

# Increasing the accessibility of marine information from Colombian's Natural History Collections by mobilizing data, strengthening infrastructure, and training

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**Programme:** BID

**Project ID:** BID-CA2020-055-NAC

**Project lead organization:** Marine and Coastal Research Institute "José Benito Vives de Andrés"

**Project implementation period:** 1/7/2021 - 30/6/2023

**Report approved:** 14/9/2023

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## Final Narrative Report

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### Executive Summary

As a result of the implementation of the project, 30316 new records of marine specimens from 43 datasets were digitized and mobilized, 42 of them of occurrences and 1 list of species, which were included in 17 deliverables. The results correspond to 14 phyla from six national biological collections. During the process, physical curation of about 28,000 lots was carried out jointly by the participating entities. For some collections, in addition to updating and increasing the information on biological groups already published, it was also possible to make new sub-collections or groups visible. Five additional deliverables of datasets were produced, totaling 7503 records, which significantly increased the impact of the work carried out.

The visibility and strengthening of the marine collections of six important institutions distributed in the Central, Caribbean, and Pacific regions of the country, will provide the possibility of consultation and research to a greater number of interested parties throughout the country. Through the physical and digital organization of their specimens and records, these collections now show specifically the groups of marine invertebrates that conserve, which prior to the project were not visible, or were under-represented under some generic label such as "Other invertebrates", "Non-insect invertebrates" or even simply "Others". The results achieved in terms of record contributions and visibility are an important milestone that makes it possible to reduce in a significant way the great gap in marine information verifiable from collections, which has historically been detected in the national and global biodiversity information systems.

An important front of work during implementation was capacity building and cooperation. In this sense, at the beginning of the project, some training was offered by other initiatives of the GBIF community, which were received by some members of the team, who replicated what they learned within the team already hired (the respective certifications are found in the supporting documentation). Directly from the project, different trainings in Data Management were offered with more than 100 people benefited in Colombia, although some professionals from other Latin American collections were also included (Data Visualisation Course, Data Management Workshops, specialized training for technical staff of the collections). In this same front of action, an outstanding achievement was the creation of a community of experts in polychaetes for Colombia, and the consolidation of a national working group with tasks aimed at generating the country's reference list by consensus, within a period of no more than one year. This Working Group (GT in Spanish) will be coordinated by Invemar as a facilitator and will be formalized post-project in the framework of the specific Community established in the national network SiB Colombia. Following the line of strengthening, in agreement with the biological collections involved, the project opted to encourage the involvement of young students motivated to work with them, generating a very positive impact, not only in the training of new data and information managers but also offering the possibility of carrying out academic or research processes in the context of the project, through the digitization and curatorship of the collections. As an outstanding result, two Biologists, one Marine Biologist as well as one Environmental Biologist get their bachelor's degrees. In addition, two students, one of them international, developed their academic internships supporting the project activities. This represented an additional and unexpected product of great impact in terms of human capital strengthening. Regarding general dissemination, the main strategy was the use of social networks to inform about the project's activities and news. This was complemented by talks and presentations at events of interest and the generation of communication pieces.

Throughout the project, the main challenge was to adjust work schedules affected by three main

factors: the pandemic, the 2022 public order disruptions, and pre-election constraints. Each of these external circumstances impacted critical project activities such as contracting, or the execution of face-to-face activities in the biological collections (which were essential to the project's purpose) or the development of inter-institutional activities. These disruptions were managed and harmonized as far as possible but ultimately generated operational delays that were felt in the closing phase of the project with task overload and very limited execution times. Despite this, all planned activities were carried out, there were no cost overruns, almost all deliverables were produced, and most importantly there was high approval of the management and results by the project partners and beneficiaries in general, which was received after the development of each activity.

During the implementation of the project, the support of the Secretariat was evident through the assigned advisor, with whom there was fluid communication, and who was always attentive to help as required. Likewise, gratitude remains with the partner organizations, the staff, students, and administrative personnel because of the receptiveness, commitment, and great support received. Their willingness to continue cooperating is an incentive to promote post-project activities, such as the generation of the data papers, which could not be carried out during the implementation, since the readjusted schedules did not allow it, as well as the final Marine Annelida Reference checklist for Colombia that will be derived of the GT work. Other specific activities of interest to be carried out in collaboration in the short term, will be the implementation of the Polychaete Course and a Workshop on good practices for marine collections, which were proposed by partners as a continuation of synergies created. Periodic support will be provided to partner collections to assist them with the documentation and publication of their collection records in order to prevent collections from becoming outdated.

## Progress against milestones

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**Has your project completed all planned activities?: Yes**

**Has your project produced all deliverables: No**

**Rationale:** The three data papers originally included as part of other project products were considered to be produced after the execution of the project in order to: 1. Incorporate the information produced by all the collections, since some of them would finish their process almost at the end of the project, 2. Facilitate the collective process of construction, and 3. Carry out the publication process with the time required by the journals. This measure was agreed with the partners. On the other hand, some datasets were not digitized, due to particular difficulties encountered in carrying out the curatorial processes of some collections. However, it should be noted that the total number of datasets and records produced is almost three times the proposed project target. The national reference list, by consensus among the experts, was generated for now as a preliminary list, with the goal of being produced in a maximum of 12 months (see more on post-project tasks in this report).

## Report on Activities

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### Summary of the implementation of the project activities

Most of the activities were carried out as planned. Notable results include the digitization of 30376 records from Colombia's marine collections which are ready to be mobilized to GBIF and OBIS. The final number of records is almost three times the proposed project target (11,400 records for 13 datasets). An important milestone that makes it possible to reduce in a significant way the great gap in marine information verifiable from collections, which has been detected in the national and global biodiversity information systems.

The training of 10 team leaders who, from their different institutions and fields of action, now have the capacity to replicate and strengthen the data management processes (evidence of the certifications issued throughout the project are presented as support in the attached documents) is remarkable. On the other hand, the generation of excellent cooperative relationships aimed at enriching good practices in data management and curatorial processes of marine specimens among the participating collections is noteworthy. As a result, some collections reorganized their material and were able to make their marine biological groups more visible, which will undoubtedly offer better possibilities for using both their biological material and the associated and published information. This is especially evident in terms of new groups made visible and a greater number of specimen records documented.

Likewise, in relation to the use of tools and capacity building to impact interested audiences, the positive reception of the course on data visualization for collections (referred to in the activities as a

workshop on data analysis) is noteworthy. Around 900 people attended the call, and although just 60 places were available, the course was aimed at Colombian residents, but because of the massive interest from the Latin American biological collections community, therefore, some quotas were designated for colleagues from some international collections. This course had a great impact in terms of acceptance and pertinence, due to an expressed need by the participants for more training to help them take advantage of the information in the collections to increase their visibility and impact on users (the documental evidence is attached). Other data management training activities were also carried out, including a workshop in Quibdó (a remote city in the Pacific Colombian), which had the participation of 30 people, including students, professors, consultants, researchers, and professionals of governmental entities. These results brought the total number of people trained in data management in the country to more than 100.

Perhaps the most unexpected and outstanding activity was the consolidation of the Working Group on Marine Annelids of Colombia, which was convened during the process of compiling information for the generation of the national reference list. During this process, we contacted different Colombian specialists to obtain information and invite them to discuss the initiative. To our surprise, we summoned more than 30 people currently active, of all generations, degrees, and groups of expertise in marine annelids; some working abroad but linked to national projects. This result showed a large and unique group of marine invertebrate specialists in the Colombian context, many of them did not know each other and were not aware of the large number of people who are currently working in the group in the country. Something important is that in Colombia there are still no guilds of specialists for marine invertebrates, as there are for fish, mammals, or other groups, so this situation alerted us to the importance of taking advantage of the opportunity to consolidate this community of experts, responding in this way to one of the clear objectives of the project, to create and promote cooperation to strengthen knowledge. This community could strongly support the consolidation of a consensual reference list among all the experts, something that went far beyond our original idea in the best of senses, since although we considered generating the list and validating it with experts, we did not imagine that it would imply a consensus validation process, which is the ideal in terms of reference lists. So, taking advantage of the convening and coordination capacity of Invemar and in particular of its Museum of Marine Natural History, during the workshop of experts on the project, the creation of an official working group was proposed, which was formed based on the will of the parties, and will be formalized later in the framework of the working communities of the national network SiB Colombia.

The Working Group defined tasks in the short and medium term, considering a 12-month horizon, whose direct purpose is the consolidation of the validated national reference list. This circumstance somewhat changed our deliverable in the context of the project, since it was considered inappropriate to publish a data paper before the working group carried out its joint validation task. Therefore, a preliminary list was generated based on the secondary information collected, which will be published as a list in the IPT to be the starting point for the validations. The list could not be mobilized by the date of delivery of this report, because of the pending review of some of the specialists who are part of the project partners, who are teaching staff at the end of the academic semester and could not send the list validated for publication before the closing date of this report. However, it is clarified that it was agreed to mobilize it on July 14, and as a support to the process, the base compilation being validated by the internal specialists of the project is provided herewith.

On the other hand, as for the preparation and publication of the data papers, there are two reasons why they could not be produced within the framework of the project. The first has already been referred to in the context of the decisions taken for the checklist. Secondly, the idea of generating data papers based on the collective results was affected by the need to develop the digitization processes in three stages, which meant that not all the results would be available at the same time. This strategy, as indicated in the mid-term report, was a measure to counteract the different delays caused in the contracting processes, due to: a. The pandemic between the middle of 2021 and the beginning of 2022; b. The national public disturbance situations that limited access to some universities in 2022; c. The pre-electoral measures in the country limit the contracting processes by public entities to a specific time, which ended up affecting the normal development of the administrative processes of recruitment, generating overloads in the entities, such as Invemar and most of the partner institutions of the project. Although the project resources were international and did not directly apply the restrictions to the project, the delays and general contractual congestion ended up generating a domino effect, whose long-term effects were the delay in contracting and initiation of digitization activities. Despite all this, the data papers will be generated post-project in agreement with the partners, and their timing and scope have already been defined (see post-project activities item).

### Completed activities

#### **Activity: Project start and formation of the work team**

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**Description:** Administrative procedures to start the project; selection and hiring of personnel who will make up the work team for the development of data mobilization activities and capacity building

**Start Date - End Date:** 1/7/2021 - 29/10/2023

**Verification Sources:** Supporting documentation attachment: Folder: ProjectStart: files:

- 1\_Hiring Contracts
- 2\_Students\_Internships
- 3\_Midterm report

### **Activity: Development of initial training workshops for the work team**

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**Description:** Attendance to BID Workshop to improve capacities; execution of initial training workshop for the work team to ensure uniformity of knowledge about Darwin Core and Ecological Metadata Language standards, handling of formats, tools and good practices.

**Start Date - End Date:** 1/8/2021 - 8/6/2023

**Verification Sources:** Supporting documentation attachment:

Folder InitialTrainingStaff: files:

- 1\_BID Badge\_CARteaga-MHNMC
- 2\_BiodiversityDataUseCourse-GBIF\_SDangond-MHNMC
- 3\_OpenRefine\_VertNet-SiBColombia\_NLizarazoMHNMC
- 4\_EvidenceIntroductionToGBIFCourse
- 5\_ImageTrainingSession

### **Activity: Digitization and publication of marine data from collections**

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**Description:** Digitization, verification and publication of marine data from Natural History Collections, and compilation of preliminary information for checklist of Polychaeta (Annelida) species.

**Start Date - End Date:** 1/11/2021 - 30/6/2023

**Verification Sources:** <https://www.gbif.org/project/BID-CA2020-055-NAC/mobilizing-marine-data-from-colombian-natural-history-collections#datasets>

### **Activity: Organization of workshops on Marine data management for national stakeholders**

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**Description:** Organization and development of workshops on Marine Data Management for biological collections and other providers and users of biodiversity data, which will incorporate the knowledge acquired in the BID workshop to improve capacities.

**Start Date - End Date:** 1/3/2022 - 8/6/2023

**Verification Sources:** Supporting documentation attachments: Folder: WorkshopDataManagement: files:

- 1\_DataManagementWorkshop-UTCH
- 2\_SaffStrengtheningWorkshop

### **Activity: Compilation, validation and publication of a national reference list**

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**Description:** Data compilation, validation and publication of the checklist of polychaetes (Annelida) species of Colombia.

**Start Date - End Date:** 1/11/2021 - 30/6/2023

**Verification Sources:** Supporting documentation attachment: Folder 5\_NationalReferenceList / subfolder:

AnelidsDataCompiled\_NLozano

### **Activity: Organization of expert workshops to prepare a national reference list**

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**Description:** Organization and execution of expert workshops for the curation of taxonomic data and preparation of the polychaetes (Annelida) checklist of Colombia.

**Start Date - End Date:** 1/3/2022 - 30/6/2023

**Verification Sources:** Supporting documentation attachment: Folder 5\_NationalReferenceList / subfolders:

- 1\_AnelidsDataCompiled\_NLozano
- 2\_WorkshopI
- 3\_WorkshopII

### **Activity: Preparation and publication of data papers**

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**Description:** Selection of proposals, preparation and publication of data papers.

**Start Date - End Date:** 1/10/2022 - 20/6/2023

**Verification Sources:** Products reevaluated, see comments sections:

- Rationale explaining the non production of all deliverables.
- Activity implementation.

### **Activity: Workshop on collection data analysis**

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**Description:** Workshop on the use and analysis of open data from National Marine Collections. Aimed at researchers, students and professionals interested in biodiversity data analysis. The material will be

digital and freely accessible through the project website. Language: Spanish

**Start Date - End Date:** 1/10/2022 - 31/5/2023

**Verification Sources:** Supporting documentation attachment: Folder  
6\_WorkshopDataAnalysis/DataVisualizationCourse

## **Activity: Project closing workshop and final report preparation**

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**Description:** Evaluation workshop among the project participants, preparation and delivery of the final project report.

**Start Date - End Date:** 1/6/2023 - 30/6/2023

**Verification Sources:** Provided in the Documents support session, under folder 7\_ProjectMonitoring / subfolders:

-EvaluationPartners.

-InvemarMonitoring

-AccessRecordingsMeetings

## **Report on Deliverables**

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### **Deliverables - Summary**

The original estimates of 11,400 records and 13 datasets set as a target for the project were far exceeded, with the digitization and publication of 30,376 new records of occurrences of marine specimens from six national biological collections. The results correspond to 14 phyla represented by 43 datasets included in 17 deliverables. Besides it was compiled a preliminary list of annelids species. This document would serve as the base for the National Work Group in Marine Annelida of Colombia during the validation process specialized for the consolidation of the final reference list. In general, the results make it possible to reduce in an important way the great gap in marine information verifiable from collections, which has been detected in the national and global biodiversity information systems.

The datasets Bryozoa and Tejidos that originally were planned for the MHNMC were not produced because, at the time of initiating their physical review, it was found that both collections were undergoing reorganization processes, which would require much more time than the time available to carry out the respective physical and digital curation, so they would probably not be able to be processed. Based on this, it was established that those resources were not feasible to document during this project. For the Porifera case, which evidenced a similar situation, it was decided to include a small set of records that was feasible to complete and that could be worked on collaboratively with another initiative to achieve a partial documentation output that was included in the deliverables. Considering that by the time the decision was taken, the number of records and datasets as the project target had already been exceeded, it was determined that not producing these deliverables would not have a significant impact on the results.

The generation of five additional deliverables stands out. On the one hand, the datasets of Foraminifera and Molluscs of the MHNMC, which had been proposed to the GBIF Secretariat as an alternative to the generation of the "Blog" product (duly requested and justified in the interim report), and which represented an option of greater impact in terms of the number of records to be provided. In addition, the Nemertea and Platyhelminthes datasets of the MHNMC were documented, which complements the mobilization of the worm collections of this museum. The final resource "Polychaetes from the Reference Collection of the Universidad del Valle (CRBMUV) - Degree Thesis (John Alexander Salazar Hernandez)" was generated as part of the digitization work of a student who, in the framework of the BID project and his degree project, documented, curated and digitized unprocessed polychaetes from Gorgona Island (Colombian Pacific) that were stored in the CRBMUV collection. This deliverable contributed to complementing the identified material in the collection with new records for the Colombian Pacific region and made the data available for consultation by interested persons.

Regarding the reference list of marine annelids, two aspects should be clarified. The first corresponds to the change of the proposed name to "Preliminary list of marine annelids: basic input for the consolidation of a reference list for Colombia". The second aspect is that the scope of this deliverable has changed. This is in consideration of the concerted process with the experts that were generated during the workshops held by the project, and from which the national working group that was created decided to undertake the task of expert validation and consolidation of this reference for the country in the next 12 months. Against this background, the list generated from the project, which corresponds to a bibliographic compilation, became a key input on which the group will work to agree on the national reference list.

Finally, it is important to mention that the publication of several datasets through the IPT platform is delayed between one and two weeks, due to important connectivity problems experienced locally in the last two weeks prior to project closure. For this reason, we will be making visible the missing datasets in the days following the closing of the project. The expected date of publication has been indicated in the descriptors of the corresponding deliverables, which are presented below. The release

of these datasets is estimated for around 14 July.

## Deliverables produced by the project

### Dataset deliverables

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#### **Colección de Biología Marina del Centro de Colecciones Biológicas de la Universidad del Magdalena - CBUMAG**

**Dataset type:** Occurrences

**Dataset scope:** Phyla Mollusca, Annelida, Crustacea, Echinodermata, Bryozoa, Platyhelminthes, Sipuncula, and Nematoda of meiofaunal communities from shallow and deep areas of the Caribbean Colombian.

**Number of records:** 1,500

**Data holder:** Universidad del Magdalena

**Data host institution:** INVEMAR

**% complete:** 100%

**Status update:** This deliverable compiles total of 2282 specimen registers that were digitalized, published and mobilized to GBIF and OBiS systems. These represent to 13 biological collections, 7 more than originally estimated, which are distributed as follows: 1. Annelida: 978 registers, included Sipuncula order, group that during the implementation of project was incorporated into the Annelida phylum. 2. Arthropoda-Crustacea: 565 registers. 3. Mollusca: 266 registers. 4. Foraminifera: 213 registers. 5. Nematoda: 203 registers. 6. Echinodermata: 29 registers. 7. Tunicata: 3 registers. 8. Platyhelminthes: 6 registers. 9. Loricifera: 5 registers. 10. Bryozoa: 4 registers. 11. Cnidaria: 3 registers. 12. Nemertea: 3 registers. 13. Chaetognatha: 3 registers. 14. Porifera: 1 register.

**DOI:** <https://doi.org/10.15472/tqtwus>

**Expected date of publication:** 2023-06-28

#### **Colección Annelida del Museo de Historia Natural Marina de Colombia (MHNMC) - Makuriwa INVEMAR**

**Dataset type:** Occurrences

**Dataset scope:** Phylum Annelida from shallow and deep environments of the continental and oceanic areas of the Colombian Caribbean and Pacific.

**Number of records:** 2,000

**Data holder:** Invemar

**Data host institution:** Invemar

**% complete:** 100%

**Status update:** A total of 7106 registers were digitalized, published and mobilized to GBIF and OBiS. This triples the proposed registers target. 6848 lots of annelids correspond to new records documented in this project. 258 lots of specimens had already been previously published, but during the implementation of the project those were complemented with additional information corresponding to more than 25 additional terms or categories from the DwC standard. Additional quality control procedures and complementary curation were performed that improved the quality of the associated data.

**DOI:** <https://doi.org/10.15472/ssc1ui>

**Expected date of publication:** 2023-07-07

#### **Invertebrados de las Colecciones marinas de la Universidad del Valle**

**Dataset type:** Occurrences

**Dataset scope:** Phyla Mollusca, Cnidaria, Echinodermata, Annelida - Polychaeta, Crustacea, Porifera, from Pacific Colombian.

**Number of records:** 1,000

**Data holder:** Universidad del Valle

**Data host institution:** Invemar

**% complete:** 100%

**Status update:** A total of 5613 registers were digitalized, published and mobilized to GBIF and OBiS. From this 1189 registers correspond to new occurrences of specimens from this collection. The result exceeds the goal of registers proposed in 183 register, which represent 6 biological collections, which are distributed as follow: 1. Mollusca: 2630 registers. 2. Crustacea: 1600 registers. 3. Echinodermata: 624 registers. 4. Cnidaria: 458 registers. 5. Annelida: 284 registers. 6. Porifera: 17 registers. Is the highlight that the result exceed in 183 register the goal proposed with new registers, but for the rest of the occurrences of this collection, were documented and complemented between 25 and 32 terms (columns) of Darwin Core estándar, which enrichment the quality of information of the specimens.

**DOI:** <https://doi.org/10.15472/k8z5po> | <https://doi.org/10.15472/f2kcuw> |

<https://doi.org/10.15472/hnrpqx> | <https://doi.org/10.15472/lywq4k> | <https://doi.org/10.15472/uofnlo> |

<https://doi.org/10.15472/otu4ix>

**Expected date of publication:** 2023-06-28

#### **Colección Estuarina y Marina de la Universidad de Antioquia – CEMUA**

**Dataset type:** Occurrences

**Dataset scope:** Specimens of phyla Mollusca, Annelida, Crustacea, Echinodermata, and Sipuncula from continental and oceanic areas of the Caribbean Colombian.

**Number of records:** 1,500

**Data holder:** Universidad de Antioquia

**Data host institution:** Invemar

**% complete:** 100%

**Status update:** This deliverable compiles total of 4388 registers of CEMUA collection which were digitalized, published and mobilized to GBIF and OBiS. The results exceeds the goal of registers proposed, presenting 4 biological subcollections, which are distributed as follow: 1. Annelida: 1520 registers, included 357 records of Sipuncula order, group that during the implementation of project was incorporated into the Annelida phylum, 2. Mollusca: 1311 registers. 3. Crustacea: 1271 registers. 4. Echinodermata: 286 registers. This is the first publication of CEMUA Collections.

**DOI:** <https://doi.org/10.15472/0lcjx9> | <https://doi.org/10.15472/6nexq0> | <https://doi.org/10.15472/bgspwz> | <https://doi.org/10.15472/2vy2mu>

**Expected date of publication:** 2023-07-07

### **Colección Brachiopoda del Museo de Historia Natural Marina de Colombia (MHNMC) - Makuriwa INVEMAR**

**Dataset type:** Occurrences

**Dataset scope:** Phylum Brachiopoda from shallow and deep environments of the continental and oceanic areas of the Colombian Caribbean and Pacific.

**Number of records:** 50

**Data holder:** Invemar

**Data host institution:** Invemar

**% complete:** 100%

**Status update:** A total of 96 specimen registers were digitalized, published and mobilized to GBIF and OBiS. This result represent almost two times the quantity of registers originally estimated. The entire dataset correspond to new records documented in this project.

**DOI:** <https://doi.org/10.15472/gdrhq2>

**Expected date of publication:** 2023-07-07

### **Colección Tunicata del Museo de Historia Natural Marina de Colombia (MHNMC) - Makuriwa INVEMAR**

**Dataset type:** Occurrences

**Dataset scope:** Subphylum Tunicata from shallow and deep environments of the continental and oceanic areas of the Colombian Caribbean and Pacific.

**Number of records:** 50

**Data holder:** Invemar

**Data host institution:** Invemar

**% complete:** 100%

**Status update:** A total of 216 specimen registers were digitalized, published and mobilized to GBIF and OBiS. This result represent more than 4 times the proposed registers target. The entire dataset correspond to new records documented in this project.

**DOI:** <https://doi.org/10.15472/7iz9gb>

**Expected date of publication:** 2023-07-06

### **Colección Nematoda del Museo de Historia Natural Marina de Colombia (MHNMC) - Makuriwa INVEMAR**

**Dataset type:** Occurrences

**Dataset scope:** Phylum Nematoda from shallow and deep environments of the continental and oceanic areas of the Colombian Caribbean and Pacific.

**Number of records:** 300

**Data holder:** Invemar

**Data host institution:** Invemar

**% complete:** 100%

**Status update:** A total of 1298 specimen registers were digitalized, published and mobilized to GBIF and OBiS. This result quadruples the proposed registers target. The entire dataset correspond to new records documented in this project.

**DOI:** <https://doi.org/10.15472/zpq4eg>

**Expected date of publication:** 2023-07-07

### **Colección Porifera del Museo de Historia Natural Marina de Colombia (MHNMC) - Makuriwa INVEMAR**

**Dataset type:** Occurrences

**Dataset scope:** This dataset contains 203 records of specimens digitized, published and mobilized to GBIF and OBiS. Although it was originally estimated to document 1500 records of specimens from this subcollection, it was decided to present only the records that were completely curated during the development of the project, since this group is currently being reorganized within the MHNMC collection.

**Number of records:** 1,500

**Data holder:** Invemar

**Data host institution:** Invemar

**% complete:** 100%

**Status update:** This dataset contains 203 records of specimens digitized, published and mobilized to GBIF and OBIS. Although it was originally estimated to document 1500 records of specimens from this subcollection, it was decided to present only the records that were completely curated during the development of the project, since this group is currently being reorganized within the MHNMC collection.

**DOI:** <https://doi.org/10.15472/uyoawe>

**Expected date of publication:** 2023-07-06

#### **Colección Platyhelminthes del Museo de Historia Natural Marina de Colombia (MHNMC) - Makuriwa INVEMAR**

**Dataset type:** Occurrences

**Dataset scope:** Phylum Platyhelminthes from shallow and deep environments of the continental and oceanic areas of the Colombian Caribbean and Pacific.

**Number of records:** 92

**Data holder:** Invemar

**Data host institution:** Invemar

**% complete:** 100%

**Status update:** This is an additional deliverable generated during the project. The dataset contains 92 records of specimens digitized, published and mobilized to GBIF and OBIS.

**DOI:** <https://doi.org/10.15472/qk4u8k>

**Expected date of publication:** 2023-07-14

#### **Colección Nemertea del Museo de Historia Natural Marina de Colombia (MHNMC) - Makuriwa INVEMAR**

**Dataset type:** Occurrences

**Dataset scope:** Phylum Nemertea from shallow and deep environments of the continental and oceanic areas of the Colombian Caribbean and Pacific.

**Number of records:** 323

**Data holder:** Invemar

**Data host institution:** Invemar

**% complete:** 100%

**Status update:** This is a new deliverable generated during the project. The dataset contains 323 records of specimens digitized, published and mobilized to GBIF and OBIS.

**DOI:** <https://doi.org/10.15472/v1bhsd>

**Expected date of publication:** 2023-07-14

#### **Colección Foraminifera del Museo de Historia Natural Marina de Colombia (MHNMC) - Makuriwa INVEMAR**

**Dataset type:** Occurrences

**Dataset scope:** Phylum Foraminifera from continental and oceanic areas of the Caribbean and Pacific Colombian.

**Number of records:** 3,500

**Data holder:** Invemar

**Data host institution:** Invemar

**% complete:** 100%

**Status update:** This is an additional deliverable generated during the project. The dataset contains 3500 records of specimens digitized, published and mobilized to GBIF and OBIS.

**DOI:** <https://doi.org/10.15472/lizecg>

**Expected date of publication:** 2023-07-14

#### **Colección Mollusca del Museo de Historia Natural Marina de Colombia (MHNMC) - Makuriwa INVEMAR**

**Dataset type:** Occurrences

**Dataset scope:** Phylum Mollusca from continental and oceanic areas of the Caribbean and Pacific Colombian.

**Number of records:** 3,500

**Data holder:** Invemar

**Data host institution:** Invemar

**% complete:** 100%

**Status update:** This is a new deliverable generated during the project. The dataset contains 3500 records of specimens digitized, published and mobilized to GBIF and OBIS.

**DOI:** <https://doi.org/10.15472/l7xmvd>

**Expected date of publication:** 2023-07-14

**Organismos marinos del Museo de Ciencias de la Universidad El Bosque**



**Dataset type:** Occurrences

**Dataset scope:** Phyla Mollusca, Annelida, Crustacea, Echinodermata, Cnidaria, and Porifera, from shallow areas of the Caribbean Colombian.

**Number of records:** 150

**Data holder:** Universidad El Bosque

**Data host institution:** Invemar

**% complete:** 100%

**Status update:** This deliverable compiles total of 2040 specimen registers were digitalized, published and mobilized to GBIF and OBiS. From this 1334 registers correspond to new occurrences of specimens from this collection. The result that exceeds the goal of registers proposed, are represented by 6 biological collections, which are distributed as follow: 1. Mollusca: 408 new registers of 692. 2. Crustacea: 335 new registers. 3. Echinodermata: 9 new 3 registers of 184. 4. Cnidaria: 104 new registers of 143. 5. Annelida: 81 new registers of 625. 6. Porifera: 20 new registers of 61. Is the highlight that previous published registers were documented and complemented between 25 and 32 terms (columns) of Darwin Core estándar, which enrichment the quality of information of the specimens. The crustacean represent a new contribution to the collection.

**DOI:** <https://doi.org/10.15472/lkbpro> | <https://doi.org/10.15472/10.15472/efdzyv> |

<https://doi.org/10.15472/fdckvs> | <https://doi.org/10.15472/mhcjwo> | <https://doi.org/10.15472/o6uaec> | <https://doi.org/10.15472/66y7cn>

**Expected date of publication:** 2023-07-14

### **Organismos marinos de la Colección hidrobiológica del Chocó CHbCH, Universidad Tecnológica del Chocó**

**Dataset type:** Occurrences

**Dataset scope:** Phyla Mollusca, Annelida, Crustacea, Echinodermata, Cnidaria, and Porifera, from shallow areas of the Caribbean Colombian.

**Number of records:** 150

**Data holder:** Universidad Tecnológica del Chocó

**Data host institution:** SiB Colombia

**% complete:** 100%

**Status update:** This deliverable compiles total of 50 registers of marine mollusks which were digitalized, published and mobilized to GBIF and OBiS. It should be noted that the original estimate of the records was far in excess of what was actually available to be digitised. As it is a very new and growing collection, it is expected

**DOI:** <https://doi.org/10.15472/5tflih>

**Expected date of publication:** 2023-07-20

### **Poliquetos de la Colección de Referencia de Biología Marina de la Universidad del Valle (CRBMUV) - Tesis de Grado (John Alexander Salazar Hernandez)**

**Dataset type:** Occurrences

**Dataset scope:** Phyla Annelida from Gorgona, Pacific Colombian.

**Number of records:** 88

**Data holder:** Universidad del Valle

**Data host institution:** Invemar

**% complete:** 100%

**Status update:** This is an additional deliverable, it compiles total of 88 registers of marine Annelida which are part of the Colección de Referencia de Biología Marina de la Universidad del Valle (CRBMUV) and were digitalized, published and mobilized to GBIF and OBiS in the frame of the Project BID-CA2020-055-NAC. The dataset was product of the work for titulation as Marine biologist of the student John Salazar Hernandez, who was involved as digitalizaterof the project.

**DOI:** <https://doi.org/10.15472/dt2wzf>

**Expected date of publication:** 2023-07-14

### **Preliminary list of marine annelids: basic input for the consolidation of a reference list for Colombia**

**Dataset type:** Checklist

**Dataset scope:** Marine species of phylum Annelida from Colombia

**Number of records:** 150

**Data holder:** Invemar

**Data host institution:** Invemar

**% complete:** 100%

**Status update:** This deliverable compiles total of 339 especies of Annelida which were get from a bibliographic revision. The checklist is a preliminar document that will be used as input during the process of expert validation, and formalization of the national reference list.

**DOI:** <https://doi.org/10.15472/zp5am0>

**Expected date of publication:** 2023-08-15

### **Colección Sipuncula del Museo de Historia Natural Marina de Colombia (MHNMC) - Makuriwa INVEMAR**

**Dataset type:** Occurrences

**Dataset scope:** Phylum Sipuncula from shallow and deep areas of the Colombian Caribbean.

**Number of records:** 200

**Data holder:** Invemar

**Data host institution:** Invemar

**% complete:** 100%

**Status update:** 287 registers published. This biological group before may of 2022 still are phylum at the World Register of Marine Species - WoRMS, which is the taxonomic database of reference for marine taxa. For that moment this dataset was published under the old taxonomic range. But for this final report, we was included the dataset into the phylum Annelida publication.

**DOI:** <https://doi.org/10.15472/e9xptg>

**Expected date of publication:** 2022-05-31

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## Other deliverables

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## Events

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### Course Data visualisation: application to the use of biological collections / Curso Visualización de datos: aplicación al uso de las colecciones biológicas

**Dates:** 2023-03-13 - 2023-03-29

**Organizing institution:** Invemar

**Country:** Colombia

**Number of participants:** 60

**Comments:** The course Data Visualisation: Application to Biological Collections certified 60 researchers and professionals from Colombia and Latin America, mainly from biological collections and involved in environmental management, who generate and use biodiversity data associated with collections. Around 900 applications were received for the course just one week before it opened and although it was originally aimed at residents of Colombia, it was finally decided to grant some places to representatives of 7 Latin American collections. The great interest aroused by the subject in the biological collections community demonstrated the need for training in the region to enhance the use and visibility of their entities and above all of the information under their custody. The certificates, and some complementaries files are included in the Document support section, under Folder:

6\_WorkshopDataAnalysis, subfolder: DataVisualizationCourse.

**Website or sources of verification:** [http://www.invemar.org.co/web/guest/cursos/-/asset\\_publisher/SvZrsStfY1Fx/content/curso-visualizacion-de-datos-aplicacion-al-uso-de-las-colecciones-biologic-1?](http://www.invemar.org.co/web/guest/cursos/-/asset_publisher/SvZrsStfY1Fx/content/curso-visualizacion-de-datos-aplicacion-al-uso-de-las-colecciones-biologic-1?inheritRedirect=false&redirect=http%3A%2F%2Fwww.invemar.org.co%2Fweb%2Fguest%2Fcourses%3Fp_id%3)

[inheritRedirect=false&redirect=http%3A%2F%2Fwww.invemar.org.co%2Fweb%2Fguest%2Fcourses%3Fp\\_id%3](http://www.invemar.org.co/web/guest/cursos/-/asset_publisher/SvZrsStfY1Fx/content/curso-visualizacion-de-datos-aplicacion-al-uso-de-las-colecciones-biologic-1?inheritRedirect=false&redirect=http%3A%2F%2Fwww.invemar.org.co%2Fweb%2Fguest%2Fcourses%3Fp_id%3)

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## Events

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### Workshop on Biodiversity Data Management and Publication / Taller de Gestión y publicación de datos sobre biodiversidad

**Dates:** 2023-06-06 - 2023-06-08

**Organizing institution:** Invemar, SiB Colombia, Universidad Tecnológica del Chocó

**Country:** Colombia

**Number of participants:** 30

**Comments:** This workshop sought to create and strengthen capacities for the publication of biodiversity data from Chocó through SiB Colombia and its marine node, SiBM, for their mobilisation to global systems such as OBIS and GBIF.

SiBM, for mobilisation to global systems such as OBIS and GBIF. Choco is a biodiverse region in all types of environments and is poorly represented in national marine information. Capacity building in data management could contribute to boost marine research activities and strengthen the regional and national inventory. The workshop was attended by students, researchers, teachers and professionals involved in environmental management. The information associated with the event can be found in the supporting documents under the folder: 4\_WorkshopDataManagement: subfolder: DataManagement-Choco.

**Website or sources of verification:** <https://www.utch.edu.co/nueva/noticias/1114-taller-gesti%C3%B3n-y-publicaci%C3%B3n-de-datos-sobre-biodiversidad-en-la-utch>

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## Events

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### Mentoring meetings for the exchange of experiences and strengthening of biological collections / Reunión de mentores para el intercambio de experiencias y fortalecimiento de colecciones biológicas marinas

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**Dates:** 2023-06-26 - 2023-06-26

**Organizing institution:** Marine Natural History Museum of Invemar

**Country:** Colombia

**Number of participants:** 14

**Comments:** This meeting corresponds to one of the closing activities of the project "Increasing the accessibility of marine information of the Natural History Collections of Colombia, through data mobilization, strengthening of infrastructure and training" which we have been leading from the Museum of Marine Natural History of Colombia - Makuriwa of INVEMAR, together with the Biological Collections of the Technological University of Chocó, University of Antioquia, University of Magdalena, University of Valle, Science Museum of the University El Bosque, the SiB Colombia, OBIS and GBIF.

The activity seeks to strengthen the ties of cooperation between the marine collections participating in the project, especially between the smaller ones and the more consolidated ones. To this end, a space has been created to meet and exchange experiences on management processes, available infrastructure, needs, strengths and possibilities for cooperation in the respective collections. The collections of the Makuriwa Museum and the Collections Centre of the University of Magdalena will also be visited.

Supporting documents are provided by Folder: 8\_Events, subfolder: MentorCollectionMeeting

**Website or sources of verification:** [https://www.facebook.com/invemar.org.co/?locale=es\\_LA](https://www.facebook.com/invemar.org.co/?locale=es_LA)

## Events

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### Capacity building workshops for project staff / Talleres para el fortalecimiento de capacidades del personal del proyecto

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**Dates:** 2022-05-12 - 2023-06-28

**Organizing institution:** Invemar

**Country:** Colombia

**Number of participants:** 10

**Comments:** These training workshops were held at different times throughout the project period and aimed to improve the data management skills of the project team. During the project, 10 people were trained, including students and professionals, all of whom were closely involved in working with the collections and their information. All training was carried out through the Teams platform. Certificates and some photographic evidence are provided.

**Website or sources of verification:** Support Documentation: Folder: WorkshopDataManagement: subfolder: WorkshopsForStaffStrengthening

## Events

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### Review and contributions to the reference list of marine annelids from MHNMC / Revisión y contribuciones al listado de referencia de anélidos marinos desde el MHNMC

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**Dates:** 2023-05-24 - 2023-05-27

**Organizing institution:** Marine Natural History Museum Makuriwa of Invemar - MHNMC

**Country:** Colombia

**Number of participants:** 10

**Comments:** This workshop was an event prior to the Expert Workshop, designed to take advantage of the availability of the guests to contribute to strengthening the technical capacities of specialized personnel, taking advantage of the strengths and expertise of researchers from the University of Antioquia, one of the partner entities and independent consultants. The event was held at the facilities of the Museum of Marine Natural History of Colombia and was attended by expert staff on polychaetes linked to the Museum and three invited specialist researchers, who together worked on the taxonomic review of specimens from the families Melinnidae, Ampharetidae, Trichobranchidae and Terebellida that are sometimes problematic for identification and are of interest to be purged and contributed from the MHNMC collections to strengthen the national list. The work was guided by one of the invited experts, spaces were generated for technical discussions and practical laboratory work was carried out strongly, with a view to strengthening the group of specialists. In total, 157 batches of specimens were jointly filtered and identified, which were recorded in detail.

**Website or sources of verification:** Support Documentation: Folder VerificationSources, subfolder : 5\_NationalReferenceList: subfolder: Workshop

## Events

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### Expert workshop for the construction of a national reference list of marine annelids / Taller de expertos para la construcción de un listado de referencia nacional de anélidos marinos

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**Dates:** 2023-05-29 - 2023-05-31

**Organizing institution:** Marine Natural History Museum Makuriwa of Invemar - MHNMC

**Country:** Colombia

**Number of participants:** 24

**Comments:** This workshop was a hybrid event, which had the face-to-face participation of 11 experts, while the other 13 were connected via Teams. The work dynamics each day was oriented under an objective pillar, in this way "Building community, during day 1", "Tuning in with the experts - polyconversations, for day 2", and "Concreting - From said to done" were addressed. , for day 3". In each of the sessions, the topics of interest were discussed through the execution of different group activities, to which the people connected virtually were integrated. Likewise, spaces were generated for reflection and the approach of individual ideas. During the workshop, the Colombian Marine Annelids National Working Group was consolidated, which will be developing specific tasks in the short and medium term over the next 12 months to refine and specify the national reference list agreed upon by this new community of experts. For this, immediate tasks were defined with a horizon of 1 week to 1 month, and medium-term tasks, with a time to act between 3 and 6 months. Likewise, work fronts were established in different aspects (Communications, Taxonomic Review, Inventories of international experts and relevant bibliography, among others). The group will be formalized after the implementation of the project in the communities of Interest and Work Groups of the SiB Colombia national alliance. Invemar will act as coordinator to facilitate the call and monitoring of the proposals. The mission of the Working Group will end in May 2024 with the publication of the official list.

**Website or sources of verification:** Support Documentation: Folder VerificationSources, subfolder : 5\_NationalReferenceList: subfolder: WorkshopII

## Communications and visibility

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Communication and visibility of project activities have been implemented through institutional social networks, mainly Twitter, Facebook, and Instagram, both Invemar's and partners'. Specific communication between the members of the National Network of Biological Collections was also useful to disseminate the project events. Other resources have also been used, such as Invemar's home page, the home page of the Universities, the GBIF Project site, and SiB Colombia's home page. On the other hand, different events were used to disseminate the project such as the National Meeting of Science Museums, Natural History, and Biological Collections held in September 2022 in Bogota, where we participated in offering two lectures. Also, we took part in the celebration of International Museum Day and Museum Week 2022 and 2023, events commemorated in May of every year, and for which an informative poster was prepared with the slogan: "We are taking marine collections out of the depths"; this piece was also presented continuously in other spaces with information alluding to the project, even in the most recent opportunity placed during the Environmental Fair - FIMA held in the middle of June (2023) in Bogota. Finally, academic spaces were used to socialize, through talks, the results of the internships carried out by six students within the framework of the project. General evidence of these dissemination strategies is provided as part of the supporting documents in this report (Support Documentation: folder 10\_Communications&Visibility).

## Monitoring and evaluation

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### Final Evaluation

This project had a very positive impact on the marine collections community, and in particular on those of the participating entities. Most of the activities were carried out according to plan and with great success; whenever an activity was carried out, there was a great deal of expectation and interest in participating. The partners valued as very relevant the contributions in terms of the digitization achieved, the additional tasks performed, and the capacity building received by the staff of each collection. Excellent comments were received regarding the orientation and coordination of the project by the different partners. The contribution in terms of improving the processes of sample reception and handling of information related to the lots in the collections was highlighted. Also, the possibility offered to the generation of spaces for sharing and exchanging experiences among the collections. The continuous follow-up of students and professionals was also highlighted.

In general, the partners considered the project to be very relevant for their entity, found that the proposed objectives had been met, and considered that trust had been established to continue working together on other initiatives. On the other hand, they also highlighted the importance of getting finance initiatives such as these, which contribute to the enrichment of knowledge of our biodiversity, particularly for biological collections, which in our Latin American countries do not have the required support. The smallest collection of the project noted that it would have liked to have more time for the execution of the tasks. This collection started its activities in the final stage of the project and had 3 months for the execution, which was not considered sufficient, especially due to the difficulties they face in terms of infrastructure and capacities. During its activities, the collection managed to digitize 50 records of marine specimens out of the 150 initially estimated.

Continuous internal monitoring of the activities made it possible to overcome the difficulties and make adjustments to the schedules. Nevertheless, and despite the monitoring of the processes, it should be recognized that for the final stage of the project, there was an overload of activities for the coordination, generated by the cumulative effect of external circumstances that ended up influencing the execution times of some activities, mainly the workshops and the publication of resources. For this reason, by the end of the implementation meanwhile, the digitalization process was ready, and some data sets were programmed to be made visible through the week following the delivery of this report.

Communication with and support from the GBIF regional advisor was always timely and very well received during the project. Overall we are very grateful to the Secretariat for the support received for the funding of this initiative.

### Best Practices and Lessons learned

One of the most successful practices during this project was the inclusion and funding of students as part of the work team of each collection. This aspect was highlighted by all the partners as successful and it was evident that although it requires a significant investment of time in training, the results more than compensate the effort. For this reason, additional products were obtained as internships, practices as a degree option, developed within the framework of the project's objectives. This work was used to deepen the knowledge of some biological groups in order to optimize curatorial and information management processes. This strategy also strengthens human capital, which is interested in getting involved with collections or environmental management.

The processes of cooperation and interaction with other entities were very enriching, but also very challenging in terms of coordination and administration. Each entity has its own time and processes and their articulation entails greater administrative effort and this factor must be considered as a very important aspect, added to the effects of delays caused by external circumstances (covid, public order, political climate, etc.) have an important effect in terms of time cost, effort and ultimately overload of tasks for a work team, and especially for those who perform coordination tasks. The lesson learned is to allocate resources to have this support during the project closure, with which it is guaranteed to close the activities easily, efficiently and with less stress.

### Post Project activities

We have activities planned on three fronts of joint work with the partners and others involved in the project. The first one is the publication of the data papers of interest that were not consolidated during implementation. For this, there are three scenarios in terms of time, 4 months for having the draft and submitting the data paper product of the gap analysis, and the progress with the results of the project. Two months maximum to finish the minor details of the data paper related to the record contribution of annelids for the Colombian Pacific and submit it, since this document is quite advanced. Finally, for the definitive national reference list of marine Annelida, the officially constituted working group established by common agreement a goal of one year for the depuration and publication of the product agreed upon by the group of experts "Marine Annelida of Colombia" which was established during the project workshops. The other medium-term action front is precisely to specify some joint training activities within the framework of the recently constituted Working Group, since there is already a structured and ready-to-implement polychaete course, which was generated within the framework of the project. Finally, another concrete goal is to generate a workshop on good curatorial practices of marine organisms both with the partner collections and with other collections interested in exchanging experiences on the subject. This was suggested from the evaluation of the project and it is hoped that it will be managed within the framework of the initiatives that are led by the Museo del Invermar, in order to continue strengthening cooperation ties with peer collections.

## Sustainability

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### Sustainability Plans

All partners involved in the project have expressed interest in continuing to plan collaborative activities to strengthen the work carried out during this time. Agreed activities are in progress. The Marine Anelid Working Group, for example have an immediate task for the next 12 months is to refine the preliminary list and publish the datapaper. For this purpose, the SiBM Marine Node will serve as facilitator and coordinator to convene the stakeholders to accomplish the proposed tasks. Starting in July, monthly meetings will be planned with the group to follow up on activities. On the other hand, Makuriwa is tasked with organizing a workshop on best practices for the management of marine collections and their information. This activity was suggested as important and necessary by several of the partner collections during the finalization phase of the project, and would be directed not only to the

participating collections, but also to other interested parties. In the same line of action, partners may request and carry out support meetings to support curatorial training processes, both physical and information. For this purpose, it will be possible to take advantage of spaces already established within the collections as part of their functioning, as well as others specially created for the development of this type of activities. In this sense, the Network of Museums of Science, Natural History and Biological Collections can be a very effective cohesive body.

A theoretical-practical course on marine annelids that was organized and structured in conjunction with other entities, this is in charge of the University of Antioquia and has been planned to be carried out in a period not exceeding 1 year, and will be open for those interested throughout the country with the support of the Marine Annelids Working Group and the Network of Museums of Science, Natural History and Biological Collections; the partners are already in the process of obtaining the resources for its execution.

A final recommendation made by the Universidad del Valle was oriented to suggest continuing the joint support work between Invenmar and SiBM to keep the specimen information updated. The SiBM as a national marine node can provide this support to the collections. The follow-up and results of this work can be monitored through the annual report of the marine registry provided to the National Biodiversity Information System through the Node. In addition, work could be done to strengthen strategies for the publication of datasets based on the collections, carried out within the framework of academic exercises. This exercise can be coordinated with the partner universities to guarantee continuity in some of the digitization processes in their collections, for which they can rely on the SiBM marine node and SiB Colombia.

### Impact of COVID-19 pandemic on project implementation

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The project suffered different impacts and was directly affected by COVID-19 the project coordinator, and one of the researchers, fortunately, both overcame it. On the other hand, the pandemic generated delays due to strong confinement measures and restrictions adopted by the country, which made it difficult to access universities and the general face-to-face work in biological collections, and consequently limited progress in digitalization activities. These activities were perhaps one of the most critical points to the entire project since a large part of the committed records were completely undigitized, and this task was very demanding in terms of time and direct work in the collections. The return to normalcy by the institutions took time and coincide with the closing stage of the year. An additional point to delay due to that time to the public entities generates a great administrative burden. In consequence, the personnel hiring process and the plan to develop the activities had to be reorganized in order to advance and mitigate the traumatic situation. By the middle of 2022, a derived effect impacted newly the project, the post-pandemic inflation arrived strongly in the Country, and the economic recovery was slow. This situation affected the air companies and some of them break. The tickets increased, so the travels and workshop activities were impacted. As a result was necessary to reduce the number, and consider the destinations, and time of execution of the activities in order to maintain control of the aircraft costs. Fortunately, the measurements taken were effective, the budget stayed under control, and the activities were developed with some changes, but conserving the essential purpose.

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**GBIF leads the Biodiversity Information for Development (BID), a programme funded by the European Union. The programme provides supplementary support for activities addressing the needs of regional researchers and policymakers through mobilization and use of biodiversity data.**

