Mapping and SWOT analysis of Citizen Science actions at the Royal Belgian Institute of Natural Sciences and the Royal Museum for Central Africa

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AFRICA museum

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II. INTRODUCTION

This report was written by Luiza Mitrache, Citizen Science Coordinator for the Royal Belgian Institute of Natural Sciences and the Royal Museum for Central Africa since 01.09.2022, under the supervision of Carole Paleco (International Relations and Research Office - RBINS) and Tine Huyse (Biology Senior Researcher - RMCA).

The methods used for this mapping and SWOT analysis of Citizen Science (CS) activities taking place at the Royal Belgian Institute of Natural Sciences (RBINS) and the Royal Museum for Central Africa (RMCA) were as follows:

- **One-on-one semi-structured interviews** and team meetings with the researchers involved or with an interest in Citizen Science were organized from September 2022 to February 2023. During these meetings, at least 60 researchers from both Institutes exchanged on the topic of CS.

- Seven divisions have received a **general introduction to Citizen Science** which took place during the monthly team meetings. At the RBINS, the Geological Survey of Belgium, the Exhibitions division of the OD Public Services, the Scientific Heritage and the Science Squad (Science Communication group facilitated by Siska Van Parys and Reinout Verbeke). Inside the MRAC, the Wood Biology, the Heritage Studies and the Culture and Society divisions.

- A joint **RBINS - RMCA networking and mapping session** took place in the RBINS on September 30th 2022. Practitioners shared their methodologies and results in the field of CS. The immediate output of the meeting was a joint internal online Sharepoint platform with access to CS related news, events and publications.

- The mapping of CS projects at the RBINS was also based on the **2021 inventory of CS projects at the RBINS** provided by Carole Paleco. No such inventory existed for the RMCA. The CS projects described in this report are characterized based on the 10 principles of Citizen Science, established by ECSA, the European Citizen Science Association.

- A **Federal Mutual Learning Event** dedicated to Citizen Science in the Federal Scientific Institutes took place on January 12th in the AfricaMuseum. It allowed to map the current needs of CS project at the federal level.

- The engagement of the staff in CS was measured with the help of **a staff survey** whose goals were:
  - to map ongoing CS projects;
  - to measure the needs of ongoing CS projects;
  - to measure the intention to start a CS project in the near future;
  - to measure the need for a CS coordinator.

- **A volunteers' survey** was carried out to gather data on the profile of the scientific volunteers currently working inside the scientific services of the RBINS and the RMCA. The volunteers

have been questioned on their motivation, needs and barriers to participation. The results of the survey allow us to recommend future actions.

III. POLITICAL FRAMEWORK

1. UNESCO recommendation on Open Science

The United Nations Educational, Scientific and Cultural Organization (UNESCO) has developed a global policy and regulatory agenda on Open Science (UNESCO Recommendation on Open Science 2021), following a global consultation on Open Science.

Citizen Science (CS) has been identified as one key element of Open Science, next to scientific volunteering and to Crowdsourcing. The UNESCO Recommendation on Open engagement of societal actors refers to the *"**extended collaboration between scientists and societal actors beyond the scientific community**, by opening up practices and tools that are part of the research cycle and by **making the scientific process more inclusive and accessible to the broader inquiring society** based on new forms of collaboration and work such as crowdfunding, crowdsourcing and scientific volunteering. Furthermore, citizen science and citizens' participation have developed as **models of scientific research conducted by non-professional scientists**, following scientifically valid methodologies and frequently carried out in association with formal, scientific programs or with professional scientists with web-based platforms and social media, as well as open source hardware and software (especially low-cost sensors and mobile apps) as important agents of interaction."*

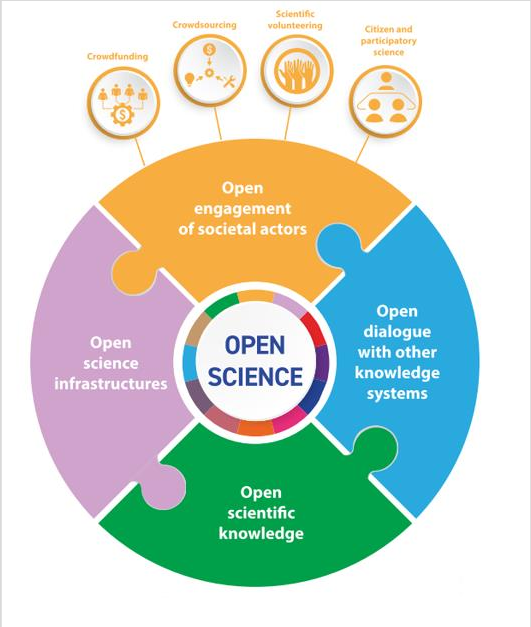


Figure 1. UNESCO framework for Open Science

2. Citizen Science and the EU

Citizen Science is one of the most interesting participatory approaches that have been developed in the field of public engagement. It is the approach that puts the practice of science by the citizens of the EU in the spotlight.

The European Commission shares a broad definition, according to which CS *"encompasses **a range of levels of engagement**: from being better informed about science, to participating in the scientific process itself by observing, collecting or processing data".*

In 2020 a new ERA policy agenda of the EC was developed. Citizen Science is one of the eight pillars of the Open Science policy part of this agenda. It is stated in this brief that to reach the ambitious targets of the European Green Deal, broad public mobilization and engagement is required.

Moreover, the EC has launched the European Mutual Learning Exercise on Citizen Science Initiatives (MLE) to strengthen CS national policies and initiatives, and to upscale cross-national CS initiatives. The final report of the MLE details recommendations, lessons learned and best practice across Europe. BELSPO (Aziz Naji), the RBINS (Carole Paleco, Luiza Mitrache) and the RMCA (Tine Huyse) have participated in the MLE. At program level, the EC has been supporting citizen and societal engagement through the program Horizon Europe.

3. Citizen Science in the RBINS and the RMCA

Museums combine scientific, education, communication and engagement expertise, competences which constitute the backbone of CS research. In this sense, museums are ideal spaces for the development of CS initiatives. Natural sciences museums have a long history of collaboration with amateur-naturalists. Nowadays, human sciences museums are also implementing CS research to **enhance public participation** in research and to collect data.

The RBINS and the RMCA have maintained for several decades links with volunteers who contribute to the enrichment of the collections by participating in the field research of species and collection of specimens, as well as to the knowledge and information on biodiversity.

The RBINS has a federal mandate for large-scale monitoring projects, which constitutes an opportunity for increasing participatory environmental governance through CS.

The RMCA through its capacity building activities is a promotor of CS in Central Africa mainly through long-date research projects ATRAP and HARISSA in DRC and in Uganda. In these projects, not only do the citizens provide crucial data to scientists, but they also play a role in raising awareness within their communities.

There is currently a need for recognition and structural support for CS activities at the RBINS and the RMCA, that are implemented on a recurrent basis and that are intended to be further developed following the growing interest that the involvement of citizens in research can bring in terms of quantitative data collection and qualitative results and enrichment of publications, as well as a better consideration of societal issues and restoration of the public confidence in research. CS is an investment in the future of scientific research.

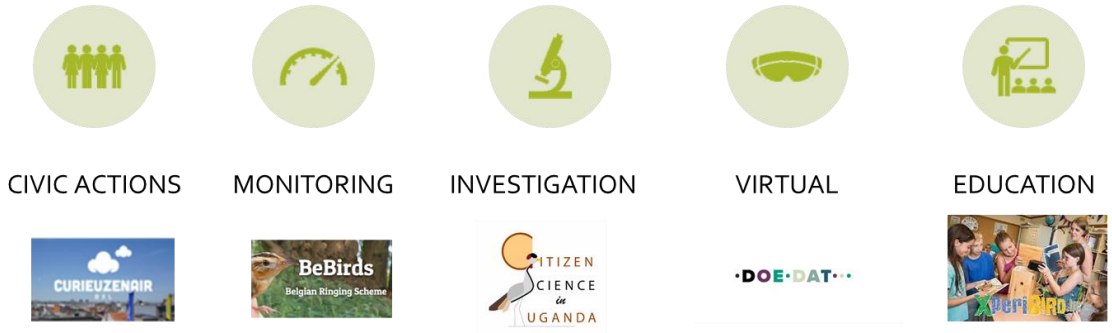
In January 2023, the first exchange on Citizen Science at the federal level took place at the AfricaMuseum. *"Citizen Science deserves to be supported and further promoted at the federal level"*. This was the conclusion of discussions between 26 researchers representing seven Federal Research Institutes and four BELSPO program managers. During this first federal exercise on CS, the researchers discussed their projects and the funding opportunities that exist or to come. Several needs were expressed concerning funding instruments, ICT support, shared platforms, the maintenance of a community of practice and the creation of a federal contact point dedicated to CS.

Several CS projects are currently taking place or have taken place in recent years in the Federal Scientific Institutes. Here is a brief description of the projects presented put together by Annelies Duerinckx (Scivil).

IV. THEORETICAL FRAMEWORK

1. The nature of the projects

This classification pays attention to the organizational and macrostructural characteristics of the projects, to their goals and the importance of physical environment to participation. This theoretical framework has been developed for the natural sciences (Wiggins and Crowston 2011) .



Action-oriented citizen science projects encourage participant intervention in local concerns, using scientific research as a tool to support civic agendas.

Conservation (or **monitoring)** projects support stewardship and natural resource management goals, primarily in ecology.

Investigation projects are focused on scientific research goals requiring data collection from the physical environment. While education is not always an explicit goal, it is frequently a strongly valued purpose, and Investigation projects often provide educational materials or include task structures that support ongoing learning. This type of program had a start and an end date, closing when enough data have been gathered. Duration varied from less than a year to several years, with the duration being set based on the research question. This contrasts with monitoring programs that are much longer-term or indefinite.

In **virtual** projects, all project activities are digitally mediated with no physical elements whatsoever.

The **Education** projects in this typology make education and outreach primary goals. However, education is the underlying goal of all types of projects.

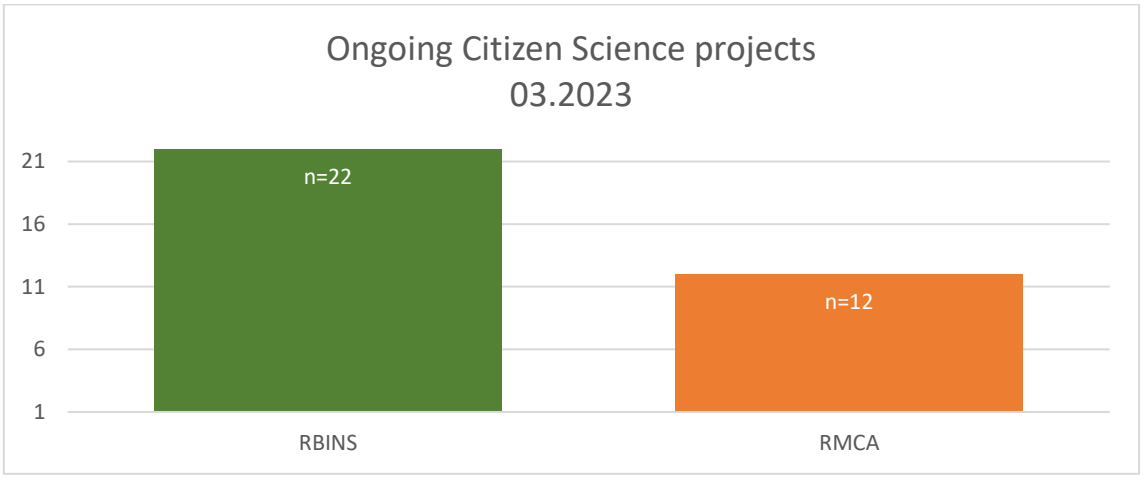
To these categories, as far as the RBINS and the RMCA are concerned, we need to add the **scientific onsite or field volunteers**, who traditionally contribute to scientific research or collection management. The majority does not participate in a defined project or contribute data to a research question. Some are involved in the day-to-day management of the collections or of the archives, performing various tasks. Others participate in fieldwork expeditions. A few are involved in collegial research, especially in Taxonomy and Paleontology.

There is a difference in terms of degree or participation and research goals between working with scientific volunteers and designing a CS project for and / or with the broad public or with a specific community. In the RBINS, we notice that the proportion of CS organized with and for the broad public

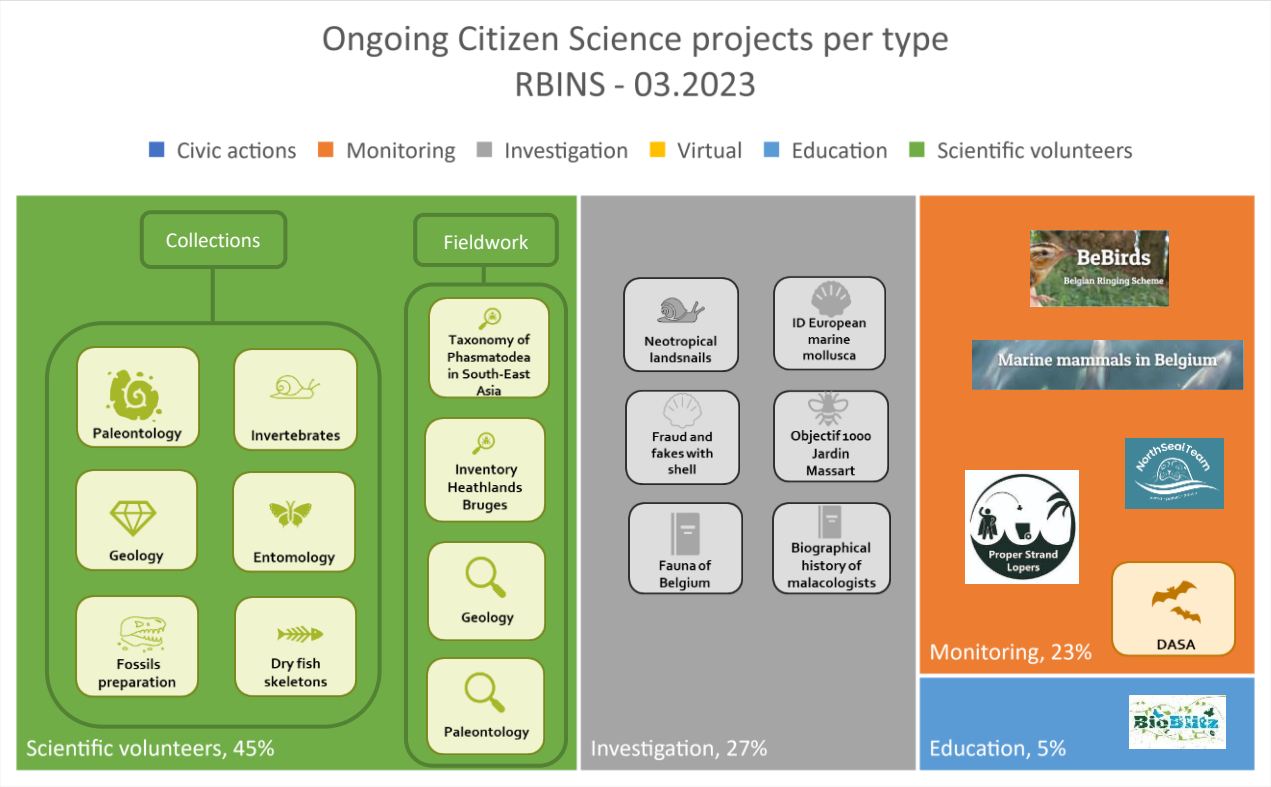
is currently low. Marine Mammals has the potential to evolve in this direction. The upcoming Proper Strand Lopers is based on structural participation of the broad public.

Regarding the types of CS, Thierry Backeljau, Director of the OD Taxonomy and Phylogeny (RBINS) points out:

> *"The main point is that one should be aware that there is a divide between CS as an incentive towards the public (i.e. a "service" provided by RBINS to the public = CS organized for the public) and CS where CS experts do their research and use RBINS to do so OR where CS join research activities of RBINS researchers, but without setting up a public CS activity or action. These two CS approaches or domains function quite differently and usually have different goals (and reflect a different type of CS involvement)."*



1.1. The RBINS



At least **390 Citizen Scientists**, including the 318 ringers of the BeBirds service are currently involved in CS projects either coordinated or supported by the RBINS. This is a rough evaluation based on lacunary statistical data.

Scientific volunteers

The most represented type of **participatory actions** is working with scientific volunteers across domains. At least **46 volunteers** are involved in these actions according to the volunteers' survey carried out in February – March 2023 (cf. Infra). The volunteers' contribution inside the collections consists of technical support, preparing, mounting, identifying and sometimes analyzing specimens or objects. Involving scientific volunteers in fieldwork is another customary practice especially in Entomology, Paleontology and Geology. The occasional volunteers who come to study a specific group of specimens or a specific collection and then share the data with the two Museums were not the subject of this survey.

Investigation

The investigation projects of the OD Taxonomy and Phylogeny are the second most represented (6 projects). One citizen scientist (CSt) is working on Neotropical land snails. One CSt is working on Identification of European marine Mollusca from NE-Atlantic and the Mediterranean Sea. Another CSt is working on Fraud and fakes with shells and shell related objects.

On behalf of the RBINS, over 60 Citizen scientists and scientists contributed to the project Objectif 1000 Jardin Massart, aiming to inventorize the insect fauna of the botanical garden Jardin Jean Massart in Auderghem.

Monitoring

Monitoring projects come in third (5 projects). 318 ringers are certified by the BeBirds service. BeBirds aims to monitor wild bird populations through a network of certified volunteer ringers.

The OD Nature works with over 100 citizens from the North Seal Team to monitor marine mammals on the Belgian coast. The data on Marine Mammals reaches coordinator Jan Haelters through many channels: fire brigade, technical services, Milieudienst and life guards of coastal communities, people on the beach that encounter a dead marine mammal, volunteers of North Seal Team that guard seals resting on the beach but also report dead animals, people that have an account on waarnemingen.be. In 2022, 143 citizen observers made 368 observations of porpoises via the website and 649 citizen observers made 1750 observations of harbor seals using waarnemingen.be. It is not possible to evaluate how many citizens in total are involved in the data collection.

MARECO, Marine Ecology and Management, lends its expertise to the Cabinet of the North Sea and to the NFPO Proper Strand Lopers in monitoring marine litter in a standardized manner. At the time this mapping was made, Proper Strand Lopers was recruiting citizens for the project.

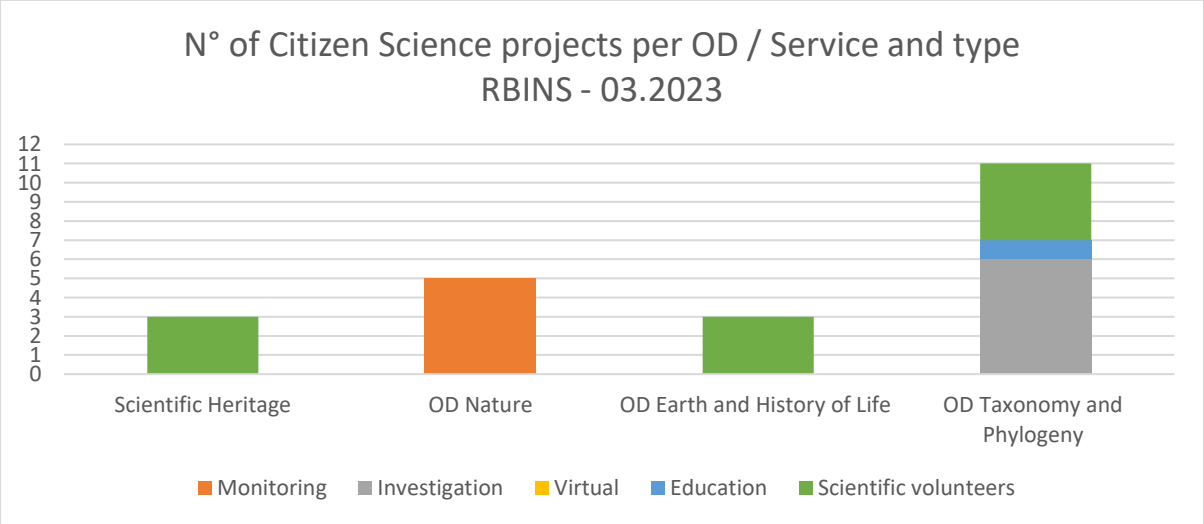
DASA (Digital Animal Sound Archive) is a project which started in June 2023. It aims to create an online database of animal sounds, in close collaboration with the Bats Working Groups of Natuurpunt and Natagora.

Education

At the moment, the Bioblitz organized by the Entomology Division is the only ongoing educational CS project promoted by the RBINS. Every year, Jerome Constant leads a Bioblitz in the Leopold parc where 20 participants map the existing biodiversity by collecting specimens which enter the Museum's collections.

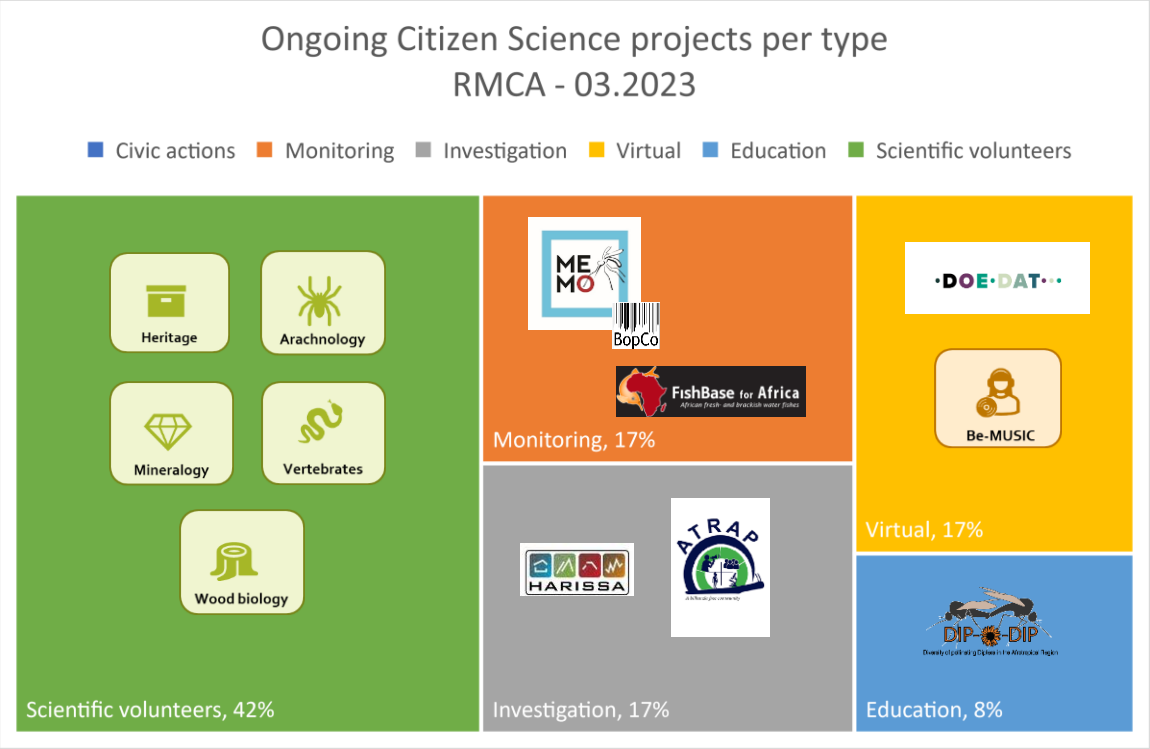
Virtual and civic actions

At the moment, the RBINS runs no civic and virtual CS actions.



Cf. ***Annex 1 : Inventory of ongoing CS projects at the RBINS***

1.2. The RMCA



58 Citizen Scientists participate in CS projects coordinated by the RMCA. 48 in Africa and at least 8 in Belgium.

Scientific volunteers

According to the volunteers' survey (cf. Infra), at least eight scientific volunteers contribute to five collection management projects. These volunteers do not conduct fieldwork. They work with the Heritage Studies, Arachnology, Vertebrates, Wood Biology and Mineralogy Divisions. They perform technical and digitization tasks.

Monitoring

The BopCo research facility provides DNA-based species validation for the Muggen Surveillance monitoring project. The CS component of the project is implemented by Sciensano. The RBINS is also providing services within the same project.

The Vertebrates Division of the RMCA manages FishBase for Africa, an online fish biodiversity information platform. There are two sorts of users: the expert collaborators who identify the species and add data, and the amateurs who can only add pictures. Statistical data on the contributors was not available at the time this report was published.

Investigation

ATRAP (Action Towards Reducing Aquatic snail-borne Parasitic diseases) and HARISSA (Natural HAzards, RISks and Society in Africa: developing knowledge and capacities) are two investigation projects taking place in Uganda and Congo, with a focus on the Citizen Science research method. 25 citizen scientists contribute to ATRAP and 50 citizen observers contribute to HARISSA.

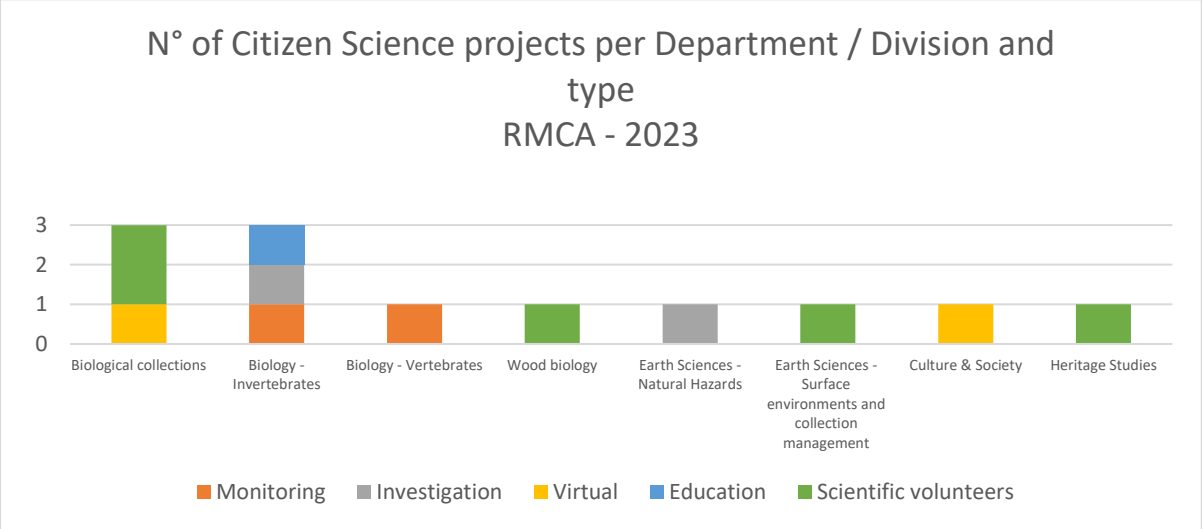
Virtual

Two citizen scientists (Rony Wouters and Myriam Engelen) have helped transcribe records from the bird collection with the help of the platform DoeDat. The project is ongoing and the online volunteers are expected to have transcribed data on 150 000 bird specimens by the end of the year.

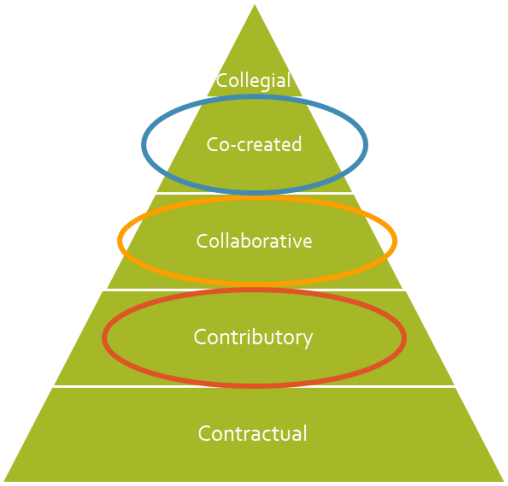
Be-MUSIC will be an online platform for audio recordings originating in the collections of the RMCA and in that of the Museum of Musical Instruments. In its later phase, the website will function as a crowdsourcing platform.

Education

In project DIPoDIP 2, school children aged 6-12y will take and upload pictures on the existing Diptera-flies-of-South-Africa project on iNaturalist and provide basic identifications. The data collection will start in 2024. Discussions with the local partners are ongoing.



2. Level of participation



Step in Scientific Process	Steps included in Contributory Projects	Steps included in Collaborative Projects	Steps included in Co-created Projects
Choose or define question(s) for study			X
Gather information and resources			X
Develop explanations (hypotheses)			X
Design data collection methodologies		(X)	X
Collect samples and/or record data	X	X	X
Analyze samples		X	X
Analyze data	(X)	X	X
Interpret data and draw conclusions		(X)	X
Disseminate conclusions/ translate results into action	(X)	(X)	X
Discuss results and ask new questions			X

Figure 2. Bonney et al. 2009

Citizen scientists are members of the public collaborating with professional scientists to collect, transcribe, categorize, and/or analyze data that contributes to scientific research.

Contractual projects are projects in which members of the public approach professional researchers with a request to carry out a piece of research and report the results so those who commissioned it can use them to address an issue of concern.

Contributory projects are projects that are designed and run by researchers. Project owners invite and recruit members of the public to assist them in a range of tasks such as data collection, classification or transcription.

In **Collaborative projects**, the researchers design the project and invite participants to join the project, but participation is enabled across more stages of the research process. This can be done by engaging participants in the analysis of the data that was collected, or by refining the research questions, or data collection methodology, or by assisting in the dissemination of the results.

Co-Created projects are designed by researchers and members of the public together. These projects require the scientists to accept the participants as peers in multiple stages of the research process. **Collegial projects** are happening completely outside the common research setting, with people carrying out research independently with different levels of communication and contact with professional researchers. DIY science projects are inherently collegial.

With the help of the volunteers' survey, we investigated the level of participation in Citizen Science research.

2.1. The RBINS : the participation of the scientific volunteers

We asked the participants to the volunteers' survey what are the tasks they are currently performing. The choices were based on Bonney's participation framework. The survey of the scientific volunteers reveals that **in the RBINS all levels of participation are represented**. 18 participants (39 %) **contribute** to data collection or transcription. 25 participants (54%) are **collaborators** who analyze data. Six

participants (13%) formulate the research question themselves (**collegial** CS) or in **co-creation** with the researchers. The majority of these expert citizen scientists collaborate with the OD Taxonomy and Phylogeny and the OD Earth and History of Life. Most of the tasks listed by the participants under **"Other"** can also be linked to Bonney's framework.

Scientific volunteers who perform **digitization** tasks in the context of a specific project can be considered citizen scientists at a contributory level of participation, their contribution being equivalent to taking pictures of live specimens on the field with the help of an app. This also applies to day-to-day **collection management** tasks.

Quelles sont vos tâches dans ce projet ?

Levels of participation			Answer	Count	%
Co-created / collegial	Collaborative	Contributory	Collecter / encoder / transcrire des données / des échantillons	18	39%
			Préparer des échantillons / des objets de collection	19	41%
			Analyser des données / des échantillons	25	54%
			Interpréter des données	19	41%
			Participer à l'amélioration de la méthodologie de collecte des données / des échantillons	1	2%
			Communiquer les résultats (à la communauté des chercheurs et/ou au grand public)	17	37%
			Discuter les résultats et formuler de nouvelles questions de recherche	10	22%
			Définir le question de recherche, définir des hypothèses	6	13%
			Other	11	24%
			Response Other		
			reiniging en fotografie specimens		
			data aanleveren voor natuursteendatabank		
			onderhoud beenderen Iguanodons		
			niet gedetermineerd bijen materiaal verwerken zodat het in de database kan		
			ordenen van de verzameling		
			digitaliseren en archivering		
			determinaties kevers en mieren		
			étudier les collections		
			participer au rayonnement de l'IRSNB		
			raad van bestuur KBVE		
			naar mijn gevoel niet echt van toepassing, zie ook hoger		

2.2. The participation of the scientific volunteers at the RMCA

This evaluation does not concern the citizen scientists in Africa.

Three participants (38%) **contribute** to data collection or transcription. One participant (13%) is a **collaborator** who analyses data. The fours participants (50%) who replied "Other" are participating in research at a **contributory** level.

There are no participants working in co-creation or collegially in the RMCA.

Wat zijn uw taken in het project?					
Levels of participation			Answer	Count	%
Co-created or collegial	Collaborative	Contributory	Verzamelen / transcriberen van data / monsters	3	38%
			Voorbereiding van monsters / collecties	2	25%
			Data / monsters analyseren	1	13%
			Data interpreteren	1	13%
			Deelnemen aan de verbetering van de methodologie van de data-/monsterverzameling	0	0%
			Resultaten communiceren (aan de onderzoeksgemeenschap en/of het grote publiek)	1	13%
			De resultaten bespreken en nieuwe onderzoeksvragen formuleren	0	0%
			Bepaal de onderzoeksvraag, stel hypothesen vast	0	0%
			Other	4	50%
			Response Other		
			Il s'agit de gestion basique du matériel des collections, lutte contre les infestations, rangement des spécimens consultés et état des lieux		
			Reiniging en fotografie specimens		
			Inventariseren		
			Digitalisering van papieren archief		

2.3. Levels of participation in monitoring, investigation, virtual and education projects

The majority of the ongoing monitoring projects of the OD Natural Environment are **contributory** projects. This is in line with the study by Heinisch (2017) demonstrating that among 1691 CS projects listed in several English-language and German-language project directories, almost 99% are contributory projects.

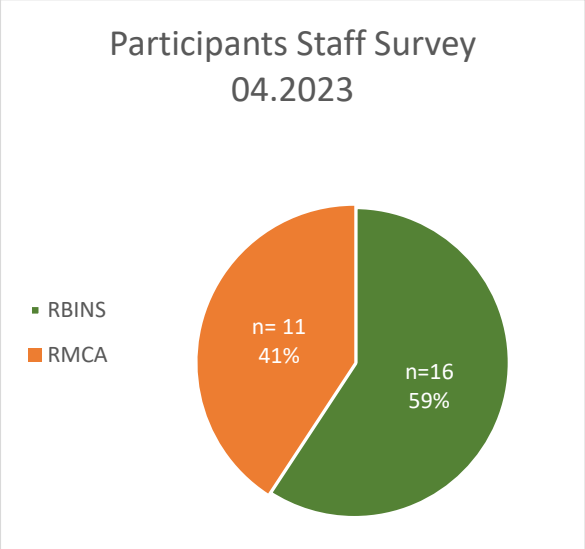
BeBirds is the only established monitoring scheme with two levels of participation. The regional coordinators collaborate with Didier Vangeluwe, the Service coordinator, in developing data collection methodologies. The ringers themselves are contributors who collect the data.

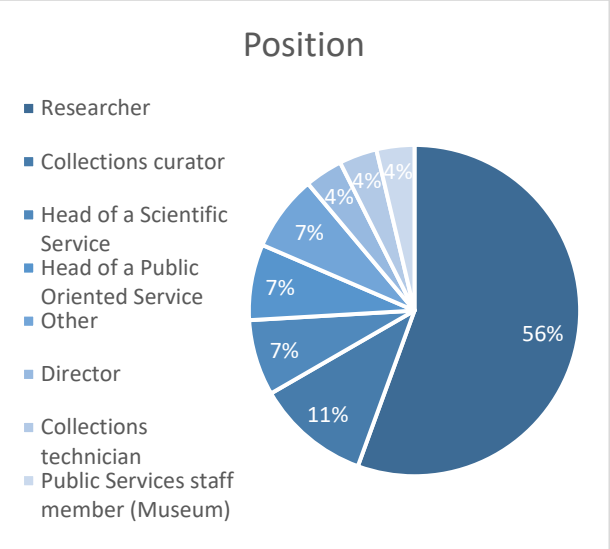
In the project **DASA**, the Digital Animal Sound Archive (OD Natural Environment), Robin Brabant, the project manager intends to work in collaboration (or possibly in co-creation) with the members of the Natuurpunt working group on bats. The members will be involved in developing a user friendly database. They will then become contributors end users of the database.

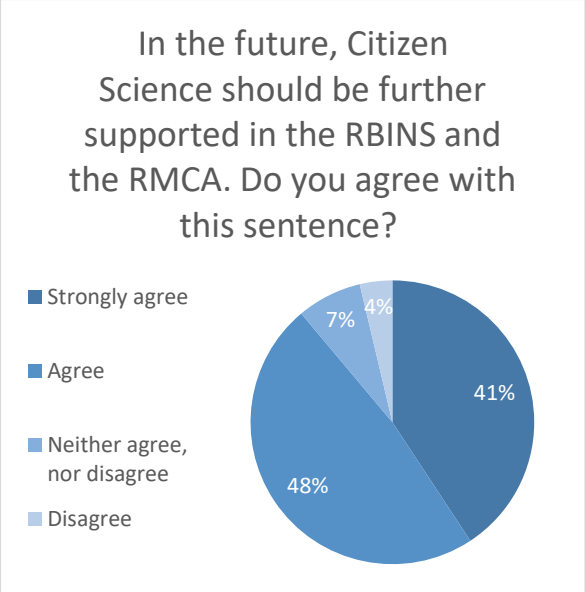
In project **ATRAP**, the citizen scientists are involved in the dissemination of the results towards their communities and policy makers. They have an important role in raising awareness around schistosomiasis, which demonstrates a level of collaboration with the professional scientists.

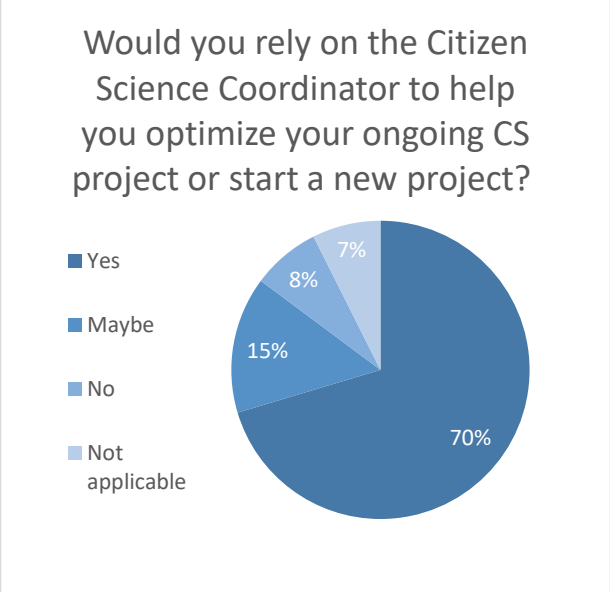
V. SURVEY : WHAT DOES THE STAFF NEED?

27 staff members (11 – RMCA and 16 - RBINS) out of the 107 members of the internal Citizen Science online platform have completed a staff survey. The goals were to map what the staff considers are CS projects or the intention to start a new CS project in the future. **The results of this survey show that researchers express an overall positive attitude towards CS without necessarily engaging in CS themselves.**

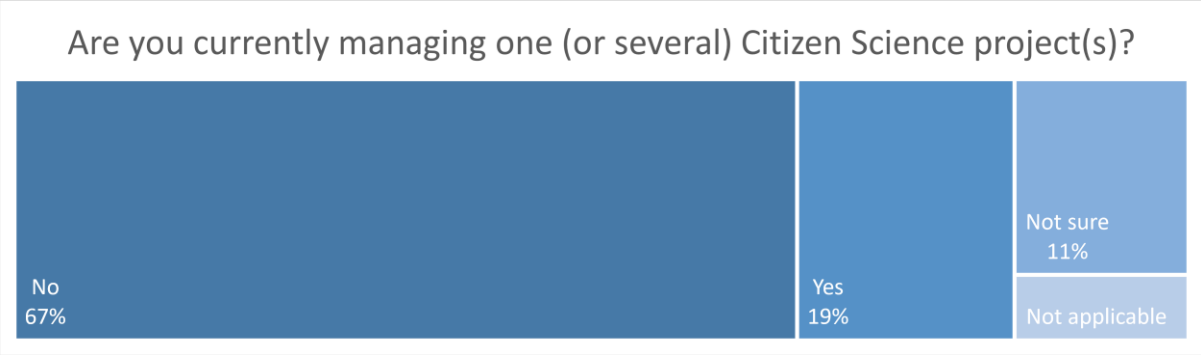








1. Current projects and needs



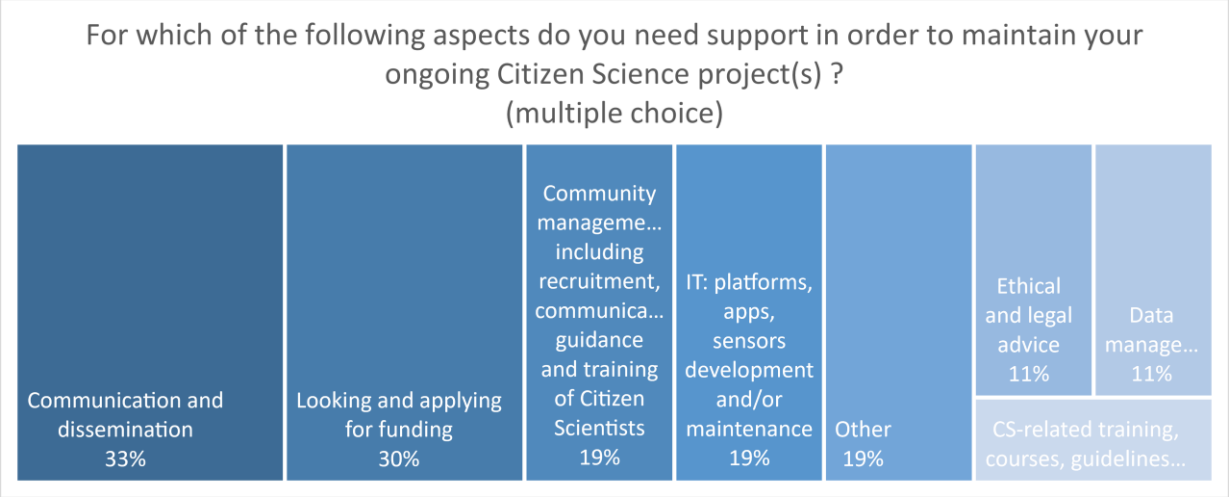
The four projects listed by the **RMCA participants** who completed the survey were also mentioned during the one-on-one semi-structured interviews with the researchers. These projects are: Doedat, Be-Music, HARRISSA and DIPoDIP II.

Project ReSoXy (Resounding the Musical Heritage of the Xylophone Collection from RMCA) was also mentioned in the survey. However during the interview with the project manager, it was unclear whether this project fits in the Citizen Science framework. The project has a strong educational and outreach aspect, but it remains to be seen in which way citizens will contribute to the data collection.

The **RBINS participants** interpret the term "project" in different ways. It is worth noting that only two participants out of the 16 can state that they are currently managing a CS project, while two are unsure. Marine mammals in Belgium was mentioned twice, but one participant expresses doubts as to whether this project belongs to CS.

The participants made the following comments:

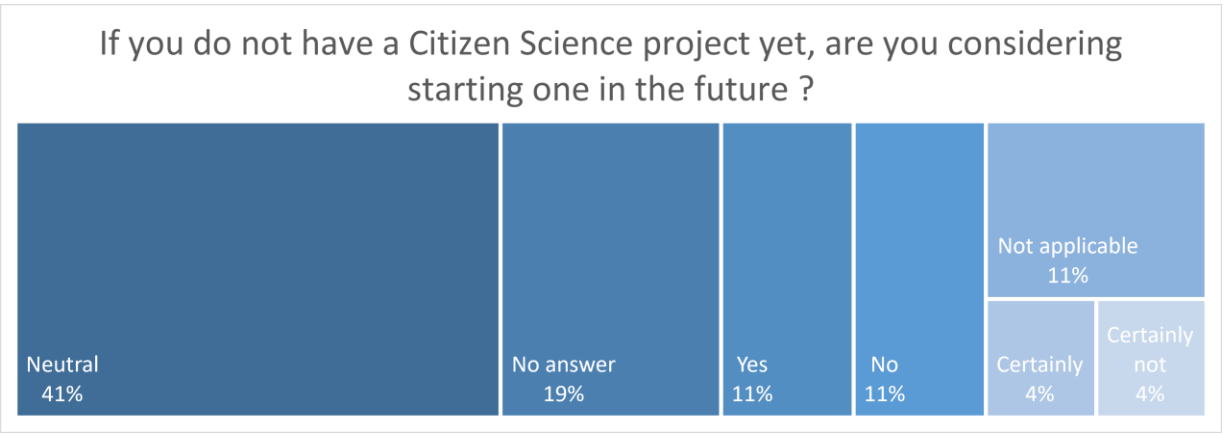
- "These titles are not "official", but instead just short descriptions of what the CS activities entail: (1) Production and publication of the "Fauna of Belgium", (2) Taxonomy and faunistics of various molluscan groups, (3) Biographical history of malacologists, and (4) Monitoring of alien mosquitoes in Belgium."
- "I never really considered it a project but each year I manage the annual contract of about 20 volunteers, including amateurs in paleontology, retired researchers, and volunteer preparators."
- "I have no citizen projects. My volunteers are working on the tasks I give or they choose."
- "Marine mammals strandings network, although this hardly would qualify as citizen science."



The "Other" answers focus on the need for more staff and more financial resources.

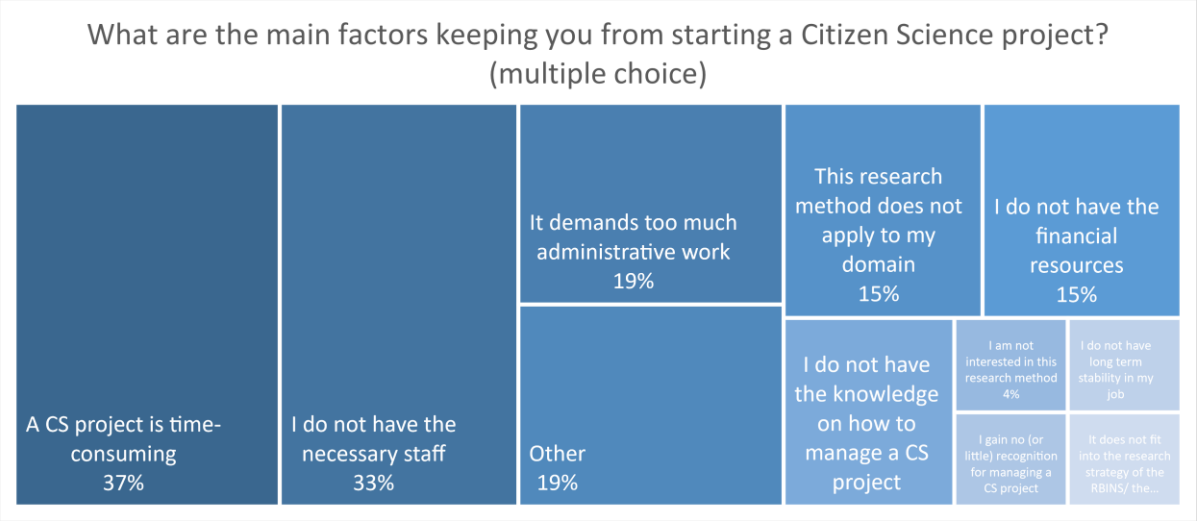
- "More personnel such as good technicians or engineers, eventually PhD-students to manage the data and manage the results - contact the citizens, give feedback- check the reliability of the data"
- "Administrative and technical"
- "We just need a small annual financial support"
- "Just budget"
- "More museum staff"

2. Future intentions, barriers and needs



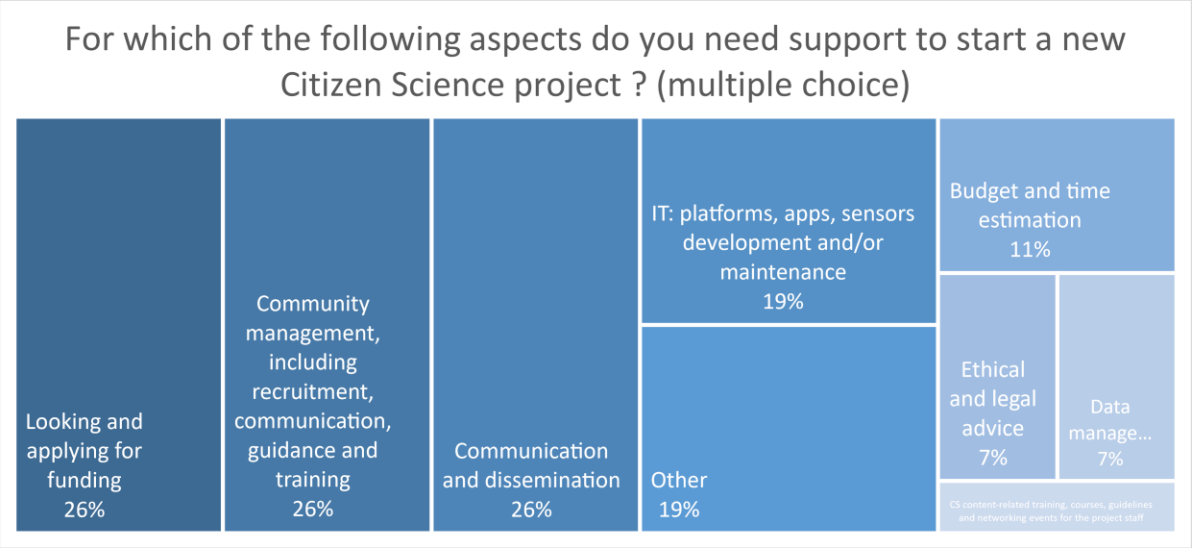
Some concrete examples of projects were given:

- Digitizing the Tervuren wood collection (RMCA)
- A project on community heritage management (RMCA)
- Collecting temperature and pCO2 data at several places underground in caves (RBINS)
- Monitoring of invasive flatworms in nature/gardens/greenhouses in Belgium with the help of gardeners. (This is a potential project of the Secretariat for invasive species based at the RBINS)
- Reconstructing ancient fish communities in the North Sea between Pleistocene and older Holocene times. (RBINS)



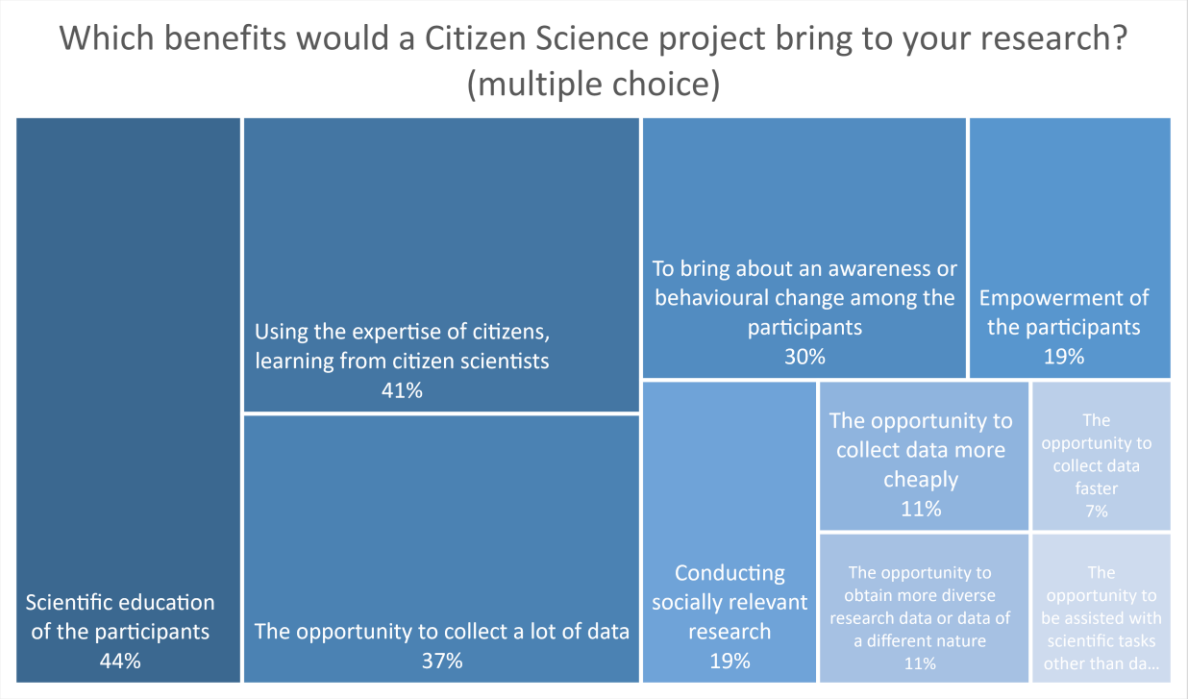
The participants made the following comments:

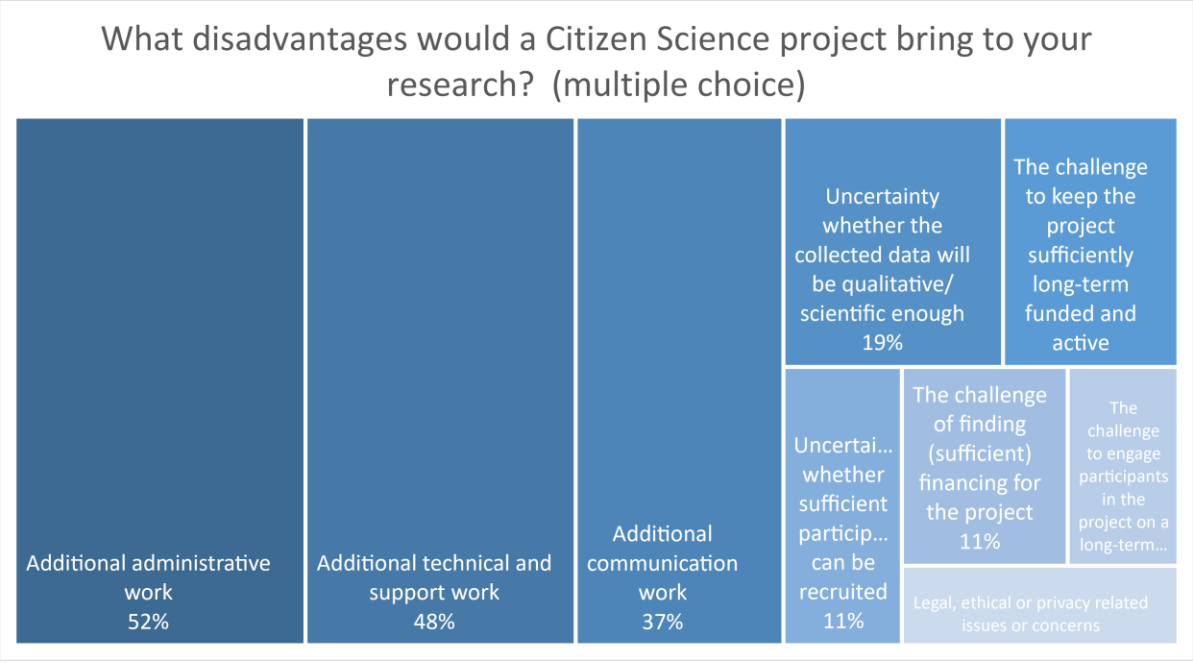
- Need IT development to be able to put the results in real time on a website...+ GISbased;
- No obstacles;
- Lack of equipment;
- We need to find the right opportunity to connect citizen science to the public space;
- Near retirement, I refrain from starting new long term project activities.



A new CS project would ideally receive support in the form of: looking and applying for funding (26%), community management (26%) and communication and dissemination (26%)

3. Perception of the benefits and disadvantages of CS research



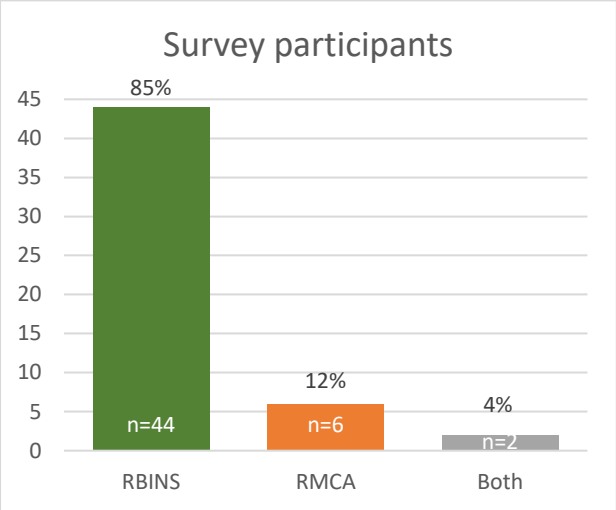


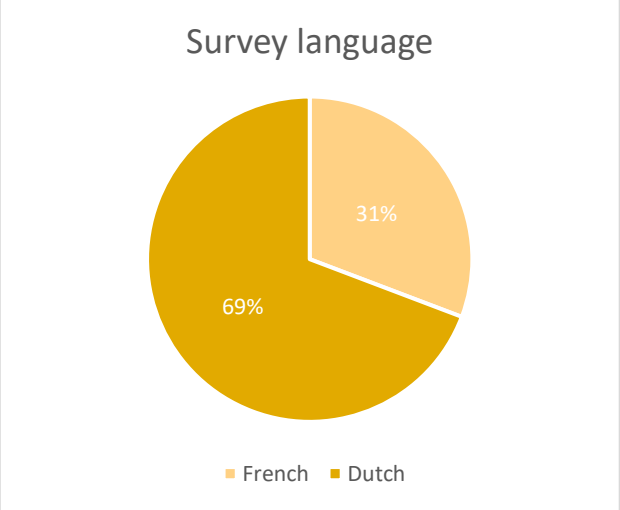
VI. SURVEY OF SCIENTIFIC VOLUNTEERS ACROSS RESEARCH DOMAINS

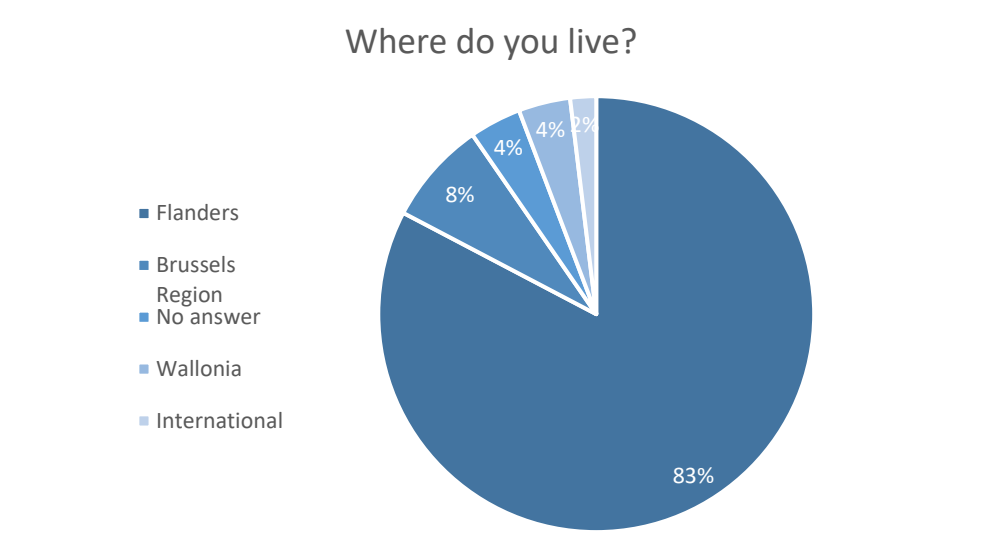
To find out more about the volunteers involved in research projects in the two Institutions, a survey was carried out from 21.02.2023 to 20.03.2023. Based on the feedback from the project managers, the survey was sent to at least 65 volunteers.

52 volunteers working with the RBINS and the RMCA completed it. Except for one participant, all are active volunteers. Six (12 %) participants collaborate with the RMCA and 44 (85%), with the RBINS. Two volunteers (4%) collaborate with the RBINS and the RMCA.

16 participants (31%) have filled in the survey in French and 36 participants (69%) in Dutch.



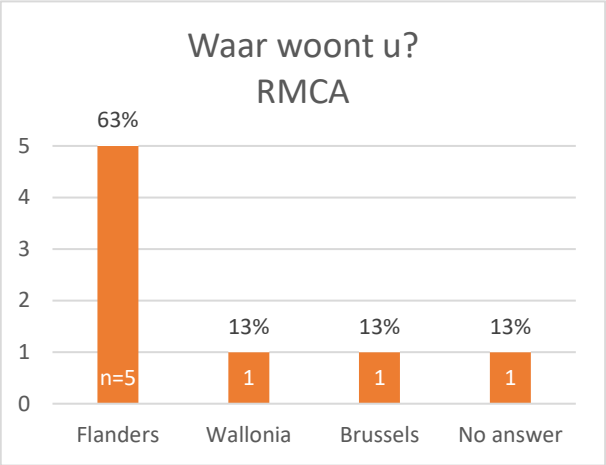


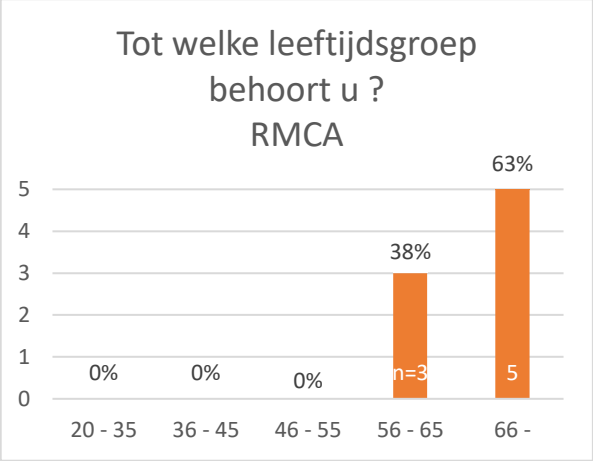


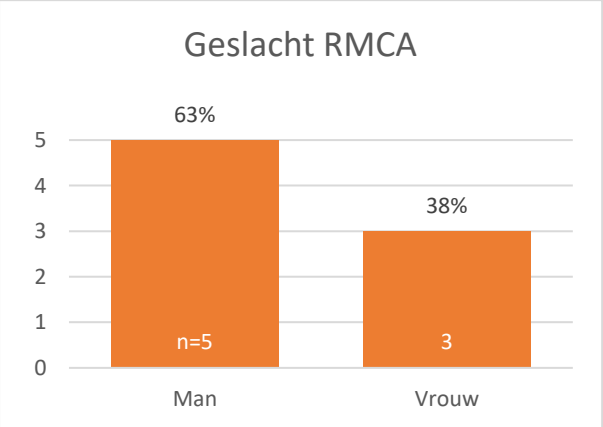
1. RMCA

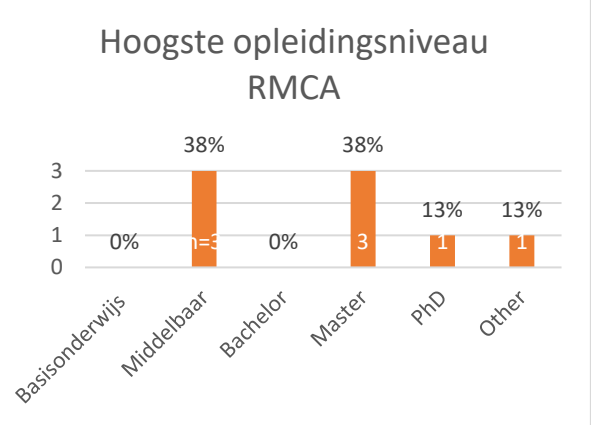
1.1. General profile

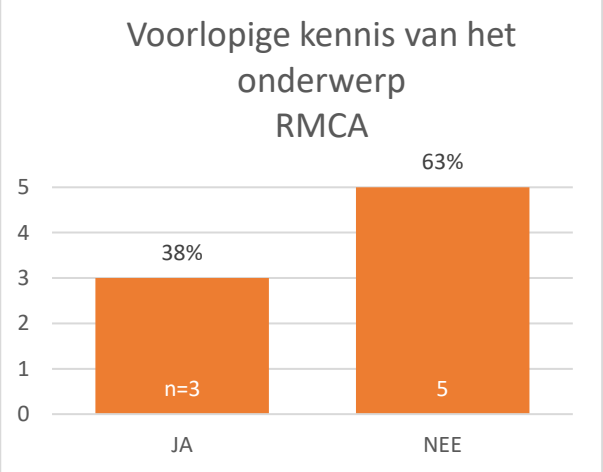
Most of the participants live in Flanders (5). The most represented age category is 66 – (5). The other 3 participants belong to the 56-65 group. 5 volunteers are male and 3 are female. 3 out of 8, had previous knowledge about the subject of the research. Half of the participants have higher education.

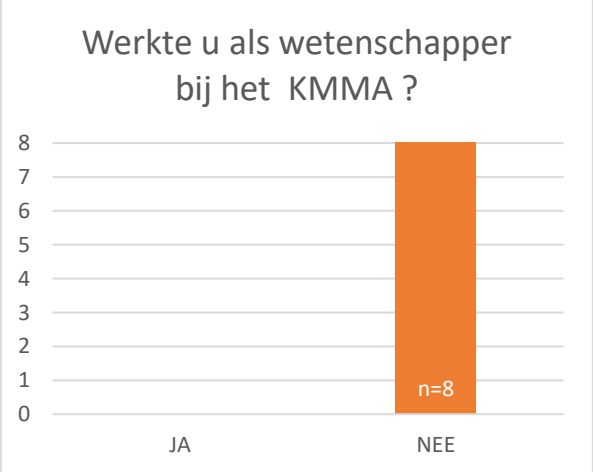






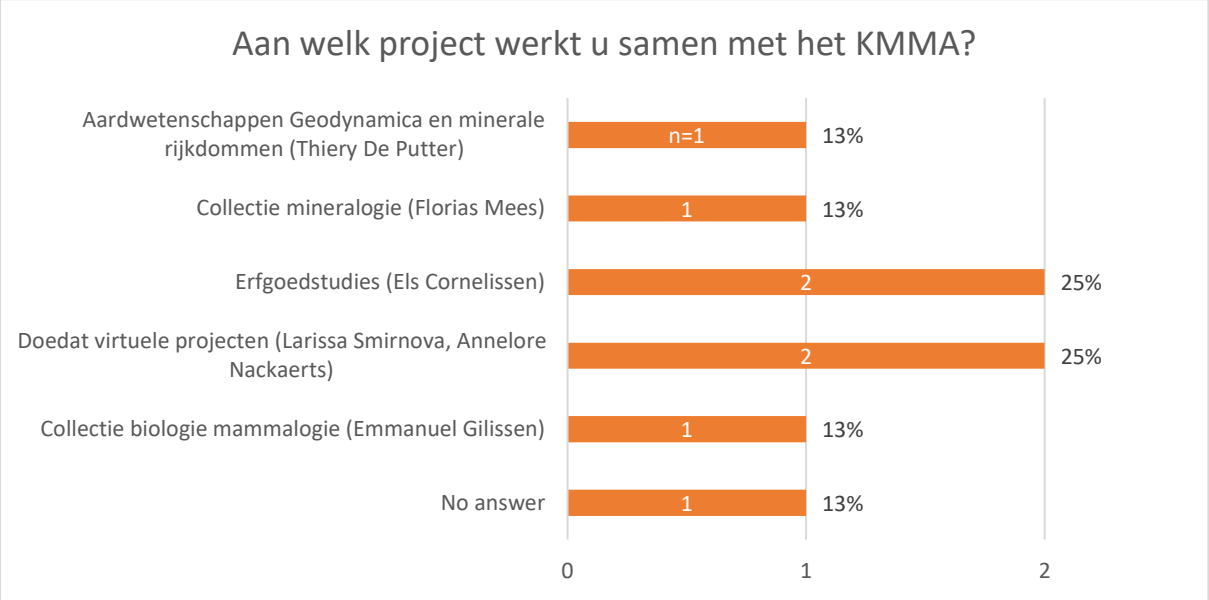


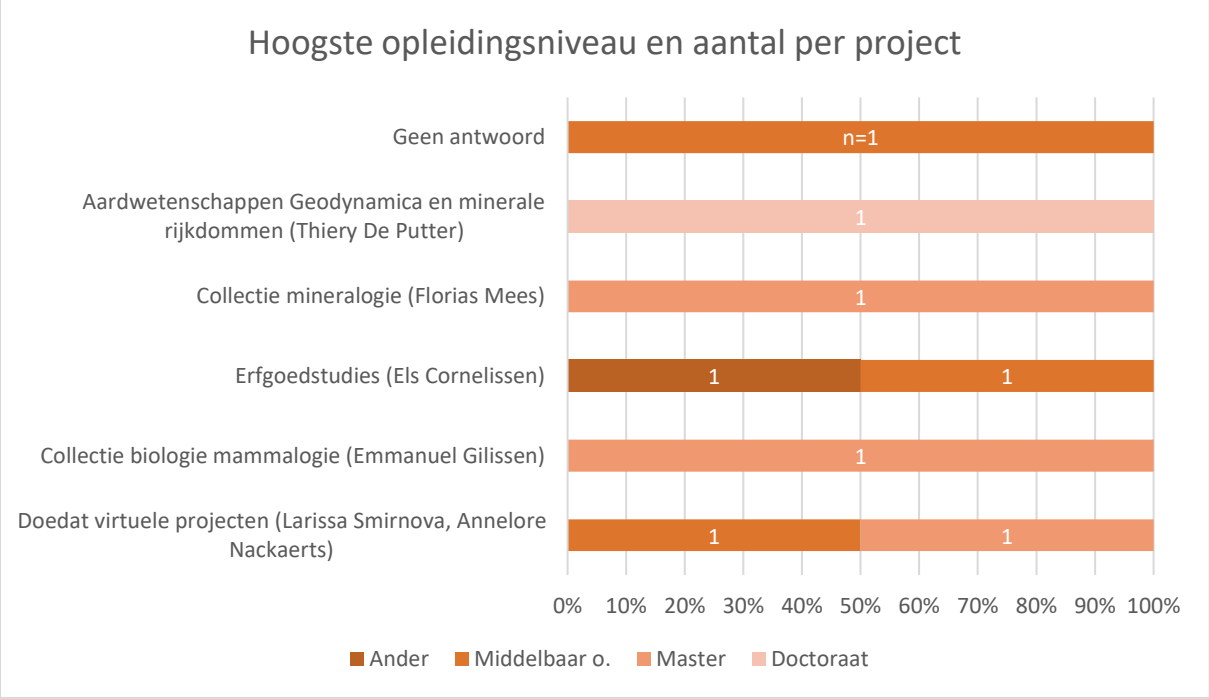


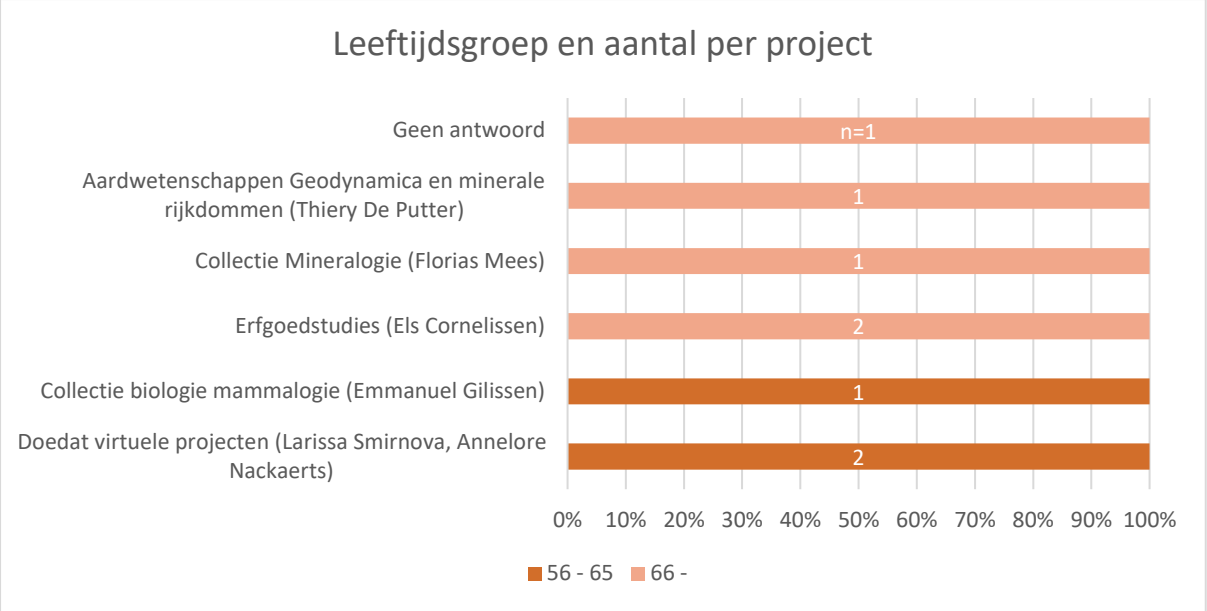


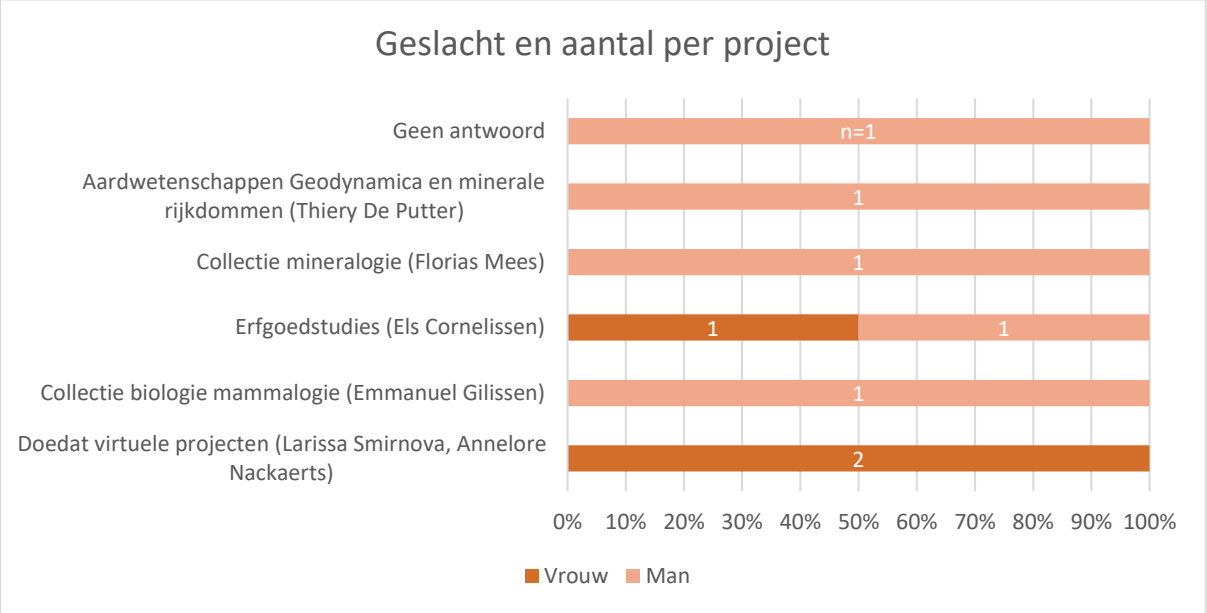
1.2. Domain

At the **RMCA**, volunteers contribute mainly to collections management in Biology, Wood biology, Archaeology and Mineralogy. The two scientific volunteers contributing to the management of the Wood biology collection and one scientific volunteer contributing to the management of the Herpetology collection have not completed the survey.









1.3. The barriers to working with onsite volunteers at the RMCA

The heads of three Departments answer the question “Do you see any barriers to working with in-house volunteers ?” in the following way.

“It is hard to have this on a regular ongoing basis as a lot depends on what the pending tasks are. I, therefore, see more merit in including this in something like collection management where there is a long term need for data input and digitization. The only field I can think of is sorting out samples that were collected but this requires a fairly good ‘para-taxonomy’ knowledge of the different groups and again it will depend on when such samples are being brought in from field work.”

Marc De Meyer (Head of the Biology Department)

Regarding CS in the humanities, Els Cornelissen (Head of the Cultural Anthropology and History Department) explains what the main barriers are: **staff and means**, and **ethical issues**.

"(…) The main barrier to working with in-house volunteers is that a good and beneficial reciprocal working relationship is in need of physical presence to follow up on any question they may have. As usual, a matter of staff and means.". Moreover, "*(…)in human sciences this often relates to personal lives and personal experiences which is more intrusive on the person than observations or counting in nature."*

François Kervyn de Meerendré (Head of the Natural Hazards Division), has had previous experience with onsite volunteers but the conclusion was:

" *Notre **staff** est trop restreint (2 statutaires) pour assurer le coaching de ces bénévoles. Avec des moyens et du temps supplémentaires nous pourrions l'envisager mais dans l'état actuel c'est impossible sans abandonner d'autres tâches. C'est paradoxal mais c'est notre réalité. »*

1.4. The opportunity of working with onsite volunteers at the RMCA

The heads of these three Departments see few opportunities for working with in-house volunteers.

One possible contribution of citizen scientists in Human sciences could be the identification of unknown people on historical photographs according to Els Cornelissen. Such a project does not require to be present inside the Museum and can be done through a virtual platform.

Mark De Meyer sees opportunities within collection management:

"*I, therefore, see more merit in including this in something like collection management where there is a long term need for data input and digitization."*

Regarding a potential virtual georeferencing crowdsourcing project on maps from the collections, François Kervyn de Meerendré concludes:

« (…) c'est certainement à garder à l'esprit mais pour le moment c'est ingérable pour nous. »

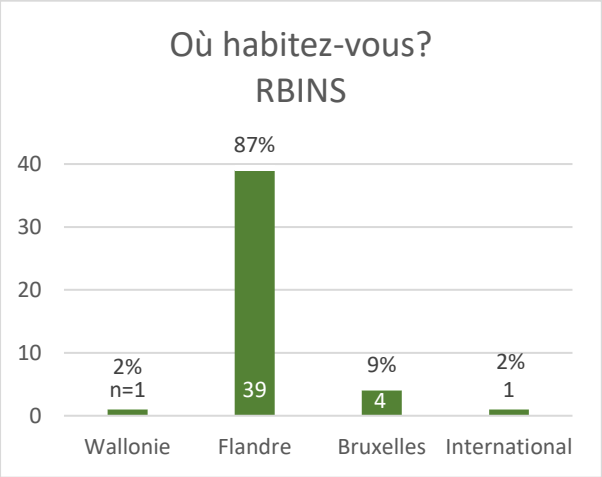
2. RBINS

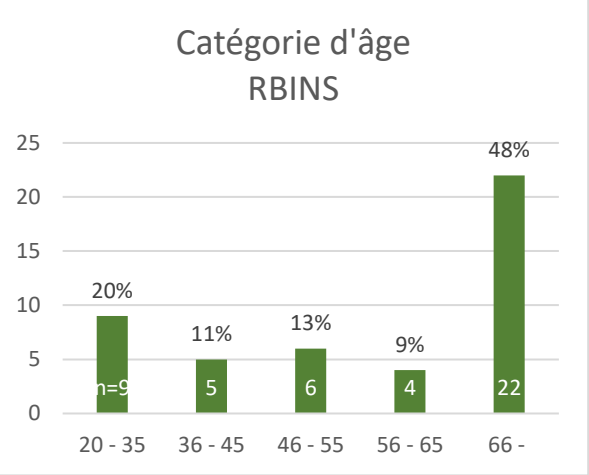
2.1. General profile

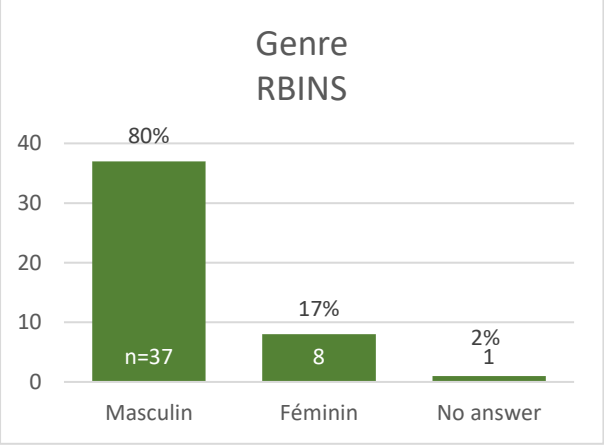
The **RBINS** supports the development of citizen scientists in various ways, notably by:

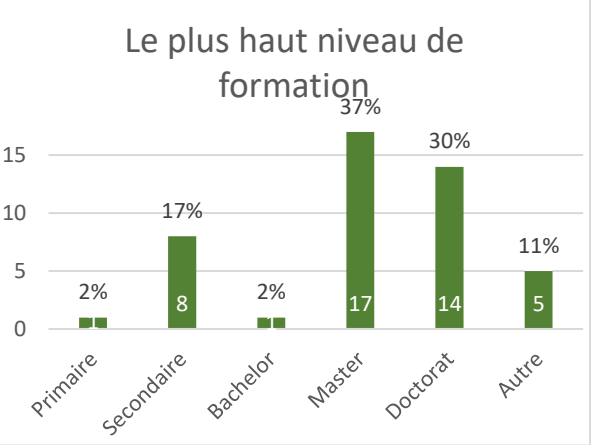
- providing access to resources such as reference specimen collections, libraries, meeting rooms and technical equipment;
- loaning collection specimens (specific groups: Families, genera, …) to citizen scientists to study at home. They are afterwards returned in the collections.
- archiving personal specimens;
- production of monographic books;
- hiring regular volunteers who contribute to collections management (sorting, mounting and labelling specimens, re-organizing collections and making them available for study);
- hiring regular volunteers who contribute to sampling in the field.

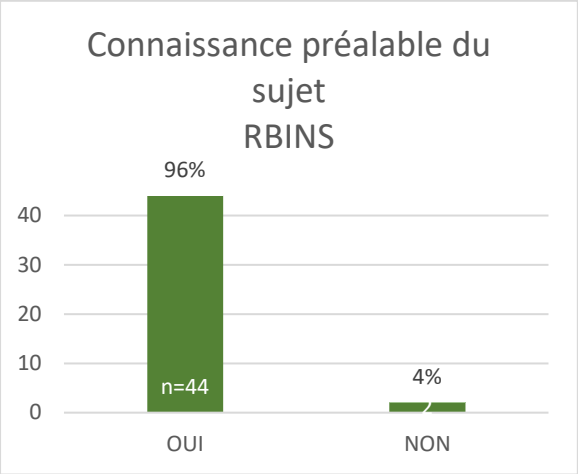
Most of the volunteers live in Flanders (39). The most represented age category is 66 – (22). 9 volunteers are 20 – 35 y. 3 of them are affiliated with the University of Liège. 37 volunteers are male. All, except 2, had previous knowledge about the subject of the research. Most of the volunteers have higher education. 17 have a Masters and 14, a PhD.

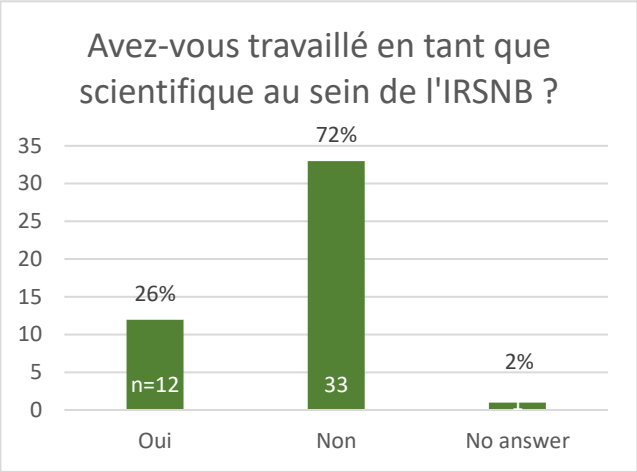












Based on the answers to the last two questions, four categories of volunteers stand out:

1. Former employees “40 jaar personeelslid KBIN, Dept. Invertebraten, Afdeling Malacologie (Belgische fauna) en algemeen beheer collecties Invertebraten; de laatste 10 jaar: OD Taxonomie en fylogenie”, “Ik was de laatste 10 jaar van mijn carrière hoofd van dat labo”.
2. Researchers having just finished a PhD “Masterproef, doctoraat en postdoc aan het KBIN (eerste twee met UGent, postdoc met ULiège)”.
3. Expert amateurs with considerable experience = DIY science “Ik verzamel al 50 jaar fossielen en heb er ook over gepubliceerd.”, “Validator op citizen science portalen, enkele artikelen geschreven.”
4. Amateurs “Ik ben al langer geinteresseerd in faunistiek, maar dit natuurlijk bijzonder gestimuleerd door de bezoeken aan de collectie destijds. Collectie nu onontbeerlijk voor goed taxonomisch onderzoek.” “Mijn hele leven was mijn hobby het bestuderen van vlinders en zeker nachtvlinders (nu vooral in België).”

From the Citizen Science perspective, categories 3 and 4 qualify as citizens without scientific academic training.

2.2. Domain

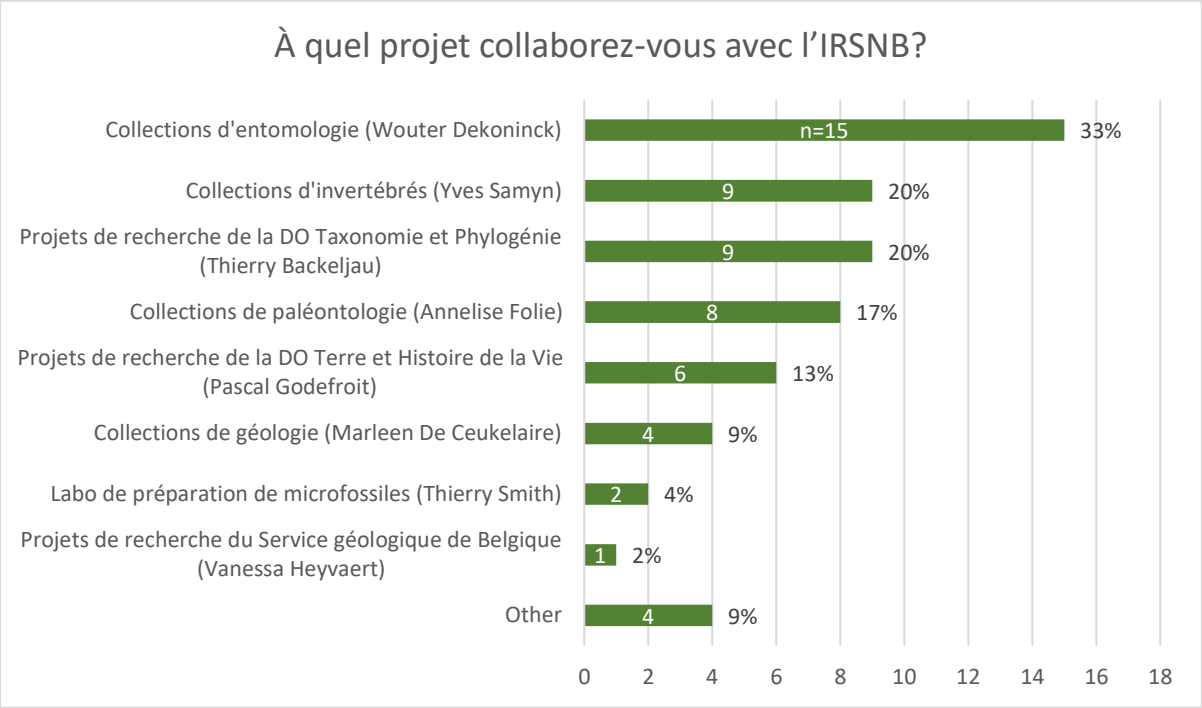
15 participants contribute to the management of the Entomology collections. 9 participants contribute to the management of the Invertebrates collections and 9 contribute to research projects of the **OD Taxonomy and Phylogeny**.

The second most represented research domain is **Paleontology**. 8 participants contribute to the Paleontology collections, 6 to research projects of the OD Earth and History of Life and 2 to the Micro vertebrates preparation lab. We should note that the paleontology volunteers indicated what they thought was the most correct.

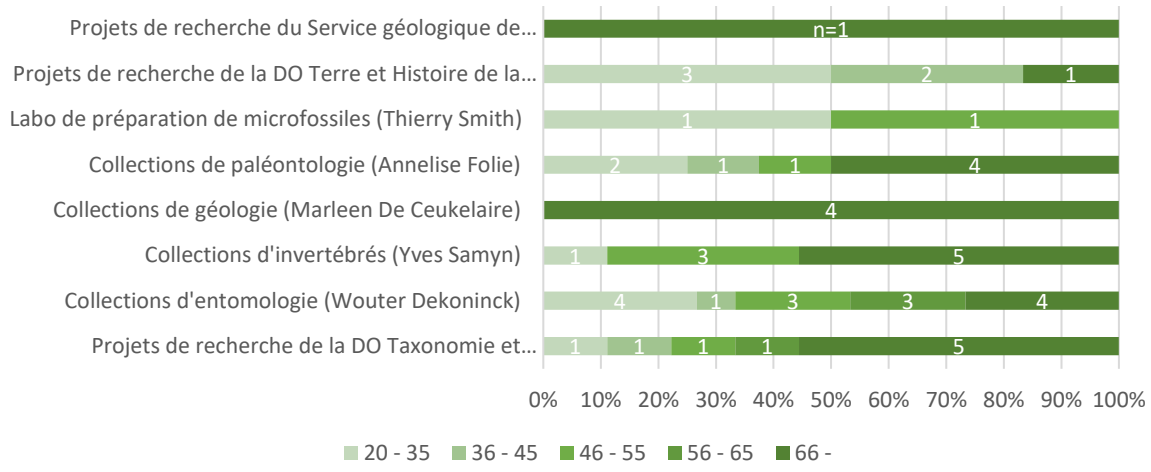
Thierry Smith informs us that in reality 2 volunteers work with the Paleontology collections Service and 23 volunteers currently work with the Division Evolution of the Paleobiosphere. A better classification would have followed the operational organigram: Research projects of the Evolution of the Paleobiosphere service, Research projects of the Quaternary Environments & Humans, and Paleontology Collections, says Thierry Smith. The options the survey participants could choose from were largely based on the existing 2021 Inventory of CS projects.

PhD students paid by other funding bodies (universities, FNRS) and collaborating with the OD Earth and History of Life have a volunteer contract. This explains why the volunteers of the OD have such a high level of training.

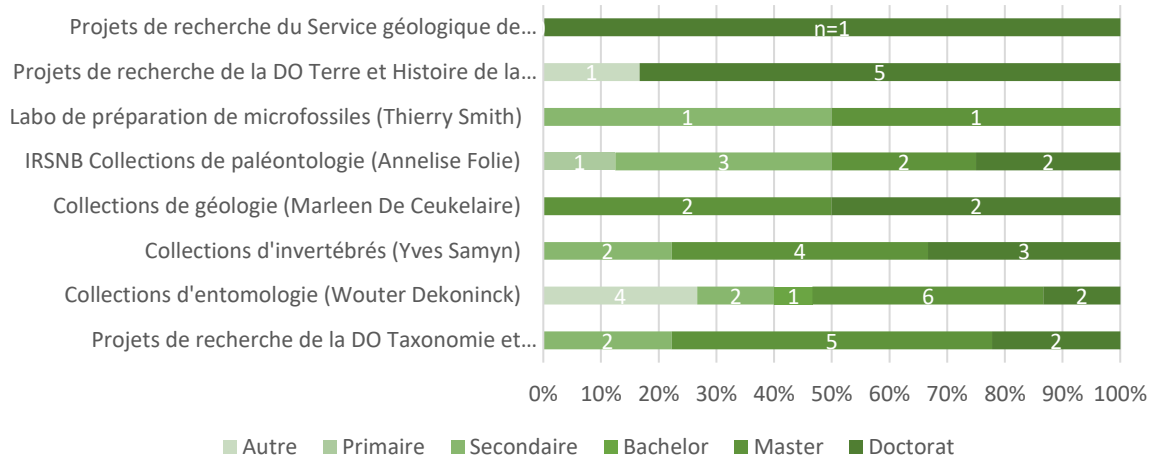
4 participants contribute to the **Geology** collections and 1 to the research projects of the Geological Survey of Belgium.



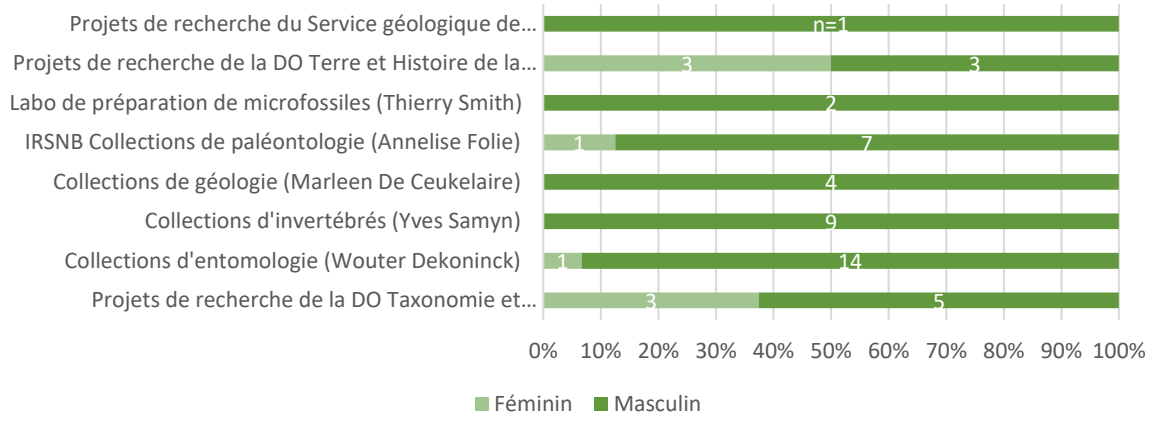
L'âge des participants par domaine par nombre et %



Plus haut niveau de formation par domaine



Genre par domaine

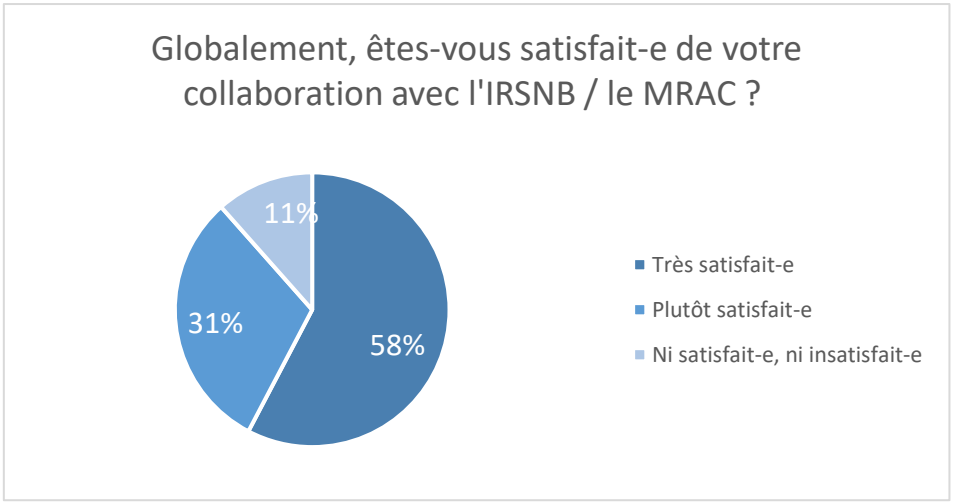


3. Giving recognition to all our scientific volunteers (RBINS & RMCA)

One of the pillars of Citizen Science is giving recognition to the participants.

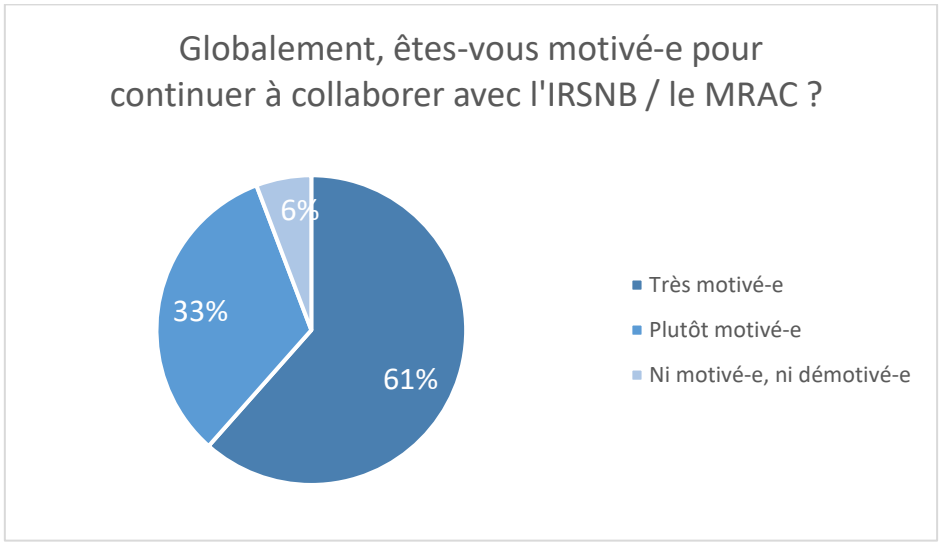
There is no coordination of the volunteers at institutional level. The collaboration with volunteers is organized by the Departments, which have a limited budget for the volunteers' allowance. In the RBINS, the volunteers are not entered in the Personnel database which makes it is difficult to contact them and collect data regarding their profiles or activities. The volunteers in the RMCA are listed on the Intranet. The gender equality plan of the RBINS does not mention contractual volunteers.

30 participants (58%) are very satisfied with the collaboration with the RBINS or the RMCA. And 32 (62%) are very motivated to continue.

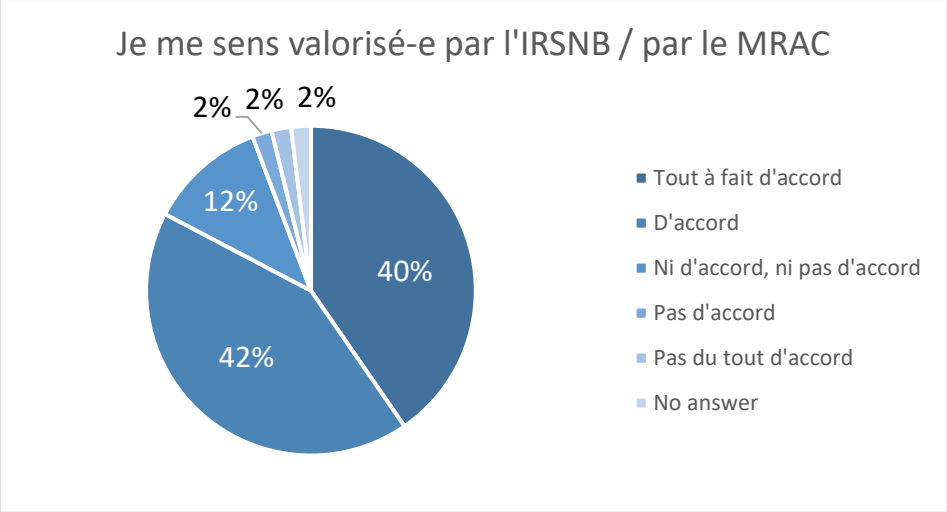


"Perfecte en correcte samenwerking met Marleen de Ceukelaire (KBIN) en Florias Mees (KMMA)"

"Altijd leuk samenwerken met Wouter"



"De ouderdom en de lange pendeltijd 2.5 uur maken het soms moeilijk."



- Volunteers like to hear their work is appreciated.

"W. Dekoninck laat telkens merken hoe blij hij is met de hulp."

"De werknemers binnen het KBIN waar ik mee samen werk tonen wel dat ze mijn bijdragen waarderen."

"Ik krijg toch af en toe positieve reacties of wordt gevraagd om bepaalde zaken op te zoeken."

- One volunteer comments on the relationship between the scientists and the citizen scientists.

"Ik dacht vroeger dat er een grotere afstand bestond tussen wetenschappers binnen hun vakdomein en citizen scientists, maar sinds ik met het KBIN samenwerk heb ik die mening moeten herzien. Het is een bijzonder aangename samenwerking, die voor mij ook heel waardevol is en waardoor ik al een pak heb kunnen bijleren, en hopelijk ook mijn steentje al heb kunnen bijdragen."

- Volunteering is a way of pursuing one's career after retirement.

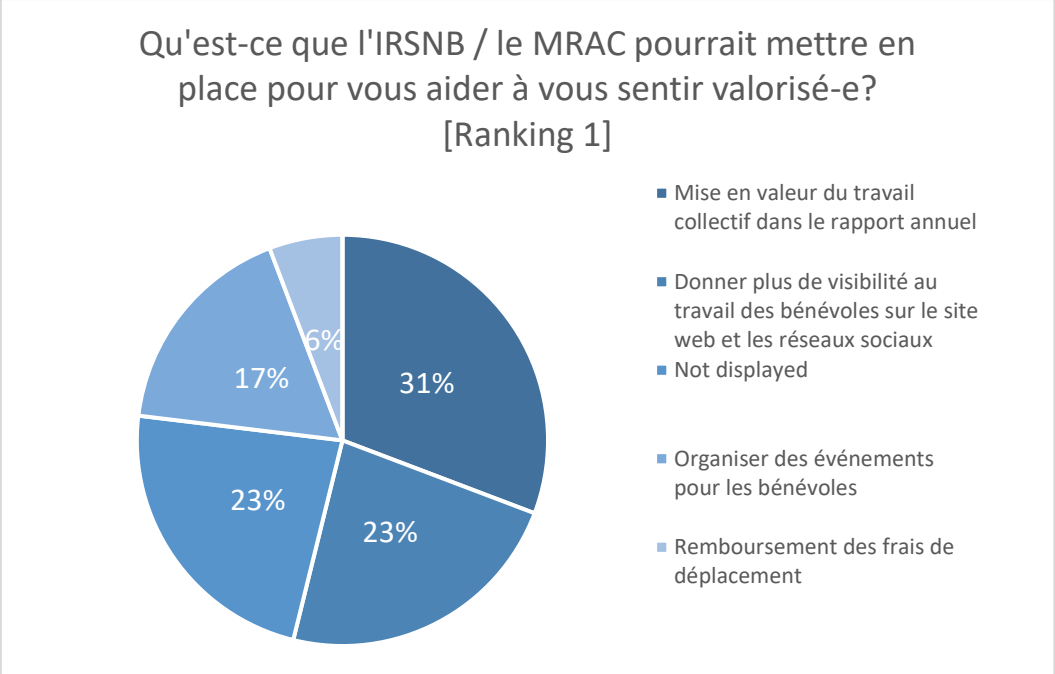
"Mon travail dans ces deux institutions me permet de poursuivre des recherches qui me passionnent et cela bien au-delà de l'âge de la retraite »

- The RBINS benefits from publications by volunteers.

"Zie mijn antwoord achteraan. Ik voel me wel gewaardeerd, maar vind niet dat het Instituut daar veel voordeel aanheeft, tenzij vermelding van KBIN op mijn publicaties."

- At the moment, the RBINS does not have an overarching follow-up of volunteers contribution.

"Er is vanuit het instituut geen opvolging naar of voor vrijwilligers, of ik heb daar nog niets van ervaren of over vernomen."



Some volunteers commented on this question and even made suggestions.

- One internet volunteer, contributing to a DoeDat project for the RMCA, made several suggestions which demonstrate the **need for more insight into the project**.

"Misschien een waarderingsmoment of actie voor de internetvrijwilligers? Suggestie: rondleiding achter de schermen zodat een vrijwilliger (die geen/weinig achtergrond heeft) zich een beeld kan vormen van de collecties waarvoor hij gegevens invoert - inzicht krijgt in het proces/werkwijzen noodzakelijk om een collectie in stand te houden of aan te leggen - een algemeen beeld krijgt van de werking van een museum als wetenschappelijke en /of publieke instelling."

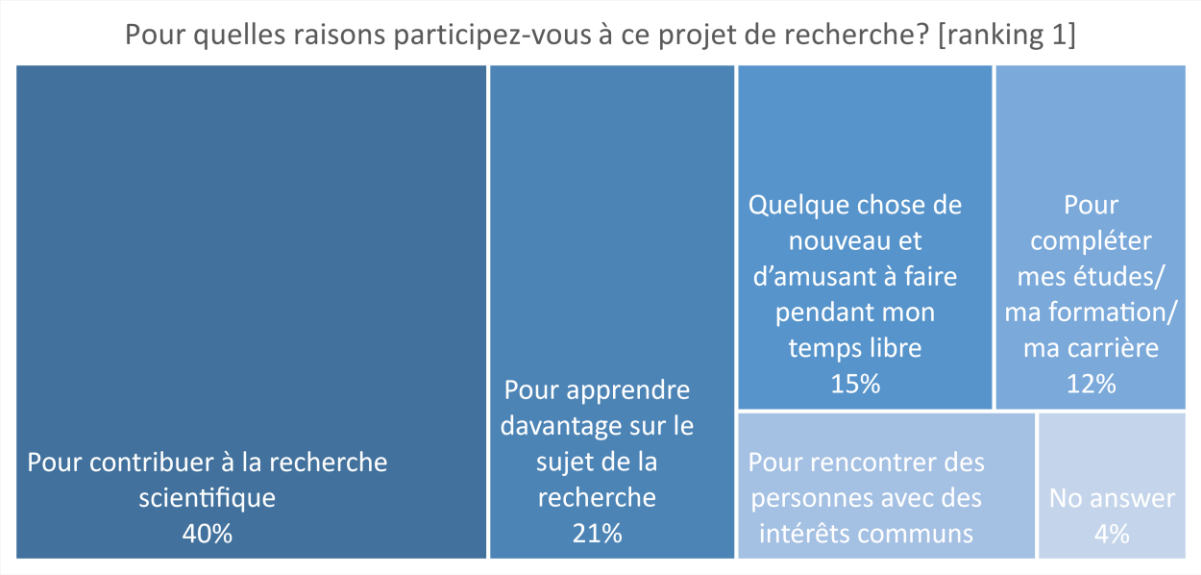
- Another volunteer made a point about receiving **feedback** on the ongoing tasks**.**

« Un suivi de la part des responsables directs sur l'état d'avancement du projet valoriserait certainement le projet. »

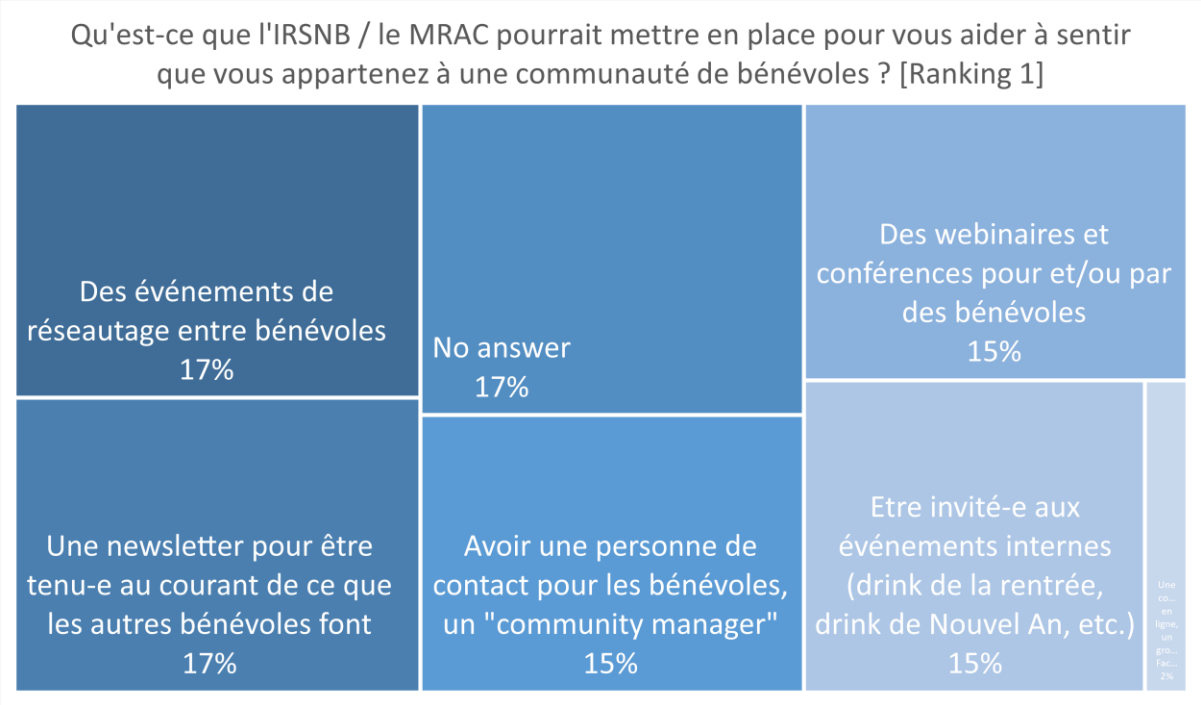
- One volunteer contributing to Entomology in the RBINS, mentions that it can be difficult to get **fieldwork authorizations** from other organizations and that the RBINS could play a role in that.

"Ik vind het moeilijk om als vrijwilliger om vergunningen voor veldwerk/ inventarisatie aan te vragen bij andere instellingen zoals Natuurpunt, AND, DNF,.. het zou fijn zijn daar in ondersteund te worden."

We then looked at what motivates the participants to volunteer. 40 % rate "contribution to scientific research" as the most important motivation factor. For 21% "learning" is the main motivation factor. For 15% it is a fun way of spending their free time. Only 8% volunteer primarily to meet people with similar interests.



An important factor that contributes to maintaining the volunteers' motivation is the sense of belonging to a community.



4. Best practice : A volunteer culture in the Botanic Garden Meise

Waarom heb je ervoor gekozen om vrijwilliger te worden bij Plantentuin Meise?

Al sinds 2004 bezocht ik de Plantentuin als echtgenoot van een werknemer. Door een ongelvol op het werk werd ik mindervalide, en daarom ben ik hier vrijwilligerswerk beginnen doen om mijn tijd zinvol te besteden. Ik hield meteen van de joviale en goede sfeer tussen de collega's. Bovendien werk ik graag in een botanische tuin omdat ik, hoewel ik in een stad woon, een echte natuurliefhebber ben.

Wat geeft je de meeste voldoening in je vrijwilligerswerk?

Het gevoel dat ik iets nuttigs doe in mijn leven en dat mijn inzet betekenisvol is voor de bezoekers, collega's en vrijwilligers. Ook het feit dat ik diensten lever en bijdraag aan de werkopdracht van de organisatie geeft mij veel voldoening.

Voor mij is dit werk en de verantwoordelijkheid die het met zich meebrengt rustgevend. Ik ben Plantentuin Meise dankbaar voor deze opportuniteit.

factures, gérer la logistique des chambres d'invités, etc. Je suis également assistant administratif pour le programme de bénévolat du Jardin : je collecte les statistiques sur les heures des bénévoles et je donne un coup de main pour les documents relatifs au remboursement de leurs frais de transport.

Qu'est-ce qui vous a poussé à devenir bénévole au Jardin botanique de Meise ?

Je viens régulièrement en visite depuis 2004, car mon épouse est employée ici. C'est à la suite d'un accident de travail qui m'a laissé handicapé que j'ai décidé de faire du bénévolat au Jardin botanique, pour me rendre utile. J'ai tout de suite été conquis par l'atmosphère chaleureuse et bon enfant qui règne au sein de l'équipe. En plus, j'aime travailler dans un jardin botanique, car même si je vis en ville, j'adore la nature.

- interview with a multi-skilled volunteer

Philippe Hendrick joined the botanic garden staff as a volunteer in 2015, after working as a team leader of social housing construction works.

What does your task as a volunteer entail?

As a reception assistant I do many tasks like answering phone calls, welcoming visitors, distributing mail and parcels, scanning and forwarding invoices, the logistics of guest rooms, etc. I am also an administrative assistant for the Garden's volunteering programme: I collate the statistics of volunteer hours and help with the transport refund documents for our volunteers.

Why did you choose to volunteer at Meise Botanic garden?

I have been visiting Meise Botanic Garden since 2004 as the spouse of an employee. Due to an accident at work, I am disabled, so I started to volunteer here to have a meaningful time. I immediately loved the jovial and great atmosphere between colleagues. Furthermore, I love working in a botanic garden because, although I live in a city, I'm a nature lover.

What gives you the most satisfaction in your volunteer work here?

The feeling that I'm doing something useful in my life and that my efforts are meaningful for visitors, colleagues, and the volunteers. Also, the fact that I deliver services and contribute to the work assignment of the organisation gives me great satisfaction.

For me, this work and the responsibility that comes with it is soothing. I am grateful to Meise Botanic Garden for allowing me to have this experience.

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Key facts & figures
250 volunteers
16.2 full-time positions
50.000€ annual budget
1 community manager
1 program for disabled persons
2 annual events for volunteers
2 annual recruitment info sessions

Figure 3. Interview with a volunteer in the annual report 2021 of the Botanic Garden Meise. In the annual report, the number of specimens digitized by volunteers is specified. Volunteers who have entered more than 2,000 specimens online are also mentioned

The Botanic Garden Meise has a volunteer-culture which has evolved over the past 20 years. Approximately 250 volunteers work currently in Meise, the equivalent of 16.2 full-time positions. Most of them are retired or unemployed. A project for disabled persons is ongoing.

Community manager

One community manager, Katrien Clarysse, is responsible for the volunteers. 10% of Katrien's work is funded under the Diversity plan of the Botanic Garden, originating in policies of the Flemish government. She "matches" the volunteers with the existing projects for which extra hands are needed. Not all the volunteers are working in scientific research, as some work for the public oriented services. Katrien coordinates the administrative procedures and has an overview of the tasks each volunteer is performing. This is an interesting way of functioning which could be implemented at the RMCA where volunteers are lacking. It could also be a solution for the RBINS where the researchers and curators are often submerged by administrative procedures.

Community facilitation

There is no intranet or social network group for volunteers. Instead, Katrien organizes events two times per year where volunteers meet for presentations, coffee and cake. 15 to 30 people participate in these subscription-only events. All volunteers are also invited to the annual barbecue, to the New Year Reception and to Monday Lunchtime Talks (similar to the Infolunches in Tervuren).

Katrien sends a regular newsletter to the volunteers. She also organizes info sessions for aspiring volunteers. 20 years ago, she started organizing a session every month. Today, two info sessions per

year are enough. Before having an established pool of volunteers, recruitment leaflets were distributed across cultural centra in the area. These are no longer necessary today.

Allowance

All volunteers have contracts and receive transport reimbursement, just as regular employees do. For some guides, a forfeiture amount of 40€/day applies. Volunteers who are not permanent collaborators and who participate in bioblitzes receive 20€/day.

VII. SWOT ANALYSIS: CITIZEN SCIENCE AT THE RBINS & THE RMCA

> *" (…) as respected and politically neutral institutions, museums are particularly well-placed to act as platforms and conveners for citizen science coordination, exhibitions, discussion and debate. Indeed, this type of activity directly helps museums to demonstrate their societal relevance and value"* Sforzi et al., 2019

Citizen Science can simultaneously deliver each of the core, mission-related priorities of the RBINS and the RMCA: collections development and access, advancing scientific knowledge, and inspiring and educating the wider public. However, working effectively across the two institutions and supporting different CS projects can be a particular challenge, as museum Departments often manage time and resources in different ways. CS has a different role and significance for each research domain in the RBINS and the RMCA.

CS requires trained project personnel for facilitation, communication, ICT support and data management. Securing sufficient resources to establish and maintain projects is not always straightforward. An investment of researchers' time and resources, embedded collaboration with the Public Services, institutional support and federal support are crucial to creating an ecosystem where CS can reach its full potential.

The AfricaMuseum is recognized as a CS leader in Africa. *"CS in Africa is not volunteering; it has a cost"*, says Caroline Michellier (Geographer, RMCA). Network development and supervision require well trained local experts, permanent communication and commitment.

The following **common and overarching aspects** of CS research stood out during the one-on-one interviews with the scientific staff. This is a summary of the strengths, weaknesses, opportunities and threats related to each one of the these aspects.

- COMMUNITY FACILITATION
- RESEARCHERS' ENGAGEMENT in CS
- ICT, DATA and ETHICS
- OUTREACH and COMMUNICATION

1. Community facilitation

SUMMARY

Community facilitation, from the recruitment to the reward phase, is one of the most important aspects of a CS project. However, this is the most overlooked aspect when designing a project. The members of scientific staff have expressed the need for a **community manager** who should be the interface between the citizens and the scientists. The community manager maintains a stable community, encourages it to take part in CS projects, gives feedback, promotes the projects and organizes outreach events.

To achieve better engagement, CS projects need **better visibility**, within each Institute, within the federal network and towards the broad Belgian public. Wide dissemination is a pre-condition for progressing towards inclusion and accessibility in scientific research, an underlining element of Open Science.

The broad public relates to issues concerning **local biodiversity**. However, in Belgium, monitoring capacities on the field is given to regional stakeholders. Project Objectif 1000 in the Jardin Massart shows that the RBINS can play a role in monitoring local biodiversity and engage the local audience in matters of societal and scientific concern.

INTERNAL FACTORS

STRENGTHS +	**W**EAKNESSES –
+ The RBINS has a long date collaboration with amateur expert naturalists, with societies and associations. + High motivation among current long-date volunteers (cf. Volunteers' survey) + RBINS and the RMCA organize trainings for students or amateur naturalists. + Embedded evaluation, feedback and reward system for citizen scientists (CSts) in projects ATRAP and HARISSA (RMCA) + Working with local intermediaries for community engagement in Africa in projects ATRAP and HARISSA (RMCA)	- Lack of diversity among our current volunteers (cf. Volunteers' survey) - Inclusion of hard-to-reach target groups - The gender equality plan does not mention contractual volunteers. - Lack of statistical data concerning the citizens currently participating in Citizen Science projects - Lack of a community facilitator / manager / engager - Few to no in-house networking events for CSts - Very few projects have embedded feedback and rewards given to CSts. - Inequitable volunteers' cost reimbursement in the RBINS. Some Departments/Services do it, others do not - Very few projects with an educational and/or outreach aspect - Lack of a structural collaboration between the Education Service and the Research Departments - Lack of a structural collaboration with the Science Communication service to set up

	innovative CS communication campaigns to attract citizens

EXTERNAL FACTORS

OPPORTUNITIES +	**T**HREATS –
+ Collaboration with NGOs for recruiting CSts and improving the visibility of our CS projects (Natuurpunt, Natagora, Apis Bruocsella, Royal Belgium Entomological Society / African Diaspora associations) + Participation in monitoring of local biodiversity projects (RBINS) + Collaboration with external partners in setting up trainings for the CSts (RBINS and RMCA) + Collaborations with waarnmingen.be when carrying recording projects (Bio Blitz) in order to make the data available in open access. + Collaboration with CEBios on CS capacity building in the upcoming program 2024 – 2033 + Various funding opportunities for CS community management (cf. Annex 7 Overview of funding opportunities for CS) + Various funding opportunities for education projects involving the Belgian public (cf. Annex 7 Overview of funding opportunities for CS) + The Impetus for CS consortium offers mentoring and training for project CRESCO – Citizen Rescuers for Collections.	- Loss of engagement from the community due to non-sustainable CS actions - Loss of engagement due to lack of allowance - Shrinking pool of volunteers during and after the Coronavirus pandemics - Reduced pool of volunteers in the RMCA, the location being one barrier - Decline in the number of hired taxonomists and technicians who can train the CSts - Lack of inclusion of the CSts in the Diversity and Inclusion policy

2. Researchers' engagement

SUMMARY
The need for training for researchers goes hand in hand with a **better agreement on the Citizen Science concept**. Areas in which knowledge is lacking are : data quality control, ICT solutions, dissemination and communication of results, and interacting with the citizens (training, feedback, evaluation). The collaboration with social scientists to assess the impact of CS on the participants is necessary. Creating and maintaining a **community of practice in CS** requires different actions: workshops networking events, a newsletter, social platforms.

INTERNAL FACTORS

STRENGTHS +	**W**EAKNESSES –
+ A Citizen Science working group has been set up in previous years at the RBINS. + The first step towards a Citizen Science federal community of practice has been taken during the Mutual Learning Exercise on CS we have organized in Tervuren in January 2023. + The first step towards a joint RBINS-RMCA CS intranet platform	- Encouragement and rewards for researchers who manage CS projects - Events for sustaining and maintaining a community of practice - IT facilities add difficulties to collaboration between Institutes, for example in terms of access to shared files.

EXTERNAL FACTORS

OPPORTUNITIES +	**T**HREATS –
+ Collaboration with external stakeholders for training (Botanic Garden Meise, Scivil) + Collaboration with universities for evaluation and impact assessment (VUB Citizen Science Contact point) + Networking and best practices exchange among CS practitioners at the federal level + Many training resources already exist but they are not visible enough. + A CS network day in collaboration with Scivil, the Flemish CS association	- Lack of financial resources - Lack of staff - Lack of platforms for sharing tools and best practices - Maintaining a community of practice in the absence of a coordinator

+ The Impetus for CS consortium offers mentoring and training on different topics related to CS (project CRESCO).	

3. ICT, data and ethics

SUMMARY
Collections-based projects are a central area of innovation, especially in the context of growing need for **digitization and data access**. Some platforms already exist but are not sufficiently valorized or accessible. With the help of platforms such as DoeDat and Zooniverse we can improve the amount of collection data in our databases while increasing accessibility for remote audiences. In this sense, Citizen Science overlaps with the objectives of **Open Science** and with those of museums as inclusive institutions. The staff interviewed and the researchers having participated in the Federal Mutual Learning Exercise agree on the growing need for IT support for CS. Long-term support and funding for the management of databases should be organized at Belspo level.

INTERNAL FACTORS

STRENGTHS +	**W**EAKNESSES –
+ Collection digital data management systems DaRWIN and Virtual Collections + Existing collaboration and joint projects between the Collections Services of the RBINS and of the RMCA + Efforts for a data architecture for Research in the RBINS	- Lack of a virtual open-source platform for running CS projects, including data encoding, storage and valorization - Lack of crowdsourcing functionalities in existing data platforms (Virtual Collections) - The % of digitized collections is still low in comparison to the overall collection. - Open access and FAIR data - GDPR

EXTERNAL FACTORS

OPPORTUNITIES +	**T**HREATS –
+ Use of platforms such as Waarnemingen.be, Zooniverse or DoeDat + Use of existing apps such as Obsidentify + The Impetus for CS consortium offers mentoring and training on data management in project CRESCO.	- Long-term maintenance of the platforms - Having to reinvent a platform for each new project - Reticence about using apps and online platforms for data collection - Ethical and legal aspects can cause difficulties on the long term.

4. Outreach and communication

ANALYSIS SUMMARY
Citizen Science research could be better showcased during outreach events. There is no ongoing collaboration between the RBINS and the RMCA in outreach and communication. A series of international Citizen Science related outreach events exist and constitute an opportunity for our institutions to collaborate and give international visibility to CS research. Most of these events encourage virtual actions. CS at the RBINS and the RMCA could benefit from **better visibility** on our social networks and websites, and in the media. Awareness campaigns, calls-to-action and networking events are an effective way of strengthening the position of the two institutions within the field of CS.

INTERNAL FACTORS

STRENGTHS +	**W**EAKNESSES –
+ Safari organized by the Entomology Service of the RBINS during the Nerdland Festival + Other events of the Entomology Service of the RBINS (BioBlitz, Insect Week) + One international networking event for amateur naturalists supported by the OD Taxonomy and Phylogeny (RBINS): The International Stick Insect Meeting + The RMCA website CS page is relatively easy to find and encourages participation. + Launch of a new RBINS website + A new Digital Communication Officer position (RMCA – since 01.2023; RBINS – since 06.2023) + CS showcased during the 125/5 outreach events in the AfricaMuseum + Broad visitor demographic. Our exhibitions are visited by diverse communities we can communicate to and engage in CS actions.	- Lack of a structural communication plan for CS - Lack of coordination of communication efforts of the different projects / actions - Lack of a visual identity - Lack of media visibility - Lack of visibility on social media - Lack of a paper brochure on CS for the broad public - Lack of call-to-actions - Collaboration with the Education Service for outreach events - Few projects are communicated to the broad public. The projects are mostly known inside a circle or scientists and experts. - The development of engaging Citizen Science gallery-based displays and interventions in our exhibitions - Lack of time and personnel for updating the CS webpage and social media channels.

EXTERNAL FACTORS

OPPORTUNITIES +	**T**HREATS –
+ Participation in international outreach events (April Global CS Month) + Hosting or partnering up with international networking events such as Les Journées de spéléologie scientifique (speleology) + Participation in local outreach festivals (I love science) and events (Erfgoeddag) + Various funding opportunities for Outreach events (cf. infra) + Collaboration with the KU Leuven - Science Communication on creating awareness (Prof. Katrien Kolenberg) + The Impetus for CS consortium offers mentoring and training on communication and outreach in project CRESCO.	- The RBINS and the RMCA are not perceived as CS actors by the broad Belgian public. - Other actors (Natuurpunt, Natagora) have an established reputation as CS actors and broader community reach in Belgium.

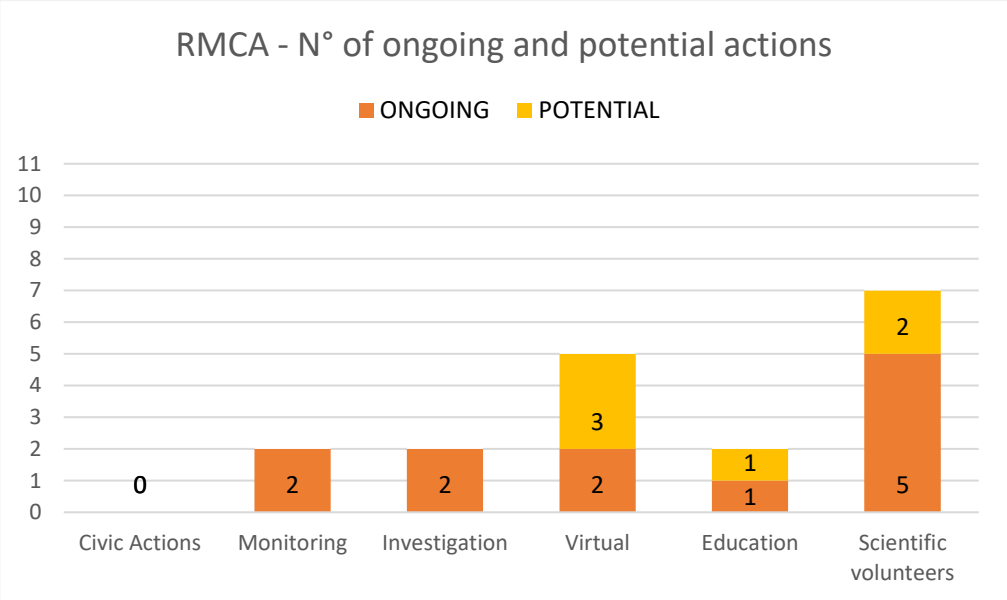
VIII. POTENTIAL PROJECTS

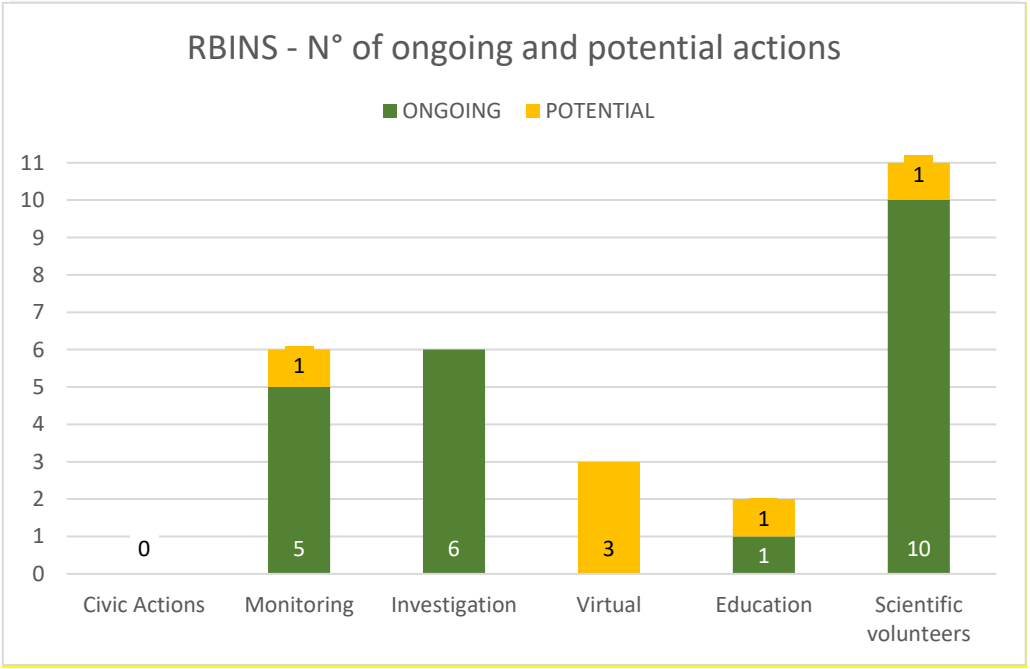
Annexes 3 and 4 : potential projects at the RBINS and the RMCA

Following numerous one-on-one interviews and team meetings since September 2023 with over 60 researchers, curators and staff of the public-oriented services, new project ideas have emerged. These potential projects (in yellow) could be developed in the future with the help of the CS Coordinator.

Some of these projects are currently planned and are close to being implemented starting June 2023 within the overarching project CRESCO Citizen Rescuers for Collections (cf. Infra).

The RBINS has potential to increase the number of virtual, monitoring and education projects, while the RMCA has potential to increase the number of virtual, onsite scientific volunteers and education projects.





IX. UPCOMING PROJECT CRESCO, CITIZEN RESCUERS FOR COLLECTIONS

Five of these potential projects have been grouped under the overarching project CRESCO (Citizen Rescuers for Collections). This marks the first collaboration in the field of CS between the Collections Department of the RBINS and that of the RMCA. CRESCO is one concrete example of how to implement CS within Collections management through both virtual and onsite actions. CRESCO has been submitted on behalf of the RBINS-RMCA consortium for an IMPETUS Accelerator call grant for Citizen Science of 20.000 €.

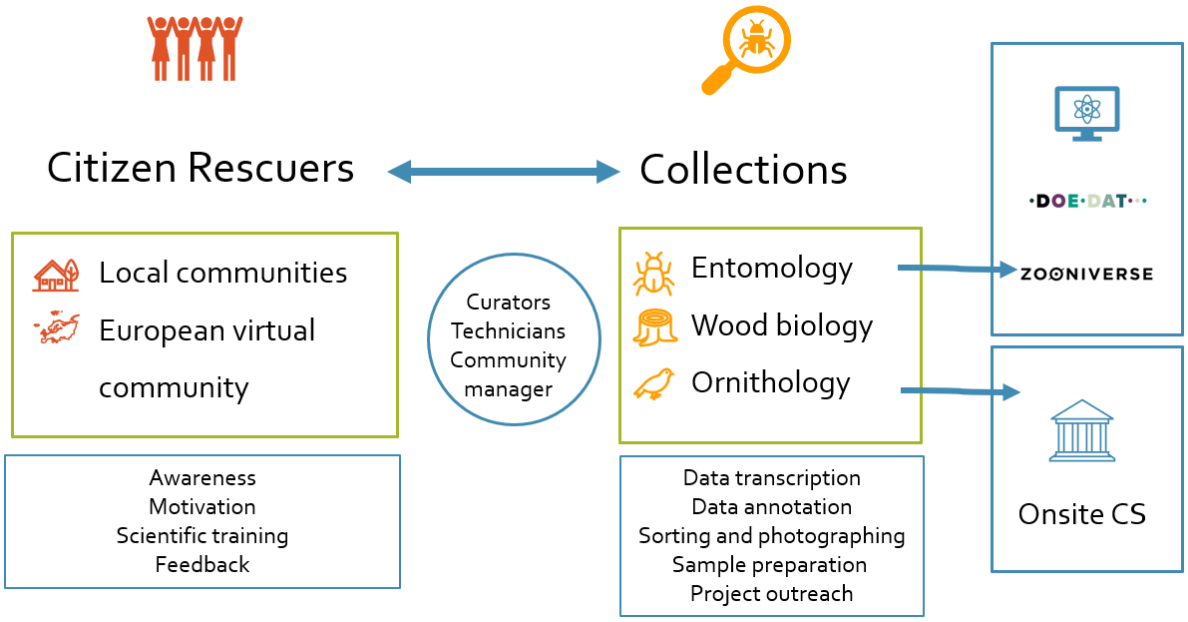


Figure 4. Structure of project CRESCO

The **participation** goals of the project are to engage online citizen scientists in 2 virtual projects. (RBINS and RMCA) and to engage 5 to 10 onsite citizen scientists in physical actions (RMCA).

Regarding **new data acquisition**, its goals are to add data on 10.000 birds specimens to the databases (RMCA) , to transcribe taxa and count insects in 5000 boxes (RBINS), to transcribe data on 10.000 mites slides (RBINS and RMCA), to apply image segmentation to 5.000 photos of wood samples for the Smart Wood ID project and to help prepare wood samples and to scan them in order to ensure digitization of the Tervuren xylarium (RMCA).

The positive changes we hope to achieve through this project concern multiple stakeholders**.** All the societal actors currently following the communication channels of our two institutions will become aware of the importance of data for policy making. The researchers will gain knowledge on engaging citizens in handling and studying biological collections. They will also benefit both scientifically, from the quantity of new data published in open access, and socially, from this new form of collaboration and work. They will also acquire new knowledge on how to manage and on how to promote inclusiveness in a CS project. Researchers worldwide will gain virtual access to the collections once CRESCO is completed. This will have an impact on the number of analytical studies and publications.

Moreover, BELSPO, the Belgian Scientific Policy Federal Department, will access new knowledge on the Citizen Science research method.

The citizen scientists will learn about biological collections and their pertinence for tackling societal challenges in biodiversity. They will also be empowered to take further actions by communicating environmental messages to their communities. We will evaluate the short term impact of the project on the citizen scientists and on science through embedded evaluation.

X. RECOMMENDATIONS FOR SUPPORTING CITIZEN SCIENTISTS

1. Supporting the development of amateur naturalists

> *"A significant level of taxonomic expertise is contained within this community: a recent study demonstrated that over 60 per cent of the 770 new species discovered on average each year in Europe since the 1950s are described by non-professional taxonomists." (Sforzi 2018)*

A trained group of amateur and professional taxonomists is central to knowledge of the world's biodiversity and how it is responding to environmental changes. Continued substantial support is needed for the development of individuals and communities with high levels of taxonomic knowledge and the motivation to observe and document changes within nature over long timescales, at a time when the demand for the biological monitoring and conservation assessment of habitats and species is increasing.

A best practice example comes from the **Natural History Museum London**, where a five-week Natural History training is organized yearly since 2021 within the Center for UK biodiversity. This training aims to help citizens build skills in identifying and recording UK wildlife. In 2022, the NHM has developed and tested a series of more advanced training courses focusing on developing identification skills. These workshops will be launched in 2023. The NHS has also organized specific trainings for young naturalists.

The RBINS and the RMCA support the next generation of naturalists by organizing trainings for different stakeholders, from universities to nature organizations. Direct scientific support, training and mentoring in identification, field survey and research methods bring these stakeholders closer to our two institutions. This approach creates opportunities for amateur and professional naturalists to interact and share their skills to mutual benefit.

The **RBINS** has a long-standing relationship with amateur naturalists and taxonomists who share their knowledge in specimen identification and in fieldwork. They are mainly linked to the projects of the OD Taxonomy and Phylogeny. Most of them have a volunteer contract and work at the Institute and/or on the field.

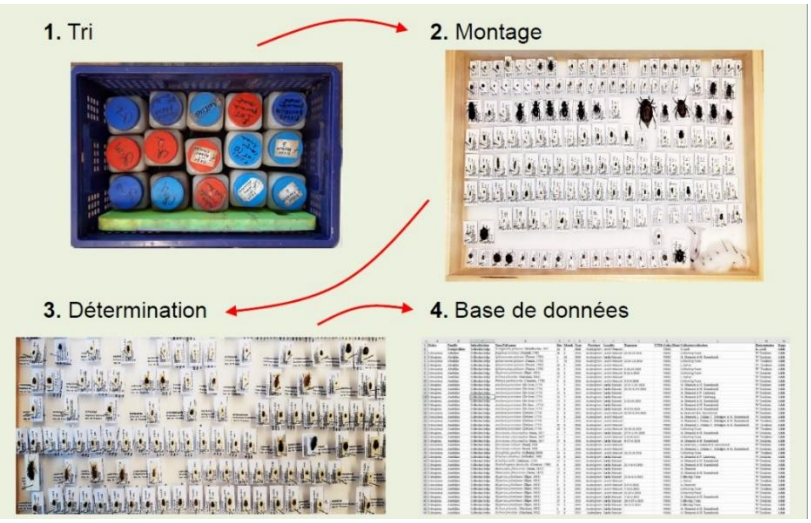
There is a second category of amateur naturalists and taxonomists collaborating with the RBINS participating in lower-skill level tasks related to collection management. They are participating either at a contributory and more rarely at a collaborative level, making for example identifications.

In the **RMCA**, the Biological Collections Department hires volunteers on a regular basis. In the field of collections, there is a permanent need for management and digitization.

For the current scientific volunteers, the RMCA and the RBINS could join forces and propose training and networking events in the following overlapping domains : archives and collections management and digitization, Taxonomy and Earth Sciences.

1.1 A best practice of working together with amateur naturalists: Objective 1000 in the Massart Garden

Objective 1000 in the Massart Garden is a project that illustrates how researchers and citizen scientists can work together to support the local government in answering burning questions about local biodiversity. Citizens participated in the project at two levels. Nature photographers contributed to the inventory by taking pictures of butterflies and amateur naturalists helped identify the specimens in collaboration with the researchers.



Key facts and figures
Launched in 2015
> 4000 arthropods species
Database of >25000 records
70 researchers and CSts
Publication

Figure 5 The workflow of the project, from collecting the specimens to data management. Photo: Alain Drumont

2. Supporting the development of amateur paleontologists and geologists

Current situation

The RBINS is supporting amateur paleontologists in different ways. Volunteers currently collaborating with the Services of the OD Earth and History of Life are:

- Amateurs without scientific training who do research and publish scientific papers;
- Post-doctoral researchers with a volunteer contract;
- Fossil preparators;
- Collectors who are contributing to fieldwork, to collections and to research;
- Volunteers doing archival work;
- One volunteer contributes to the digitization of the mineralogy collections of the RBINS and the RMCA by taking pictures.

Most of the amateurs work in Paleontology. In Geology, we find retired RBINS scientific employees working on the collections.

Barriers

The main barrier for developing structural monitoring projects in Belgium is legislation. In paleontology, everyone can collect fossils that are on their private property or in the public domain. There is one exception: the fossils in the North Sea are in the state property. For fear of control, many collectors do not want visibility.

Identified opportunities

" Il est plus logique que les bénévoles travaillent avec les collections, car il y a là un vrai travail d'archivage et de digitalisation. »

Thierry Smith, Head of the Division Paleobiosphere Evolution, RBINS

As far as amateur clubs are concerned, the Geology Services of the RBINS and the RMCA maintain contact with several associations of amateurs, such as Likona. In specific projects, there is often opportunity for collaborating with carefully selected citizens, usually specialists in their field.

Inside collections management, virtual transcription and digitization projects are an opportunity. The Curator of Paleontology collections of the RBINS, Annelise Folie, will be exploring the possibility of a virtual project.

Education-related projects are an opportunity to involve a diverse audience in scientific research. The Education Service of the RBINS is currently exploring the possibility of a Citizen Science project for schools, in which students will sort sediment with the Microfossils Laboratory.

Collaboration RBINS – RMCA

The range of methods and applications of CS within the Earth Sciences are centered on geohazards, observations and classification, and education and outreach. The first step towards a collaboration between the Earth Sciences services of the RBINS and the RMCA is the field of CS, will be the organization of networking and exchange events. Collaborations between these organizations are already ongoing in other areas.

In Paleontology, collaborations between the RMCA and the RBINS are possible, as demonstrated by the PAL-EUR-Africa project (2013-2017).

SWOT analysis

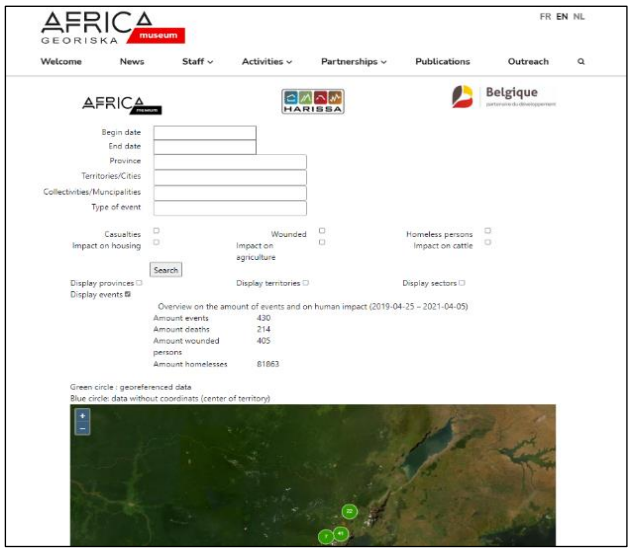
INTERNAL FACTORS

STRENGTHS +	**W**EAKNESSES –
+ Long-standing collaboration with amateur paleontologists and geologists associations + Existing collaboration between the RMCA and the RBINS in geology and paleontology	- Lack of experience with virtual CS tools and platforms

EXTERNAL FACTORS

OPPORTUNITIES +	**T**HREATS –
+ Virtual transcription and digitization projects within the collections + Educational CS projects in the context of considerable public hype around paleontology + Funding opportunities at EU level	- Legislation on collecting fossils makes collectors stay away from the public eye

2.1. Best practice of working with volunteers in the field of Earth Sciences : HARISSA



Key facts and figures
Approx. 50 citizen observers
+ 800 events reported in 2020 and 2021
data on 6 different disasters
Development of a web-GIS

HARISSA (Natural HAzards, RISks and Society in Africa: developing knowledge and capacities) collaborates with two networks of citizen observers, 25 members in Southwestern Uganda and 22 representatives of the North and South Kivu Civil Protection. The citizens are trained to use a smartphone or tablet. They are also trained in the field to recognize and report events impacts using the Kobo app. One refreshment training is organized every year. The data collected by the citizens is available online on a Web-GIS app integrated to the AfricaMuseum website.

The network is operational since December 2019. The educational component of the project goes beyond the circle of citizen observers. A serious game, Hazagora: will you survive the next disaster?, was designed with the goal of raising awareness about geohazards and disaster risk reduction.

3. Supporting CS inside the humanities

"Researchers in the humanities need to learn from the natural sciences practices."

Nicolas Nikis (archeologist, Heritage Studies)

A survey of CS projects in Europe revealed that more than 80% of current CS practice is confined to life and natural sciences and only 11% to the social sciences and humanities (Hecker et al., 2018b). This is also reflected by the mapping of CS at the RBINS and the RMCA.

At the RBINS and the RMCA, only one project in the domain of humanities mentions crowdsourcing in the project description. *Be-Music* aims to create an online platform for audio recordings which will work as an aggregator for the collection of the RMCA and that of the Museum of Musical Instruments. In its later phase, the website will function as a crowdsourcing platform to which professors and students from the University of Makerere will contribute. Collecting musical fragments in Africa at a larger scale is a complex project which requires a solid partnership with local entities such as local radios and an agreement on the protocol, says Rémy Jadinon (musicologist, Culture and Society), the promoter of the project.

Researchers from the Heritage Studies Division of the RMCA mentioned similar challenges. Most CS projects are top-down, and the research question is decided in Europe, by European researchers. In Africa, getting the community involved depends on local intermediaries who can facilitate and maintain the link between the researchers and the local community. To involve the local communities in monitoring actions or in archaeological survey projects means to ensure access to tools and instruments, as well as training. At the moment, such a project is unsustainable.

The main need identified was a better understanding of how a CS project is designed and how it can be adapted to the African context. The first step is to create a space for dialogue on how to implement CS in the humanities, in the African context.

INTERNAL FACTORS

STRENGTHS +	**W**EAKNESSES –
+ Researchers' motivation to learn about CS + Mutual Learning Exercise with Natural Sciences researchers + Virtual transcription projects in collaboration with the Archives Division	- Few opportunities to exchange on CS in a transdisciplinary manner - Embedded feedback, communication and evaluation

EXTERNAL FACTORS

OPPORTUNITIES +	**T**HREATS –
	- Reticence related to CS as "free labor". As for each discipline, ensuring a win-win situation for all parties is one of the basic principles of CS research. - The ethics of publishing sensitive content - Access to tools and instruments for African communities - Local intermediaries for community facilitation in Africa

The following best practices covering history, archeology, architectural heritage and genealogy were discussed with the RMCA researchers.

Our history. The South Denmark University in partnership with upper secondary schools, archives and other history actors, collect the Danes' stories by means of audio recordings and apply them in curriculum-based teaching. The project focuses on topics such as welfare, children and the family in the period 1950-2000.

Erfgoed gezocht (Heritage wanted) is a Citizen Science project led by the University of Leiden in which volunteers participate in archeological research in the Netherlands.

Erfgoed in gevaar. The KIK-IRPA, the Belgian Royal Institute for Cultural Heritage, launched a call for witnesses to identify the heritage affected by the floods of July 2021. Participants were asked to fill in an online form and to upload pictures of damaged heritage.

MamaMito is a project on genetic genealogy with the aim of tracing relationships through the maternal line and gain new insights into mitochondrial DNA. It is a collaboration between the Leuven University, Histories and Familiekunde Vlaanderen.

S.O.S. Antwerpen (Social Inequality in Mortality) is a project in which volunteers, together with scientists, collect and analyze the causes of death of those who died in Antwerp between 1820 and 1946. Together with researchers from Ghent University, University of Antwerp, the Antwerp city archives and Histories, they are collaborating on a large digital database that will make it possible to study health developments over time.

4. Improving accessibility and inclusiveness through digital technology mediated Citizen Science

A citizen scientist needs to be aware of his progress, of how many tasks have been completed and of how many are still left to do. Online platforms for crowdsourcing and Citizen Science do exactly that, by breaking down the work in separate projects and workflows. Volunteers can go from one project to the other and track their own progress. Breaking down a project in separate workflows helps ensure a challenging experience.

Moreover, with the help of online platforms, we improve the accessibility and the inclusiveness of the projects by addressing the needs of different stakeholders, including local and far-away communities.

This is an overview of past, present and future virtual projects in the RBINS and the RMCA. The submission of the CRESCO project for the IMPETUS Accelerator call for Citizen Science has had an impact on the development of new virtual project initiatives inside the two institutions. Two projects are currently in preparation in the RBINS , project "Count the bugs" using Zooniverse and project "Transcribe the Cooreman collection mites slides" using the platform DoeDat.

VIRTUAL PROJECTS AT THE RBINS AND THE RMCA						
Institute	**Department / Division**	**Project**	**Platform**	**Status**	**Financing**	**Timing**
RMCA	Wood biology	Jungle Weather	Zooniverse	Finished	COBECORE BRAIN	2017
RMCA	Wood biology	Jungle Rhythms	Zooniverse	Finished	COBECORE BRAIN	2020
RMCA	Biological collections	Lepidoptera type specimens	DoeDat	Finished	/	2021-2022
RMCA	Biological collections	Odonates type specimens	DoeDat	Finished	/	2021-2022
RMCA	Biological collections	Birds collection	DoeDat	Ongoing	/	2022-2023
RBINS	Collections - entomology	Count the bugs	Zooniverse	In preparation	IMPETUS	2023
RBINS - RMCA	Collections – entomology	The mites slides	DoeDat	In preparation	IMPETUS	2023
RBINS	Collections – paleontology	Registers from the paleontology collection	DoeDat/ Zooniverse	Idea	/	2023
RMCA	Wood biology	Smart Wood ID	Zooniverse	In preparation	IMPETUS	2023

3.1. Best practice: Jungle Rhythms and Jungle Weather

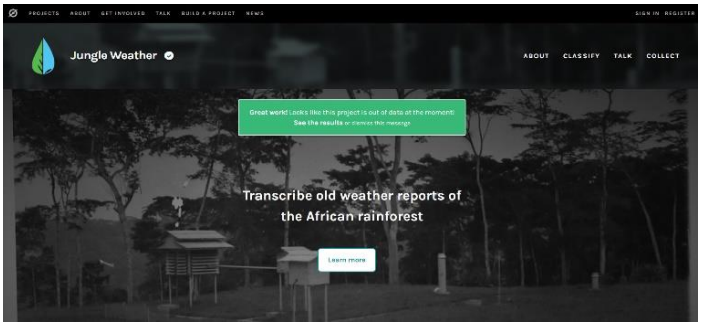


Figure 6. The home page of the project on the platform Zooniverse

Key figures
+ 350.000 pictures
+ 1.800.000 classifications
+ 2400 participants

Two virtual projects were carried out in 2017-2020 in the RMCA within the COBECORE project of the Wood Biology Department. The scientific goal of Jungle Weather was to gain insight in the climate of the central African rainforest, complement the completed Jungle Rhythms Zooniverse project and contribute to machine learning training datasets in order to automate future transcription efforts.

Citizen scientists transcribed digital pictures of the original weather observation sheets. In total more than 70 000 records were digitized. The citizens were asked to track strange cases and to transcribe the correct data. Two workflows were provided, one covering the measurements and another one to complement the data with additional information on the site's ID number, and month and year of observation. Citizens were free to choose one or the other. Over 350k tasks were completed by over 2400 participants.

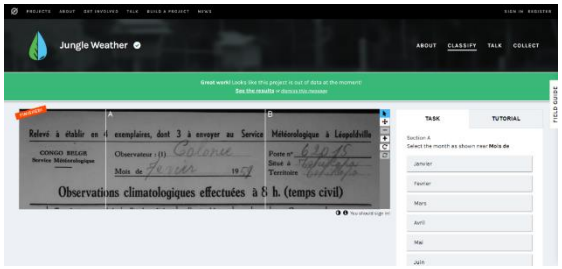


Figure 7. Transcribe meta-data workflow

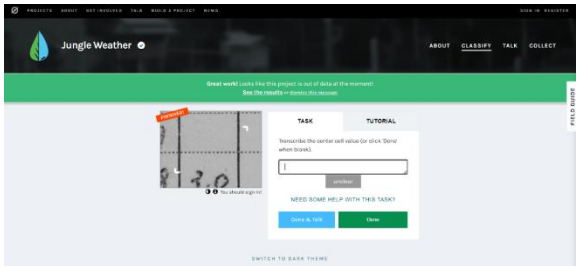


Figure 8. Transcribe climate data workflow

The manager of the project, Koen Hufkens from Ghent University and founder of Bluegreenlabs shared his top three advantages and disadvantages when working with Zooniverse. He also shares in a blog post the workflow of Jungle Weather and data best practices.

Advantages (+)	Disadvantages (-)
Easy to use project manager;	Volume limitations (maximum ~300K pictures);
Large and diverse community (Community drives work);	Little flexibility on some tasks (trade-off between easy usage and specialisation);
International impact.	Lack of internationalization (mainly English-speaking contributors) .

3.2. Best practice: enhance collection data using the platform DoeDat

"Het werken als internetvrijwilliger via DoeDat is voor mij een 'STOP-EVEN'-moment tijdens mijn werk als planner/coördinator/roosteraar. Door me te concentreren op de in te geven data, wordt het denkpatroon bij de coördinerende taken stilgelegd. Als het eigenlijke werk daarna terug hervat wordt, gebeurt dit makkelijker vanuit een neutrale positie. Hierdoor blijf ik niet in een vast denkpatroon zitten en vind ik vlugger nieuwe, alternatieve oplossingen en manieren voor knelpunten die stelden. Je zou dus kunnen zeggen dat ik dit vrijwilligerswerk vooral doe om mijn eigenlijk werk vlotter te kunnen doen." Anonymous, DoeDat online volunteer

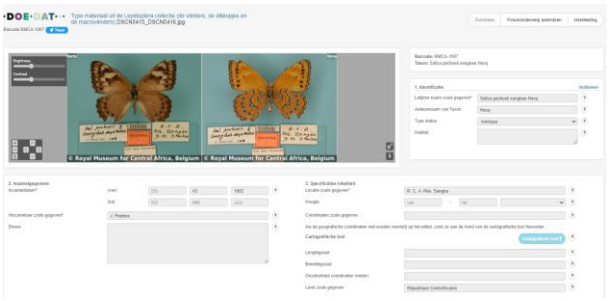


Figure 9. DoeDat encoding module

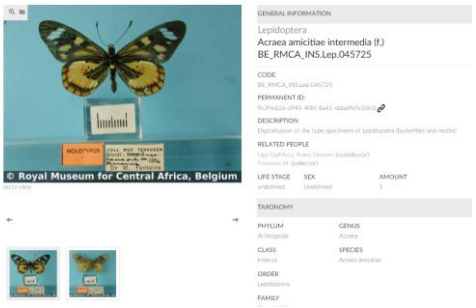


Figure 10. Virtual collections encoding module

Larissa Smirnova, Biological Collections Project Officer, describes the project in the 2021 annual report of the AfricaMuseum:

"Labels associated with each specimen provide essential information including the collector's name, collection site and year, identification records, sex determination, and so on. These metadata are an integral part of the specimen and their transcription in a database is crucial for scientific research. For this reason, the RMCA has invested in citizen science projects. These projects invite volunteer scientists to help enrich databases by transcribing labels — that is, by entering the information found on these labels into the corresponding fields in a database. The first project, launched in 2021, involved the collection of Odonata (the insect order that includes dragonflies and damselflies). It was successfully completed in record time thanks to the volunteers involved. A second project planned for 2022 will cover the museum's butterfly collection. These citizen science projects are carried out using the DoeDat platform managed by Botanic Garden Meise."

Two of the volunteers working in Meise on projects of the AfricaMuseum have answered the volunteer survey. They are both women, aged 56 – 66. When asked about the factors that could prevent from contributing to these projects, one volunteer replies: *"Niets. Als internetvrijwilliger bepaal je zelf wat en wanneer je iets doet."* The factors of motivation are contribution to science, learning and a fun way to spend free time.

ANALYSIS SUMMARY
A lot of data is transcribed in a very short period, especially when photos of specimens are shown. For the Lepidoptera type specimens of the AfricaMuseum, 2200 tasks were transcribed in a couple of days. The data is made available in the collection databases Darwin and Virtual Collections. We rely on the volunteers of the Meise Botanic Garden for our Doedat projects. We need our own pool of volunteers to mobilize on specific projects. The DoeDat platform has its own disadvantages. The page does not allow to visualize any data without creating an account and logging in. There is only one contributor per task with an impact on time spent on quality control and task validation. The Botanic Garden Meise will support Doedat until the end of 2024 through DISSCO Flanders. For the RBINS and the RMCA, it will remain a free service. For the other institutions, a fee of 500€/project will be applied. In the following years, priority will be given to the projects of the Botanic Garden and to projects that do not require new templates. The team in Meise has agreed to support us in setting up a new DoeDat project for transcribing the Cooreman mites slides collection of the RMCA and the RBINS. This project will take off in June 2023 and will be online by September 2023.

INTERNAL FACTORS

STRENGTHS +	**W**EAKNESSES –
+ Data quantity; + Open access data imported in Darwin and Virtual Collections; + The project reaches more people in a short time period; + Promoting our DoeDat projects during outreach events; + Provide pop-up crash-training for the general audience;	- Lack of own pool of online volunteers; - New volunteers must create an account before accessing the projects; - GDPR. We cannot contact the volunteers directly, only via the website manager. - Lack of rewards for virtual volunteers; - Lack of a community manager position.

EXTERNAL FACTORS

OPPORTUNITIES +	**T**HREATS –
+ A workshop on setting up a DoeDat project in collaboration with Botanic Garden Meise.	- Uncertainty concerning the services of DoeDat beyond 2024.

4. Hosting biological recording schemes and developing species monitoring projects

Annex 5 : SWOT analysis of monitoring schemes within the RBINS

The study of biodiversity patterns and processes across multiple scales is one of the actions within Flagship 1 of RBINS' research strategy : Nature Discovery. The OD Nature hosts or contributes to the following monitoring schemes which are analyzed in detail in Annex 5.

The RBINS has a federal mandate for large-scale monitoring projects. A mandate is an opportunity for increasing participatory environmental governance. However, some of these projects are not fully designed as CS projects in the first place and therefore face various considerable challenges. The managers of long date existing projects such as Marine Mammals signal several weaknesses: community engagement and management, the instauration of protocols and the quality of the IT infrastructure. Upcoming projects such as DASA and Proper Strand Lopers are only at the beginning of the participatory process.

MONITORING PROJECTS OF THE OD NATURE				
Project	**Role of RBINS**	**Status**	**Financing**	**Timing**
BeBirds	Coordinator	Ongoing	BELSPO	/
Marine Mammals	Coordinator	Ongoing	BELSPO	/
DASA – Digital animal sounds archive	Coordinator	Starts in 2023	BRAIN 2.0	2023-2025
Proper strand lopers	Collaborator	Starts in 2023	FPS Health, Security of the Food chain and Environment	2023-2024
North Seal Team	Collaborator	Paused	Provincie West-Vlaanderen (stopped)	/

5. Hosting BioBlitzes

BioBlitzes contribute to urban biodiversity mapping. A BioBlitz is an event where the aim is to find and identify as many species as possible in a defined place and time, usually one day. It is typically accessible to all ages, and to novices or nature lovers, with expert naturalists on hand to offer help and advice. These events can be the start of a long-term project to monitor and map urban biodiversity and ecological networks.

RBINS has organized two BioBlitz in the past, led by the experts of the Entomology Service. While contributing to collecting specimens, participants gain a combination of first-hand experience and learning about the biodiversity surrounding them. For that reason, a BioBlitz has a very strong educational component.

INTERNAL FACTORS

STRENGTHS +	**W**EAKNESSES –
+ Inclusion and diversity; + Enjoyable, engaging, participatory; + Fosters education and learning. Scientists and citizens learn and share knowledge and experiences around scientific subjects. + Contributes to rooting our scientific research locally.	- Data management. The broad public cannot visualize the data. - Lack of expert CSts to identify all the collected specimens.

EXTERNAL FACTORS

OPPORTUNITIES +	**T**HREATS –
+ Co-organize events with the RMCA in Tervuren and in Brussels + Collaboration with the Botanic Garden Meise + Collaboration with waarnemingen.be + Collaboration with Natuurpunt and Natagora + Collaboration with Brussels-based associations + Organizing a bioblitz during an international event: International Day for Biological Diversity, April Global Citizen Science Month, City Nature Challenge	

6. Developing full-scale education projects

There is currently no ongoing CS project led by the Education Departments of the RBINS and the RMCA.

The opportunity of a project in collaboration with the Microvertebrates Laboratory is currently being studied by the Education Department of the RBINS. The lab has important amounts of sediment material to sort, a task which is appropriate for higher elementary and secondary school students. The material needed to accomplish the tasks would be a stereomicroscope and a good magnifying glass. Students could even DIY or recycle some of the equipment such as sorting trays and reference grids.

INTERNAL FACTORS

STRENGTHS +	**W**EAKNESSES –
+ A fixed team of part-time educators (RBINS) with pedagogical expertise; + Existing didactic material and tools ; + Privileged contact with school teachers ; + Experience with CS thanks to project XperiBird (RBINS).	- Only two part-time educators (RMCA); - Lack of project follow-up due to lack of time and personnel.

EXTERNAL FACTORS

OPPORTUNITIES +	**T**HREATS –
+ Funding: Solvay Foundation, Roi Baudouin Foundation, Innoviris, Promethea.	

XI. COMMUNICATION AND OUTREACH

1. External communication

The **RBINS** disseminates CS projects towards the broad public through a dedicated page on the website (Path: Museum/Visits & Activities for everybody/Citizen Science). The different projects are presented as a series of articles. A new general website will be launched before the end of 2023. The Citizen Science page will be easier to find and the presentation of the projects will be improved. Currently, there is no "call to participants" on this page. The page is available in French and Dutch.

Figure 7. CS on the RBINS Webpage

Not all CS projects are described on the general page. Some projects coordinated by the OD Nature have separate websites (Marine Mammals, BeBirds).

The **RMCA** disseminates CS projects towards the broad public through a dedicated page on the website (Path: Get involved/Citizen Science). Three "call for participants" corresponding to three virtual projects on collection data enrichment by label transcription have been published so far. The page is available in French, Dutch and English.

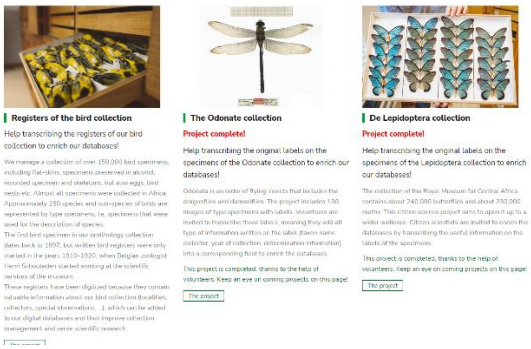


Figure 8 CS on the RMCA website

One article was published in 2022 in the BRUZZ magazine about a the digitization of the biological collections using the platform DoeDat.

The CS page of the public website does not present Citizen Science investigation projects taking place in Africa, for which separate websites exist: Citizen Science in Uganda, HARISSA Natural hazards, risks and society in Africa, DIPoDIP.

Figure 9. Awareness campaign logo created by a group of KU Leuven students

In collaboration with the science communication teams in both Institutes, we have explored ways of improving awareness among the broad public and among potential citizen scientists who can and want to be involved in scientific research. Except for the Birds Registries transcription project using DoeDat, there is currently no recurring recruitment campaign of virtual or onsite volunteers. We strongly believe that the following tools will help to reach out and open CS research to external stakeholders.

COMMUNICATION TOOLS AND ACTIONS				
Action	**Target**	**Collaborators**	**Status**	**Deadline**
Leaflet on CS	Potential CSts and the broad public	the communication service of the RMCA	Ongoing	09.2023
Awareness digital campaign on CS	Potential CSts	the communication services of the RMCA and the RBINS science communication students (KU Leuven)	Ongoing	09.2023
CS section of the new website of the RBINS	Potential CSts and the broad public	/	Not started	

For a list of outreach events in which CS projects should be showcased, see ***Annex 6 : Overview of outreach events.***

2. Internal communication

Internal communication on CS is done through a SharePoint website. The goal of this platform is to share expertise on CS. It is an internal (RBINS-RMCA) membership based platform. It consists of events, news and scientific publications on CS. Over 100 members follow the platform.

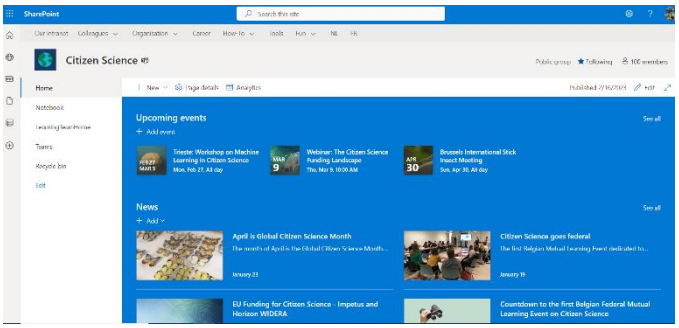


Figure 10 Intranet CS platform

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Annual report 2021 RBINS

Gender equality plan RBINS 2022

Annual report 2021 of the Meise Botanic Garden

XIII. ANNEXES

Annex 1: Inventory of ongoing CS projects at the RBINS

Type	Count	Title	Description	Coordinator	OD	Funding
Civic actions	0					
Monitoring	5	Marine Mammals	The repository of all Belgian marine mammal observations and strandings gathered by the RBINS.	Jan Haelters, Kelle Moreau	OD Natural Environment	*Marine Mammals is structurally funded by BELSPO.*
		BeBirds	BeBirds aims to monitor wild bird populations through a network of certified volunteer ringers.	Didier Vangeluwe	OD Natural Environment	*Structurally funded by the Belgian Federal Science Policy (BELSPO) and by the ringers themselves. The ringers pay 135 €/year.*
		The North Seal Team	100 citizens monitor marine mammals on the Belgian coast.	Inge de Bruycker, Colette De Meyer Jan Haelters, Kelle Moreau	North Seal Team OD Natural Environment	/
		DASA, database of animal sounds	A digital archive of animal sounds created in collaboration with various stakeholders.	Robin Brabant	OD Natural Environment	*DASA is supported by a BRAIN grant in 2023-2025.*
		Proper strand lopers	Monitoring marine litter at the Belgian coast in a standardized manner.	Thomas Kerkhove	OD Natural Environment	*Proper Strand Lopers is funded by the Cabinet of the North Sea.*
Investigation	6	Contribution to Taxonomy: Neotropical land snails, especially the re-evaluation of the Orthalicoidea	Multiple topics project involving neotropical land snails, type material, bio history, archives and historical collections.	Abraham Breure – Citizen Scientist	OD Taxonomy and Phylogeny	*These projects are funded by the OD Taxonomy and Phylogeny.*
		Contribution to taxonomy & population distribution -	Identification of European marine Mollusca from NE-Atlantic & Mediterranean Sea, with emphasis on	Thierry Backeljau	OD Taxonomy and Phylogeny	

Annex 1: Inventory of ongoing CS projects at the RBINS

Type	Count	Title	Description	Coordinator	OD	Funding
		Identification of European marine Mollusca from NE-Atlantic & Mediterranean Sea	Gastropoda; Opisthobranchia.			
		Fraud and fakes with shells and shell related objects	Investigation, detecting and understanding fraud and fakes with shells and shell related objects in NHMs, private collections and ethnographic collections worldwide.	Roland De Prins - Citizen Scientist	OD Taxonomy and Phylogeny	
		Fauna of Belgium	Production of monographic books on the fauna of Belgium (identification, faunistics, distribution) conjointly by CS and RBINS researchers for a wide readership and use.	Thierry Backeljau	OD Taxonomy and Phylogeny	
		Objectif 1000 Jardin Massart	The project is aiming to inventory the insect fauna of the botanical garden Jardin Jean Massart in Auderghem.	Alain Drumont	OD Taxonomy and Phylogeny	*A small grant from Bruxelles Environment covered the cost of the material.*
		Biographical history of malacologists		Thierry Backeljau	OD Taxonomy and Phylogeny	
Virtual	0					
Scientific volunteers	10	Contribution to Taxonomy (Broad sense) / Malacology	Citizens and professionals passionate about new species, collections, oddities combine their expertise with the RBINS for the benefit of research and nature conservation.	Thierry Backeljau (DO Taxonomy and Phylogeny)	OD Taxonomy and Phylogeny	*These projects are funded by the ODs.*
		Contribution to Taxonomy		Thierry Backeljau Wouter DeKoninck	OD Taxonomy and Phylogeny Scientific Heritage	

Annex 1: Inventory of **ongoing** CS projects at the RBINS

Type	Count	Title	Description	Coordinator	OD	Funding
		(Broad sense) / Entomology				
		CS contributions to Collection Management		Thierry Backeljau Wouter DeKoninck	OD Taxonomy and Phylogeny Scientific Heritage	
		CS contributions to field sampling and international scientific missions/expeditions: Inventory project Heathlands Bruges		Wouter DeKoninck	OD Taxonomy and Phylogeny Scientific Heritage	
		CS contributions to field sampling and international scientific missions/expeditions: Project Taxonomy of Phasmatodea in South-East Asia		Jerome Constant	OD Taxonomy and Phylogeny	
		CSts feed entomological databases and websites by crowd sourcing		Wouter DeKoninck	OD Scientific Heritage	
		Collecting geological data and samples from temporary outcrops		Marleen De Ceukelaire	OD Scientific Heritage	
		Scientific contribution to paleontology and geology		Pascal Godefroit	OD Earth and history of life	
		Technical contribution to fossil preparation		Olivier Lambert	OD Earth and history of life	
		Enlargement of the RBINS reference collection of dry fish skeletons		Wim Wouters	OD Earth and history of life	
Education	1	Bioblitz		Jerome Constant	DO Taxonomy and Phylogeny	*This event is funded by the OD Taxonomy and Phylogeny.*

Annex 2: Inventory of ongoing CS projects at the RMCA

Type	Count	Title of the project	Coordinator	Department	Funding
Civic actions	0				
Monitoring	2	MEMO – Monitoring exotic mosquitoes	Nathalie Smitz	Biology – Invertebrates	*Federal and Federated Entities for Health and Environment*
		Fishbase for Africa	Jos Snoeks	Biology - Vertebrates	*Directorate-General for Development Cooperation and Humanitarian Aid (DGD)*
Investigation	2	ATRAP - Action Towards Reducing Aquatic snail-borne Parasitic diseases	Tine Huyse	Biology – Invertebrates	*Directorate-General for Development Cooperation and Humanitarian Aid (DGD)*
		HARISSA - Natural HAzards, RISks and Society in Africa: developing knowledge and capacities	Francois Kervyn de Meerendré Olivier Dewitte Caroline Michellier	Earth Sciences, Natural Hazards	*Directorate-General for Development Cooperation and Humanitarian Aid (DGD)*
Virtual	2	The birds collection registers transcription on DoeDat	Larissa Smirnova Annelore Nackaerts	Biological collections	*This project is made possible by the Botanic Garden Meise through the DoeDat platform, supported under DISSCO Flanders*
		Be-Music	Remy Jadinon	Cultural anthropology & history, Culture & society	*This project is supported by a BRAIN grant 2023-2027.*
Education	1	DIPoDIP2 - The Diversity of Pollinating Diptera in South African biodiversity hotspots	Kurt Jordaens	Biology – Invertebrates	*Directorate-General for Development Cooperation and Humanitarian Aid (DGD)*
Scientific volunteers	5	Mineral collections	Florias Mees	Earth Sciences, Surface environments and collection management	*These projects are funded by the ODs.*
		Archaeology collections	Els Cornelissen	Cultural anthropology & history Heritage studies	
		Biology collections - arachnology	Didier Van Den Spiegel Arnaud Henrard	Biological collections	
		Biology collections - vertebrates	Didier Van Den Spiegel Garin Cael	Biological collections	
		Wood biology collections	Hans Beeckman	Wood biology	

Annex 3: Inventory of potential projects at the RBINS

	OD	Title	Person responsible	Volunteers	Type	Description	Funding
1.	OD Earth and History of Life Geological Survey of Belgium	Learning from the past: The impact of abrupt climate changes on society and environment in Belgium	Sophie Verheyden (Geological Survey of Belgium) Christian Burlet (Geological Survey of Belgium)	Union Belge de Spéléologie. 20 to 50 speleologists could get involved.	Monitoring	Measure climate change in Belgian underground caves with the help of the Niphargus device, developed by the Geological Survey of Belgium research unit. Niphargus is a small low power temperature logger with an easy-to-use interface. Temperature in caves will be measured over a long period (at least 3-5 years) in order to map variations. Another element of the research will be measuring CO2, which has never been done in Belgium before. Combining temperature and CO2 measurements over time would contribute to the understanding of climate change.	complementary to project LEAP, funded by a BRAIN grant
2.	OD Public OD Earth and History of Life Microfossils preparation lab	Schools sorting microfossils	Freek Fonteyne (OD Public) Thierry Smith (OD Earth and History of Life) Nathan Vallee-Gilette (OD Earth and History of Life)	Students	Education	Higher elementary and secondary school students sort microfossils bearing sediment provided by the Microfossils preparation lab of the RBINS. Freek, Thierry and Nathan are looking into it at the moment.	Solvay Foundation
3.	OD Taxonomy and phylogeny Scientific Heritage Entomology collections	Counting insect boxes with Zooniverse	Patrick Semal (Scientific Heritage) Wouter Dekoninck (Scientific Heritage / OD Taxonomy and Phylogeny)	Online contributors	Virtual	We will publish 5000 photos of boxes of insects on Zooniverse. The Citizen Scientists will transcribe the species available in the drawer and count all the specimens for each species. An inventory with a complete list of all species available, the number of specimens and the locality (number of drawer and cabinet they are located) are important for the collection managers and collaborators as well as the scientists working on these insects. For the later it is important to know if a species is present in the RBINS collection and how many specimens are available.	IMPETUS Accelerator grant under the overarching project CRESCO

Annex 3: Inventory of potential projects at the RBINS

	OD	Title	Person responsible	Volunteers	Type	Description	Funding
4.	OD Taxonomy and phylogeny Scientific Heritage Entomology collections	Transcribing the Cooreman mites slides with DoeDat	Patrick Semal (Scientific Heritage) Wouter Dekoninck (Scientific Heritage / OD Taxonomy and Phylogeny) Katarzyna Smistek (Scientific Heritage)	Online contributors	Virtual	A virtual DoeDat project for unlocking data from the mite collection of the RBINS and the RMCA aims at harvesting metadata of 10000 slides. The Fain collection is one of the most complete and type-specimens rich mite collection worldwide. It contains more than 2000 types of different mite orders. All the specimens are mounted on slides accompanied by two labels. One label with information on locality, date of collecting, host, the other label contains the taxonomical information. So far more than 80.000 slides have been digitized and are available in Darwin. Another 30.000 are still to be done. Many species are of medical importance as host and/or vector of parasites for humans and vertebrates. Knowing their locality and other details such as how and on which host they were collected is crucial knowledge in health issues.	IMPETUS Accelerator grant under the overarching project CRESCO
5.	OD Earth and History of Life OD Scientific Heritage Paleontology collections	Transcribing registers from the Paleontology collection using DoeDat/Zooniverse	Annelise Folie (Scientific Heritage / OD Earth and History of Life)	Online contributors	Virtual	Transcribe archival documents from the Paleontology collection using an online platform.	No funding necessary Support of the DoeDat platform
6.	OD Earth and History of Life	Preparation of fossil specimens	Pascal Godefroit (OD Earth and History of Life)	Amateur paleontological association	Scientific volunteers	No additional information	No additional information

Annex 4: Inventory of potential projects at the RMCA

	Service	Title	Person responsible	Volunteers	Type	Description	Funding
1.	Earth Sciences Natural Hazards	Georeferencing old maps	François Kervyn de Meerendré (Natural Hazards)	Online contributors	Virtual	This approach has already been considered during the Cartesius project. At the moment, this project cannot be supported. There is a lack of scientific personnel to develop and supervise the project. "From a technical point of view, a problem arises with the absence on many of the maps of the projection information necessary for georeferencing. But this point can be circumvented with an impact on quality. To conclude, it is certainly something to keep in mind but for the moment it is unmanageable for us." François Kervyn de Meerendré	No funding
2.	Biology collections	Canathist	Didier Van Den Spiegel (Biology Collections)	African contributors	Virtual	Using a remote sensing app to record and submit new collection specimens directly from the field.	BELSPO funding for research infrastructures (pending)
3.	Biology collections	Scientific volunteers for the birds collection	Larissa Smirnova (Biology Collections) Annelore Nackaerts (Biology Collections)	Belgian onsite contributors	Scientific volunteers	Based on the experience gained from the pilot digitization project already conducted, we expect that in six months, the citizens should process 10.000 physical samples. The data will include taxonomic determinations, special observations, date and place of collection/donation.	IMPETUS Accelerator grant under the overarching project CRESCO
4.	Wood Biology	Scientific volunteers for digitizing the Tervuren xylarium	Hans Beeckman (Wood biology) Ruben de Blaere (Wood biology)	Belgian onsite contributors	Scientific volunteers	To digitize the wood collection, we sand the specimens with a robotic arm to visualize their anatomical features. Volunteers can use the robotic arm to sand the wood surfaces and preprocess the samples for image capturing. This allows for the processing of large amounts of specimens (100/day) without overburdening volunteers. One volunteer with some woodworking experience or a strong interest in wood as a material can work with the intuitive and easy-to-	IMPETUS Accelerator grant under the overarching project CRESCO

Annex 4: Inventory of **potential** projects at the RMCA

	Service	Title	Person responsible	Volunteers	Type	Description	Funding
						operate robotic arm software. The volunteer would need to come to the Museum to perform this task as the robot cannot be moved. To capture the anatomical features of the wood samples in detail, we use a flatbed scanner. Image capturing is a key step for computer vision-based wood research and requires minimal manual labor, making it doable for volunteers with joint ailments. Volunteers can either come to the AfricaMuseum to scan the samples or arrangements can be made for them to do the work from home with mutual trust established between the museum and the volunteer(s).	
5.	Wood Biology	Sorting pictures for Smart Wood ID with Zooniverse	Hans Beeckman (Wood biology) Ruben de Blaere (Wood biology)	Online contributors	Virtual	Our goal is to study the automatic detection of various wood anatomical features using computer vision. This research provides valuable insights into forestry management, evolutionary traits, and wood 2 technology. We will invite citizens to participate through Zooniverse and onsite by providing annotations of different visible tissues (vessels, parenchyma, fibers, rays) using image segmentation for 10.000 images of wood samples.	Submitted for the IMPETUS Accelerator grant under the overarching project CRESCO
6.	Cultural anthropology	School students record interviews to measure how local heritage is perceived by the community (part of the project Afrisurge)	Hein Vanhee Felix Fufulafu (Cultural anthropology)	Primary school students	Education	Felix will co-create with teachers courses on heritage which will be embedded in the official school program starting from September 2023. Felix will then observe the teachers and the students in how they interact during the courses. This will enrich his observation on how heritage is perceived. He has the intention to involve the pupils' families. In this case, Citizen Science is an option. For example, one assignment the pupils may fulfill is interview their family members on heritage and record local knowledge. To collect and analyze the data, a tool (app) will be developed to take photos or make recordings. The added value for the teachers and their pupils is the creation of a course on local heritage, which does not exist right now. There is now a disconnection between the community and objects.	BRAIN 2019-2024

Annex 5: SWOT analysis of monitoring schemes within the RBINS

BeBirds
The RBINS organizes the ringing of wild birds in Belgium. The first birds were ringed in 1927, making it one of the longest scientific programs of the RBINS. To become ringer of the RBINS and receive the legal authorization to capture and ring wild birds, he or she must follow a training period of minimum 4 years within a ringing group and successfully present two exams. This system ensures the competence of ringers and therefore the quality of the data collected. In Belgium, ringers always work in teams; there are 51 ringing groups totalizing around 350 ringers. These are distributed throughout the country but with a lower coverage in Western Ardennes, in Hainaut and Gaume. Website

INTERNAL FACTORS

STRENGTHS +	**W**EAKNESSES –
+ The structure is the main strength of the project. The group supervisors are giving a lot of time to train the ringers and to control the data. The structure is decentralized. + Because the ringers pay for their membership, a selection occurs. Only motivated people enroll. + The Regions approve. + Having one coordinator, Didier, who is himself a ringer and has thorough knowledge. + The ringers have an e-mail address and send the data in digital format only. + The ringers have prior interest and knowledge in bird observation.	- Human resources. The website exists since 2014 but is not updated regularly. - The ringers pay to sustain the network. - Acknowledgement of the efforts needed to manage, maintain and evaluate the network. - Few network meetings, team buildings or seminaries.

EXTERNAL FACTORS

OPPORTUNITIES +	**T**HREATS –
+ Integrate the network management aspect in the functioning of the Service. + In the context of the Data architecture plan, collaborate with Francis Strobbe for a new and better web platform.	- Members' rebellion. Solution: acknowledgement must be fair. - The Access database will soon become technically obsolete.

Marine Mammals

Marinemammals.be is the repository of all Belgian marine mammal observations and strandings gathered by the RBINS. It contains data ranging from sightings and strandings and the results of scientific research. It includes data about dolphins, whales and seals from Belgian waters.

More structural and extra data for detailed scientific interpretation of the trends help to give policy advice on the short, medium and long term. Short term policy advice are often caused by dramatic events. In 2021, at the west coast more dead or injured seals were stuck in fishing nets, mostly dead. The Marine Mammals network can provide data to help adapt legislation.

Website

INTERNAL FACTORS

STRENGTHS +	**W**EAKNESSES –
+ Big coverage, not only for stranded animals, but also for the living animals resting on the beaches.	- The Marine Mammals database needs updating and cleaning. - The site should not be in English, but in Dutch and French, so it is suitable for a wider audience. It should also serve as a practical tool to inform people on what to do in case of encounters with live and dead marine mammals. - We do not possess statistics on the citizens involved in data collection.

EXTERNAL FACTORS

OPPORTUNITIES +	**T**HREATS –
+ The procedures (protocols) on what to do with the rare events should be revived with the local communities. These protocols should derive from the operational procedures for scientists. We should publish them on the websites of the coastal communities, in local magazines, etc. + Collaboration with Waarnemingen.be. + In the context of the Data architecture plan, collaborate with Francis Strobbe for a new and better web platform. + Collaborate with the coastal educators network in which all representatives of educational centers (VOC, De Panne, VLIZ, RBINS) are invited once a year to share new insights of relevance to educators. VLIZ already creates educational packages for schools.	- Journalists following the Facebook groups and asking for interpretations. - Potential tensions between the communities. Fishermen feel stigmatized and start reacting. The majority apply the rules and could be allies. In 2021, our research showed that most recreational fishermen were not responsible for the wounded mammals. - A tool (app, website) would be useful for every individual observer that collects the data. An intermediary (expert citizen scientist) could control the data. However, our database would not be complete, as some people already use Waarnemingen.be for monitoring and tracking their activity.

North Seal Team
The RBINS works together with the North Seal Team civic organization to monitor seals at the coast. The volunteers keep people firmly at a distance (= Guard and Protect) and raise their awareness. When a seal is sick or injured, Sealife is contacted so that the animal can be taken in for care (= Rescue). During Covid, there were more seals on the beaches. Oostende, the busiest beach at the coast, was at the time a dog-free running zone, which was a problem for the seals. Because of that situation, it is now a dog-free beach. This event had an impact on local regulations. Website

INTERNAL FACTORS

STRENGTHS +	**W**EAKNESSES –
+ We do not, ourselves, organize a dedicated citizen team to collect data, as marine mammal strandings are inherently a fairly rare event. If we would have to do so, it would take up a lot of organizational time, and we can currently get the assistance of NorthSealTeam and others in collecting data. + In the beginning, there was some aggressive behavior because the general public didn't recognize the authority of the North Seal Team. With the support of the Province, a kit (fluo vest, sign, badge) has been provided to increase legitimacy.	- There are only occasional observations allowing us to know the maxima. The urge to report every day is low. It would be interesting to see the everyday trends depending on the tidal cycle. We should have a fixed schedule (e.g. once every day at low tide, one person of the network has to go check). + We need information on human activity (e.g. a boat ramp where seals rest).

EXTERNAL FACTORS

OPPORTUNITIES +	**T**HREATS –
+ A press event will take place in spring 2023 to inform the public of the existence of the network and plead for sustainability.	- The Province will not maintain the financing for this project. - Conflict between the two managers of the North Seal Team. The communication with the two managers of the network is very difficult at the moment. - There is no structure in the network and dataflow depends on the good will of individuals. There are two ladies managing the community of volunteers. One lady keeps the information in an Excel file and sends it to us. We have ourselves no contact with all the volunteers.

Digital Animal Sounds Archive (DASA)
The goal of the project is to create a digital archive of animal sounds in collaboration with working groups of Natagora and Natuurpunt.

INTERNAL FACTORS

STRENGTHS +	**W**EAKNESSES –
+ RBINS has inhouse expertise with 4 years research at hand and a lot of data.	

EXTERNAL FACTORS

OPPORTUNITIES +	**T**HREATS –
+ The chair of the working group at Natuurpunt is also a volunteer. They have an established network of volunteers that we as a federal Institute don't have. A lot of people are working almost daily with bats. + The chair of Natuurpunt is associated to the project. He has identified a strong need from the volunteers to have a common database.	- The database is not fit for purpose and does not meet the needs of the volunteers, in which case it will not be used. - There are no common protocols. Each volunteer has his own way of working.

PROPER STRAND LOPERS
The RBINS will collaborate with FOD Health and the Proper Strand Lopers organization in monitoring marine litter on the Belgian coast. Website News

INTERNAL FACTORS

STRENGTHS +	**W**EAKNESSES –
+ Thorough reflection on data quality. There can always be an issue with data collection by several different people (scientists and citizen scientists). The odd data will flatten out each other. The more data there is, the less variation they have. + Today, scientists monitor one trajectory of 1 km 4 x a year. PSL will do 10x more, monitoring a trajectory of 100m in each of the 10 coastal cities 4x a year. Today there is interference in the data the scientists record because there are other cleanup actions going on at the same time. The PSL could mark the trajectory on each beach where people shouldn't pick up litter to allow for the monitoring to happen in a standardized manner.	

EXTERNAL FACTORS

OPPORTUNITIES +	**T**HREATS –
+ In Flanders, a lot of litter is plastic bottles and cans. PSL members are good in creating awareness among the broader public and policy makers. + Collaboration with Proper Strand Lopers NGO.	- The RBINS will not select or manage the volunteers. The same situation as with the North Seal Team may occur.

Annex 6 : Overview of outreach events

This is a non-exhaustive list of international outreach events where Citizen Science research can be showcased and communicated.

INTERNATIONAL OUTREACH EVENTS	
Event page	**Description**
International Day for Biological Diversity	The UN celebrates the International Day for Biological Diversity every year on the 22nd of May.
April Global Citizen Science Month	Campaign organized by the platform SciStarter in collaboration with Arizona State University and with support from the National Library of Medicine. SciStarter provides its website to host and make available resources and connections for scientists and event organizers and the public.
City Nature Challenge	Cities around the world collaborate to share observations of nature in the 2023 City Nature Challenge.
idigbio.org	Digital transcription challenges for making data and images of millions of biological specimens available on the web.

This is a non-exhaustive list of national outreach events where Citizen Science research can be showcased and communicated.

OURTREACH EVENTS AT THE RMCA					
Event	**Date**	**Public**	**Responsible**	**Submission deadline**	**Potential CS Actions**
Month of science within the 125/5 Anniversary	Every week-end of September	Families, adults	Tine Geunis (Education and Culture)	15/03	Workshops Brochure
Dag van de wetenschap	28/11 (last Sunday of November)	Families, adults	Science Communication	by end September	Behind-the-scenes visits by scientists and volunteers Workshops Collections transcribing marathons
Bedrijven Dag	1/10	Adult	Science Communication		Behind-the-scenes visits by scientists and volunteers
Erfgoed Dag	23/04	Families, adults	Katrien Van Craenenbroeck (Education and Culture)	13/01	Behind-the-scenes visits by scientists and volunteers Workshops
Erfgoed Week	17 – 28/04	Schools	Katrien Van Craenenbroeck (Education and Culture)	2/12	Workshops in schools

Africa Sundays		Families	Tine Geunis (Education and Culture)		Visits Workshops
Museum Talks	Online	Adults	Nadia Nsayi (Education and Culture)		Present one specific project with interventions from volunteers and researchers.

This is a non-exhaustive list of national outreach events where Citizen Science research can showcased and communicated.

OUTREACH EVENTS AT THE RBINS					
Event	**Date**	**Public**	**Responsible**	**Submission deadline**	**Potential CS Actions**
I love science festival	13-15/10	Families, adults	/	15/02	Workshops Xperilab participates
Phasma meeting	04	Phasma amateurs	Jerome Constant (Entomology)	/	Seminar
Fête de l'Iris	07/05	Families, adults	Donatienne Boland (Communication)	02	Various
Nerdland festival	26-28/05	Families, adults	Reinout Verbeke (Science Communication)	02	Workshops Education participates
Saviez-vous	Each last Friday of the month	Adults	Geraldine Maulet (Education)	/	Seminars by scientists
Semaine des insectes	05	Families, adults	Wouter Dekoninck (Entomology collections)	/	Safari
BioBlitz	05	Families	Wouter Dekoninck Jerome Constant Carole Paleco (Taxonomy & Phylogeny)	/	BioBlitz
Ensemble pour la biodiversité	Permanent campaign	General	Marc Peeters (Natural Environment)	/	Awareness campaign

Annex 7: Overview of funding opportunities for CS

Logo	Entity	Program	Call	Themes	Department	€	Deadline
	European Commission	Horizon Europe	Horizon Widera (Widening participation and strengthening the European Research Area)	HORIZON-WIDERA-2023-ERA-01-08: Laying the groundwork towards Europe-wide citizen science campaigns	All		09.03.2023
	European Commission	Horizon Europe	CLUSTER 2: Culture, creativity and inclusive society	Example: HORIZON-MISS-2023-SOIL-01-07: Back to earth: bringing communities and citizens closer to soil Other themes: Democracy Transformation Heritage Climate Soil Oceans	RBINS Geological Survey of Belgium RMCA Earth Sciences		20.09.2023
	European Commission	Horizon Europe	CLUSTER 6: Food, bioeconomy, natural resources, agriculture and environment	HORIZON-CL6-2023-GOVERNANCE-01-12: Empowering citizens to monitor, report and act in partnership with relevant public authorities to protect their environment in the context of environmental compliance assurance	RBINS Natural environment RMCA Biology		23.03.2023
	European Commission	Horizon Europe	CLUSTER 6: Food, bioeconomy, natural resources, agriculture and environment	HORIZON-CL6-2024-BIODIV-01-1 Invasive alien species	RBINS Taxonomy and phylogeny Natural environment Secretariat for invasive species RMCA Biology		22.02.2024
	Impetus Consortium	IMPETUS project has received funding from the European Union's Horizon WIDERA 2021-ERA-01 Research and Innovation Programme under	IMPETUS 1st Open Call: The Accelerator Programme for Citizen Science projects 2023 and the European Union Prize for Citizen Science 2023	Challenge 1 Healthy Planet for all - Water - Land - Biodiversity Challenge 2 Cities for life - Health issues - Climate and ecological emergency - Social and economic inequalities	RBINS Taxonomy and Phylogeny Natural environment Scientific Heritage RMCA Biology collections	10.000 – 20.000	13.03.23 03.24 03.25

Annex 7: Overview of funding opportunities for CS

Logo	Entity	Program	Call	Themes	Department	€	Deadline
		Grant Agreement No 101058677					
	BELSPO	Impulse funding	BRAIN 2.0	- Pillar 1: Challenges and knowledge of the living and non-living world - Pillar 2: Heritage science - Pillar 3: Federal societal challenges	All		A new generation of impulse funding schemes coming up in spring 2024
	BELSPO	Research infrastructures			All		
	BELSPO	STEREO Support to the exploitation and Research in Earth Observation	STEREO IV	- Impact of climate change on terrestrial/marine environments (data exploitation, monitoring, modelling, mitigation strategies); - Advanced Monitoring and Assessment of Hazards (including pandemics); - Monitoring environment for improved environmental health and biodiversity; - Geo-information for Sustainable and Green Cities	RBINS Geological survey of Belgium RMCA Earth Sciences		31.03.2023 Expression of interest 09.06.2023 Research proposals
	BELSPO	FED-tWIN	Develop sustainable joint research activities between the FSI and the universities. Post-doctoral researcher who is employed part-time at the FSI and part-time at the university.	CS is a component of FedTwin profiles.	All		
	Fondation Roi Baudouin	Answer a call for projects	Fonds Ernest Solvay – STEM annual call	Climate, environment and biodiversity	All In collaboration with the OD Public Services	10000	2x/y March September
	Fondation Roi Baudouin	Answer a call for projects	Private sponsorship for museum collections fund	Valorization of museum collections	Scientific Heritage	/	1x /y
	Baillet-Latour Fondation	Support for the Social Sciences	Fonds Baillet-Latour	- Education - Culture	RBINS		/

Annex 7: Overview of funding opportunities for CS

Logo	Entity	Program	Call	Themes	Department	€	Deadline
		and the Humanities, including Citizen Science activities with a Belgian dimension		- Environment	Earth and history of life Scientific Heritage RMCA Cultural anthropology and history		
	Promethea	Corporate sponsorship	Crowdsourcing campaigns and coaching	Heritage and culture	Any cultural project in collaboration with the OD Public Services	/	/
	CERA	Any organization that is not a company can request up to 3000 euros in support	Submit a project	Societal challenges The conditions are: - Cooperation with other organizations - The presence of volunteers involved in the development or implementation of the project - For and/or with people in vulnerable situations - Stimulate encounters, links and social diversity - Enable a leverage effect for the functioning of the organization - Achieve a positive and concrete, local and sustainable impact - The creation of a relationship between Cera and the organization in request	All	3000	3x / y 09.01.23 09.04.23 09.09.23
	The National Lottery	No dedicated Citizen Science call	General Call	Support for any project which demonstrates societal impact	All		/
	FNRS	No dedicated Citizen Science call					
	FWO	No dedicated Citizen Science call					

Annex 7: Overview of funding opportunities for CS

Logo	Entity	Program	Call	Themes	Department	€	Deadline
	VLAIO	Part of the Flemish Food Strategy	A consortium to map food environment(s)	Food	/		/
	Scivil	Part of Flemish Action Plan on Artificial Intelligence	Calls through project Amai! First 2 calls: 9 projects funded	Artificial Intelligence	/		/
	Innoviris	Supporting innovation in the Brussels Region	I love science festival	Science outreach	All		15.02.2023
	Innoviris	Supporting innovation in the Brussels Region	Proof of concept	Grant for a proof of concept or a proof of interest of research results	All RBINS		Permanent
	Innoviris	Supporting innovation in the Brussels Region	Co-creation	Research in co-creation for urban resilience in all its dimensions (ecological, economic, social and democratic).	All RBINS		Permanent
	Innoviris	Supporting innovation in the Brussels Region	STEM	Science promotion	All RBINS		Permanent
	Bruxelles environnement	Strategy pollinators	Public contracts One atlas / order	This Strategy is in line with the European Pollinator Monitoring Scheme	RBINS Taxonomy and phylogeny		One public contract / year
	Bruxelles environnement	No dedicated CS program	Project support for any organization wanting to promote sustainable development	Sustainable development - nature conservation awareness - waste sorting - gardening courses	All RBINS		Permanent
	VUB	Citizen Science Contact Center	Internal call for VUB researchers working with a community of Citizen Scientists	Innovative research, fundamental or applied, that allows citizens to contribute to the scientific process and to feed science-based actions and policies	VUB researchers		2022
	KU Leuven	Citizen Science working group	Citizen Science Internal call	Stimulate interdisciplinary collaboration with a strong social engagement between the different groups and campuses at KU Leuven. Collaboration with a societal partner is strongly recommended	KU Leuven researchers		11.05.2023

Annex 8 : Annual budget estimate

Staff salaries	*Salary (€)*	*Overhead (15%)*	*Days spent on CS projects*		*Total funded (€)*
CS Coordinator	76173,43	11426,01	1 y		87599,44
Onsite volunteers working in CS projects in Belgium (34€/day)	6800,00	1020,00	200		7820,00
Subtotal					**95419,44**
Travels	*Explanation*	*Staff attending (names)*	*Cost (€)*	*Overhead (15%)*	*Total funded (€)*
ECSA biennial conference	Based on 50% of the costs of the 2022 conference	CS Coordinator	800,00	120,00	920,00
ECSA biennial conference	Based on 50% of the costs of the 2022 conference	1 Researcher RBINS	800,00	120,00	920,00
ECSA biennial conference	Based on 50% of the costs of the 2022 conference	1 Researcher RMCA	800,00	120,00	920,00
6 Networking events in Belgium	Various	CS Coordinator	300,00	45,00	345,00
2 Networking events in Belgium	Various	1 Researcher RBINS	100,00	15,00	115,00
2 Networking events in Belgium	Various	1 Researcher RMCA	100,00	15,00	115,00
Subtotal					**3335,00**
Equipment	*Explanation*		*Cost (€)*	*Overhead (15%)*	*Total funded*
			0,00	0,00	0,00
			0,00	0,00	0,00
Subtotal					**0,00**
Consumables, other goods and services	*Explanation*		*Cost (€)*	*Overhead (15%)*	*Total funded (€)*
Printed CS flyer	Communication and recruitment		1000,00	150,00	1150,00
Volunteer's kit (t-shirt, badge)	Community management		1000,00	150,00	1150,00
Merchendising	Oureach (Erfgoeddag, Dag van de Wetenschap)		500,00	75,00	575,00
2 internal events for Citizen Scientists	Community management		1000,00	150,00	1150,00
2 internal events for Researchers	Internal Communication		1000,00	150,00	1150,00
participation in 2 outreach events	Oureach (Erfgoeddag, Dag van de Wetenschap)		1000,00	150,00	1150,00
Subtotal					**6325,00**
Subcontracting*	Explanation		Cost (€)	No overhead	Total funded (€)
Subtotal					**0,00**
Total (€)					**105079,44**