

Impact Assessment Report



INTRODUCTION

Project Title	CRESCO Citizen Rescuers for Collections
Geographical Location	Belgium
Lead and partners organisation	Institute of Natural Sciences AfricaMuseum



Project Description

Project CRESCO Citizen Rescuers for Collections brings together for the first time a team of Belgian biology researchers and curators from the AfricaMuseum (Tervuren) and from the Institute of Natural Sciences (Brussels), and 26 citizen scientists. They join forces to make hidden biological collections data accessible. How? Either by taking standardized photos of specimens, which can help researchers worldwide describe a species without visiting the museums, or by transcribing hundred-year-old handwritten collection labels, the ones that even the best OCR programs cannot deal with. CRESCO has pioneered hybrid, online and on-site, citizen science approaches. The project has strengthened the citizen science community of the two museums by achieving gender equality and by reaching out to Ukrainian refugees. It has delivered quality scientific data that couldn't have been obtained otherwise.





PROJECT RESULTS IN FIGURES



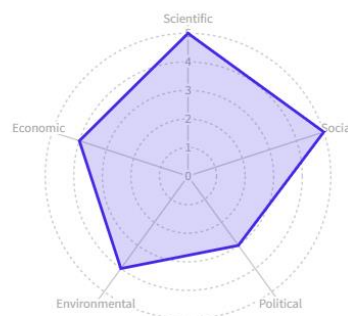
Main achieved impacts

CRESCO has had an important scientific impact. Over 6.300 new biological specimens and samples have been digitized and published in open access. New and innovative digitization methods were developed for the project.

The project has achieved gender equality and inclusion of underrepresented groups, which represents a significant change considering data on citizen science museum activities pre-CRESCO.

CRESCO's economic impact was equally significant for the two coordinating research institutes. The work of the citizen scientists generated a cost saving of at least 26.800 €. CRESCO has also achieved additional political support for citizen science in the federal research institutes in Belgium.

On the long term, CRESCO will have a considerable environmental impact. The data will be used to train an AI model for protected wood species identification. This app will help non-expert users trace wood from illegal logging and timber trafficking.





New knowledge resources

CRESCO Citizen Rescuers for Collections has generated knowledge which would have been impossible to produce without the citizen science approach. In only 12 weeks, the project has created 3 new datasets consisting of more than 6.500 new biological collection items. The data is FAIR. It is findable online and accessible through reports generated by databases [Darwin](#) and [Virtual Collections](#). It is interoperable as data is normalized, with country codes, and taxons are checked.

Citizen scientists have sorted and photographed 3.000 new bird specimens from the AfricaMuseum collections. They have prepared and photographed 1.288 wood samples, which constitute a crucial step towards digitizing the Smart Wood ID collection, a reference collection which will be the basis for training AI models to identify protected wood species. The Tervuren wood collection is the third most important worldwide in general and the most important collection of African wood worldwide. The digitization of this extraordinary knowledge resource is of crucial importance for international cooperation in the field of wood biology.

Online citizen scientists have transcribed metadata on more than 2.300 mite specimens mounted on microscopic slides from the collection of the Institute of Natural Sciences, one of the most important mite collection worldwide.

New research fields and interdisciplinarity

The project has stimulated interdisciplinarity by enabling experimentation with new methods for digitizing microscopic slides to achieve the right quality for online crowdsourcing. The mite slides were digitized with a 4K Webcam 4 Mpx and a backlit custom made plate. This inexpensive and efficient setup is truly innovative as it delivers high-quality pictures, suitable for online transcription projects. Without this new digitization system, online transcription wouldn't have been possible.

For the digitization of the Tervuren wood collection we used an innovative approach to wood digitization using a tiny sanding tool and a hand-held microscope. This tool efficiently creates a high-quality, flat sanded surface, ideal for detailed anatomical assessments. With a quick transition from rough to high polish in under 2 minutes, it expedites fieldwork. User-friendly and robust, the tool simplifies the digitization process. For capturing detailed images, we used a hand-held microscope. Designed for ease of use and featuring superior magnification, the microscope enhances the efficiency of wood anatomical assessments. Together, the Tiny Sanding Tool and hand-held microscope provide a practical, efficient, and detailed solution for advancing wood digitization in a formal research context.



Community building and empowerment

26 citizen scientists participated in the project. 14 were present on-site and 12 have contributed from home on the platform [DoeDat](#). 171 people participated in the CRESCO-related events and over 56.000 learned about CRESCO from social media.

The citizen scientists have collected, processed and curated data, and created dissemination material. Task variety was greatly appreciated and reinforced the citizens' loyalty. All 14 on-site participants were active during the 12 weeks of the programme and at least half will volunteer at the AfricaMuseum in 2024.

We measured the social impact of the online (Transcribing mites) and the on-site (photographing wood and birds) citizen science actions with the help of two separate surveys. The project had more social impact on on-site citizen scientists than on online citizen scientists.



Thanks to its community engagement strategy CRESCO has achieved gender equality and was successful in including diverse participants. 43% of on-site citizen scientists have a migrant background. CRESCO achieved this by communicating the project in French, Dutch, English and partially Russian. 5 nationalities were represented (8 Belgians, 1 Italian, 1 Spanish, 1 Nigerian and 3 Ukrainians). 6 French-speaking and 2 Dutch-speaking Belgian nationals have participated. 50% of on-site participants are 25-49 y, 24% are 50-64y and 36% are over 65. This data is in stark contrast with data on citizen scientists active at the Institute of Natural Sciences prior to CRESCO. 48% were retired and 80%, male.

On-site citizen science activities had a considerable impact on community building and empowerment. 64 % of participants say they will keep in touch with the new people met during the project. 64 % say the project has increased their trust in their local community and 91% say the project increased their trust in the AfricaMuseum.

The **online** participants were a slightly different social group. All online participants are Belgian nationals. 16,7% are 25-49 y and 66,7% are retired. 50% are women. 67% have previous knowledge of collections digitization. 34% say the project increased their trust in the Institute of Natural Sciences. The online participants did not meet new people or felt they were part of a new community during the project. Despite being invited to on-site event, only one person attended.

Changes in way of thinking, attitude and values

Going back to **on-site** participants, 27% say that thanks to the project they have changed their ideas on environmental issues such as pollution or climate change. 55% say that CRESCO increased their participation to the life of their community. 55% think of pursuing a scientific career. 18% say that the project played a bit of a role in that decision and 45% say the project reinforced previous ideas.

Behavioural change

45% of **on-site** and 16,7% **online** participants said they will change some of their behaviours in order to reduce their impact on bird and insect biodiversity, and illegal logging.

Science education

All participants say that CRESCO has increased their interest for science. CRESCO was the first citizen science project in which all 14 **on-site** participants had ever participated, whereas 50% of **online** participants had already taken part in citizen science projects, on the platform DoeDat.

Among the **on-site** participants, 50% said they had a good understanding of scientific processes and 25% said they had a good understanding of the study of biological collections before joining CRESCO. At the end of the project, 73% say the project has increased their skills of science inquiry.

Wellbeing

One participant started a part-time job while working on the project. He said that participation in project CRESCO gave him a structure which was beneficial for his wellbeing. Other participants have come in contact with museum personnel and have thus broadened their professional network. This is an important achievement as 50% on-site citizen scientists are under 49 y old and still looking for a job. For them, CRESCO was the only way of getting in the backstage of a federal museum.



ECONOMIC IMPACT

The work of the citizen scientists in project CRESCO generated a cost saving of at least 26.800 € in total for the two Federal Scientific Institutes involved. Moreover, these activities would have been impossible to perform in the absence of additional personnel. The tasks performed by the citizen scientists would not have been performed by research or collection management personnel or they would have been considerably delayed.

The work performed by the citizen scientists on-site (670 hours = 88 days) is worth 17.600 €, the reference being a collections technician's salary. If we consider a post-doctoral researcher's salary, their work is worth 34.000 €. The on-site citizen scientists received a 10€/day transport reimbursement, while online citizen scientists received a free annual subscription to the Institute of Natural Sciences.



We did not evaluate the time-investment by online volunteers. However, we know that a collection technician transcribes 50 mite labels in one working day. It would have taken him 46 working days to process the 2300 labels transcribed by the citizen scientists. In that time, he would have earned 9.200 €. However, we should consider the fact that a technician would transcribe the labels directly into the Darwin collection management database, whereas after transcription using the platform DoeDat, the data is normalized by the curator and imported in batch by the online database manager, which constitutes extra work.

In addition to IMPETUS, CRESCO has benefited from public funding. The extension of the Citizen Science Coordinator position was partly funded by the federal dotation of the Institute of Natural Sciences.



POLITICAL IMPACT

CRESCO has reached out to policy makers in two ways:

- By informing regional, national and international policy makers in the field of wood regulation about the outcome of the digitization of 1288 specimens in the wood collection.
- By informing the Belgian Scientific Policy, the agency of the federal government responsible for science policy making, about the impact of citizen science research.

CRESCO was presented at the meeting of the follow-up committee of ENFORCE on 12.12.2023. ENFORCE is the wood biology forensic center of the AfricaMuseum. The follow-up committee includes key-representatives that benefit from the centre: customs, CITES administration, the service responsible for timber legislation, but also the timber industry itself (both federations and importer companies), retailers, NGOs (Greenpeace, WWF, TRAFFIC) and research institutions.

CRESCO achieved additional support for Citizen Science at the federal level. It was one of the main case studies used in information briefs and reports on citizen science in the Belgian Federal Scientific Institutions. The BELSPO (Belgian Scientific Policy) Directors' Committee has extended the Citizen Science coordinator position. Without the results of project CRESCO, this kind of support would have been considerably more difficult to obtain. A medium term result will be the creation of a Citizen Science working group of representatives of the 10 Belgian federal scientific research institutes.



ENVIRONMENTAL IMPACT

On the longterm, CRESCO will have an impact on ecosystems. The tools created with the help of the wood dataset will help reinforce wood importation regulations, which will have an impact on forests worldwide.

The 1288 photos of wood samples taken by the citizens will help train AI models. The end product will be an AI identification app for non-experts. The citizen science approach to producing the dataset necessary to train the app has never been more pertinent than in project CRESCO.

“The project SmartWoodID to which CRESCO contributes directly aims at automating part of the wood identification process by applying artificial intelligence techniques for the analysis of wood anatomical images of timber species of the Democratic Republic of the Congo. The tree flora of Central Africa comprises 3013 species, 27 of these belong to the class 1 commercial timber species of the DRC and are actually intensively logged and traded, 20 to class 2 (have potentially a big commercial value), 44 to class 3 (are considered to be promoted) and 879 to class 4 (commercial value is not yet known). The project uses wood samples of all the species of the four classes and takes advantage of the power of modern deep learning approaches. It also relies on expert wood anatomical descriptions which will serve as annotated training data to develop the software.”
(Source: <https://congobasincarbon.africamuseum.be/smartwoodid>)



15
LIFE
ON LAND



15.2 Promote the implementation of sustainable management of all types of forests, halt deforestation, restore degraded forests and substantially increase afforestation and reforestation globally

15.5 Protect biodiversity and natural habitats. Take urgent and significant action to reduce the degradation of natural habitats, halt the loss of biodiversity and, by 2020, protect and prevent the extinction of threatened species.

15.9 Integrate ecosystem and biodiversity values into national and local planning, development processes, poverty reduction strategies and accounts.

Over 30 million m3 of wood are logged illegally worldwide. For this reason, there is a growing demand for timber identification tools that can be applied by law enforcement officers.

SmartwoodID will improve both identification success and speed by non-experts, such as customs officers or wood importers. On the long term, the SmartwoodID app will have an impact on imposing sanctions and creating new regulations on wood logging and importation.

Websites

[Institute of Natural Sciences CRESCO project page](#)

[AfricaMuseum website CRESCO project page](#)

[ENFORCE Belgian center of expertise for forensic wood research](#)

[SmartWoodID](#)

Scientific articles

Ruben De Blaere, Kévin Lievens, Dieter Van Hassel, Victor Deklerck, Tom De Mil, Wannes Hubau, Joris Van Acker, Nils Bourland, Jan Verwaeren, Jan Van den Bulcke, Hans Beeckman, SmartWoodID—an image collection of large end-grain surfaces to support wood identification systems, Database, Volume 2023, 2023, baad034, <https://doi.org/10.1093/database/baad034>

Online datasets

[AfricaMuseum virtual collections online database](#) Search “CRESCO”

[Institute of Natural Sciences collections Darwin online database](#) Check the “Citizen Science” box

[CRESCO SmartwoodID Database](#)

Videos

[CRESCO trailer](#)

[DoeDat trailer](#)