire temperate zone (Europe + North America + Asia). However, it is still unclear how this sink will evolve in the future under changing climate conditions.

Brienen et al. (2015) showed that the carbon storage capacity of the Amazon region during the period 1990 to 2011 systematically decreased to the half its original capacity. Current odds are that the carbon storage capacity of the Amazon will disappear completely in the near future. The Amazon region will therefore turn from a carbon "sink" into a "source". This drastic decline in carbon storage capacity is probably caused by a complex interaction of three factors: 1. rising temperatures hamper tree growth (respiration becomes more important than photosynthesis), 2. more intense droughts favor tree mortality and 3. a complex internal demographic feedback mechanism between tree growth (productivity) and tree mortality. Specifically, higher productivity in the 90s (due to atmospheric carbon 'fertilization') is now thought to be internally offset by higher mortality.

African rainforests are on average one degree cooler than the Amazon and the trees have developed a higher drought resistance because they receive less rainfall per year than in the Amazon. As a result, the carbon storage capacity in Africa did not decrease during the last decades, in contrast to the Amazon (Hubau et al, in prep.). Yet it is not certain whether these benefits will continue to outweigh the threats of climate change. It is likely that rising temperatures and drought in Africa will reach a certain "threshold", so that the carbon storage capacity will decrease as is the case in the Amazon.

In order to examine the impact of higher temperatures and drought on carbon storage in Africa in the short term, we can focus on temporary extreme weather situations. The El Niño phenomenon is a good example. El Niño is a climate cycle in the Pacific that can temporarily have a big impact on global climate patterns. During the autumn of 2015 and spring of 2016 Earth witnessed one of the most significant El Niño cycles. This is an excellent opportunity to investigate, for the first time in history, the impact of this climate phenomenon on Central African forest dynamics.

A working hypothesis is that El Niño is associated with abnormally intense drought periods. As a result, abnormally high tree mortality rates can be expected. This can lead to a temporary inversion of the carbon storage

capacity of tropical forests (Phillips et al. 2009), which in turn can have dramatic consequences on the global climate cycle (Pan et al. 2011).

METHODOLOGY :

To test this hypothesis, the Wood Biology service (Hans Beeckman) of the RMCA, in collaboration with Leeds University (School of Geography, Simon Lewis) developed a research project based on intensive monitoring of about 100 permanent forest inventory plots in six Central African countries. These permanent research plots usually consist of 1 ha of primary (virgin) forest where each tree with a diameter at breast height of at least 10 cm (approximately 400 trees ha-1) has been tagged. These trees have been measured at least twice just before the start of the last El Niño cycle. In this way, the former (pre-El Niño) carbon storage capacity of these plots is well known. To compare this capacity with the storage capacity during and just after the El Niño, we have planned fieldwork campaigns in 2016 and 2017 to measure the trees on the plots again.

Furthermore we conducted three-monthly “mortality checks”. These checks are performed by a team that visits each tree in the plots. They make a detailed description of trees that died since the last check (how, when, by which phenomenon). In this way we can closely follow the evolution of the mortality in the plots during and after the El Niño cycle.

FUTURE PROSPECTS AND EXPECTED OUTPUT :

The plots will be measured again during 2017. In this way, there will be a census interval spanning the el Nino, a census interval before and one after the El Nino. This will allow a detailed assessment of the short-term effects of temporary climate change on forest mortality, productivity and net carbon storage change. The results of the 16 plots in Yangambi / Yoko will be combined with the results of about 90 other plots (Cameroon, Gabon, Ghana, Congo Brazzaville, Liberia) that are being monitored by Leeds University. We continue to carry out mortality checks until the end of 2016. Finally, we will organize a full recensus of all plots during the spring of 2017. We expect first analysis results by the end of 2017, which will be published in a high impact journal shortly after.

2.2 Divergent carbon sink response of African and Amazon tropical forests

Remaining intact tropical forests sequestered ~1 Pg C yr-1 over the 1990s and early 2000s1,2, limiting the increase in atmospheric CO2. Modelling studies suggest this carbon sink should be increasing over time3,4. However, recent results from Amazonia show a declining sink, with

	suggestions that this may be a pan-tropical phenomenon5. Here we test whether a similar decline is occurring across African forests. Long-term forest inventory data from 245 plots across 12 countries shows a long-term increase in the aboveground carbon sink in structurally intact African closed-canopy tropical forest (1983-1990, 0.24±Y; 1990-2000, 0.36±Y; 2000-2010, 0.45±Y Pg C yr-1). Thus, the carbon sink response of Earth's two largest expanses of tropical forest are currently diverging, with the African forest sink exceeding the Amazon sink over the decade 2000-2010, despite the larger Amazon forest extent . The divergence is driven by differing temporal trajectories of tree mortality. Over three decades both continents' forests showed similar and significant increases in woody productivity (growth), significantly positively correlated with changes in atmospheric CO2 concentration , and significantly negatively correlated with changes in local air temperature , consistent with modelling studies3,4. However, carbon losses from tree mortality significantly increased in Amazonia, with no significant long-term change in African forests. Mortality was significantly correlated with both drought metrics , and the significantly higher stem turnover rates (shorter carbon residence times) of Amazonian forests, suggesting that past increases in growth more quickly pass through the system to become larger losses from mortality. The results suggest that African forests' sink capacity may be a decade or more 'behind' Amazon forests, by being on average cooler (by 0.X K) and having longer carbon residence time (by XX yrs) delaying increases in mortality. Ongoing monitoring and modelling of tropical forests will be required to assess the future trajectory of the carbon sink in African tropical forest.

Project 6	
Naam (en acroniem)	Xyladate & Geforco
Financiering	Bron: DGD, CIFOR & R&SD Budget: 25 475 € (KMMA, DGD)
Partners	Intern verantwoordelijke: Hans Beeckman (promotor) Interne medewerkers: Nils Bourland Externe medewerkers: Emmanuel Kasongo (UNIKIS/Ugent), Prosper Sabongo (UNIKIS), Benjamin Toirambe (Ministère congolais de l'environnement), Gaston Limba (INERA-Yangambi), Frans Arijs (CITES Belgique), Hélène Perier (CITES EU), Karim Ammacha (Compagnie Forestière et de Transformation/CFT), Chadrack Kafuti (UNIKIN & UNIKIS), Ed Espinoza (US FWS Forensics Laboratory), Robert Nasi (CIFOR)
URL website	
Data	Begin: 01/01/2016 Einde: 31/12/2017
Algemene beschrijving van het project	Le projet est développé conjointement par le musée, le CIFOR et la filiale singapourienne de R&SD. Ce projet est le prolongement du projet Xyladate précédemment mis en oeuvre exclusivement sur financement de la DGD. Modèle d'étude : *Pericopsis elata* (Harms) Meeuwen (Fabaceae) - afrormosia, assamela

	Objectifs : L'objectif principal du projet est de contribuer à la préservation du rôle majeur de stockage de carbone des peuplements riches en *P. elata* et à la conservation de la biodiversité dans un contexte de changements climatiques et d'exploitation forestière pourvoyeuse d'emplois. Les objectifs intermédiaires sont : A. approfondir les connaissances écologiques sur *P. elata* en RDC afin d'affiner les paramètres de dynamique forestière nécessaires pour l'évaluation de la durabilité d'une exploitation (croissance, mortalité naturelle, phénologie, passage à la futaie) ; B. estimer les principaux paramètres d'exploitation forestière afin de proposer une méthode fiable de conversion de volumes commercialisés en nombre de tiges abattues (coefficients d'exploitation) ; C. sur la base de l'historique des peuplements de l'espèce, comprendre l'impact des variations climatiques actuelles sur sa capacité à stocker le carbone (variations temporelle de la croissance en relation avec des variables climatiques) ; D. définir des outils, destinés aux entreprises forestières congolaises, en vue d'apporter un appui post-exploitation à la régénération de l'espèce (récolte de graines, éducation de plants en pépinière, programmes de reboisements des zones dégradées) ; E. apporter un soutien scientifique de qualité aux institutions internationales confrontées au commerce international du bois de l'espèce.
Evolutie en resultaten voor het afgelopen jaar	Plusieurs avancées ont été réalisées durant l'année 2016, dont les principales concernent : - récolte d'échantillons (disques) à des fins d'analyse de la croissance de l'espèce et de travaux de dendrochronologie Des récoltes de disques (2 par arbre-cible) ont été réalisées sur 10 tiges. En complément, de multiples données ont été récoltées concernant, pour chaque arbre-cible, sa dendrométrie et son milieu de croissance (y compris des prélèvements d'échantillons composites de sols). Ces disques ont été poncés, scannés à haute résolution puis conditionnés en vue de leur transfert vers Tervuren. Les perspectives pour 2017 sont : la transmission de prélèvements sur le

	matériel à destination de l'université de Bern (Daniele Colombaroli) pour la participation à un article scientifique, l'utilisation du matériel pour la rédaction de deux articles respectivement sur l'annualité des cernes de l'espèce (article 1) et sur sa tendance de croissance et la variabilité qui l'entoure (article 2). - fonctionnement cambial en lien avec la phénologie et certains traits fonctionnels de l'espèce (ligneux et foliaires) Suivant un protocole spécialement produit par le projet, deux campagnes de récoltes d'échantillons de cambium ont été réalisées respectivement en mars et décembre 2016 dans la concession de la société partenaire CFT. Ces deux campagnes ont permis la récolte de 100 échantillons de bois sur un total de 25 arbres. Pour un sous-échantillons d'entre eux, l'état phénologique a été décrit au moment de la récolte des échantillons de bois et un échantillonnage additionnel a été effectué pour permettre la description des traits fonctionnel foliaire (rameaux, herbiers). Enfin des échantillons spécifiques ont été récoltés pour renforcer les analyses génétiques en cours à l'ULB. Les perspectives pour 2017 sont : transfert des échantillons vers le musée, une ou plusieurs campagnes additionnelles, préparation et analyse des échantillons, traitements, insertion des résultats en complément à l'article sur l'annualité des cernes (article 1 ci-avant). - régénération de l'espèce, appui en matière de reboisements (pépinière), méthodes d'identification de l'espèce sur la base des plantules La première phase du projet a permis l'installation d'une pépinière chez le partenaire CFT, alimentée en graines de l'espèce-cible mais également d'autres espèces ligneuses exploitées. Une étude a été initiée sur l'influence de différents paramètres (date de récolte des graines, génétique et stade de développement du semencier) sur la germination puis la croissance des plantules en milieu contrôlé. Enfin, une campagne de récolte de matériel végétal a permis d'initier une étude portant sur les méthodes d'identification d'une espèce (expertise botanique *in situ*, expertise botanique *ex situ*, anatomie du bois, génétique et chimie du bois) sur la base de ses plantules (dont l'espèce-cible). Les perspectives pour 2017 sont : réalisation d'un travail de fin d'études portant sur la régénération de l'espèce-cible (mars-avril 2017, étudiant Master de l'ULB), alimentation de l'étude génétique en cours (ULB), première campagne de reboisements (octobre-novembre 2017), la continuation de l'étude sur les méthodes d'identification des plantules

	d'espèces d'arbres et arbustes - inventaires complémentaires (forêt aménagée et non perturbée récemment) dans la réserve de Biosphère de Yangambi En forêt non perturbée récemment, des inventaires complémentaires à ceux effectués durant la première phase du projet (Xyladate) ont été réalisés, notamment dans le but d'écarter le risque de biais lié à l'approche statistique utilisée. Ces inventaires ont permis de couvrir, au total, plusieurs dizaines de km de layons le long desquels plus de 500 tiges de l'espèce-cible ont été localisées et mesurées (hauteurs, diamètre, épaisseur d'écorce). En outre, un ré-inventaire des tiges de l'espèce-cible a été mené à bien dans 247 ha de forêt aménagée (bloc d'aménagement "Lusambila", premier inventaire en 2010). Les perspectives pour 2017 sont : "traduction" des classes de diamètre en classes d'âge, étude de la croissance de l'espèce en collaboration avec l'Université de Liège/Gembloux Agro-Bio tech, étude de l'impact de la sylviculture passée. - suivi de la dynamique forestière Deux dispositifs de suivi de la dynamique forestière (croissance, mortalité, phénologie) de l'espèce-cible ont été installés des forêts respectivement récemment perturbées et non perturbées. Des équipes ont été formées au sein de la société partenaire CFT ainsi qu'au sein du personnel technique de l'INERA-Yangambi afin de permettre à terme une appropriation de ces suivis. Les perspectives pour 2017 sont : débuter le suivi de la phénologie et effectuer les premières mesures de la croissance et de la mortalité naturelle, alimenter l'étude sur la croissance de l'espèce et celle portant sur sa phénologie, permettre à terme d'alimenter les réflexions en matière de gouvernance/gestion, évaluer l'efficacité des anciennes pratiques sylvicoles (périodes de la colonisation et post-colonisation) et en déduire des mesures sylvicoles à préconiser, des caméras seront installées afin de permettre un suivi continu dans le temps de la phénologie d'un sous-échantillons des tiges des dispositifs déjà installés. - formation des étudiants (Master complémentaire et doctorant UNIKIS/CIFOR) et d'un stagiaire (KMMA) Le cours d'aménagement et inventaires forestiers a été dispensé à une

	promotion d'étudiants en Master (UNIKIS/CIFOR). Ces séances ont inclu la dispense du cours théorique, la réalisation de travaux pratiques, de travaux de groupes et individuels ainsi que la préparation, la surveillance puis la correction des différents examens. Deux étudiants en doctorat (Emmanuel Kasongo et Dieu-Merci Assumani) ont également bénéficié de l'encadrement du projet durant l'année 2016. En outre, un stagiaire (Chadrack Kafuti) particulièrement prometteur a été accueilli au musée afin de travailler sur les traits fonctionnels de l'espèce-cible. Les perspectives pour 2017 sont : le cours sera dispensé à la nouvel promotion du Master. Le stagiaire sera à nouveau accueilli au musée pour progresser dans ses recherches. Le doctorant le plus avancé continuera de recevoir l'encadrement apporté par le projet, tandis qu'un nouveau doctorant en bénéficiera également si son dossier est retenu par le projet FORETS. - interventions auprès de la CITES, soutien scientifique institutionnel De nombreuses interventions ont été effectuées sous la forme d'un appui scientifique au profit essentiellement des équipes CITES de l'Union Européenne et de la Belgique et, mais dans une moindre mesure, de l'Allemagne. Les perspectives pour 2017 sont : participation aux séances du groupe d'examen scientifique de l'Union Européenne et au 23ème meeting du comité des plantes de la CITES, accompagnement sur demande de l'équipe CITES belge.

Project 7	
Naam (en acroniem)	Kongoking
Financiering	Bron: Budget: 3000 EUR
Partners	Intern verantwoordelijke: **Wannes Hubau**

	Interne medewerkers: **John Tshibamba Mukendi** Externe medewerkers: Koen Bostoen (UGent), Bernard Clist (UGent)
URL website	
Data	Begin: 27/08/2016 Einde: 31/10/2016
Algemene beschrijving van het project	The area which once hosted the Kongo Kingdom is today characterized by a very diverse landscape. The Mayumbe hills in the western part of the area are occupied by dense rainforests. A strong oceanic influence, together with the topography of the region creates favourable conditions for the establishment of the dense semi-deciduous Mayumbe rainforest despite its location on a relatively low latitude (Couralet, 2010; Donis, 1948; Lebrun et Gilbert, 1954). The forest is characterized by deciduous and evergreen species in the upper stratum and mostly evergreen species in the understory (Couralet, 2010; Donis, 1948). Caesalpinioideae are among the most important indicator species for this forest type (e.g. Prioria spp. and Scorodophleus zenkeri). Other indicator species belong to the families of Olacaceae (e.g. Strombosia spp.), Ulmaceae (e.g. Celtis spp.), Sterculiaceae (e.g. Cola spp.) and Meliaceae (e.g. Entandrophragma spp. and Guarea spp.) (Compère, 1970; Lebrun et Gilbert, 1954). Furthermore, Donis (1948) notices Staudtia stipitata and Coelocaryon spp. (both Myristicaceae) as the most remarkable species in old climax forest. The area to the east of the Mayumbe is lying in the rainshadow of the hills (e.g. the areas around Lake Sinnda and the Bu3 site in Figure 1). Clouds blown in from the Atlantic are depleted above the hills (orographic precipitation), leaving very little for the area behind. As such, the eastern parts of the Lower-Congo are more arid than the Mayumbe hills. As a consequence, they are mainly occupied by woodland and grassland savannahs. Typical savannah species are Psorospermum febrifugum, Bridelia ferruginea, Strychnos spp. and Annona spp. (Compère, 1970; Vincens et al., 1998).

	Simple as this may seem however, most of the Lower-Congo area is not occupied by large stretches of contiguous forest or contiguous savannah. In contrast, most areas are occupied by a complex and shifting pattern of forest-savannah mosaics (Leal, 2004; Maley et Brenac, 1998; Ngomanda et al., 2009a; Ngomanda et al., 2009b; Schwartz et al., 1990; Vincens et al., 1998). This mosaic pattern is composed of a complex mixture of woodland savannah, grass savannah, pioneer forest, secondary forest, primary rainforest and a broad range of intermediate phases within the forest succession cycle. Secondary forest stands are locally abundant and they may be characterised by prominent dominant species such as Xylopia aethiopica and Terminalia superba (Compère, 1970; Donis, 1948; Schwartz et al., 1990). Another remarkable type of secondary forest stands are the 'Marantaceae open forests', which are dominated by tall herbs with bulky leaves, presumably hindering the regeneration of mature forest species (Schwartz et al., 1990). Most of these secondary forest stands are assumed to be of anthropogenic origin, although some might be relicts of palaeoclimatically induced vegetation shifts (Gillet, 2013; Schwartz et al., 1990; Tovar et al., 2014). Finally, many authors describe a wide variety of edaphic vegetation types such as monodominant Prioria balsamiferum stands on sandy soils or gallery forests in river gullies occurring all over the area (Compère, 1970; Donis, 1948; Lebrun et Gilbert, 1954). However, the current vegetation map is presumably not representative for the entire Holocene. Indeed, the last 3000 years were characterised by periods of drought and subsequent periods of wetter conditions. The Lower Guinea was presumably occupied by a forest that extended beyond current boundaries between 7000 and 4000 calBP, which was a particular humid period in the area (Hubau et al., 2015; Maley et Brenac, 1998; Ngomanda et al., 2009a; Ngomanda et al., 2007; Ngomanda et al., 2009b; Vincens et al., 1998). During the period between 4000 and 2000 calBP however, the rainforest suffered from dryer conditions, enhanced by a more pronounced seasonality (Neumann et al., 2012a; Neumann et al., 2012b; Ngomanda et al., 2009a; Ngomanda et al., 2009b). Most pollen records show how rainforests were largely replaced by savannahs. Lake Sinnda totally or partially dried up during this period (Vincens et al., 1998). It was not untilDuring the period 22000-1500 calBP that the rainforest started towas recovering, as indicated by the many pioneer species in the pollen and charcoal records. Furthermore, the period between 1500 and present was characterised by a pattern of subsequent short drought periods, from which the Little Ice Age is the last and best documented one. Rainforest was scarcer in the Mayumbe than before 4000 calBP as indicated by the pollen diagram of Lake Kitina (Elenga et al., 1996).

	However, the abundance of pioneers shows that the forest was regenerating from the subsequent droughts. Despite the few pollen records mentioned above, our knowledge of Holocene climate and vegetation dynamics in Central Africa is limited due to a scarcity of stratified lakes. Therefore, charcoal assemblages from pedoanthracological or archaeological excavations are important to fill the gaps. Charcoal is defined as 'the blackened plant-derived material that has been significantly altered, chemically and structurally, through heating via fire' (Forbes et al., 2006). Charcoal has significant palaeobotanical and archaeological value because many anatomical features remain preserved during the charcoalification process. It is a chemically inert material and persists in soil profiles for thousands of years, even in the tropics (Di Pasquale et al., 2008; Hubau et al., 2015; Scheel-Ybert, 2000). Despite its compatibility with palaeolimnology and its undeniable archaeological and palaeobotanical possibilities, anthracology has only sporadically been applied in Central Africa due to a seemingly unsurpassable species richness. Yet these problems can presently be taken care of thanks to the development of on-line databases and state-of-the-art imaging techniques (African Plants Database, 2016; Hubau et al., 2013a; Hubau et al., 2012; IAWA Committee, 1989; Inside Wood Database, 2016; PROTA4U, 2016; Wheeler, 2011). Charcoal and pollen analysis are highly compatible (Emery-Barbier et Thiébault, 2005; Hubau et al., 2012). The charcoal assemblages collected during the KongoKing project may therefore shed a light on vegetation dynamics throughout the last 2000 years in the Lower-Congo. Here we present preliminary charcoal identification results and we discuss how our first insights may contribute to answering the following research questions : 1. How species-rich are the different KongoKing charcoal assemblages? ; 2. Which vegetation types are represented in the charcoal assemblages? ; 3. Are the charcoal-inferred vegetation reconstructions comparable to the few pollen records from the most nearby lakes (Elenga et al., 1996; Vincens et al., 1998)?; 4. Can the vegetation composition be explained by climatic events documented by other palaeoproxies (Russell et Johnson, 2007)?
Evolutie en resultaten voor het afgelopen jaar	**Methods**

Archaeological excavations were carried out in the form of 'trenches', which consist of one or several 'squares'. Each square has a surface area of 1 m² and was excavated carefully and systematically using standardized archaeological methods. The depth of each square and the number of squares per trench depended on the archaeological assemblages that were found. The layout of each trench was determined based on former fieldwork results and varied from site to site. For a more detailed archaeological background of each of the sites mentioned in this chapter, we refer to earlier publications of the KongoKing team (Clist et al., 2015a; Clist et al., 2015b; Clist et al., 2015c; Clist et al., 2013a; Clist et al., 2013b; Clist et al., 2014; Matonda et al., 2015; Matonda et al., 2014). During archaeological excavation, charcoal fragments associated with artefact assemblages were randomly hand-picked, but no attempt was done to quantify charcoal abundance.

For charcoal identificationFrom the archaeological sites excavated during the KongoKing project, we selected for charcoal identification 6 archaeological sites that were excavated during the KongoKing project and which had been radiocarbon dated. Three of the selected sites are currently situated in an environment of forest-woodland mosaics at the margins of the Mayumbe forest (MSG=Misenga, KND=Kindu and Bu3), while the other three sites are situated in an environment dominated by several types of savannah and -gallery forest environment (TAL=Kitala, NBC=Ngongo Mbata, KDK=Kindoki, cf. Fig.1).

From each site, at least two trenches were selected for charcoal identification (except Bu3 with only one trench) and at least one charcoal fragment was chosen randomly for radiocarbon dating. Archaeological signature of the artefacts from the NBC trenches indicates the charcoals from trench 44 are probably of the same age as the other trenches in the site. All selected charcoal fragments were radiocarbon dated using AMS 14C dating at the Poznán Radiocarbon Laboratory (Poland), except one sample that was dated at Beta Analytic, Florida, US. Calibration was performed with the Calib 6.1.0 software package (Stuiver et Reimer, 1993; Stuiver et al., 2005) using the SHCal04 southern hemisphere atmospheric curve (McCormac et al., 2004). Table 1 specifies the archaeological epochs to which the charcoal assemblages can be assigned: Early Iron Age, pre-1483 Late Iron Age, post-1483 Late Iron Age.

	If enough fragments were available, a minimum number of 5 charcoal fragments from each square were randomly selected for identification, and a minimum number of 20 charcoal fragments per trench. After selection, charcoal fragments were analysed using reflected light microscopy (RLM) following Hubau et al. (2012). Per square, all charcoal fragments were grouped into charcoal types, of which each type generally represents a group of species or (in rare cases) one single species. Next, a large fragment of each charcoal type was mounted on a stub for scanning electron microscopy (SEM). Using SEM images, charcoal types were described applying the numbered anatomical features used for the on-line InsideWood database (Hubau et al., 2012; IAWA Committee, 1989; Inside Wood Database, 2016; Wheeler, 2011). This produces two strings of numbered features. The first string represents primary anatomical features that are easily visible, while the second string represents secondary features that are variable or unclear. All charcoal types were identified applying the Central African identification protocol described by Hubau et al. (2012). However, due to time constraints, only the first phase of the identification protocol was applied (Hubau et al., 2012: IP1 in Fig.2). This phase is designed to search genera in the Inside Wood Database (2016), rather than species. Specifically, we conducted a query on InsideWood using the charcoal description, then we retained those species that are likely to occur in the research area according to on-line databases (African Plants Database, 2016; PROTA4U, 2016), inventory lists (Couralet, 2010; Donis, 1948; Donis et Maudoux, 1951; Maudoux, 1954; Monteiro, 1962; Pendje, 1993), and descriptions of vegetation types in the Lower-Congo (Compère, 1970). After Identification Phase1, the species retained on the InsideWood database were classified per vegetation type (Table 2) using ecological information from on-line databases (African Plants Database, 2016; PROTA4U, 2016), indicator species lists for vegetation types described by Lebrun et Gilbert (1954) and indicator species for vegetation types described by Compère (1970). In this way, retained species were attributed to 4 broadly defined vegetation types (cf. colour codes in Table 2): 1. evergreen and semi-deciduous rainforest, 2. gallery and riparian forest (periodically inundated forest), 3. pioneer and old secondary forests (regrowth) and 4. woodland savannah and grass savannah. These are the four major vegetation types used for the vegetation maps of the Lower-Congo (Compère, 1970) and the Congo Basin (Lebrun et Gilbert, 1954). Some species occur in several vegetation types. Moreover, a certain charcoal type can be associated with several retained species belonging to

several vegetation types, which hampers clear ecological interpretation of the charcoal type. Subsequently, charcoal types were attributed to a vegetation type based on the ecological characteristics of the retained species. The vegetation types are the same as the 4 major vegetation types to which the retained species were attributed (cf. colour codes in Table 2). Finally, each charcoal type was assigned to a significance class reflecting the level of ambiguity of ecological interpretation.

Results

In total, 532 500 charcoal fragments were analysed and classified in 40 charcoal types from which 36 are identifiable and derived from wood, 2 are derived from wood but not identifiable (ID class 5) and 2 are derived from endocarps of Elaeis guineensis and Canarium schweinfurthii. 19 charcoal types resemble one of the charcoal types identified in pits excavated in the forests of the Mayumbe (Hubau et al., 2015).

22 of the 36 identified charcoal types were attributed to significance classes 1 or 2 and are therefore the types that were used for the discussion. Furthermore, 11 types were assigned to significance class 3 and were used in the discussion, but with care. Significance classes are discussed in detail below.

Significance class 1 (containing 19 15 charcoal types) is attributed to those types where the retained species could be clearly assigned to only one vegetation type. This group of types is the most important one for the discussion as their ecological classification and interpretation is fairly straightforward. Examples are the types cf. Vernonia conferta and cf. Pycnanthus angolensis (Table 2). Wood anatomy of these taxa is quite unique and the charcoal fragments are therefore easily identified. For SEM images of a charcoal fragment derived from Pycnanthus angolensis in the Mayumbe, see Hubau et al. (2013b).

Significance class 2 (containing 7 types) is attributed to those types that occur in only one site but from which the retained species are attributed to two different vegetation types. The charcoal type is attributed to the vegetation type that is ‘most probable’ considering the current site environment. An example is the type cf. Tabernanthe iboga from which

	the retained species occurs in rainforest as well as in gallery forest environments (Compère, 1970; PROTA4U, 2016). As the site (NBC) is currently located in a savannah-gallery forest environment the type is attributed to gallery forest. As such, ecological classification of this group of types is partly deduced from geographical aspects and partly from identification results. Hence, they should be regarded with caution when discussing the results. Significance class 3 (11 types) is attributed to those types occurring in two or more sites currently located in different environments and from which the retained species are attributed to different vegetation types. For each site, the charcoal type is attributed to a certain vegetation type that can be different among the sites where the charcoal fragment occurs. An example is the type cf. Irvingia spp. from which the retained species occur in the rainforest (Irvingia robur and Irvingia gabonensis) and in gallery forest (Irvingia smithii) (Compère, 1970; Donis, 1948; Lebrun et Gilbert, 1954). Therefore, the type is attributed to rainforest for the sites currently located on the edge of the Mayumbe forest (KND and MSG) and to gallery forest for the sites currently located in savannah (NBC and TAL). Ecological classification of types from significance class 3 is partly deduced from geographical aspects,. So they should be regarded with caution when discussing the results. Significance class 4 (3 types) contains those types from which the retained species occur in three or four different vegetation types. Hence, it was considered as impossible to use these types for ecological interpretation. An example is the type cf. Syzygium guineense, from which the retained species has a very large spatial distribution (from Senegal to South Africa) and a very large ecological tolerance (from evergreen rainforest to dry woodland) (PROTA4U, 2016). Finally, significance class 5 (2 types) contains those charcoal fragments from which the anatomy was too unclear for identification. For an illustration of identification difficulties due to unclear charcoal anatomy, see Hubau et al. (2013a). **Conclusions**

	Discussion of the results will be published as a chapter in the KongoKing book. The charcoal identification results are preliminary. While they are not suitable to draw definite conclusions, they do provide a first insight in how charcoal identifications from multiple archaeological sites contribute to the reconstruction of the vegetation history within the KongoKing study area, especially when compared to pollen records from nearby lakes. The Early Iron Age assemblages (1800-1500 calBP) from the Kongo Kingdom area (Bu3 and Kindu) show a remarkable abundance of secondary forest and pioneer species. Moreover, mature rainforest indicators are absent (e.g. Olacaceae and Meliaceae). This supports the hypothesis that the Mayumbe rainforests may have been regenerating between 1800 and 1500 calBP, after being fragmented during the 3rd Millennium BP rainforest crisis. This result is in line with pollen and non-archaeological charcoal records from the Mayumbe and its surroundings (Elenga et al., 1996; Hubau et al., 2015; Vincens et al., 1998) and from Cameroon and Gabon (Maley et Brenac, 1998; Ngomanda et al., 2009a; Ngomanda et al., 2007; Ngomanda et al., 2009b). In contrast to the other two Early Iron Age sites, the Kitala site is relatively species-poor, containing only a few savannah and gallery forest species. This may indicate that the site was located in a different environment than the Bu3 and Kindu sites, but more evidence is needed to confirm this. The period of 1500 - 700 calBP, between the Early and the Late Iron Age, is not represented in the archaeological record of the KongoKing project. Also, the only dates available from other research projects were obtained from a site in the Mayumbe (Lukula) and from a site in the south (Tovo caves). It is unclear why we have this gap in the archaeological record. Clist argues that it may be a research gap rather than a genuine temporary population setback. In contrast with the Early Iron Age assemblages, the Late Iron Age assemblages of Misenga and Kindu (between 500-700 calBP) show a larger percentage of mature rainforest taxa (46% vs 31% of the taxa), while they also contain many pioneer taxa. This may support the idea that the forest was re-establishing, as indicated by an increase in forest pollen in the Lake Kitina record (Elenga et al., 1996). Finally, the youngest site (Ngongo Mbata, 400 calBP-present) is characterized by a larger number of types than any other site, even though it is now located in a savannah environment that may be rather species-

	poor as compared to the other sites. The variety of species in the charcoal record may reflect the variety of different vegetation types in the environment, rather than a species selection strategy. In contrast to the other two sites currently situated in a savannah environment (Kitala and Kindoki), the surroundings of Ngongo Mbata may have been relatively diverse. To conclude, the preliminary results presented here do support some insights from previous, more thorough analyses. However, these archaeological charcoal records may not all be representative for the surrounding vegetation due to a number of pre- or post-depositional biases, such as species-specific preservation of charcoal, preferences for certain species or vegetation types whilst collecting fuel wood (Théry-Parisot et al., 2010). Further analysis is needed to address the question of how representative our records are.

Project 8	
Naam (en acroniem)	Archaeobotany and vegetation history in central Africa through analysis of charcoal
Financiering	Bron: Budget:
Partners	Intern verantwoordelijke: Interne medewerkers: Julie Morin-Rivat (PhD student) Externe medewerkers:
URL website	

Data	Begin: October 2011 Einde: June 2017
Algemene beschrijving van het project	In the northern Congo Basin, populations of light-demanding trees extended about 2,500 years ago due to major climatic disturbances. From this period, human populations of farmers settled in the forest, and created gaps in the canopy (slash-and-burn agriculture) thus maintaining the populations of these light-demanding trees. Today, however,, several species of these trees, and exploited for their timber, present a deficit in terms of regeneration, threatening the sustainability of the resource. In order to understand the possible causes of this deficit, we sought to understand the potential role of man in this process by pursuing two objectives: **(i)** to identify past evidence of human presence (types of activities, time periods), and **(ii)** to retrace the history of land-use changes (targeted period: the last 1,000 years).
Evolutie en resultaten voor het afgelopen jaar	**(i)** We developed a methodology to extract a large quantity of wood charcoal, charred seeds and artifacts (i.e. pottery) from forest soils, in order to identify evidence of human presence (Morin-Rivat et al. 2016 The Holocene). We applied this methodology in the forest concessions of Wijma (southwestern Cameroon) and SFID-Mbang (south-eastern Cameroon). A total of 50 radiocarbon ages were also obtained. Charred remains were found in many places in the forest, suggesting dispersed human activities. Those are distributed into two periods (Phase A: 300 BC-650/500 AD, Phase B: 1420/1700 AD to the present). The remains indicate two types of land-use: (1) domestic, with palm oil endocarps most commonly associated with potsherds (villages), and (2) agricultural, with many charcoal pieces, possible remnants of slash-and-burn agriculture (fields). The quantity of palm oil endocarps was greater in the vicinity of the potential villages and decreased with distance. Our field methodology made it possible to document, at high spatial resolution and with simple tools, the spatial and temporal patterns of human occupation in the moist forests of central Africa. In addition, this can be easily applied in other forest concessions. **(ii)** Our second study looked at the process that led to the cessation of the regeneration of these light-demanding species in the northern Congo Basin (Morin-Rivat et al. 2017). The analyzes concentrated on four species: tali, limba, ayous and assamela, inventoried in 22 forest concessions (Cameroon, Congo-Brazzaville, and CAR). The results showed that most of these trees were aged to 165 years in average, regardless of differences in

their growth rate. This means that fewer young trees established since the mid-19th century (1850). By the middle of the 19th century, more human populations lived in the forest, and their activities, particularly the slash-and-burn agriculture, created openings in the canopy, leading to a mosaic landscape, which allowed the establishment of the light-demanding species. From the 1850s onwards, however, when the Europeans began to colonize the region, people and villages were moved out of the forests, for administrative and commercial purposes. In addition, many people died from diseases or during conflicts, which accentuated the phenomenon. Forests have thus been less and less disturbed. With less land clearing, fewer trees have access to light to root and grow.

The results of our interdisciplinary study showed that disturbances were necessary to maintain certain forest habitats and tree species, including the light-demanding tree species. The logging commonly practiced does not create openings in the canopy large enough to guarantee the natural implantation of these species. Additional treatments are therefore necessary, which may include selective logging in the vicinity of young trees, or the planting of the threatened species.

References:

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http://orbi.ulg.ac.be/handle/2268/205439

Project 9	
Naam (en acroniem)	Climate as driving force for tree growth in tropical Africa
Financiering	Bron: Budget:
Partners	Intern verantwoordelijke: Interne medewerkers: Externe medewerkers:
URL website	
Data	Begin: Einde:
Algemene beschrijving van het project	
Evolutie en resultaten voor het afgelopen jaar	

Project 10	
Naam (en acroniem)	Hydraulic architecture of mangrove trees and its functional importance
Financiering	Bron:

	Budget:
Partners	Intern verantwoordelijke: Interne medewerkers: Externe medewerkers:
URL website	
Data	Begin: Einde:
Algemene beschrijving van het project	
Evolutie en resultaten voor het afgelopen jaar	Mangroves occur along the coastlines throughout the tropics and sub-tropics, supporting a wide variety of resources and services. In order to understand the responses of future climate change on this ecosystem, we need to know how mangrove species have responded to climate changes in the recent past. In 2016 we published a study aiming at exploring the climatic influences on the radial growth of *Heritiera fomes* from from the Sundarbans, Bangladesh. A total of 40 stem discs were collected at breast height position from two different zones with contrasting salinity. All specimens showed distinct tree rings and most of the trees (70%) could be visually and statistically crossdated. Successful crossdating enabled the development of two zone-specific chronologies. The mean radial increment was significantly higher at low salinity (eastern) zone compared to higher salinity (western) zone. The two zone-specific chronologies synchronized significantly, allowing for the construction of a regional chronology. The annual and monsoon precipitation mainly influence the tree growth of H. fomes. The growth response to local precipitation is similar in both zones except June and November in the western zone, while the significant influence is lacking. The large-scale climatic drivers

	such as sea surface temperature (SST) of equatorial Pacific and Indian Ocean as well as the El Nio-Southern Oscillation (ENSO) revealed no teleconnection with tree growth. The tree rings of this species are thus an indicator for monsoon precipitation variations in Bangladesh. The wider distribution of this species from the South to South East Asian coast presents an outstanding opportunity for developing a large-scale tree-ring network of mangroves.

Project 11	
Naam (en acroniem)	Identification of lignified tissues by their anatomical characteristics
Financiering	Bron: Budget:
Partners	Intern verantwoordelijke: Interne medewerkers: Externe medewerkers:
URL website	
Data	Begin: Einde:
Algemene beschrijving van het project	

Evolutie en resultaten voor het afgelopen jaar

identification de 42 expertises.

n°expertise	Demandeur	Contexte	Identification
Exp_151	Didier De Scheemaecker	objet d'art	*Crossopteryx febrifuga*
Exp_152	-	-	-
Exp_153	-	-	-
Exp_154	HOGent - Hoge School Gent	commerce	*Eucalyptus sp.*
Exp_155	HOGent	commerce	*Eucalyptus sp.*
Exp_156	HOGent	commerce	*Eucalyptus sp.*
Exp 157	MRAC	objet d'art	*CFR. LAMIACEAE Vitex sp*
Exp_158	Somex S.A.	Commerce	*Handroanthus sp.*
Exp_159	Roger Vankelst	objet d'art	*Alstonia congensis*
exp_160	STEVEN WAES	Construction	*Entandrophragma utile*
exp_161	Somex S.A.	Commerce	*Entandrophragma angolense*
exp_162	Eric Laval	Commerce	*Handroanthus serratifolius*
exp_163	Somex S.A.	Commerce	*Afzelia sp*
exp_164	Somex S.A.	Commerce	*Aucoumea klaineana Pierre (OKOUME)*
exp_165	Musée des Instruments de Musique	objet d'art	*Buxus sempervirens L. (BOXWOOD)*
exp_166	Hans van der Velden	objet d'art	*Arbutus*

exp_167	Hans van der Velden	objet d'art	*Quercus sp*
exp_168	Hans van der Velden	objet d'art	*Salix sp.*
exp_169	-	-	*MORACEAE Milicia sp. (IROKO)*
exp_170	Somex S.A.	Commerce	*cfr. Shorea pauciflora*
exp_171	G. Lejeune	-	-
exp_172	Anne-Marie LEZINE	recherche scientifique	*Syzygium sp.*
exp_173	Anne-Marie LEZINE	recherche scientifique	*Syzygium sp.*
exp_174	Anne-Marie LEZINE	recherche scientifique	*Syzygium sp.*
exp_175	Anne-Marie LEZINE	recherche scientifique	*Syzygium sp.*
exp_176	Anne-Marie LEZINE	recherche scientifique	*Syzygium sp.*
exp_177	Anne-Marie LEZINE	recherche scientifique	*Syzygium sp.*
exp_178	Anne-Marie LEZINE	recherche scientifique	*Syzygium sp.*
exp_179	Anne-Marie LEZINE	recherche scientifique	*Syzygium sp.*
exp_180	Anne-Marie LEZINE	recherche scientifique	*Syzygium sp.*
exp_181	Anne-Marie LEZINE	recherche scientifique	*Syzygium sp.*
exp_182	Anne-Marie LEZINE	recherche scientifique	*Syzygium sp.*
exp_183	Somex S.A.	Commerce	*Piptadeniastrum africanum*
exp_184	Somex S.A.	Commerce	*Entandrophragma cylindricum*
exp_185	Somex S.A.	Commerce	*Entandrophragma*

			cylindricum
exp_186	Rik Ceyssens	objet d'art	*CFR. Pteleopsis hylodendron*
exp_187	Kristof Haneca	recherche scientifique	*Pinus banksiana*
exp_188	Kristof Haneca	recherche scientifique	*Pinus banksiana*
exp_189	RTBF	Commerce	*Handroanthus sp.*
exp_190	Vincent Colet	objet d'art	*Mansonia altissima*
exp_191	Vincent Colet	objet d'art	*Pyrus communis*
exp_192	Hubert Debiesme	Construction	*Pericopsis elata*

Project 12	
Naam (en acroniem)	Tervuren xylarium database
Financiering	Bron: Budget:
Partners	Intern verantwoordelijke: Interne medewerkers: Externe medewerkers:
URL website	
Data	Begin:

	Einde:
Algemene beschrijving van het project	
Evolutie en resultaten voor het afgelopen jaar	- 239 nouvelles coupes Tw - 115 nouvelles macérations Tw - nouvelles images SEM pour 73 Tw

Project 13	
Naam (en acroniem)	Contribution to expositions on forests, trees and wood
Financiering	Bron: Budget:
Partners	Intern verantwoordelijke: Interne medewerkers: Externe medewerkers:
URL website	
Data	Begin: Einde:

Algemene beschrijving van het project	
Evolutie en resultaten voor het afgelopen jaar	

Project 14	
Naam (en acroniem)	Educational and training activities on wood biology
Financiering	Bron: DGD-Raamakkoord Budget: 66 500 €
Partners	Intern verantwoordelijke: Hans Beeckman Interne medewerkers: Mélissa Rousseau, Nils Bourland, Claire Delvaux Externe medewerkers:
URL website	
Data	Begin: 1/7/2015 Einde: 31/12/2016
Algemene beschrijving van het project	La formation est subdivisée en deux activités différentes : d'une part, un court stage d'initiation à la botanique forestière sur le terrain et d'autre part, un stage de spécialisation intensif au MRAC (les thèmes variant d'une

	session à l'autre). Le stage d'initiation a pour but de donner un aperçu sur : (1) Les connaissances des plantes (2) L'introduction à l'écologie forestière et la croissance des arbres, (3) les principes de base de l'anatomie du bois, (4) la dendrométrie, (5) l'observation microscopique des préparations à main levée et coupes microtomiques, (6) la botanique forestière, y compris la collecte de matériel d'herbiers et des diaspores des essences intéressantes et (7) un aperçu des mécanismes qui assurent une gestion responsable de la forêt, une exploitation légale du bois et qui réglementent le commerce international. L'identification et la cartographie de bons semenciers est intéressante dans la campagne de récolte des semences (graines) qui pourront jouer un rôle important dans le processus de reboisement à partir des pépinières qui seront érigées. Ces pépinières pourront jouer plusieurs rôles dont le reboisement des milieux dégarnis par des essences de valeur, les essais agroforestiers, essences à croissances rapides pour la production de bois (makala), etc. Une meilleure connaissance de ces ressources ligneuses permettra leur utilisation judicieuse en termes de projet de reboisement des zones dégradées, des arbres à conduire dans les essais agroforestiers, des boisements à partir des essences locales à croissance rapide pour la production de charbon de bois, etc. Le stage intensif a pour but de former les participants selon les différents thèmes: (1) Anatomie du bois et identification des espèces ligneuses, (2) la dendrochronologie, (3) la technologie du bois et (4) la paléo-écologie et l'analyse des charbons de bois.
Evolutie en resultaten voor het afgelopen jaar	Au cours de cette année, trois stages ont été organisés: - un stage d'initiation local pour 20 stagiaires à Lwiro (RDC) en partenariat avec le Centre de Recherches en Sciences Naturelles

	(CRSN) du 27.03.2016 au 10.04.2016 - un stage intensif en anatomie du bois à Tervuren du 02.05.2016 au 22.07.2016 pour 6 stagiaires sélectionnés à l'issue du stage local organisé à Luki (RDC) - un stage intensif en dendrochronologie à Tervuren du 4.09.2016 au 26.11.2016 pour 6 stagiaires sélectionnés à l'issue du stage local organisé à Lwiro (RDC)

Andere activiteiten

- mission NIls Bourland: February 28th - March 31th 2016: DR Congo
- mission Mélissa Rousseau: organisation du stage groupé d'initiation à la biologie du bois à Lwiro (RDC), 23 march-12 april
- Maaike De Ridder & Hans Beeckman: Joachimstal (COST actie Streess): 13-15 april
- Maaike De Ridder & Hans Beeckman: Montpellier (ATBT): 19 – 24 juni
- mission Nils Bourland: RDC - 28 février au 31 mars
- mission Nils Bourland: RDC - 12 avril au 14 juin
- mission Nils Bourland: RDC - 1er août au 27 août
- mission Nils Bourland: RDC - 13 octobre au 4 novembre
- mission Nils Bourland: RDC - 15 novembre au 11 décembre
- mission Kévin Lievens: RDC - Projet Biospheretraits - du 1 août - 16 septembre 2016
- mission Claire Delvaux: CITES COP17 - Johannesburg - 25 september - 6 oktober 2016
- (april-juni: Maaike De Ridder: deelname slotcongres COST STREeSS (Berlijn, april) en deelname ATBC congres Montpellier (juni) met mentorship van twee sessies)
- april-augustus: begeleiding master thesis Thomas Berkani (Maaike)
- Défenses de thèses: Vera De Cauwer (PhD - KULeuven), Judith Auma Okello (VUB),
- Défenses de mémoires: Thomas El Berkani (ULB), Mirva Angela Rocha Vargas (UGent), Bhély Angoboy Ilondea (ERAIFT), Manoé De Neck (ULB)
- mission Victor Deklerck - Oregon (Ed Espinoza)
- 4 november: lesdag rond dendrochronologie in Gent (UGent) (Maaike)
- 14 november: networkmeeting Belspo Brussel HERBAXYLAREDD (Hans, Maaike)

Bezoekers: onderzoekers, gebruikers van bibliotheken, stagiairs, enz.

- Simon Cuveele, administratieve stage KTA Tervuren van 22/02/2016 t.e.m. 04/03/2016
- Justin

- Bart Muys en Vincent Kint (16 februari)
- Marie-Claude Saad - bezoeker fossiel hout - Parijs (22-25 februari)
- Thomas El Berkani - stage UlB
- Prof. Jan Bogaert (Gembloux) (6/4)
- Karen Bahr: audit beleidsrelevant onderzoek raamakkoord (19/4)
- Alessia Portaccio (enforcement timber trade) (20/4)
- Arthur Boom (ULB – Miombo ecologie – 20/4)
- Maarten Devriendt (UGent – masterthesis- 21/4)
- Groepsstage wood anatomy (6 deelnemers) 2/5-22/7
- Daniel Cattier (film museum – 20/5)
- Emmanuel Kasongo (PhD student, UNIKIS/CIFOR)
- Cédric Ilunga (PhD student, UNIKIS/CIFOR)
- Chadrack Kafuti (Master student, UNIKIS/CIFOR)
- Benie Yalanga Mayala (Master student, UNIKIS/CIFOR)
- John Tshibamba
- Achille Yves Amougou
- Groepsstage Dendrochronologie (6 deelnemers) 4/9-26/11

Voordrachten tijdens conferenties

- Maaike De Ridder, 20 juni '16, voordracht jaarringen *Pericopsis elata* op ATBC congres in Montpellier.

Andere

- Volgen workshop R München, 13-16 maart (gebruik van R binnen dendrochronologie, Maaike)
  Vergaderingen

- 1 april: intern overleg Afrormosia-stam
- 4 april: CITES (België en Europese commissie), overleg quota DRC Pericopsis hout
- 21 april: WWF: samenwerkingsmogelijkheden Congo
- 22 april: The Ecology of lianas in tropical ecosystems (UGent)
- 12 mei: inrichting Houtmuseum Plantentuin Meise
- 23 mei: comité de thèse Julie Morin-Rivat
- 30 mei: comité de thèse Thalès de Hauleville
- 14 juni : raad van bestuur BOS+
- 30 juni: public defense Judith Okello (VUB)

Aanwinsten voor de collecties

aantal houtstalen	**Twnummers**	**oorsprong verzameling**

14 houtstalen	Tw69042 t.e.m. Tw69055	verzameld door Nils Bourland = schors en cambium van Pericopsis elata uit het réserve de biosphère de yangambi, D.R.Congo
17 houtstalen	Tw69056 t.e.m. Tw69072	verzameld door Tom De Mil = stamschijven uit het réserve de Luki, D.R.Congo
31 houtstalen	Tw69073 t.e.m. Tw69103	verzameld door Nils Bourland = stalen 'wood plug' uit het réserve de biosphère de yangambi, D.R.Congo
143 houtstalen	Tw69104 t.e.m. Tw69246	verzameld door Maarten Devriendt = boorspanen van meerdere soorten Entandrophragma
37 houtstalen	Tw69247 t.e.m. Tw69283	verzameld door Yves Achille Amougou = stamschijven uit Ndeng, Est Cameroon
191 houtstalen	Tw69284 t.e.m. Tw69474	verzameld door Benoit Cassart = boorspanen uit Yoko Reserve Forest, D.R.Congo
192 houtstalen	Tw69475 t.e.m. Tw69616	verzameld door Chadrak Kafuti = houtstalen uit D.R.Congo
1419 houtstalen	Tw69617 t.e.m. Tw71035	verzameld door Moses Libalah = boorspanen uit
1 houtstaal	Tw71036	verzameld door Benoit Cassart = boorspaan uit Yoko Reserve Forest, D.R.Congo

expertises:

39 expertises réalisées

Muziekinstrumentenmuseum : expertise d'un instrument de musique, l'échantillon est identifié comme étant : *Buxus sempervirens*.

Middeleeuws houtsnijwerk : expertise de 3 statues chrétiennes, les échantillons sont identifiés comme étant : *Quercus sp*. et *Salix sp*.

Firma's en privépersonen : Somex S.A., Eric Laval, Roger Vankelst, Hans van der Velden, Anne-Marie LEZINE, G. Lejeune, Rik Ceyssens, Haneca, Vincent Colet, Hubert Debiesme, RTBF (On n'est pas des pigeons).

Bruiklenen

- 20/09/2016 tot 25/11/2016: uitleen houtstalen aan Belgium Woodforum via Joëlle De Weerdt:

Shorea guiso	Tw19046
Betula alleghaniensis	Tw14354
Erisma uncinatum	Tw20635
Eucalyptus globulus	Tw14545
Durio graveolens	Tw18602
Dyera costulata	Tw21699
Dryobalanops beccarii	Tw18617
Dryobalanops lanceolata	Tw18840
Dryobalanops loblongifolia	Tw29470
Anisoptera glabra	Tw23318
Anisoptera marginata	Tw13680
Anisoptera laevis	Tw13283
Anisoptera polyandra	Tw11500
Anisoptera megistocarpa	Tw13679
Anisoptera thurifera	Tw25904
Robinia pseudoacacia	Tw13988
Endospermum malaccense	Tw20664
Couratari guianensis	Tw37446
Couratari macrosperma	Tw50236
Couratari multiflora	Tw25449
Couratari pulchra	Tw50378
Entandrophragma angolense	Tw14504
Cedrelinga catenaeformis	Tw20131
Pinus pinaster	Tw23487
Pinus radiata	Tw14546
Pinus banksiana	Tw14410

Follow-up van thesissen en verdediging ervan

Doctoraatsstudent 1	
Voornaam en naam	Emmanuel Kasongo
Titel doctoraat	Thématique : étude des espèces d'Entandrophragma en RDC
Universiteit	UNIKIS & UGent
(Co)promotor (KMMA en externen)	Nils Bourland (KMMA), Joris Van Acker (Ugent), Jean-Marie Kahindo (UNIKIS)
Datum verdediging thesis	not defined yet (2018?)

Doctoraatsstudent 2	
Voornaam en naam	
Titel doctoraat	
Universiteit	
(Co)promotor (KMMA en externen)	
Datum verdediging thesis	

Digitalisaties en online zetten van de collecties

scannen houtstalen voor project: "Constructing a database of macroscopic features of the commercial timbers of Central Africa"

Biological collection and data management

Rapport annuel 2016

L'unité de gestion des collections et des données biologiques est une partie intégrante du département de biologie ; elle coordonne et standardise toutes les activités relatives à la collecte et la gestion des données des espèces.

Évolution du personnel

En 2016, l'unité de gestion des collections et des données biologiques était composée de 15 personnes :

Nom	**Prénom**	**Rôle linguistique**	**Niveau**	**TITRE Function (FR)**
Allard	Christophe	F	C	Gestionnaire de collections -Invertebrés
Brecko	Jonathan	F	1	Attaché scientifique/Gestionnaire de projets
Buset	Alice-Marie	F	C	Gestionnaire de collections - Entomologie
Cael	Garin	N	B	Gestionnaire de collections - Herpétologie
Gilissen	Emmanuel	F	1	Curateur - Mammalogie
Hanot	Stéphane	F	B	Gestionnaire de collections - Entomologie
Jacobsen	Kim	N	1	Gestionnaire de projets En congé de maladie jusqu'en mars 2016
Mafuta Zameka Keta	Baudouin	F	D	Technicien de collections
Mathys	Aurore	F	1	Attaché scientifique/Infographiste
Meirte	Danny	N	1	Curateur - Herpétologie

Parrent	Miguël	F	B	Gestionnaire de collections – Ichtyologie En congé de maladie d' Avril à fin Août.
Puttemans	Renilde	N	D	Technicien de collections Retraité depuis fin 2016
Smirnova	Larissa	N	1	Gestionnaire de projets
Van den Spiegel	Didier	F	1	Chef de service
Wendelen	Willem	N	A	Gestionnaire de collections - Mammalogie Retraité depuis fin 2016

En 201, avec le départ à la retraite de Wim Wedelen et Renilde Puttemans fin 2016, l'équipe n'est plus composée que de 3 scientifiques curateurs de collections (en ce y compris le chef de section), d'1 équivalent temps plein scientifique gestionnaire de projets, de 2 attachés scientifiques mi-temps, de 4 gestionnaires de collections, et d'1 technicien de collections. Cette équipe gère une collection de plus de 10 millions de spécimens dont 6 millions d'insectes. Elle est également fortement impliquée dans le processus de rénovation du MRAC.

Afin de continuer à valoriser les collections, le service s'entoure de collaborateurs volontaires et en 2016 le service a accueilli un nouveau volontaire :

Jean-Marc Herpers : Réorganisation des collections entomologiques

Projets : de recherche, expositions, activités éducatives, de communication

Projets des services scientifiques :

Projet 1 : Projet « focus »	
Nom (et acronyme)	**Exploration and conservation of the algal and echinoderm biodiversity of KwaZulu-Natal, South Africa – building modern voucher collections and increasing local taxonomic capacity**
Financement	Source : GTI, MRAC Budget : 20 800 €
Partenaires	Responsable interne : D. Van den Spiegel Collaborateurs internes : Collaborateurs externes : Yves Samyn (IRSNB), De Clerck O (University of Gent), Jennifer Olbers (Ezemvelo KwaZulu-Natal Wildlife).
URL site web	
Dates	Début : 01/01/2016 Fin : 01/12/2016
Description générale du projet	The last comprehensive monograph of the South African echinoderms (holothuroids excluded) is Clark & Courtman-Stock (1976), a work that is complementary to the last monograph on the Indo-Pacific echinoderms (Clark & Rowe, 1971). For sea cucumbers the last three decades saw the addition of many important contributions (e.g. Samyn & Thandar, 2003a, 2003b; Thandar, 1991; 1992; 1999; 2006; 2007; 2008; 2009), but for the other four classes little work has been done until the last couple of years (Olbers & Samyn, 2012; Olbers et al., 2014; Olbers et al., in press; Filander 2014, Filander & Griffiths, 2014). Bolton et al. (2001) reported that from 1999 to 2001, the Belgian echinoderm expeditions, led by the applicant, resulted in the addition of over 50 new records to the echinoderm fauna of KwaZulu-Natal. The majority of these new records had an Indo-Pacific signature, suggesting southern movement/migration of tropical species along the East coast. However, because, the KwaZulu-Natal expeditions of applicant were the first to rigorously utilize SCUBA for sampling, Samyn & Thandar (2003) could not conclude if the new records were recent additions to the local fauna or if they were species that that remained undetected due to sampling artefact. New collecting in the same locations will reveal if southward migration is due to global change. It is well known that climate change will affect seaweeds. Under 'optimal' conditions, including light availability, warm water and elevated nutrient levels, algae can grow very rapidly and cause so-called blooms. Such blooms can bring significent damage to ecosystems as they block sunlight and change the oxygen level in the water hereby restricting growth and survival of other aquatic organisms. As with echinoderms the results of previous sampling in KwaZulu-Natal indicated many new species to the flora, but it remained unclear whetheher these were new arrivals to the local flora or just not yet detected species. New collections in the same locations will allow us to reveal if southward migration is due to global change.

	In order to consolidate the past investments in South African echinoderm and algal taxonomy, it is crucial that the next four logical steps are taken: (1) providing in-situ training in sampling echinoderms and algae by handpicking, snorkelling and SCUBA-diving; (2) providing training in the build-up of modern reference collections in South Africa; (3) build up of modern state-of-the-art collections of both algae and echinoderms; (4) providing an intensive training course on the taxonomy of echinoderms and algae. This will ensure that there will be a large 'return on investment' with fully operational algal and echinoderm taxonomists installed in South Africa. Next to this, it will also allow to test the scientific hypothesis that global warming is 'pushing' tropical Indian Ocean species further South (Olbers, pers. comm.). **Resolving this hypothesis can have profound importance for the South African economy, and thus for the alleviation of poverty, as knowing how the renewable natural marine resources behave under changing environmental conditions will be crucial to protect and sustainably manage them.**
Évolution et résultats pour l'année écoulée	*Species collected* More than 300 echinoderm's specimens were collected during the EATSA project. All specimens have been sent to belgium for determination. After identification, material collected will be deposited in different museums and herbaria whereby fair and equitable sharing of samples will be pursued. In South Africa, samples will be deposited in the South African Museum (Cape Town) and in the herbarium of the University of Cape Town with duplicates in the Royal Museum for Central Africa, the Royal Belgian Institute of Natural Sciences and the herbarium of the University of Gent if possible. *Training* The last week of the January field trip was devoted to an intensive training course on the taxonomy of echinoderms and algae. The talk given during the workshop are available on the website: WWW.echinodermata.be *Barcoding* Samples of all specimens collected have been taken for sequencing
Photos	

Projet 2	
Nom (et acronyme)	Molecular Characterization of Recent Echinoderms (MolChaRE)
Financement	Source : JEMU Budget: 7500€
Partenaires	Responsable externe : Dr. Yves Samyn (IRSNB) Responsable interne : Dr. D. Van den Spiegel Collaborateurs externes : - Dr. Gustav Paulay: Florida Museum of Natural History, U.S.A. - Dr. Tim O'Hara: Museum Victoria, Australia

	- Dr. Bruno Danis: Université Libre de Bruxelles, Belgium
URL site web	www.echinodermata.be
Dates	Début : 01/08/2016 Fin : 01/07/2017
Description générale du projet	The primary objective of this project is with the molecular identification of echinoderms through the sequencing of COI and by comparing the obtained sequences with those available in public sequence repositories as well as those of selected national and international partners. This barcoding will not only allow to cross-check the identifications done on the basis of morphological characters, but will also flag cryptic species and will help in fine-tuning the echinoderm Tree of Life. To the latter end, we will also sequence three additional genes (16S, 28S, 18S), raising the amount of bp to +3500, for taxa that reveal themselves as cryptic. Specimens that will be tackled will be those echinoderms that were sampled in South Africa in 2016 by P.I. and co-P.I. (all five classes), but also crinoids sampled in previous expeditions to South Africa (1999, 2000, 2001 and 2003) as well as recently sampled (i.e. those that have not been fixed with formaldehyde) sea cucumbers in the family Holothuriidae that are deposited in the collections of the RMCA and the RBINS. Special attention is given to the Crinoidea because with the reverse taxonomy approach, P.I. and co-P.I. hope to get a better understanding of the intricate morphological taxonomic characters. Special attention is given to the sea cucumber family Holothuriidae because P.I. and co-P.I. have concentrated on this group together with partner Dr. G. Paulay during a past U.S. National Science Foundation project. This project likely will be continued in 2017 because a preproposal submitted to the USNSF has been accepted (Paulay, pers. comm.).
Évolution et résultats pour l'année écoulée	Tissue clips for barcoding have been taken and sequencing is in progress.

Projet 3	
Nom (et acronyme)	
Financement	Source : EU Budget : 9000000 (RMCA: 306682.40 (with subcontracting))
Partenaires	Responsable interne : Smirnova Larissa replacing Jacobsen Kim

	Collaborateurs internes : Mergen Patricia, Theeten Franck Collaborateurs externes : Aaike De Wever and Isabelle Vandevelde (RBINS), Quentin Groom (NBGB)
URL site web	http://www.eubon.eu/
Dates	Début : 01/12/2012 Fin : 31/05/2017
Description générale du projet	EU BON proposes an innovative approach in terms of integration of biodiversity information system from on-ground to remote sensing data, for addressing policy and information needs in a timely and customized way. The project will reassure integration between social networks of science and policy and technological networks of interoperating IT infrastructures. This will enable a stable new open-access platform for sharing biodiversity data and tools to be created. EU BON's 30 partners from 18 countries are members of networks of biodiversity data-holders, monitoring organisations, and leading scientific institutions. EU BON will build on existing components, in particular GBIF, LifeWatch infrastructures, and national biodiversity data centers.
Évolution et résultats pour l'année écoulée	Following up the EU BON activities via weekly WP1&2 online meetings. Contribution to the WP1 Deliverable on the Citizen Science Gateway (editing, content) Contribution to MS517 (editing, content) WP5 Survey of the GBIF IPT tool (contribution and participation) Contribution to the last training (MS285) Finalized and submitted the Deliverable 2.4 Report and assessment of training activities and final versions of training manuals Portal review (design, content, functioning) Coordination and content updating for the helpdesk The contribution of RMCA in different work packages was summarized in the 8th EU BON interim report. The Financial report has been submitted. Following participation in the EU BON Roundtable (in collaboration with Plantentuin Meise), we contributed to a COST Action proposal. Input and potential for collaboration on other EU BON sustainability initiatives (eg. H2020 proposals) was discussed.

Projet 4	
Nom (et acronyme)	**Synthesys III**
Financiering	Bron: EU Budget: 8000000 (RMCA: 213595.26)
Partners	Intern verantwoordelijke: Smirnova Larissa

	Interne medewerkers: Mergen Patricia, Matijs Aurore, Winant Virginie Externe medewerkers:
URL website	http://www.synthesys.info/
Data	Begin: 01/09/2013 Einde: 30/08/2016
Algemene beschrijving van het project	SYNTHESYS is the European Union-funded Integrated Activities grant. This four year project which began in September 2013 comprises 20 European natural history museums, Universities and botanic gardens, & research organisations. It aims to create an integrated European infrastructure for researchers in the natural sciences. SYNTHESYS is split into three activities: **Access**, **Networking** and **Joint Research Activities**. SYNTHESYS aims to produce an accessible, integrated European resource for research users in the natural sciences. SYNTHESYS will create a shared, high quality approach to the management, preservation, and access to leading European natural history collections.
Évolution et résultats pour Juillet-Septembre 2016	Deliverable D3.6: European roadmap is completed and submitted. Participated in online meetings to discuss the structure of the document, use cases and action plan. Working on the deliverable for NA2 together with Nathalie Smitz. Preparation for the meeting in Berlin in June 2016. Participation to NA3 meeting in Prague (Didier van Den Spiegel) Following up the Synthesys activities via online meetings and email conversation.

Project 5:	
Naam (en acroniem)	Global Assessment of Reptile Distributions (GARD)
Financiering	Bron: Budget:
Partners	Intern verantwoordelijke: Danny Meirte Interne medewerkers: Danny Meirte Externe medewerkers: chair: Shai Meiri [Israël]
URL website	http://www.gardinitiative.org/
Data	Begin: 05/09/2013 Einde:

Algemene beschrijving van het project	Consortium of scientists from across the world that work together to gather species-level data on the global reptile distributions
Evolutie en resultaten voor het afgelopen jaar	The global distribution of terrestrial tetrapods reveals a need for targeted conservation for reptiles, and in particular lizards

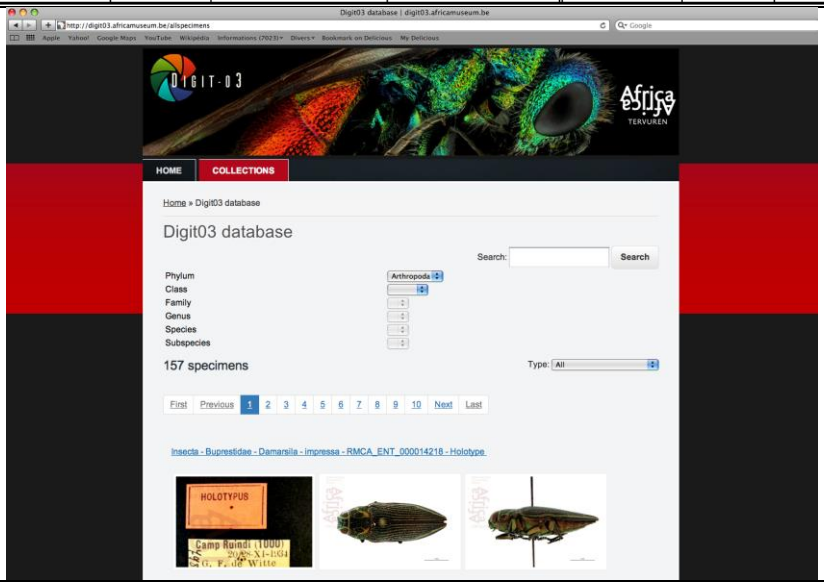
Projet 6	
Nom (et acronyme)	**DIGIT 03**
Financement	Source : Federal (BELSPO) Budget :
Partenaires	Responsable interne : D. Van den Spiegel Collaborateurs internes : Aurore Mathys & Jonathan Brecko Collaborateurs externes : Patrick Semal (IRSNB)
URL site web	https://sketchfab.com/africamuseum http://digit03.africamuseum.be/allspecimens
Dates	Début : 01/07/2014 Fin: 31/12/2018
Description générale du projet	Le MRAC et l'IRSNB hébergent ensemble près de 50 millions de spécimens d'Histoire naturelle qui représentent un patrimoine inestimable relatif à la biodiversité passée et actuelle. Ceci constitue l'une des plus grandes collections en Europe après celles du NHM London et du Museum d'Histoire naturelle de Paris et l'une des 10 plus grandes collections au monde. Parmi ces spécimens, on estime à environ 0.5 % le nombre ayant permis la description des espèces (types) ou ayant fait l'objet d'une description détaillée et illustrée (figurés). Ces 250 000 spécimens constituent un patrimoine unique au niveau mondial. En Europe, différentes initiatives nationales ont permis d'entreprendre la numérisation des collections d'Histoire naturelle et leur mise a disposition de la communauté scientifique internationale. Via le programme fédéral DIGIT-3 l'unité de gestion des collections et des données biologiques bénéficie de 2 x 0,5 ETP (1 ETP) scientifiques qui sont spécifiquement dédiés à la numérisation à haute résolution des types et figurés des collections sciences naturelles. Les techniques utilisées ont été développées et validées dans le cadre du programme fédéral AGORA3D

Évolution et résultats pour Avril-Juin 2016

- Mise a échelle des modèles 3D mollusques en Agisoft Photoscan et mise en ligne des holotypes et paratypes et sur Sketchfab (https://sketchfab.com/africamuseum)
- Réalisation des test nouveau site web DIGIT03
- (http://digit03.africamuseum.be/allspecimens)
- Digitalisation des types des Tephritidae en 2D+ (Focus Stacking)
- Digitisation of requested types of the Dermestidae, Megachilidae, Diplopoda, etc … (see table)

Focus Stacking				3D		
		Species/specimens	2D+ Pictures/views		Uploaded	Processing
Entomology	Beetles	17	49	**Archaeology**	175	40
	Millipedes	63	87	**Entomology**	5	
	Bees	6	26	**Museology**	4	
	Flies	126	1124	**Vertebrates**	3	
Vertebrates	Fish	5	27			
	Reptiles	2	4			
Invertebrates	Corals	2	4			
Fossiles	Fish	8	20			
	Total	**229**	**1341**	**Total**	**187**	**40**

Photos



Projets des services non scientifiques :

Projet 7 :	
Nom (et acronyme)	DaRWIN 2
Financement	Source : MRAC Budget :
Partenaires	Responsable interne : D. Van den Spiegel Collaborateurs internes : Aurore Mathys & Jonathan Brecko, Franck Theeten, Son Du, Philippe Vignaux

	Collaborateurs externes : Patrick Semal (IRSNB)
URL site web	
Dates	Début : 01/07/2014 Fin : 31/12/2018
Description générale du projet	Dès le début de l'année 2014, le système de Gestion des banques de données DaRWIN développé par l'ESF IRSNB a été installé sur un serveur à l'ICT du MRAC. Afin d'assurer une gestion commune des collections toutes les banques de données du département de Zoologie seront migrées vers le système DaRWIN système également utilisé à L'IRSNB. Cette migration permettra, à terme, d'obtenir une fusion virtuelle des collections des 2 ESF.
Évolution et résultats pour l'année écoulée	En 2016 la banque de données mammalogie a été transférée dans DaRWIN qui est maintenant accessible sur le site du MRAC (http://darwin/)

Projet 8 :	
Nom (et acronyme)	Participation de la section BIOCOL au processus de rénovation de l'exposition permanente
Financement	Source : MRAC Budget :
Partenaires	Responsable interne : D. Van den Spiegel Collaborateurs internes : Allard Christophe, Buset Alice-Marie, Cael Garin, Gilissen Emmanuel, Hanot Stéphane, Meirte Danny, Parrent Miguël, Wendelen Willem, Eliane De Coninck
URL site web	
Dates	Début : 01/01/2015 Fin : 2017
Description générale du projet	Depuis début 2014 l'équipe de gestion des collections et des données biologiques contribue activement au bon déroulement du processus de rénovation. Après avoir assurer le déménagement des spécimens exposés dans le musée et leur réintégration dans les espaces de collections, les membres de l'équipe ont participé à la sélection (retrait physique des spécimens des salles de collections, prise de mesures et photographies) des spécimens qui figureront dans la nouvelle exposition permanente. En tant que « commissaire général » de l'exposition permanente, le

	chef de service est impliqué de façon continue dans le processus de rénovation du musée.
Évolution et résultats pour l'année écoulée	Sélection des spécimens ; soclage ; suivi de la taxidermie, relecture des textes…

Autres activités

Visiteurs : chercheurs, utilisateurs des bibliothèques, stagiaires, etc.

Le MRAC est un centre de référence incontournable en ce qui concerne les collections se rapportant à l'Afrique centrale avec une vaste documentation comprenant des informations uniques en sciences naturelles. Ces collections et ces données constituent un outil inestimable pour la recherche scientifique ; nous avons accueilli durant l'année 2015 plus de **79** stagiaires ou chercheurs visiteurs pour des séjours d'une journée à plusieurs semaines pour un total de plus de 425jours. Environ **4466** spécimens ont été prêtés à des fins de recherche (Voir détail des visites et des prêts dans les rapports trimestriels). Près de **8500** nouveaux spécimens (principalement des poissons) sont venu enrichir nos collections.

Communications lors de conférences

Date	
7-27/02/2016	Meeting Cosh COST TD 1201 in Malta and London. A. Mathys
04/03/2016	Synthesys3 SA2 Task 1.2. meeting in Crete. J. Brecko & A. Mathys
19/05/2016.	Cites : vergadering Belgisch Wetenschappelijk Comité . Danny Meirte
27 juin 2016	workshop Synthesys à Berlin – Jonathan Brecko
21 Septembre 2016	Participation au séminaire "Infrared and Spectral Imaging" donné par Batenburg Data Vision à Veenendaal – Aurore Mathys
24/06/2016	voorbereiding en deelname aan vergadering Belgisch Wetenschappelijk Comité. CITES – Danny Meirte
9-13/10/2016	1st ILTER Open Science Meeting, Kruger Park, South Africa "Building the European Biodiversity Observation Network: enhancing biodiversity data mobilization, publication and integration". Kim Jacobsen, Larissa Smirnova, Patricia Mergen, Hannu Saarenmaa.
October 25, 2016	« Brain structures and functions : some examples in primates and

	beyond ». Seminars in Biological Anthropology – Department of Anthropology, University College London. Emmanuel Gilissen
December 8, 2016	« Planum Temporale and Parietal Operculum asymmetries in common chimpanzees and humans: a reappraisal ». Laboratoire d'Histologie, Neuroanatomie et Neuropathologie, Faculté de Médecine, Université Libr de Bruxelles. Emmanuel Gilissen

Autres

Nouveaux projets acceptés pour financement

BRAIN network proposal

1. "NaturalHeritage.be - Portal and databases related to Natural History collections in Belgium" in collaboration with RBINS and BGM.

BRAIN pioneer proposal

1. "Multispectral 3D digitization of the Cultural Heritage objects and Natural History specimens" in collaboration with RBINS.

Prêts

Environ **4466** spécimens ont été prêtés à des fins de recherche (Voir détail des visites et des prêts dans les rapports trimestriels).

Acquisitions pour les collections

Près de **8500** nouveaux spécimens (principalement des poissons) sont venu enrichir nos collections. (Voir détail des acquisitions dans les rapports trimestriels)

Suivi de thèses et défenses

Doctorant 1	
Prénom et nom	Armand Richard NZOKO FIEMAPONG
Titre doctorat	Diversité biologique des diplopodes du plateau Sud du Cameroun
Université	*UNIVERSITY OF YAOUNDE - Cameroun*
(Co-)Promoteur(s) (MRAC et externes)	D. Van den Spiegel, MBENOUN MASSE Paul Serge
Date défense de thèse	2017

Digitalisations et mise en ligne des collections

Emmanuel Gilissen

MR scanning de spécimens de grands singes (suite) au UZ campus Gasthuiberg, Leuven

Mise à disposition (par site FTP ou envoi de disque dur) de CT scans de matériel crânien de grands singes suite à la demande de plusieurs collègues

Danny Meirte

1) Digitalisation of scientific references

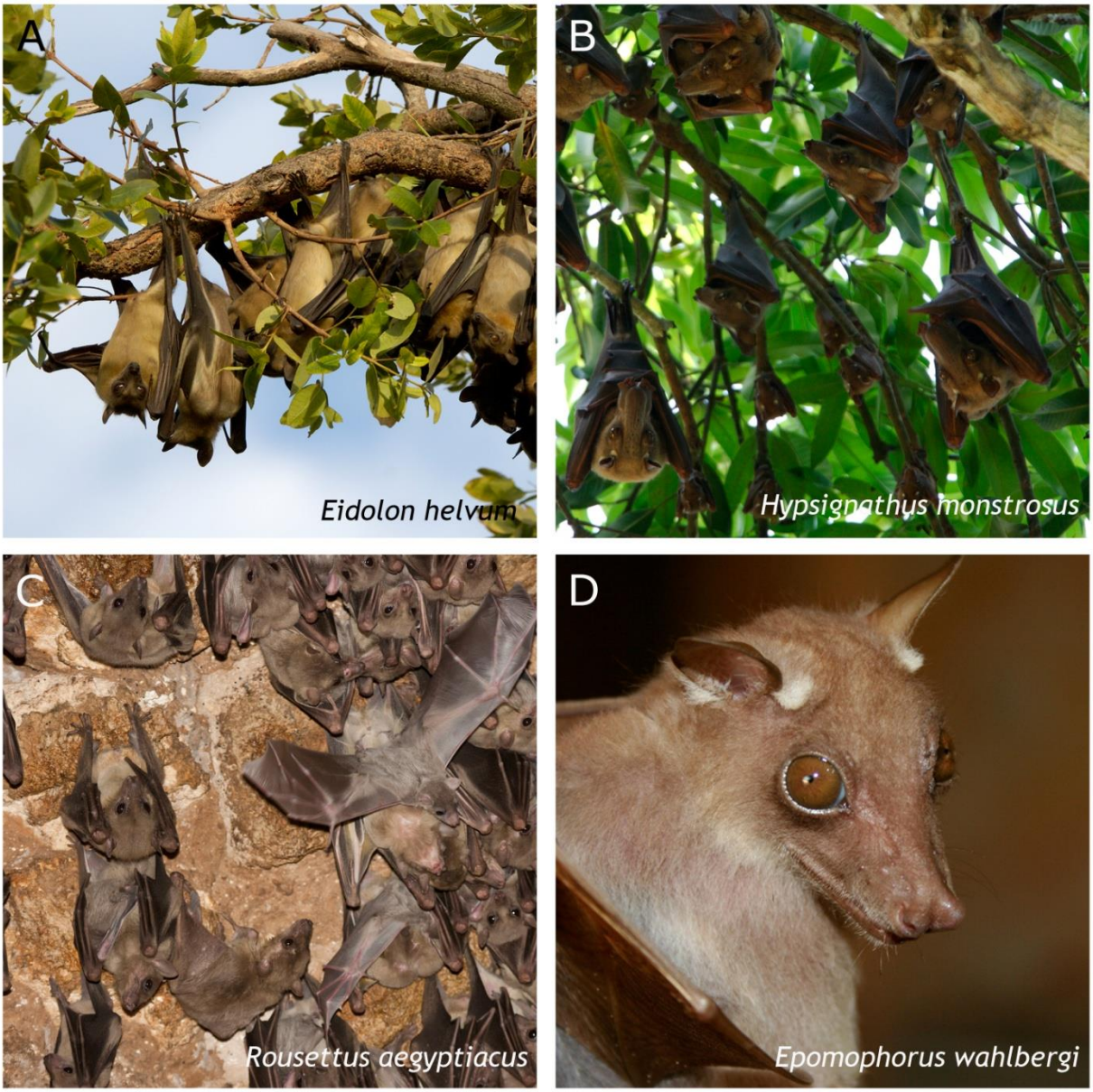
Activité de recherche (Chercheurs MRAC)

E. Gilissen

Ongoing research : Most of our research activity is focused on exploiting mammal material collected in DRC (Yoko forest area) during field trips in 2010 and 2011. This research is a collaboration between the RMCA, the University of Kisangani (C. Kaswera) and the University of the Witwatersrand, South Africa (P.R. Manger).

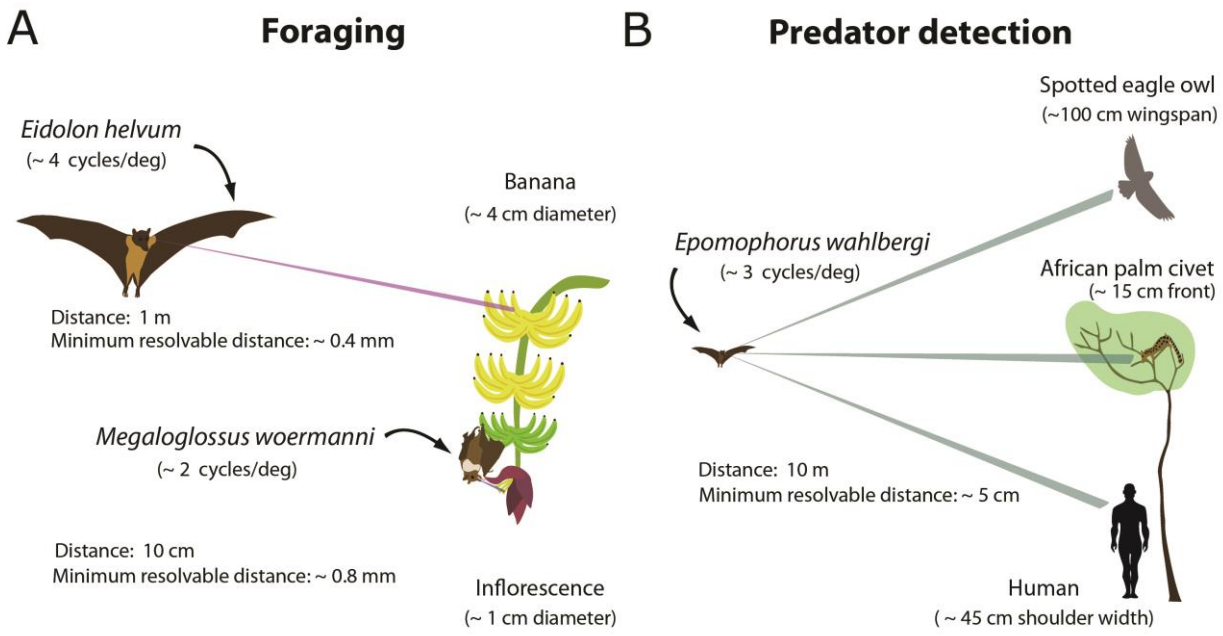
Visual acuity in megabats

Megachiropteran bats (megabats) show remarkable diversity in microhabitat occupation and trophic specializations, but information on how vision relates to their behavioral ecology is scarce.



Diversity of open and enclosed roosting microhabitats occupied by African megachiropterans. A: *Eidolon helvum* roosting in exposed branches of a tree. B: *Hypsignathus monstrosus* roosting under dense foliage. C: *Rousettus aegyptiacus* roosting in a cave. D: Close-up of the head of *Epomophorus wahlbergi* to show the large eyes. Photo credits to Malcolm Schuyl (*E. helvum*), Christophe Lepetit (*H. monstrosus*), Eyal Bartov (*R. aegyptiacus*), and Paul Manger (*E. wahlbergi*). [Color figure can be viewed at wileyonlinelibrary.com.]

Using stereology and retinal wholemounts, we measured the topographic distribution of retinal ganglion cells and determined the spatial resolution of eight African megachiropterans with distinct roosting and feeding ecologies. Spatial resolving power of the eye of megachiropterans was estimated using anatomical methods from the lowest (~2 cycles/degree) to the highest (~4 cycles/degree). The often mentioned unit for visual acuity is the number of “cycles per degree” of visual angle. See J. Comp. Neurol. 525:186–203, 2017 and https://petavoxel.wordpress.com/2010/02/26/cycles-per-degree/ for explanations.



Schematic diagrams illustrating the minimum target size that representative megachiropterans with different levels of spatial resolving power can detect at presumed distances relevant for foraging (A) and predator detection (B). Megachiropterans and African palm civet profiles were redrawn from Kingdon (2004). [Color figure can be viewed at wileyonlinelibrary.com.]

Retinal traits do not appear to provide substantive evidence regarding the phylogenetic relationships of megachiropterans but variations in the topographic organization and magnitude of retinal ganglion density reflect the specific ecological needs to detect food/predators and the structural complexity of the environments. J. Comp. Neurol. 525:186–203, 2017.

D. Meirte

Ongoing research : Identification Keys for African Snakes (IKAS)

Correcting of 4 final distribution maps of snake species found in RDC.

Actually working and correcting on the distribution maps for 149 lizard species found in RDC. Verification showed that in several taxa all specimen identifications need to be checked and updated. [Determination keys for these taxa are under construction].

D. Van den Spiegel

Research activities

Revision of several families of Diplopoda. In collaboration with Dr S. Golovatch (Institute for Problems of Ecology and Evolution, Russian Academy of Sciences, Moscou) & Dr J.J. Goeffroy (Muséum national d'Histoire naturelle, Département Systématique et Évolution, Paris).

Study of the "Antea" Holothuroids . In collaboration with Dr. Yves Samyn (Royal Belgian Institute of Natural Sciences).

Sea-beasts of the South Seas: Integrative Revision of Bêche-de-mer (Echinodermata: Holothuroidea: Holothuriidae). En collaboration avec l'université de Floride et l' IRSNB

Editorial and referee work

- Co-editor of *AbcTaxa (www.abctaxa.be)*
  Volume in press pour 2016 : Diatoms of the Congo and Zambezi Basins by Jonathan Taylor and Christine Cocquyt
- Thematic editor (Diplopoda/Echinodermata) of the journal *Zookeys* and *European Journal of Taxonomy*
- Reviewer for Zookeys, EJT, Zootaxa, JMBA

Scientific services

- Member of the consultative committee of the BRAIN.BE project: Multidisciplinary assessment of BELgian wild BEE decline to adapt mitigation management policy.
- "Commissaire general" for the new permanent exhibition
- Member of the management committee of "Pôle Nature"
- Membre du conseil de Direction MRAC

Activité de recherche (Chercheurs volontaires)

Rudy Jocqué

Study of afrotropical arachnids

Jean Deligne

Valorisation des collections de termites du musée Royal de l'Afrique centrale.

En 2016, j'ai participé au rangement, à la surveillance, et à l'étude des collections de termites du MRAC. Je me suis occupé en particulier des collections du genre *Cubitermes*.

Ces termites humivores jouent des rôles écologiques importants dans les savanes et les forêts africaines mais leur étude est contrariée par les nombreuses incertitudes qui subsistent dans leur systématique. Dans la collection principale du MRAC ces *Cubitermes* sont représentés par 275 échantillons récoltés tout au long du XXème siècle et conservés dans 35 bocaux. Comme l'inventaire existant était sommaire et manuscrit, j'ai poursuivi et achevé en 2016, un inventaire numérique détaillé de ces échantillons, en transcrivant le contenu des étiquettes originales, en recherchant les coordonnées géographiques des lieux de récolte et en dénombrant les spécimens des différentes castes présentes. Le matériel ainsi inventorié a servi de base pour un travail de révision générale du genre entamée par le professeur Guy Josens (ULB) et moi-même. Ce travail en cours a déjà permis de réunir à ce jour plus de 10.000 photographies de la morphologie externe et interne des

spécimens et de prendre sur chacune diverses mesures selon un programme standardisé. Ce matériel est complété par des échantillons provenant d'autres musées et d'autres chercheurs européens, africains ou américains. Une première étape de la révision (définition de 4 sous-genres basés sur des apomorphies du tube digestif) sera prête pour publication en 2017. Des espèces nouvelles, dont deux appartenant à la collection principale de notre Musée, seront également décrites prochainement.

Parallèlement à ces activités, j'ai entamé l'inventaire des termites d'autres genres que *Cubitermes* dans la collection principale de termites du MRAC (1.570 échantillons) et celle de l'ensemble de la collection de termites léguée au Musée par le Professeur Albert Bouillon (3.030 échantillons).

À la demande de plusieurs chercheurs africains j'ai identifié des échantillons de termites qu'ils ont fait parvenir au MRAC et je collabore au projet de renovation de l'exposition permanente du MRAC.

Illustrations

Photo 1 : *Cubitermes minitabundus*, soldat entier vu de profil. Type conservé au MRAC.

Photo 2: *Cubitermes oblectatus*, ouvrier, valvule épineuse du tube digestif. Type conservé au MRAC.