



# Enabling grey literature discovery to benefit aquatic science, fisheries and aquaculture

25 September 2019  
Terengganu, Malaysia



**Cover photo:**  
@FAO / Maria Kalentsits

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25 September 2019  
Terengganu, Malaysia

Edited by

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and

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## Preparation of this document

This document presents the proceedings of the joint Aquatic Sciences and Fisheries Abstracts (ASFA) and University of Malaysia Terengganu (UMT) Conference “Enabling Grey Literature discovery to benefit aquatic science, fisheries and aquaculture.” The conference was jointly organised by the FAO ASFA Secretariat and University of Malaysia Terengganu, who hosted the conference in Terengganu on 25 September 2019. The conference was financed by ASFA with contributions from UMT.

# Abstract

Grey literature, which includes policy reports, technical guidelines and dissertations and theses, is produced by many actors within aquatic sciences, fisheries and aquaculture. Many hours of research go into producing these documents, often with the purpose of solving particular environmental, species or socio-economic problems. Whilst the nature of the problem tackled by much grey literature is focused on a specific problem in a specific area, its lessons can often be applied to similar problems or environments around the world. What prevents this taking place is that grey literature can be hard to access – due to the way it is produced and stored, grey literature can often be stored offline, or on institutional websites where it is difficult to access using internet search engines or databases.

This conference was designed to identify the problems of grey literature discovery around the world in the fisheries and aquaculture sectors. Presenters from Latin America, Africa, Asia and Europe presented their experiences of improving the discoverability of grey literature, giving ideas for how its management can be improved. Whilst the digital age has caused an increase in the volume of information being published, Gabriela Silvoni (Instituto Nacional de Investigación y Desarrollo Pesquero – INIDEP, Argentina) highlighted the importance of digitising and making available historic literature which is often one of a unique record of research – in this particular case, fisheries management research in Argentina. Daryl Superio (Southeast Asian Fisheries Development Center/Aquaculture Department – SEAFDEC/AQD, Philippines) and co-authors covered the work needed by information professionals to identify and record grey literature of use to researchers in the digital age – they found that 75 percent of publishers whose grey literature was cited by Filipino aquaculture researchers did not have publications included on ASFA, making it less likely these publishers' works would be discovered despite their use to researchers. Speakers from Uganda, Tunisia and Kenya presented the important role of grey literature across Africa, outlining how it can counter publication bias and lead to better recognition of work by authors from this region. The ideas generated at the conference will be used to ensure Aquatic Sciences and Fisheries Abstracts (ASFA) makes these publications accessible, and that the valuable research and effort that goes into producing these documents is not lost.

# Contents

Preparation of this document	iii
Abstract	iv
Acknowledgements	vi
Abbreviations and acronyms	vii
<b>Enabling grey literature discovery to benefit aquatic science, fisheries and aquaculture</b>	<b>1</b>
Message from the FAO ASFA Secretariat	1
Introduction to the Conference	1
<b>Report of the Conference</b>	<b>3</b>
Opening of the Conference	3
Conference summary	4
Gaps and future direction	4
<b>Contributed papers</b>	<b>5</b>
Publishing and disseminating WorldFish’s research communications products	7
Aquatic Sciences and Fisheries Abstracts: Adopting a Grey Literature Strategy to meet stakeholder needs	11
Grey literature usage among Filipino aquaculture researchers: A bibliometric analysis of research from 2009 to 2018	17
Fisheries development projects by FAO in the 1960s–1970s: Argentina case	21
Analysis of deposition and usage of aquatic science grey literature in Africa	35
An evaluation of the value of grey literature to fishery science students at Mindanao State University, Naawan, Philippines	45
Mainstreaming grey literature in the digital age	55
<b>Annex 1 Opening speeches</b>	<b>58</b>

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## Abbreviations and acronyms

<b>ADB</b>	Asian Development Bank
<b>ASFA</b>	Aquatic Sciences and Fisheries Abstracts
<b>BFAR</b>	Bureau of Fisheries and Aquatic Resources
<b>CARPAS</b>	Comisión Asesora Regional de Pesca para el Atlántico Sudoccidental/Regional Fisheries Advisory Commission for the South West Atlantic
<b>FISH</b>	Fish Agri-Food Systems
<b>GIDMAP</b>	Grupo de Información Documental en Ciencias Marinas, Acuáticas y Pesqueras
<b>IAMSLIC</b>	International Association of Aquatic and Marine Science Libraries and Information Centers
<b>IBM</b>	Instituto de Biología Marina/Marine Biology Institute
<b>INIDEP</b>	Instituto Nacional de Investigación y Desarrollo Pesquero/National Institute for Fisheries Research and Development
<b>INSTM</b>	Institut National des Sciences et Technologies de la Mer, Tunisia
<b>IOC/IODE</b>	Intergovernmental Oceanographic Commission's International Oceanographic Data and Information Exchange
<b>IODE</b>	International Oceanographic Data and Information
<b>KMFRI</b>	Kenya Marine and Fisheries Research Institute; Kenya
<b>LLDA</b>	Laguna Lake Development Authority, Philippines
<b>MEL</b>	Monitoring, Evaluation and Learning
<b>MSUN</b>	Mindanao State University - Naawan
<b>NaFIRRI</b>	National Fisheries Resources Research Institute, Uganda
<b>OAI-PMH</b>	Open Archives Initiative Protocol for Metadata Harvesting
<b>OPAC</b>	Online public access catalog
<b>PCAMRD</b>	Philippine Council for Aquatic and Marine Research and Development
<b>PDP</b>	Proyecto de Desarrollo Pesquero/Project of Fishery Development
<b>SEAFDEC/AQD</b>	Southeast Asian Fisheries Development Center's Aquaculture Department
<b>SHN</b>	Servicio de Hidrografía Naval/Argentine Naval Hydrographic Service
<b>SIDALC</b>	Alianza de Servicios de Información y Documentación Agropecuaria de las Américas/Agricultural Information and Documentation Service of the Americas
<b>UMT</b>	University of Malaysia Terengganu
<b>VRE</b>	Virtual Research Environment

# Enabling grey literature discovery to benefit aquatic science, fisheries and aquaculture

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## MESSAGE FROM THE FAO ASFA SECRETARIAT

On behalf of Aquatic Sciences and Fisheries Abstracts (ASFA), the FAO ASFA Secretariat is pleased to have co-organized this conference with University of Malaysia Terengganu (UMT). Though the ASFA Advisory Board has been meeting annually for the past fifty years, this is the first Conference that ASFA has organised and marks the beginning of a new, open and more user-focused direction for ASFA. As ASFA adapts to the age of mass information, it is vital that the needs of aquatic sciences, fisheries and aquaculture students, researchers, policy makers and other stakeholders are understood and met. This conference was an opportunity to learn from librarians, publishers and authors of grey literature from around the world; to understand the challenges faced in improving the accessibility of grey literature and formulate solutions for its improvement. We look forward to putting the ideas generated at this conference into action in order to benefit aquatic sciences, fisheries and aquaculture stakeholders.

## INTRODUCTION TO THE CONFERENCE

The first conference to be hosted by ASFA in its fifty-year history, *'Enabling grey literature discovery to benefit fisheries and aquaculture research'* provided a forum for ASFA partners (primarily librarians and information managers) to interact with and learn from the publishers, authors and users of grey literature.

The theme of the conference is how information services, such as ASFA, can improve the discovery of aquatic science, fisheries and aquaculture grey literature in order to benefit research. Improving discovery is vital to ensuring that grey literature is not overlooked or forgotten and that it remains available to researchers beyond specific project cycles or conference dates. Grey literature is often described as literature not controlled by commercial publishers but of sufficient quality to be collected and preserved by libraries and institutions. The conference brings together librarians, information managers, publishers, students and academics working in the fields of aquatic sciences, fisheries or aquaculture, to discuss challenges and solutions to ensuring grey literature is available to all.

## Conference Topics:

The twelve conference speakers presented on one or more of the below four topics:

1. **How new technologies are improving the discovery of grey literature** – this topic was covered by the ASFA Secretariat who updated on plans to adopt new technologies in order to improve the ASFA Subject thesaurus and database. Lim also discussed the importance of publishing techniques and evaluation tools to improve and measure the impact of grey literature publications.

2. **The role of Abstracting and Indexing services in enabling discovery of global grey literature** – the role of the ASFA Abstracting and Indexing database was discussed by the ASFA Secretariat as well as featuring in papers presented by Palloculo *et al.* and Messaoudi *et al.* As a discovery tool, abstracting and indexing services continue to provide a useful service to researchers, however a number of innovative changes were proposed, such as the coverage of a wider range of authors and sources, in order to enhance abstracting and indexing products.
3. **Changing formats of grey literature in a digital age** – Dr Amirrudin B. Ahmad (UMT) spoke of mainstreaming grey literature in the digital age and encouraged students of UMT to consider how their own grey literature (dissertations and theses) could be stored and disseminated. As grey literature is produced in a digital format, the recording of these documents on databases, such as ASFA and institutional repositories which are indexed by Google, is likely to greatly enhance their discoverability.
4. **Researchers' grey literature storage and retrieval priorities** – Silvoni presented a paper on historic fisheries research that took place in Argentina during the 1960s to 1970s. This research was not only the first but often the only research to have been conducted in some areas, however access remained problematic due to its print only format. She argued that historic, print only materials were being lost and discarded due to the difficulties in producing digital copies.

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# Report of the conference

## OPENING OF THE CONFERENCE

**Professor Dato' Dr Nor Aieni binti Haji Mokhtar, University of Malaysia Terengganu Vice-Chancellor** opened the conference (see Appendix One for the full speech). The Professor welcomed delegates to the conference and thanked the ASFA Secretariat for jointly organizing the conference with UMT. She highlighted the importance of sharing information in the fields of aquatic sciences, fisheries and aquaculture research.

**Marc Taconet, Chief, Fisheries Statistics and Information Branch, FAO**, then welcomed delegates (see Appendix One for the full speech). Marc Taconet thanked UMT for facilitating and organizing the conference. He commented that ASFA continues to play an important role in disseminating the world's aquatic science, fisheries and aquaculture research, despite the advent of new technologies. The need for ASFA to focus on hard-to-reach grey literature in order to be of most benefit to its stakeholders was highlighted and Marc Taconet expressed his hope that the conference would provide a chance to reflect and learn from the speakers' experience of managing and promoting Grey Literature.

### CONFERENCE SUMMARY

Students from UMT attended the Conference, as well as 34 ASFA Partners from 23 different countries. The Conference comprised eight presentations by 12 different speakers, representing eight different countries. Each presentation focused on the management of grey literature in their country or region, highlighting the unique barriers or opportunities encountered at institutional, national or regional levels.

### GAPS AND FUTURE DIRECTION

The conference demonstrated to willingness of librarians, publishers and researchers to work together to improve the discoverability of aquatic science, fisheries and aquaculture grey literature. In order to build on this enthusiasm, several areas of work were identified as being crucial to facilitating improvement:

1. Improvements to ASFA's strategy to cover grey literature on its database – having previously tried to cover all relevant literature produced in a country or region, ASFA partners should instead focus on recording the hard-to-reach grey literature that is likely to be missed by internet search engines. Such a strategy could be developed following Pallocchio *et al.*'s approach of conducting a bibliometric analysis to identify authors and institutions who are cited by researchers but not covered by databases.
2. Funding and training to assist with the digitisation of historic grey literature – as cited by Silvoni, the need to digitise historic grey literature research should not be overlooked because of the difficulty involved in digitising print only materials or belief that they are no longer relevant. Despite their print only status, many historic fisheries management reports continue to be cited by researchers today, citations which would surely increase were materials to be made available to a wider audience. The FAO library should consider digitising materials upon request, ASFA will also continue to work with its partners to support and fund the digitisation of materials.
3. Support to authors to enable their grey literature to reach a wide audience – as stated by Messaoudi *et al.*, many authors face barriers to publishing in primary journals (such as publication bias, cost, lack of resources). As such, there is a large volume of research being conducted that, for various reasons, will not be found in primary journals. ASFA will develop a free to access database, OpenASFA, to create records for grey literature that can then be exported to other information systems as a way to improve the discoverability of grey literature, particularly grey literature produced by authors underrepresented in primary journals.

## **Contributed papers**



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# Publishing and disseminating WorldFish's research communications products

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## **ABSTRACT**

WorldFish is an international, nonprofit research and innovation institution that creates, advances and translates aquatic food systems science into scalable solutions for healthy people and planet. For over 45 years, WorldFish's data, evidence and insights have shaped practices, policies and investments to end hunger and advance sustainable development in low- and middle-income countries. Headquartered in Penang, Malaysia and with regional offices across Africa, Asia and the Pacific, WorldFish makes part of One CGIAR, the world's largest agricultural innovation network. Embedded in local, national and international partnerships WorldFish sets agendas, builds capacities and supports decision-making for climate action, food and nutrition security, sustainable fisheries and aquaculture, blue economy, OneHealth and AgriTech, integrating gender, youth and social inclusion. Effective communication of our research and the scientific evidence we produce is critical for making a difference to the people whose livelihoods, in both the developing and developed world, depend on and are shaped by aquatic food systems. Opening our research, including publications, data and tools, ensures that more people can read and apply our research findings, thereby increasing the efficiency, reach and impact of our work. This paper provides an overview of WorldFish publishing process. We will also review our research communications products dissemination policy and briefly describe the WorldFish online repository.

## **INTRODUCTION**

WorldFish is an international, non-profit research and innovation institution that creates, advances and translates aquatic food systems science into scalable solutions for healthy people and planet. With a 45-year track record of leading-edge science, we generate research evidence and innovations to inform sustainable practices and inclusive policies that enable better livelihoods and healthier diets for millions of poor people, particularly women, who depend on aquatic food systems for food, nutrition and income in the developing world. We do this by partnering with an extensive network of national research institutions, universities, NGOs, development agencies, the private sector and other actors to develop and test practical, innovative solutions for sustainable fishing and fish production, processing and trade. By working together in this way, we ensure that the poorest and most vulnerable communities can share in economic growth, nourish their families and sustainably manage precious natural resources in the face of climate change and other challenges.



WorldFish is a member of One CGIAR, the world's largest agricultural innovation network. Headquartered in Penang, Malaysia and with regional offices across Africa, Asia and the Pacific, WorldFish leads the cross-disciplinary CGIAR Research Program on Fish Agri-Food Systems (FISH) that brings together a unique set of multistakeholder partnerships to harness emerging science in aquaculture and fisheries to deliver development outcomes at scale (WorldFish, 2021).

### 1. WorldFish research communications products

WorldFish research communications products are intended to increase the visibility of WorldFish as an organization, its programs, projects and researchers as well as to facilitate the dissemination and recognition of our research outputs and delivery.

As such WorldFish publication types are divided into four categories, namely:

- corporate resources – which include annual report, brochure, fact sheet, flyer, financial statements, newsletter, strategy and marketing collaterals;
- science publications – which include journal article, book, brief, case study, report and working paper;
- training materials – which include guide, handbook, manual and toolkit;
- conference and workshop contributions – which include conference paper, poster, presentation, proceedings and workshop report.

Grey literature is considered an important source of information which includes our research works that are published in non-commercial form as well as unpublished research works. Approximately 40 *percent* of our publications are grey literature. The common grey literature we produced include reports (annual report, research report and technical report), briefs (policy briefs), manuals, proceedings, working papers, strategy, newsletters etc.

Grey literature that is published by WorldFish is accessible via the WorldFish website and online repository (DSpace). Unpublished research works are deposited on the WorldFish Monitoring, Evaluation and Learning (MEL) platform which ensures that grey literature is not overlooked and that it remains available across WorldFish programs/projects and with external partners.

### 2. WorldFish publishing process

Across the various publishing platforms and channels, WorldFish publishing process aims to achieve the high science quality, optimum editorial/design layout quality and style with maximum accessibility of our research communications products to target audiences.

We start the publishing process with annual planning to establish science and organizational priorities. The WorldFish Annual Plan of Work and Budget provides realistic planning and budgeting, allows opportunity to create linkages across countries and regions and better prioritization of effort for efficiency and greater impact.

For high science quality, we promote publication in external peer-reviewed channels and give priority to journals with high impact factors. At the same time, we ensure that our own science publishing undergoes appropriate internal science review before they reach the communications and marketing department for production.

We aim for different levels of editorial and design layout investment according to purposes and resources available. High editorial and design layout standards are typically reserved for publications with global audiences. We also maintain an editorial pool of resources that support staff and projects needing different types of assistance.

We intend to make all our research communications products openly accessible in standard digital forms that most people can access. In addition, all our publications are licensed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License (CC BY-NC-ND 4.0) which permits non-commercial re-use,

distribution, and reproduction in any medium, provided the original work is properly cited, and is not altered, transformed, or built upon in any way.

All our research outputs including unpublished outputs are deposited on the WorldFish MEL platform which is a results-based management system that enables better reporting, monitoring and evaluation, as well as knowledge sharing and dissemination across WorldFish programs/projects and with external partners. All published research communications products are available on WorldFish DSpace, an open source repository for published digital content.

### 3. WorldFish dissemination campaign

At WorldFish we constantly look at how we can better showcase the impact of our research. What innovative tools and processes can we explore to further highlight our relevance to the sustainable development agenda? And how do we produce research evidence *that is* tangible, measurable *and* highly visible *at country, regional and global levels*? With this in mind, our dissemination campaign aims to:

- increase the reach and impacts of WorldFish's research;
- reach audiences that have the potential to increase WorldFish's research impacts;
- facilitate knowledge sharing with partners;
- promote an open access approach through dissemination of our research communications products.

We adopt multichannel approach in our dissemination campaign looking at publishing on different platforms and formats for maximum reach and impacts, namely:

- **online repositories** – MELSpace, DSpace;
- **media** – Website, blog, story, press release, newsletter;
- **social media** – Twitter, Facebook, LinkedIn;
- **print media** – we adopt print on demand approach.

In a rapidly expanding digital landscape, it is essential that WorldFish leverages the power of social media, to widely disseminate research findings and key messages, and make direct, long-lasting connections with increasingly larger audiences. However, just being present on social media does not ensure success. As such, crafting tools, methods and strategies to cut through the noise is an integral part of WorldFish social media strategy.

We are particularly interested in digital storytelling channels that are:

- easy and affordable to set up and run;
- offer enhanced interactive possibilities;
- are suited to rapid “upstream” multimedia sharing.

Tracking the impact of our research is considered an important monitoring and evaluation activity. It facilitates our capacity to monitor progress toward outputs, outcomes and impacts as well as improving our overall research management capacities. Metrics used to measure our digital impact and reach include Altmeter, Google Analytics, Google Scholar, and Meltwater Media Monitoring.

In 2018, WorldFish produced 124 publications, out of which 65 are journal articles. 73 percent of our peer-reviewed articles are open access. At the end of 2018, we had 40 575 followers across our social media channels. An increase of 44.5 percent compared to 2017.

## CONCLUSION

This year, WorldFish began developing a comprehensive communications and marketing strategy that is driven by a stronger focus on new and digital media which aims to raise the profile and reach of our research evidence beyond traditional stakeholders. We also established a global network of communications specialists within WorldFish projects and country offices. The network meets monthly to share experiences, knowledge and learning, identify strategic communications opportunities and plan innovative communications products and digital campaigns. Our external communications efforts were complemented by more coordinated and regular internal communications through this network.

In conclusion, we believe that effective communication of our research and the scientific evidence we produce, including grey literature, is critical for making a difference to the people whose livelihoods, in both the developing and developed world, depend on and are shaped by aquatic food systems.

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# Aquatic Sciences and Fisheries Abstracts: Adopting a grey literature strategy to meet stakeholder needs

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## ABSTRACT

Since its establishment in 1971, Aquatic Sciences and Fisheries Abstracts (ASFA) has strived to cover the world's aquatic sciences, fisheries and aquaculture research, paying particular attention to grey literature. Grey literature coverage on ASFA has been achieved by working in partnership with institutions around the world who are responsible for monitoring the relevant literature in their country or region for inclusion on the ASFA database. This set up has been in place since the ASFA database was first published almost 50 years ago. By working with librarians and information officers at relevant institutions, ASFA has managed to build a reputation as a database for aquatic sciences grey literature. A recent thesis on ASFA concluded that ASFA users "recognize the importance of ASFA for its international coverage, particularly of grey literature about fisheries and aquatic sciences" (Castillo, 2018). However, in the digital age with new technologies expanding the volume and types of grey literature being produced, can ASFA's partnership model still be said to provide comprehensive coverage of grey literature? This paper examines ASFA's progress to adopting a strategy to quantify and improve its grey literature strategy in order to benefit aquatic sciences, fisheries and aquaculture stakeholders.

## DEFINING AND MEASURING GREY LITERATURE

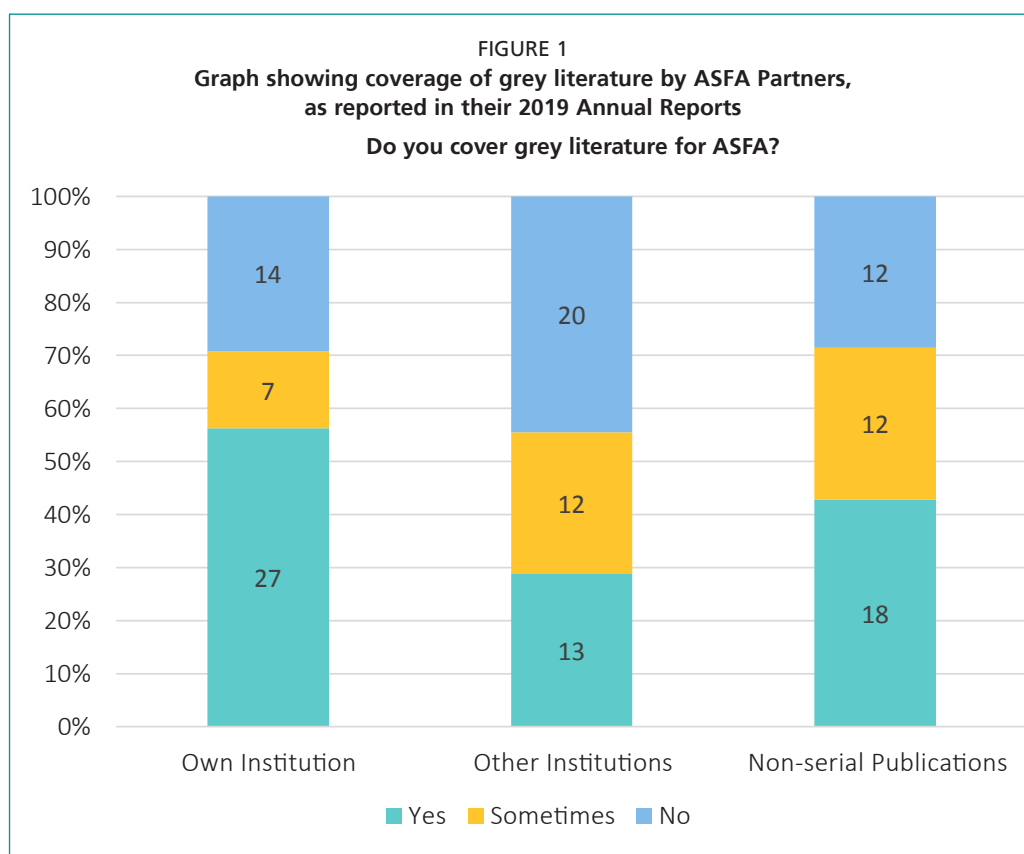
As a somewhat nebulous concept within the rapidly changing field of information management and publishing, the impact of grey literature can often be overlooked if it does not have the same metrics and impact assessment of commercially published journals. In order to address this balance, we attempted to adopt a definition of grey literature which will help to identify it and measure its coverage on databases such as ASFA.

A discussion session was held at the 2019 ASFA Advisory Board meeting in Terengganu, Malaysia (University of Malaysia Terengganu, 22–24 September 2019). This discussion resulted in the below working definition being proposed by ASFA partners. Although not formally adopted by ASFA, this definition will serve to provide a framework to understand the concept of grey literature for ASFA:

*Grey literature is information presented in any number of physical or digital formats, under the subject scope of aquatic sciences, fisheries or aquaculture, of sufficient quality to be preserved and of public good.*

This broad definition can be interpreted to cover a wide variety of materials produced by, or of use to, aquatic sciences, fisheries or aquaculture institutions. Having a definition is one way of helping agree an understanding of what is meant by the term grey literature, particularly among ASFA partners and information professionals who are responsible the recording of research and publications on library catalogues and repositories. To help measure the coverage of grey literature on ASFA, partners were asked to report on their own coverage of grey literature for ASFA as part of a standardized online report and an assessment of the volume of grey literature by document type was made on the ASFA database.

Between June and July 2019 ASFA partners and collaborating centres were asked to report on their ASFA activities using a standardized online report or offline template. The results of these reports showed that just under half the respondents monitored their own institutions grey literature for inclusion on ASFA; less than a third monitored other institutions' grey literature; and less than half monitored non-serial publications (see Figure 1). Consequently, there is room for improvement in ASFA's monitoring activities, which ASFA's grey literature strategy must seek to address.

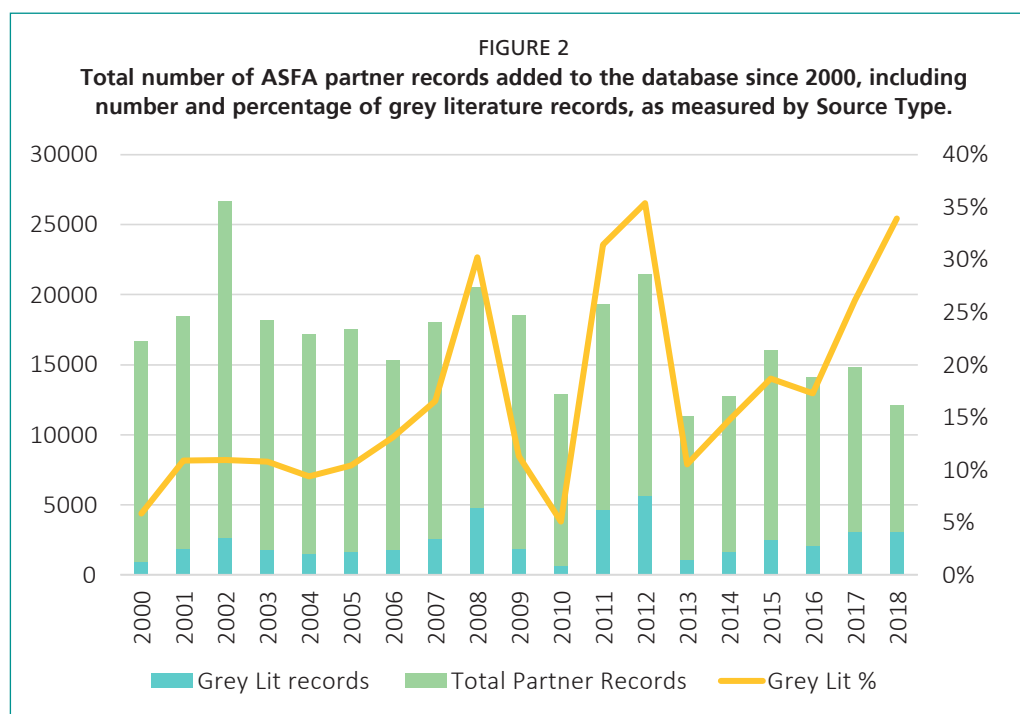


In order to assess the volume of grey literature being added to the database since 2000, the below search string was used to identify the number of records created by ASFA partners for grey literature source types. Figure 2 shows the results of this search.

Search string:

**Input centre:** All ASFA partners

**Source type:** Conference papers and proceedings; Dissertations and theses; Government and official publications; Reports; Working papers; Other sources.



Although Figure 2 shows an increase in the percentage of grey literature being added to the database by Partners, as the overall number of records has fallen, the total number of grey literature added to the database has remained relatively stable since 2000.

In summary, the above assessments represent the first attempts in recent years to quantify the amount of grey literature being added to the ASFA database. By highlighting gaps in partners' monitoring, areas for improvement can be identified, and these assessments also provide a baseline from which to measure future changes. This is the first step in ASFA adopting a formal strategy to improve its coverage of this often overlooked information source.

### **ADOPTING A STRATEGY TO COVER GREY LITERATURE: UPDATING TECHNOLOGIES**

From a printed journal in 1971, ASFA is now an online database of 3.7 million records, however there are many technological improvements and adaptations that must be made if ASFA is to meet its goal of promoting and disseminating the world's aquatic science, fisheries and aquaculture research. The first is implementing a Virtual Research Environment (VRE) whose services will be provided by D4Science. The VRE will allow the harvesting of up to ten Open Archives Initiative Protocol for Metadata Harvesting (OAI-PMH) compliant repositories and will allow records to be made openly searchable, therefore providing an open platform for ASFA partners to share and promote their research. The VRE will also allow records to be shared with other information products whilst still maintaining the ASFA database hosted by ProQuest. It is hoped the move to an open platform will allow ASFA to contribute to FAO projects, such as the CECAF-PESCAO project and Aquatic Genetic Resources Registry, and also non-FAO projects such as becoming an OpenAIRE provider. Enabling an open platform is also key to attracting new partners to ASFA, particularly those in developed countries, and will therefore improve the geographic coverage of grey literature on ASFA's database.

To further support this move to an open system, ASFA has moved its subject thesaurus to VocBench where it is now openly searchable and downloadable. Future development of this subject thesaurus will play a key role in enabling the discovery of aquatic sciences, fisheries and aquaculture grey literature.

## ADOPTING A STRATEGY TO COVER GREY LITERATURE: PROMOTING THE BENEFITS OF GREY LITERATURE COVERAGE

Though fundamental to ASFA's success, updated technologies alone will not achieve ASFA's goals of increasing its grey literature coverage. Promoting awareness of the importance of grey literature, and educating both librarians on how to monitor grey literature, and authors on how to publish and archive their grey literature, are fundamental to ensuring the success of ASFA's strategy.

The 2019 ASFA Advisory Board Meeting provided an opportunity to share knowledge and ideas of grey literature across the partnership. Aside from drafting a working definition of grey literature, the Advisory Board also discussed the problems of covering grey literature, namely that it is time consuming when compared to covering primary journals. The fact that it is time consuming, and often stored with incomplete metadata on diverse repositories and websites, is of course the reason why it is so important for ASFA to cover this important research source. Whilst search engines are perfectly capable of retrieving primary literature, the absence of much grey literature from search engines is the reason why ASFA must cover if it is to differentiate itself from other databases and services. The detailed metadata that ASFA partners add to records enable advanced search with precise retrieval, ensuring that the user is able to locate information relevant to their needs based on subject, taxonomic or geographic keywords.

ASFA needs to recognize the efforts of those partners who spend significant time covering grey literature, either for their own institution or more widely in their country or region. A reward or incitement to encourage this grey literature coverage to continue and grow across the partnership should be in place, so that ASFA shifts from measuring partners' input only based on total number of records added to the database. In order to achieve this, ASFA's Partnership Agreement Working Group will examine the responsibilities and entitlements of ASFA partners and ensure they are fit for purpose and reflect the extra effort grey literature coverage necessitates.

Authors and users will also benefit from better promotion of the benefits of grey literature. This conference – *Enabling Grey Literature discovery benefits aquatic sciences, fisheries and aquaculture researchers* – can be seen as ASFA's first step in reaching out to the research community in order to listen to and assess their needs, a process we hope will be repeated at future ASFA Advisory Board Meetings. Covering the dissertations and theses authored by students at partner institutions, such as University of Malaysia Terengganu, benefits the authors in that it increases the reach of their work, and also the scientific community as it ensures the valuable research is not lost. ASFA will be working with individual partners to ensure they are aware of the importance of monitoring the grey literature produced at their institution, as well as providing technological support, such as harvesting and importing library catalogue records, where appropriate. ASFA will also be producing training and guidelines to ensure authors of grey literature have the necessary skills and knowledge to ensure their work is stored, catalogued and disseminated. Finally, ASFA's Impact and Strategies Working Group is responsible for measuring ASFA's impact on its users and will conduct a number of assessments to ensure ASFA is adapting to meet their needs.

## CONCLUSION

ASFA's pursuit of a strategy to improve its grey literature coverage coincides with its move to a new business model which will provide open information products and services to users. ASFA's greatest strength has always been its partners, who as experts in the literature being produced in their country or region are best placed to curate these national or regional resources for ASFA and ensure they find a wide audience as part of the ASFA database. Grey literature is typically available on institutional repositories and websites, where access to the full text is given freely and unrestricted (open access). ASFA's challenge is therefore not removing a paywall or negotiating

rights with commercial publishers, but rather in surveying the vast volume of aquatic sciences, fisheries and aquaculture research outputs already made freely available worldwide. The increasing volume of literature made available on open access repositories means that selecting information that is of public and scientific good, and recording and promoting to a wide audience will be an increasingly important task in order to ensure information of relevance to users is stored and discoverable. In order to achieve this, the work of not only ASFA partners but information users and grey literature authors is needed, to ensure a consensus and understanding of the value in grey literature is arrived at, and that methods for storage and disseminating research are implemented. ASFA looks forward to working with these various stakeholder groups to improve coverage of these important materials to benefit future aquatic sciences, fisheries and aquaculture research.

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# Grey literature usage among Filipino aquaculture researchers: A bibliometric analysis of research from 2009 to 2018

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## EXTENDED ABSTRACT

Aquaculture is one of the fastest growing food production industries globally (Natale et al., 2011), and it is expected to exceed the production of other animal production industries such as beef, pork, or poultry in the next decade (OECD and FAO, 2012). In the Philippines, aquaculture contributes significantly to food security, employment for the poor, women, youth, and foreign exchange earnings (FAO, 2019; Sekhar and Ortiz, 2006). The Philippines is the 11th top aquaculture producing country in the world; it ranked third, fifth, and ninth in seaweeds, finfish, and marine crustacean productions, respectively (FAO, 2018). However, unsustainable aquaculture practices in the country “contributed to nutrient loading, threatening environmental harm” (FAO, 2018). The majority of countries in the world, including the Philippines, are experiencing environmental problems due to unsustainable aquaculture practices. Thus, to address these problems and further develop aquaculture, research was actively done by the government, academic, and research institutions. According to Superio *et al.* (2019) research plays a major role in development, and commonly, the results were published for public consumption. However, some fisheries and aquaculture researches were unpublished and of limited distribution because a high proportion of fisheries information was published as grey literature (Parker *et al.*, 2010). Notably, FAO (2009) found that fisheries information in developing countries was published in grey literature due to the stringent criteria of the editorial boards of Western peer-reviewed journals, while in Africa, an estimated 70 percent of fisheries information is published as grey literature.

Grey literature refers to “material that usually is available through specialized channels and may not enter normal channels or systems of publication, distribution, bibliographic control or acquisition by booksellers or subscription agents” (Schopfel and Farace, 2010). Grey literature is usually produced by associations, academic institutions, research institutions, libraries, societies, etc. Common types are theses, unpublished documents, conference proceedings, datasets, reports, working papers, etc. (Mason, 2012; Schopfel and Farace, 2010). Grey literature of any type is useful for research development in any field (Chowdappa and Ramasesh, 2011; CGIAR, 1989). Hence to assess the value of grey literature among Filipino aquaculture researchers, the study was conducted. Generally, this paper aimed to evaluate, by means of bibliometric analysis, the use of grey literature among Filipino aquaculture researchers based on

their published research outputs from 2008 to 2019. Specifically, it aimed to: 1) identify the commonly used types of grey literature; 2) identify the most common publishers of the grey literature cited in the studies; and 3) determine if the most common publishers are covered in Aquatic Sciences and Fisheries Abstracts (ASFA) Database.

The data were identified using the Scopus Database by searching the word "aquacultur\*" in the title, abstract and keywords list, and "Philippines" in the affiliation. The search results were then limited to all research that was published from 2009 to 2018. A total of 199 relevant articles were extracted from the database and analysed. Results of the bibliometric analysis revealed that out of the 199 aquaculture publications published in 100 peer-reviewed journals, 74.4 percent were written by Filipino first authors. In contrast, non-Filipino first author wrote the remaining proportion (25.6 percent) with Filipino(s) as co-author(s). The majority (68.3 percent) of the studies were published in commercial academic journals, while 31.7 percent were published in open access journals.

The 199 aquaculture publications have cited 9 447 literature sources, of which 20 percent were grey literature, suggesting that one in every five literature cited by Filipino researchers was grey literature. Furthermore, 92 percent of the publications have cited at least one grey literature. On average, Filipino aquaculture researchers have cited nine grey literature documents per article.

When classified according to types, the most common grey literature cited were monographs, conference proceedings, websites, reports, government documents, theses, technical documents, statistics, legal documents, guidebooks, and news articles published by 774 different local and international academic, research, governmental and non-governmental institutions among others. The most common publishers of the grey literature cited include the following international institutions: FAO, WorldFish Center, World Bank, International Union for Conservation of Nature (IUCN), UNESCO, Asian Development Bank (ADB), International Lake Environment Committee, etc.; and local academic and research institutions, and government agencies: SEAFDEC Aquaculture Department (SEAFDEC/AQD), Bureau of Fisheries and Aquatic Resources (BFAR) – Philippines, Laguna Lake Development Authority (LLDA), Philippine Council for Aquatic and Marine Research and Development (PCAMRD), University of the Philippines – Los Baños, University of the Philippines Marine Science Institute, Law and Legislations (Republic Acts) - Philippines, etc. Among these 774 publishers, 16 percent (124) have at least three publications that Filipino aquaculture researchers have cited. However, only 25 percent (31) of these publishers have publications covered in ASFA Database.

The results of the study suggest that grey literature of various types published both locally and internationally remains to be the essential source of information among Filipino aquaculture researchers. However, only a small proportion of the grey literature publishers with publications cited by Filipino aquaculture researchers were indexed in ASFA Database. Thus, it is recommended that ASFA partners should consider covering publications of those institutions, or the ASFA Secretariat should consider recruiting those institutions to become ASFA partners. Moreover, the ASFA partners should also consider covering non-traditional information sources, such as websites, laws and legislation documents, and newspaper articles relevant to the aquatic science community.

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# Fisheries development projects by FAO in the 1960s–1970s: Argentina case

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## ABSTRACT

The 1960s and 1970s was a very important period for developing countries as they developed their fishing areas due to the help of funds and technical expertise of FAO. In the case of Argentina, this period represented the first important fisheries research, through participation in two FAO projects. First, the regional project: CARPAS – Comisión Asesora Regional de Pesca para el Atlántico Sudoccidental (Regional Fisheries Advisory Commission for the South West Atlantic), including Argentina, Brazil and Uruguay. Second, a national project: Proyecto de Desarrollo Pesquero FAO/Argentina (Fisheries Development Project). FAO also had projects in many countries of Latin America, as well as Africa Region during this time. These projects produced technical reports with the results of research on biological, technological and socioeconomic aspects of fishing. These were very exhaustive and deep studies because they were the first conducted on these topics, and also included new methodology. The information from these projects continues to be consulted and cited today, since in many cases it is the only available information on these subject matters.

The INIDEP Library (ASFA National Partner, Argentina) considers that it is very important that these grey literature documents be “visible” in a database like ASFA, where the information can be shared with a wide audience. At present, the information is included in INIDEP’s databases, and the full text can be accessed in open-access repositories. Reflecting the sentiment of the article “The library as custodian of information resources” (Sado, 2019), this presentation demonstrates the important role libraries and ASFA partners have to play in order to ensure research is accessible, especially in light of the closure of the FAO’s Fisheries Library.

## INTRODUCTION

The exploration of the Argentine Sea basin before 1890 took place at the same time as the great circumnavigation trips performed by foreign ships. Afterwards, the first national activities were those of hydrographic and topographic surveillance trips undertaken by the Argentine Navy – Armada Argentina; the Navy ships carried researchers from the Museums of Natural Sciences and the Universities of Buenos Aires and La Plata National, as well as from the Directorate of Fishing and Wildlife dependent on the Argentine Ministry of Agriculture. The biological material collected, which comprised algae, molluscs, crustaceans and fish from the benthic and demersal communities, made it possible to publish the first compilations concerning fishing resources of the Argentine Sea. From the second half of the 20<sup>th</sup> century onwards, these surveys were complemented with fishery biology studies performed onboard ships of the commercial fishing fleet.

In 1898, Dr Fernando Lahille founded the first marine biology coastal laboratory, located at Punta Mogotes, Mar del Plata. In 1960, a group of researchers and lecturers of the Buenos Aires, La Plata and Bahía Blanca Universities created the Marine Biology Institute (IBM) in Mar del Plata, where the first laboratories were established and where basic research lines were developed with permanent working groups. Likewise joint activities between Argentine and foreign scientists were important within the framework of international cooperation agreements, for they enabled an increase in the number, regularity and geographic scope of research surveys, as well as in the number of researchers, scientific publications and biological material collections.

The National Institute for Fisheries Research and Development (INIDEP), Argentina, was created in 1977 on the basis of the former IBM in order to perform integral research programs on fishing grounds, emphasizing the assessment of Argentine fishery resources and a sustainable fishing development. It is a decentralized agency affiliated with the Secretariat of Agriculture, Livestock, Fishing and Food of the Ministry of Economy and Production. The projects being developed generate and adapt knowledge, information, methodology and technology for the sustainable development, use and preservation of Argentine fisheries and they mainly aim at the assessment of the fishing resource for optimizing its annual by-catch and the establishment of the technical and economic foundations that will enable its sustainable preservation and management. The infrastructure and efforts oriented to personnel training have turned INIDEP into a leading entity in the country's fisheries research sector with international recognition.



Angelescu and *Sánchez (1995)* have broken the historical background of fishery research in Argentina into four stages:

1. the beginning of Oceanography in Argentina (1874–1938);
2. the epoch of interinstitutional cooperation (1938–1959);
3. advances in marine science as a result of international cooperation (1957–1980);
4. the incorporation of fishery research vessels with INIDEP and the development of new cooperation programmes (1980–1992).

Similar classification was presented by Ehrlich and Sánchez (1990), who gave the following description of what roughly corresponds to the third period in the above classification:

The situation between 1950 and 1976. The development of biological oceanography and fisheries biology in Argentina: This period was to become one of the most intense and creative stages in marine research in Argentina. The foundation of several institutes devoted to oceanography, the establishment of different forms of international cooperation and the post war arrival of European hydrobiologists which organized several working groups contributed to this development.

### FAO COOPERATION PROJECTS

Cooperation was key factor in two FAO projects which laid the foundations of fisheries biology and oceanography in Argentina. First, the regional project: CARPAS – Comisión Asesora Regional de Pesca para el Atlántico Sudoccidental (Regional Fisheries Advisory Commission for the South West Atlantic), including Argentina, Brazil and Uruguay. Second, a national project: Proyecto de Desarrollo Pesquero FAO/Argentina (Fisheries Development Project).

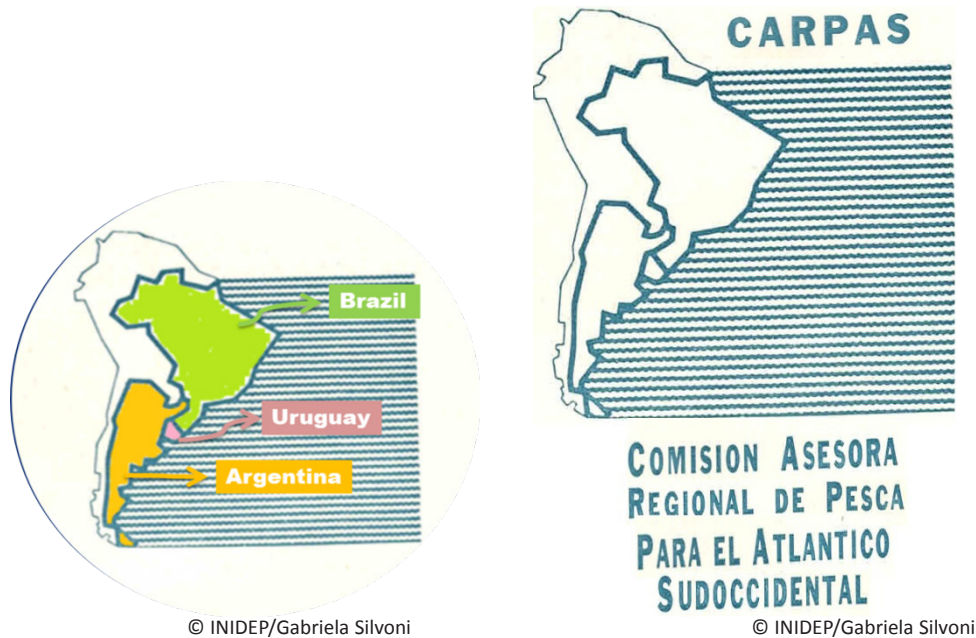
Argentinian institutions acting as counterparts were: the Argentine Naval Hydrographic Service (SHN) and Institute of Marine Biology (IBM) the National Directory of Fishery, and the National Institute of Industrial Technology (INTI/CITEP), with the official venue in Mar del Plata. International and national experts were assigned to the project; cruises were carried out on the Argentinian Continental Shelf between 1966–1975 as part of this cooperation, by research vessels and commercial fleet.

The research covered many biological, technological and economic aspects of fishing. As regards fisheries resources, the information obtained during this period refers mainly to biomass assessment of the stocks of the principal commercial species (common hake, anchovy, decapod crustaceans and molluscs) and to the hydrological characteristics of their habitats. For the first time in Argentina, a sampling program with appropriate space-time coverage was designed, with a degree of periodicity and continuity never applied before and seldom afterwards. These were very exhaustive and deep studies because they were the first ones conducted on these topics, and also included a new methodology.

Both projects generated a significant amount of data and information. The results of the oceanographic, biological and fishery investigations were published in a series of Technical Reports and Information Documents of the projects, although very few copies were made and distributed during that period. The paper documents were catalogued and available only at the INIDEP Library, they were not processed by the FAO Library. They were also published in several numbers of the Contributions of the “Instituto de Biología Marina” of Mar del Plata and in “Physis”, the Journal of the Natural Sciences Association of Argentina.



## CARPAS - COMISIÓN ASESORA REGIONAL DE PESCA PARA EL ATLÁNTICO SUDOCCIDENTAL/REGIONAL FISHERIES ADVISORY COMMISSION FOR THE SOUTH WEST ATLANTIC



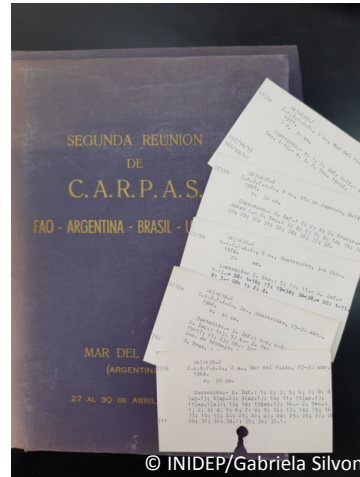
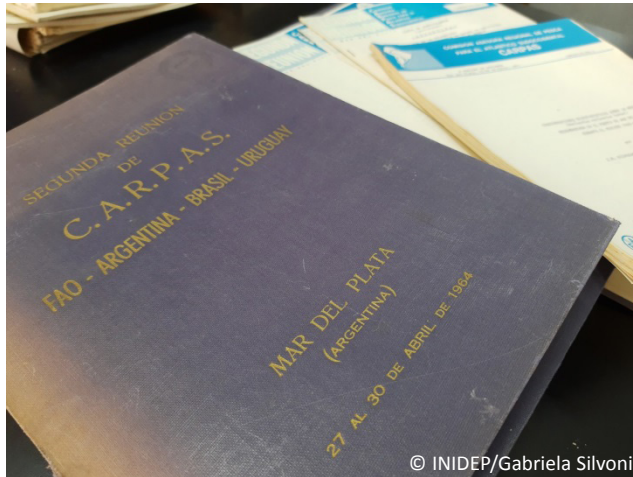
In the mid-1960s FAO established regional fisheries bodies in accordance with Article VI of the Constitution of the Organization. The objective of these bodies was to promote a common point of view and coordinate and facilitate the work of people and national institutions that deal with different aspects related to the management of marine and inland fisheries. They cover the following inland and oceanographic regions:

- Regional Fisheries Advisory Commission for the Southwest Atlantic (CARPAS);
- Indian Ocean Fisheries Commission (IOFC) – abolished in 1999;
- Fishery Committee for the Eastern Central Atlantic (CECAF);
- The Western Central Atlantic Fishery Commission (WECAFC);
- European Advisory Commission on Inland Fisheries (CAEPC) – since 2010, European Inland Fisheries and Aquaculture Advisory Commission (EIFAAC);
- Committee for Inland Fisheries of Africa (CIFA) – which later became the Committee for Inland Fisheries and Aquaculture of Africa (CIFAA);
- Commission on Inland Fisheries and Aquaculture for Latin America and the Caribbean (COPESCAALC).

CARPAS included Argentina, Uruguay and Brazil. It ceased developing activities in 1974 and was finally abolished in 1997 by FAO Resolution 13/97 with the corresponding notification to the 3 member states. The other Committees are still active.

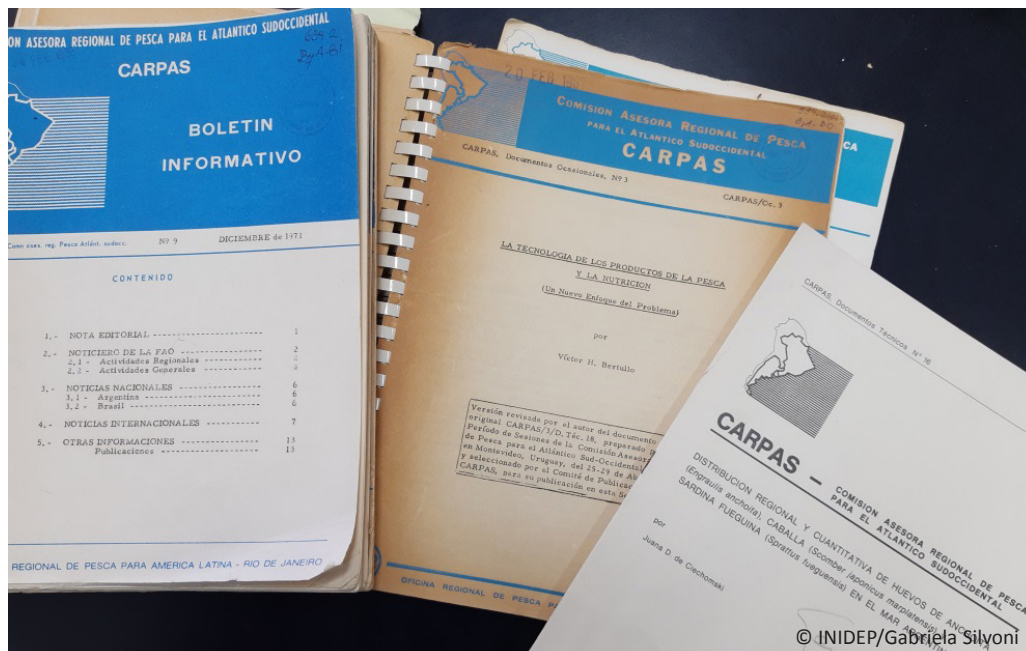
Around 300 documents were produced covering many aspects of the Southwest Atlantic commercial resources from Argentina, Uruguay and Brazil (fishery biology, statistics, market, fishing gear, fishery products, research programmes, etc.). The document types include CARPAS and FAO Series: reports, serial collections and annual conference proceedings. CARPAS Board Meetings were held at the following dates and locations:

1. 1962, Río de Janeiro (Brazil)
2. 1964, Mar del Plata (Argentina)
3. 1966, Montevideo (Uruguay)
4. 1968, Río de Janeiro (Brazil)
5. 1971, Mar del Plata (Argentina)
6. 1974, Montevideo (Uruguay)

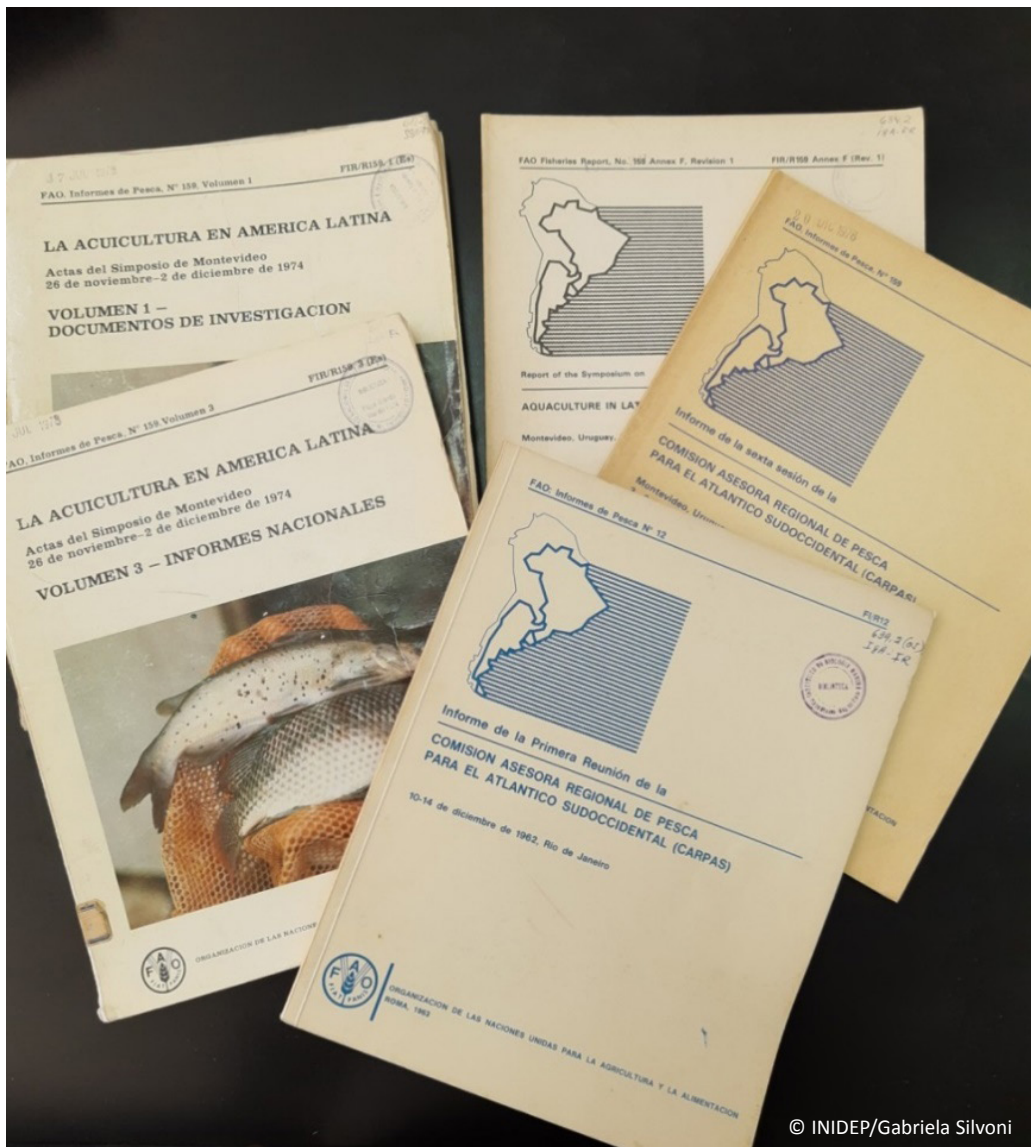


CARPAS Serials included:

- CARPAS boletin informativo: 1967–1971 (1-10);
- CARPAS documentos: 1966–1969 (1-16);
- CARPAS documentos tecnicos 1964–1972 (1-19);



FAO Fisheries Report/Informes de Pesca volumes 12, 25, 34, 67, 108 and 159;



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Proyecto de Desarrollo Pesquero (PDP)/Project of Fishery Development



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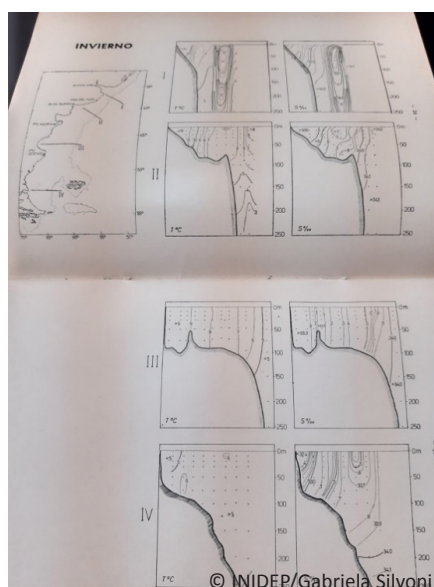
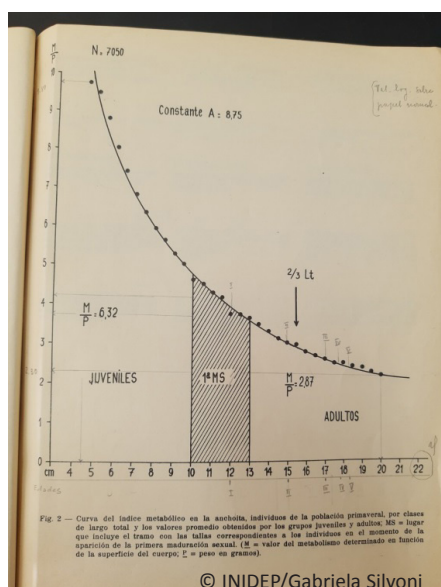
Besides the regional fishery bodies established by FAO in the mid 1960's, the Project of Fishery Development was executed by several developing countries in Latin America (Argentina, Brazil, Colombia, México, Perú, Venezuela):

No doubt of all the international cooperation agreements during this period, the most successful, and the one which more significantly stimulated the advance of fishery biology, was the Project of Fishery Development, proposed by Argentina to the United Nations in 1964. Participating institutions were the FAO, and as an Argentine counterpart the Institute of Marine Biology (IBM), and Argentine Naval Hydrographic Service (SHN). The main objective of this project, which covered as a whole a period of almost nine years, was the assessment of the biomass of commercially important fish stocks, supported by environmental studies, experimental fishing and food technology. A total of 33 international experts were assigned to the project, working in close collaboration with the Argentine scientists. During the first stage (1966–1971), 26 cruises with the research vessel (RV) “Cruz del Sur” of the FAO were completed, along with 14 hydrographical surveys with the RV “Capitán Cánepa” of the SHN. (Ehrlich and Sánchez, 1990)

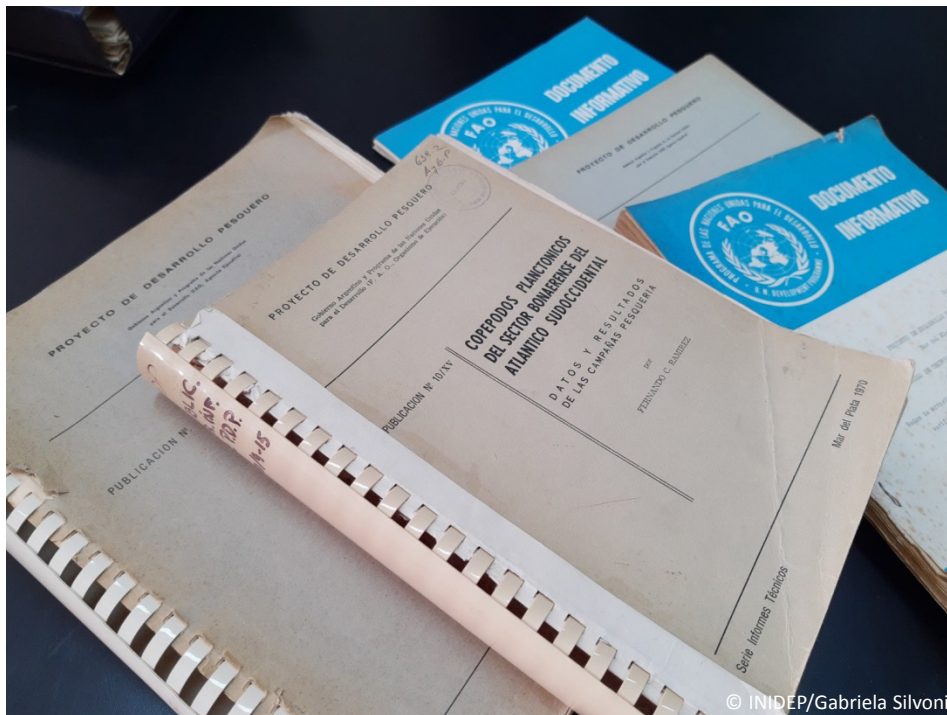
The most important studies were focused on sampling of fish and decapod crustacean species of the coastal region and inner shelf, carried out during fourteen cruises of the series “Pesquerías” (the Spanish word for Fisheries) in the fishing grounds of the most important commercial species. These studies were complemented with data on the horizontal and vertical distribution of physical parameters and nutrients, distribution and abundance of phyto-, zoo- and ichthyoplankton. Bathymetric registers were made, and bottom sediments were collected. Furthermore, environmental conditions and plankton samples were studied seasonally.

The results were published in the Project Series. As regards fisheries resources, the information obtained during this period included various aspects of the fishery biology of several fish species, decapod crustaceans and mollusc bivalves including studies of the hydrological characteristics of their habitats (Brandhorst and Castello, 1971), or copepod catalogue from “Pesquerías” in one transect off Mar del Plata (Ramirez, 1971).

Publicacion serie informes técnicos: 1967–1973 (1–46)

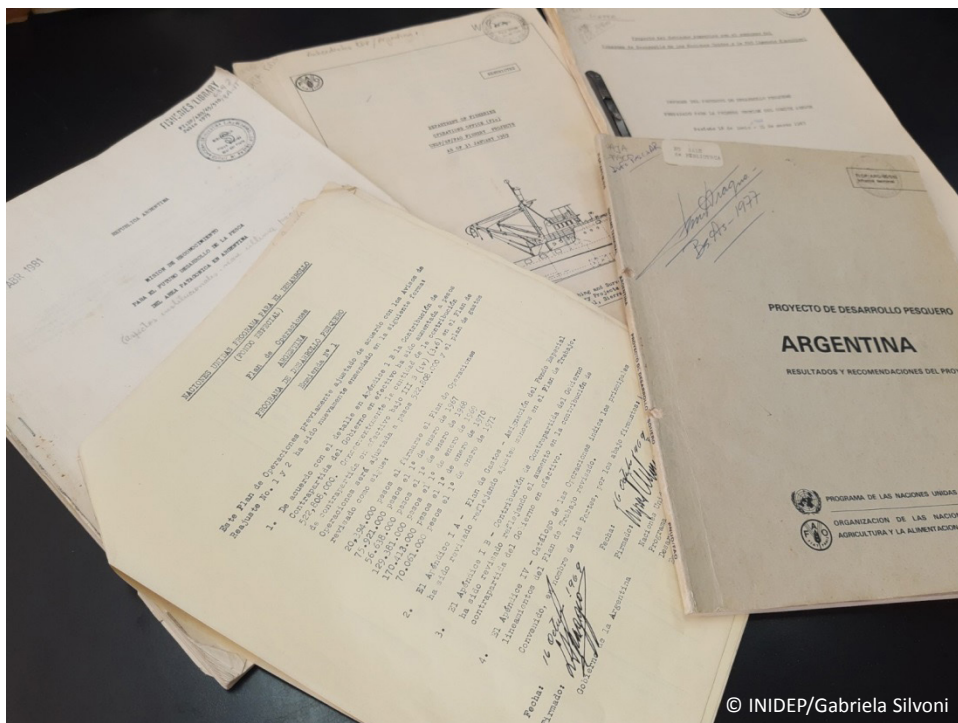


## Documento informativo: 1970–1975 (1–44)



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## Final Report: FIDP/ARG/65/510; Manuscript Reports



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## VISIBILITY

The Library of the National Institute for Fisheries Research and Development (INIDEP) is a government science library; created in 1960 on the basis of IBM. Unique in Argentina, it specializes in marine science and fisheries and assists INIDEP scientific community as well as other local, national and international users. One of its main objectives is to collect, preserve, and assure national and international visibility of scientific output of Argentinian researchers in this field. INIDEP became a partner of ASFA in 1996. INIDEP also participates in regional and international cooperation networks and projects (Agricultural Information and Documentation Service of the Americas – SIDALC, Grupo de Información Documental en Ciencias Marinas, Acuáticas y Pesqueras – GIDMAP, International Association of Aquatic and Marine Science Libraries and Information Centers – IAMSLIC, International Oceanographic Data and Information – IODE) and contributes to international repositories (AquaticCommons and OceanDocs, as well as INIDEP developed maintains its own repository – MarAbierto (<http://marabierto.inidep.edu.ar/xmlui/>))

As regards to the CARPAS and Proyecto de Desarrollo Pesquero (PDP) publications that are catalogued in INIDEP's Online public access catalog (OPAC), the serial collections and many analytical references are present, however not the complete collection. Also, only very few have been digitized and INIDEP remains the only place to find the physical copies. INIDEP'S document database (DOCAU) includes both IBM and INIDEP publications, from 1960 to present day, with more than 2 200 items. All items are processed as ASFA records, using agreed methodology and indexed with subject descriptors from the ASFA Subject Thesaurus. The ASFA database therefore increases visibility of these publications, and provides links to the full text where available. Items are also accessible through the SIDALC Megabase catalogue: <http://www.sidalc.net/docau.htm>

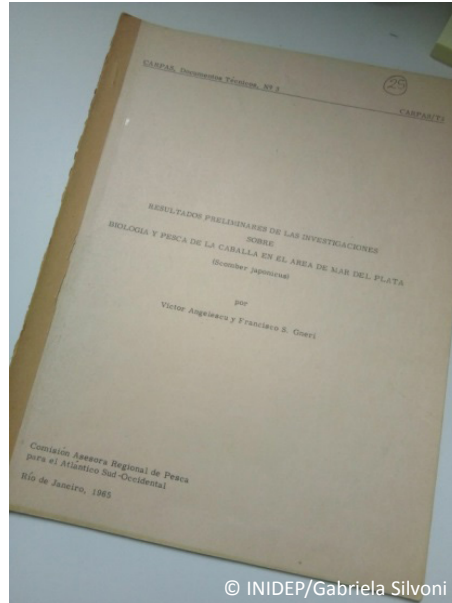
For the examples of visibility we analysed the following references:

TABLE 1  
Number of citations for two fisheries management reports

Reference	Number of citations recorded on each source:			
	Google Scholar	Scopus	OceanDocs	Aquatic Commons
Contribution N° 18: <b>Angelescu, V.A. &amp; Gneri, F.S.</b> 1965. Resultados preliminares de las investigaciones sobre biología y pesca de la caballa ( <i>Scomber japonicus</i> ) en el área de Mar del Plata. Documentos Técnicos 3. Rio de Janeiro, CARPAS. 21 pp.	101	4	16	0
Contribution N° 166: <b>Brandhorst, W. &amp; Castello, J.P.</b> 1971. Evaluación de los recursos de anchoíta ( <i>Engraulis anchoita</i> ) frente a la Argentina y Uruguay. I. Las condiciones oceanográficas, sinopsis del conocimiento actual sobre la anchoíta y el plan para su evaluación. Publicación Serie Informes Técnicos. Proyecto de Desarrollo Pesquero FAO/ Argentina 29. Mar del Plata, FAO 59 pp.	165	63	50	3

Contribution N° 18:

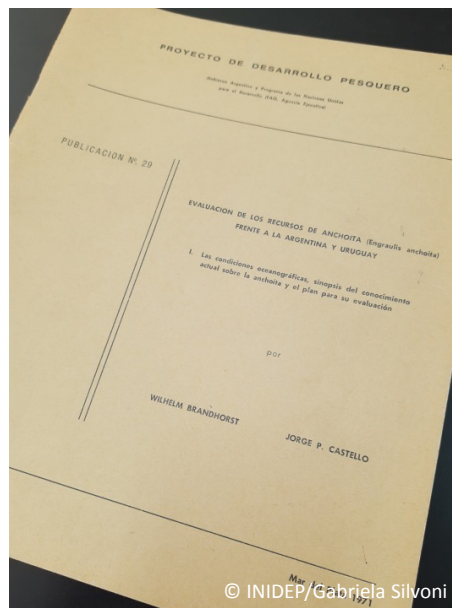
**Angelescu, V.A. & Gneri, F.S.** 1965. *Resultados preliminares de las investigaciones sobre biología y pesca de la caballa (Scomber japonicus) en el área de Mar del Plata.* Documentos Técnicos 3. Rio de Janeiro, CARPAS. 21 pp.



Contr. 18: Angelescu & Gneri, 1965

Contribution N° 166:

**Brandhorst, W. & Castello, J.P.** 1971. *Evaluación de los recursos de anchoíta (Engraulis anchoita) frente a la Argentina y Uruguay. I. Las condiciones oceanográficas, sinopsis del conocimiento actual sobre la anchoíta y el plan para su evaluación.* Publicación Serie Informes Técnicos. Proyecto de Desarrollo Pesquero FAO/Argentina 29. Mar del Plata, FAO 59 pp.



Contr. 166: Brandhorst & Castello, 1971

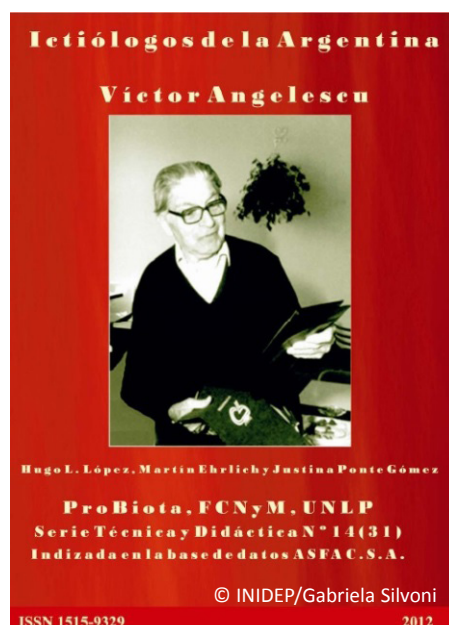
To analyse the value of the documents today, we searched for citations using Google Scholar and Scopus (<https://www.scopus.com/search>), so that we can not only see the number of times they were cited but also the citing documents. Besides Google Scholar

and Scopus, we also searched the AquaticCommons (<http://aquaticcommons.org/>) and OceanDocs (<https://www.oceandocs.org>) repositories, where the full-text search could be performed, in addition to the metadata search. Scopus enables searching just in the “Reference” field.

### DR. VICTOR ANGELESCU

At this point, the author would like to honour Dr Victor Angelescu for his role in promoting historic grey literature and also because of his important role in PDP and ASFA cooperation.

Historical accounts resemble icebergs, in that much remains concealed beneath the surface; this is no exception.....Many of the staff of the various organisations and institutions associated with ASFA are not mentioned by name in this account. From the start they have worked together with a sense of purpose, unity and camaraderie, and with a firm belief in the value of their collective effort; without them there would be no ASFA (Varley, 1995)



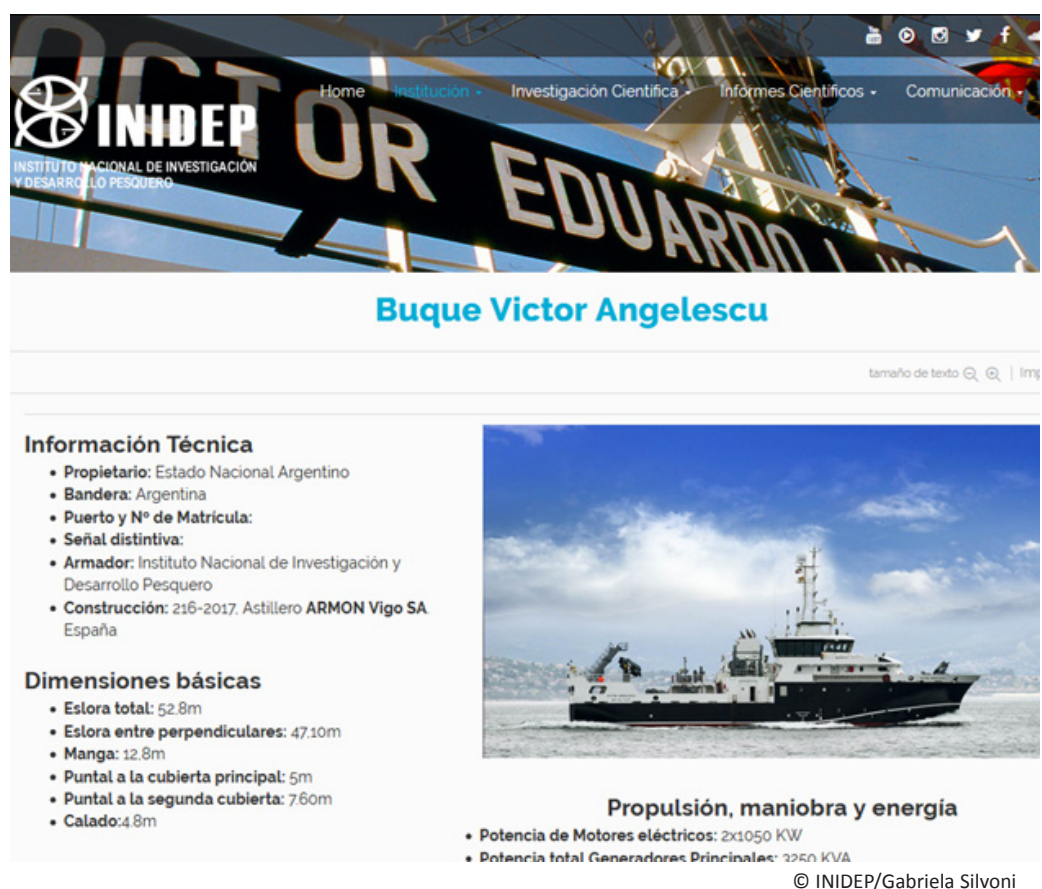
Victor Angelescu (Jassy, Romania, September 20 1912 – Mar del Plata, Argentina, June 12 2002) completed his studies obtaining the title of Agronomist specialized in Hydrobiology and Fish Farming, in the Faculty of Agronomic Sciences of the University of Jassy (Romania). Later he complemented his training in Austria, Germany and the Netherlands. He specialised in fisheries research. He mastered the Romanian, Spanish, German, French and English languages. After the Second World War, he arrived in Argentina and was hired by the National Atomic Energy Commission, with a place of work in the Argentine Museum of Natural Sciences “Bernardino Rivadavia” of the city of Buenos Aires. His activity was relevant to studies on biology and feeding of fish and he began to study common hake (*Merluccius hubbsi*) of the Argentine Sea. In the early 1950s he acquired Argentine citizenship, a country that he adopted as his second homeland, and that he did not abandon for the rest of his life, except when he worked at the headquarters of the FAO, in Rome in the period from 1967 to 1974. So he was one of the many of the staff of the various organisations and institutions associated with ASFA who are not mentioned by name in this account, working on the development of ASFA.



He was one of the founders of the IBM (Mar del Plata), created with the participation of the Province of Buenos Aires and the Universities of Buenos Aires, National de La Plata and National del Sur. IBM was one of the first institutes of its kind in Latin America and had continental significance with a permanent presence of scholars and visitors from South American countries. From there, Dr Angelescu started the school of marine fishery biologists in Argentina.

He was a mentor and promoter of the Fisheries Development Project (PDP/FAO), he was co-director of the Project during the period 1965–1967, guiding fisheries research, establishing plans for works with foreign experts and choosing their Argentine counterparts. It was in those years when systematized research on marine fishery resources in Argentina began.

With regards to the area of bibliography, he was an “addict”, and devoted himself to extensive and in-depth contributions to a number of bibliographies concerned with his field of study, at which he worked tirelessly. He was also a meticulous editor of works and served as a member of the Editorial Committee of INIDEP and as arbitrator of various manuscripts. He was an experienced bibliography locator, who continually incorporated his manuscripts, which he delayed in finalizing, despairing his collaborators. He was among the first users of the ASFA database on CD, searched on MS-DOS in 1994, a great technological advance at the time! Today we say with pride that the modern research vessel at INIDEP, BIP Victor Angelescu, launched in 2017, bears his name by unanimous vote of the INIDEP staff.



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## Buque Victor Angelescu

Información Técnica

- **Propietario:** Estado Nacional Argentino
- **Bandera:** Argentina
- **Puerto y N° de Matriculación:**
- **Señal distintiva:**
- **Armador:** Instituto Nacional de Investigación y Desarrollo Pesquero
- **Construcción:** 2016-2017. Astillero **ARMON Vigo SA**, España

Dimensiones básicas

- **Eslora total:** 52.8m
- **Eslora entre perpendiculares:** 47.10m
- **Manga:** 12.8m
- **Puntal a la cubierta principal:** 5m
- **Puntal a la segunda cubierta:** 7.60m
- **Calado:** 4.8m

**Propulsión, maniobra y energía**

- **Potencia de Motores eléctricos:** 2x1050 KW
- **Potencia total Generadores Principales:** 2250 KVA

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<https://www.inidep.edu.ar/>

## CONCLUSION AND FINAL COMMENTS

Cooperation with FAO was a key for the development of studies on commercial marine resources and fisheries biology. The 1960s and 1970s became one of the most intense and creative periods in marine research in Argentina:

For the first time in Argentina, a sampling program with an appropriate space-time coverage was designed, with a degree of periodicity and continuity never applied before and seldom afterwards. (Ehrlich and Sánchez, 1990)

The joint scientific efforts of FAO experts and Argentinian institutions acting as counterparts, and the periodicity and continuity of the sampling programme, provided results that meant a relevant step forward in the knowledge of the fisheries ecosystems of the Argentinian Sea, their potential, and related environmental conditions. (Angelescu and Sanchez, 1995)

The projects CARPAS and PDP produced core regional fisheries bibliography but very few copies were made and distributed during that period and the paper documents are available only at the INIDEP Library, and its OPAC. They are no longer accessible at the FAO Fisheries Library (closed in 2014 with its collections transferred to the FAO's Main Library where selected reports are only available to those able to visit in person). Historic grey literature can often be overlooked as library and publications staff struggle to manage new publications. However, as is the case with CARPAS and PDP, historic documents can be of immense value to researchers, being in-depth studies and sometimes the first and only of their kind. As we move to uncertain times, the need to understand the history of our marine environment is crucial for protecting its future, and it is hoped that a project to digitise these important publications can be arranged.

We thank Angie (the name we know Dr Angelescu by) for not remaining *concealed beneath the surface* but rather for being a voice for the promotion of fisheries research, and we hope for similar visibility for PDP and CARPAS. We hope in the near future to digitise and make these grey literature documents visible and accessible in the ASFA database, where the information can be shared with a wide audience. The challenge consists in processing all the references and uploading the full text in open access repositories.

Reflecting the sentiment expressed in “The Library as Custodian of Information Resources” (Sado, 2019) this paper demonstrates the important role that libraries and ASFA partners have to play in order to ensure research is accessible. INIDEP Library is the most important Information unit in marine and fisheries science in Argentina, not only for its collection but for its services. Since the beginning of the 1960s, the staff of INIDEP library know perfectly the value of their collections, how to preserve and disseminate them. We specially thank Guillermina Cosulich, leader INIDEP librarian (40 years) who retired in 2017, mentor of the INIDEP–ASFA Agreement (20 years active ASFA Board Member) and “the best promoter of marine and fisheries bibliography in Argentina.”

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# Analysis of deposition and usage of aquatic science grey literature in Africa

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<sup>2</sup> National Fisheries Resources Research Institute (NaFIRRI), Jinja, Uganda

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## ABSTRACT

With the increasing importance of grey literature in managing marine environments (Wells, 2014), aquatic science and fisheries libraries play a correspondingly important role as custodians of this information. Library collections, both physical and digital, are an important source of these often hard to reach and access resources. In the case of historical, non-digital grey literature, libraries can be the only place where this research can be consulted. In Africa, aquatic sciences research centres generate a significant amount of grey literature which contains information of use to, and referred to by scientists, students, policy makers and fishers throughout the world. Constituting up to 70 percent of fisheries research output in some African countries (FAO, 2009), grey literature can often be overlooked or disregarded as it lacks the visibility of research presented in primary journals.

In order to enable the discovery of grey literature, African aquatic science and fisheries libraries have set up institutional repositories and participated in several initiatives set up by international organizations, such as the International Association of Aquatic and Marine Science Libraries and Information Centers (IAMSLIC), International Oceanographic Data and Information (IODE) and FAO. These online initiatives include Aquatic Commons, OceanDocs digital repositories and the Aquatic Sciences and Fisheries Abstracts (ASFA) partnership.

This paper discusses the benefits to African aquatic science and fisheries libraries of promoting grey literature using Aquatic Commons and OceanDocs. An analysis of the usage statistics of African grey literature in Aquatic Commons and OceanDocs repositories is provided. We conclude with an analysis of how the ASFA database has enabled the discovery of specialized grey literature in the field of aquatic sciences in Africa.

**Keywords:** Grey literature; Africa; Aquatic and marine libraries; E-repositories; Aquatic Commons; OceanDocs; ASFA.

## INTRODUCTION

Due to the high volume of aquatic science and fisheries research published as grey literature in Africa, improving its discovery is essential to ensuring sustainable management of aquatic environments and resources. However, the difficulties of processing grey literature in terms of metadata and cataloguing present challenges to librarians and information managers. Grey literature is a very broad concept,

for the purposes of this paper we define grey literature as a research output produced by organizations outside of the traditional commercial or academic publishing and distribution channels. This could include: conference materials (papers, abstracts, presentations, proceedings), technical reports, working papers, dissertations/theses, patents, accepted manuscripts, preprints, bulletins, brochures, or scientific videos.

Grey literature is more difficult to process than other open source types because of its predominantly nonstandard formats (Osayande, 2012). Product brochures, for example, rarely provide adequate information to allow them to be catalogued or retrieved easily. Important metadata, such as author, title, place and date of publication, and publisher can be missing from the document, meaning they are poorly recorded and accessioned by libraries. Whilst primary journals undergo a peer review process to ensure quality of research, this process does not always take place with grey literature.

Publication in peer-reviewed journals is sometimes considered an essential indicator of quality. As grey literature has not always undergone a peer-review, issues or questions of the scientific quality of the work may arise, as may issues such as spelling and grammar which a thorough peer-review would resolve. This is particularly true for trade or commercial publications that would be classified as grey literature; however, for other document types such as theses and dissertations, the peer review process can often be more rigorous than for primary literature. Likewise, conference presentations are often peer reviewed before acceptance. As there is sometimes a long time gap between the submission and publication of research in primary journals, grey literature can present the most up to date picture of what is happening within a body of evidence or area of practice at the time of their view. In summary, though the treatment of grey literature varies according to document type and internal practices, the benefits outweigh any disadvantages and grey literature should not be overlooked or omitted by the research community.

Scientific and technological information and knowledge is critical to the development of Africa. However, very little research output from Africa finds its way into international journals despite the importance of fisheries to the continent in terms of economy and food security. A bibliometric analysis of fisheries research published in primary literature, found that not one African country featured in the list of top 20 countries with the publication highest volume (Aksnes and Bowman, 2015). Instead, much African research remains as grey literature – reports, conference papers and policy documents stored on institutional websites or repositories. This literature is therefore not easily visible or accessible to potential users (scientific and technological communities and policy makers) both inside and outside of Africa. Use of information and communication technologies for the management and distribution of digital-based scientific information and knowledge will enhance access and sharing of these vital resources on the continent and contribute to the development of aquatic science and fisheries research in Africa, which is essential to sustainably managing aquatic environments to secure positive economic and food security outcomes. In particular, Open Access repositories have the potential to improve access to the scientific and technological data, information, and knowledge being generated in Africa.

Grey Literature in Africa is often produced in physical copies and has limited circulation even within the institutions where they are produced. The situation is made worse by the fact that grey literature on the continent is inadequately documented and there is a general absence of national or regional bibliographic databases that can be accessed to find the grey literature that exist on the continent, and where to access it. Where the databases do exist, it is usually very difficult to get access to the actual documents unless one visits the institutions which produce the research in person. There is also a lack of capacity, both human and institutional, for managing grey literature, which increasingly is being generated in digital format. The result is that much grey

literature being generated by research institutions is not shared, meaning that scientific and technological research is not being developed further beyond field and laboratory research or field work. Very useful and valuable technological and scientific information and knowledge remains unexploited and, in some cases, lost. Most of the aquatic science libraries in Africa have inadequate financial resources to enable them to embark on digitization projects, which are costly and require planning. Access to repositories and databases is therefore essential in improving the accessibility of research.

### **BENEFITS OF VALORIZING AFRICAN GREY LITERATURE COLLECTIONS IN AQUATIC AND MARINE LIBRARIES**

Grey literature is very important to African aquatic science and fisheries libraries in that most aquatic institutions cannot afford to subscribe to primary research journals, and as a result they end up relying on grey literature which is often free to access. The grey literature uploaded onto various online repositories has therefore enabled access to relevant information from different parts of the world. Often, grey literature can be more relevant to local needs and environments (Kufa, 1993), as in many cases it is the only research conducted in a particular place or is the first type of research to address a problem that a particular habitat may be facing. It is therefore important to valorize African grey literature and ensure it is available to present and future researchers. To summarise, the reasons for valorizing African grey literature below:

- to improve the management of local and regional aquatic environments by ensuring stable, online access to grey literature conducted in Africa;
- to disseminate, communicate and promote research published outside of primary journals which may be the first of their kind on a particular topic or geographic area;
- to benefit researchers in developing countries where the rising cost of journals subscription may prevent access;
- to enhance the research process by ensuring grey literature is added to literature reviews;
- to reduce publication bias against authors from developing countries and overcome financial or resource barriers to publishing in primary journals;
- To preserve the grey literature documents for future scientists, researchers, policymakers and fishers.

A key step to achieving the above goals is the storage of grey literature on a sustainable open access repository. Two such repositories, Aquatic Commons and Ocean Docs, are examined below to analyse their role in valorizing African grey literature in the domain of aquatic sciences and fisheries research.

### **AQUATIC COMMONS**

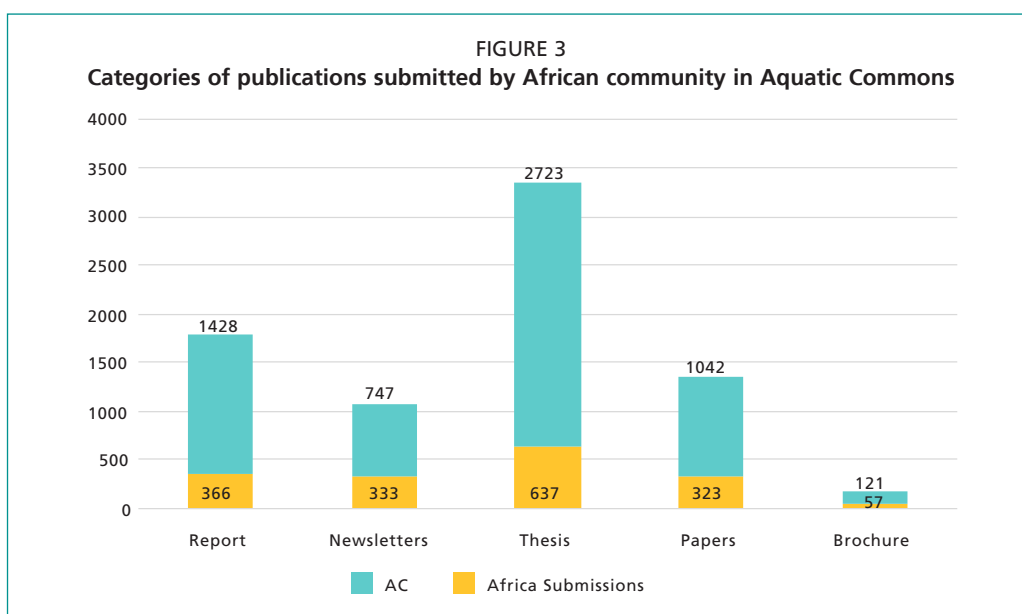
The Aquatic Commons is a digital repository covering the natural marine, estuarine, brackish and freshwater environments. Its subject scope covers all aspects of the science, technology, management and conservation of these environments, their organisms and resources, as well as economic, sociological and legal aspects. The repository contains a growing collection of published and unpublished research, organizational publications, and other scholarly materials contributed by researchers, librarians and their institutions.

The repository is directed by the International Association of Aquatic and Marine Science Libraries and Information Centers (IAMSLIC) to provide visibility, usage and impact through global access to digital publications from marine and freshwater organizations around the world that do not have access to an institutional repository of their own.

In December 2010, within the framework of the long-standing collaboration between IAMSLIC and the Intergovernmental Oceanographic Commission's International Oceanographic Data and Information Exchange (IOC/IODE), the IOC Project Office for IODE in Oostende, Belgium agreed to host Aquatic Commons as part of its efforts to promote free and open access to marine scientific information to the global community.

#### Grey documents deposited into the Aquatic Commons repository

There are more than 1 750 grey literature documents submitted to Aquatic Commons (AC) repository by about 15 countries in Africa. The most important category is thesis and dissertations (over 600 out of 2 723) which represent about a quarter of the total number of theses submitted by all the regions, as described by the graph below:



Member countries continue to deposit their information to enable access. Accordingly, Nigeria has the largest number of deposits among the African countries, followed by Uganda. The Table 2 describes the amount of aquatic information that has been deposited into Aquatic Commons.

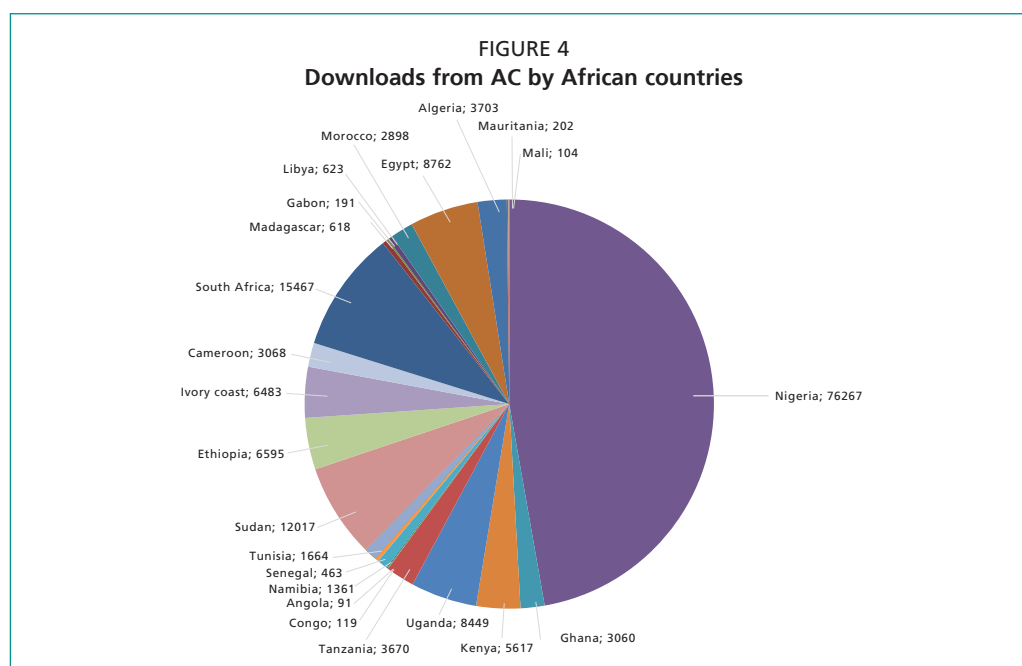
TABLE 2.  
AC deposits by institutions in Africa.

Aquatic Science and Fisheries Institution/ Library	Country	Number of Records
Fisheries Society of Nigeria	Nigeria	1 057
National Fisheries Resources Research Institute	Uganda	472
Centre de Recherches Océanographiques	Côte d'Ivoire	175
Instituto de Investigação Pesqueira	Mozambique	121
Lake Victoria Fisheries Organization	Uganda	77
Lake Kariba Fisheries Research Institute	Zimbabwe	50
National Institute for Freshwater Fisheries Research	Nigeria	36
Bunda College of Agriculture	Malawi	23
Lilongwe Univ. of Agriculture and Natural Resources	Malawi	4
Permanent Okavango River Basin Water Commission	Botswana	3
Direction de la Pêche Continentale	Senegal	2
Institut National de Recherche Halieutique	Morocco	2
Tanzania Fisheries Research Institute	United Republic of Tanzania	2
Univ. of Botswana Harry Oppenheimer Okavango Res. Centre	Botswana	1
<b>Grand Total</b>		<b>2 028</b>

### USAGE OF THE AQUATIC COMMONS REPOSITORY

A total of 21 826 grey literature documents were downloaded from Aquatic Commons from January 2007 to August 2019. A look at the statistics revealed that articles are the most downloaded document type (10 969), followed by book/monograph (5 420), Conference/Workshop Item (4 260), Book Section (582), Thesis (324), Book (108) and Image (81).

When looking at total number of downloads, Nigeria leads African countries in numbers of downloads from the repository followed by South Africa, Egypt and Uganda.

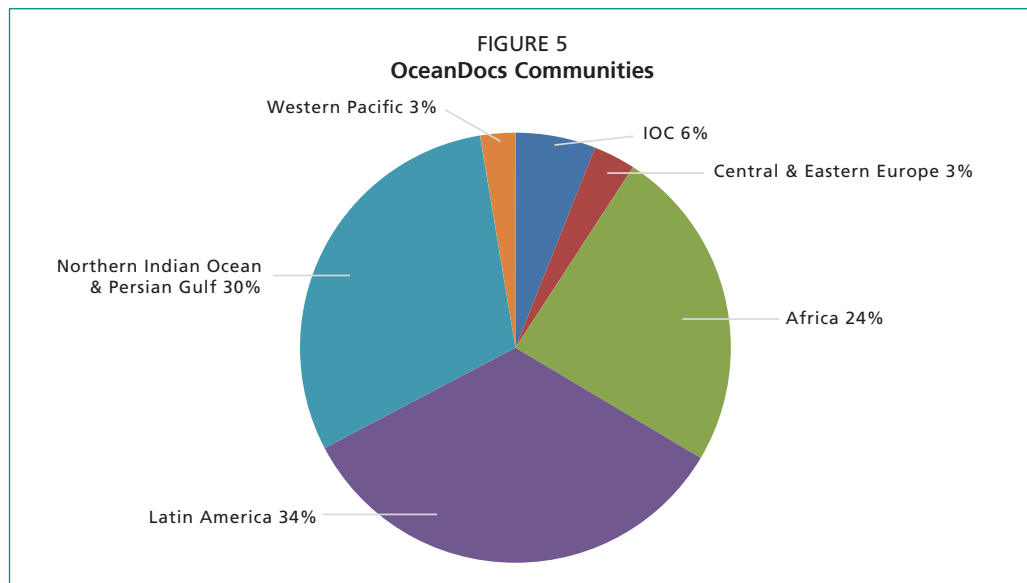


This high number of deposits and downloads shows Aquatic Commons is a valued repository for aquatic science and fisheries researchers in Africa. Uploading research output on this repository means it is available not only to researchers in Africa, but worldwide.



## OCEANDOCs

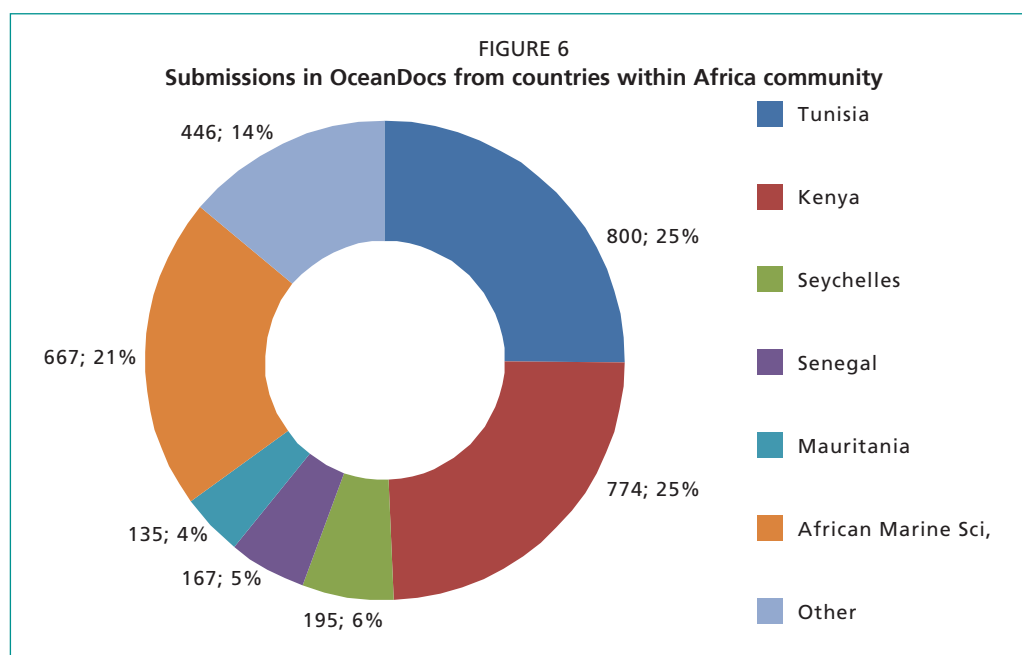
The e-repository of the IOC-IODE programme began in 2004 under the OdinPubAfrica name and was developed by the Information Managers within the Ocean Data and Information Network for Africa (ODINAFRICA) project. It was supported by the Intergovernmental Oceanographic Commission (IOC/IODE) to collect, preserve and facilitate access to African publications in marine and freshwater science (including grey literature, preprints, published articles, technical reports, working papers and more). In 2007, OdinPubAfrica was extended to become an e-repository for the IODE related communities and was renamed OceanDocs. Also some of the IODE partners joined OceanDocs, which is now considered the repository network of UNESCO–IOC–IODE. The network contains, as of September 2019, approximately 50 members who submitted a total of 14 000 documents to the repository.



The OceanDocs–Africa network now has 24 members or sub-communities. The repository includes more than 3 300 documents submitted from African community, this represents about a quarter of the total number of submissions in the OceanDocs repository.

It is important to note that most of OceanDocs submissions are grey literature such as journals published by institutions outside of the commercial publishing. In fact, OceanDocs increases the visibility of publications produced by African institutions. The publications include:

- Bulletin. Institut National des Sciences et Technologies de la Mer (INSTM, Tunisia): all the articles (691 articles) of this Bulletin published since 1924 to the present, are freely available in OceanDocs with links to ASFA records;
- Egyptian Journal of Aquatic Research (National institute of oceanography and fisheries, Egypt);
- Bulletin Scientifique (Institut Mauritanien De Recherches Océanographiques Et De Pêches, Mauritania – IMROP, Mauritania);
- Documents Techniques (IMROP, Mauritania);
- Document Scientifique/Archives (Centre de Recherche Océanographique de Dakar Thiaroye, Senegal) .



African members enrich the OceanDocs repository with unique grey literature, in addition to disseminating their publications on aquaculture, resource management and oceanography. According to the OceanDocs statistics of September 2019 related to grey literature submitted by African community, more than 40 percent of the total number of documents (3 300) are articles published by non-commercial publishers; followed by reports and thesis.

Interest in OceanDocs repository is growing as a result of it being available through search engines like Google and Google Scholar. The following table shows the OceanDocs view statistics of publications related to some active African members. The statistics cover five years, from 1 January 2015 to 30 August 2019 (Source: Google statistics), and show that African grey literature documents are more visible and transparent since they are exposed on the internet via OceanDocs repository. For example, for 800 submissions from Tunisia there are 17 000 views; while there are 20 500 views for only 195 documents submitted by Seychelles. So, OceanDocs allows for better indexing and visibility in popular search engines, including Google and Google Scholar.

**TABLE 3**  
**Views of African grey literature publications uploaded into OceanDocs.**

OceanDocs Communities & Sub-Communities	Number of records	Total number of views Jan 2015-Aug 2019
Region – AFRIC <a href="https://www.oceandocs.org/handle/1834/1337">https://www.oceandocs.org/handle/1834/1337</a>	3 270	6 938
Region – AFRICA – AfReMaS (African Register of Marine Species) <a href="https://www.oceandocs.org/handle/1834/5156">https://www.oceandocs.org/handle/1834/5156</a>	451	298
Region – AFRICA – Mauritania <a href="https://www.oceandocs.org/handle/1834/130">https://www.oceandocs.org/handle/1834/130</a>	135	1 544
Region – AFRICA – Senegal <a href="https://www.oceandocs.org/handle/1834/96">https://www.oceandocs.org/handle/1834/96</a>	167	5 454
Region – AFRICA – Seychelles <a href="https://www.oceandocs.org/handle/1834/135">https://www.oceandocs.org/handle/1834/135</a>	195	20 486
Region – AFRICA Tunisia <a href="https://www.oceandocs.org/handle/1834/137">https://www.oceandocs.org/handle/1834/137</a>	800	16 641
Kenya <a href="https://www.oceandocs.org/handle/1834/89">https://www.oceandocs.org/handle/1834/89</a>	774	4 606

## **AQUATIC SCIENCES AND FISHERIES ABSTRACTS (ASFA) DATABASE ROLE IN INCREASING DISCOVERABILITY OF AFRICAN GREY LITERATURE**

The ASFA database is produced under the auspices of the ASFA Partnership. Each ASFA Partner produces bibliographic records for the aquatic and marine science literature published in their country or region. This enables grey literature to be findable on an international and well-respected database of aquatic sciences, fisheries and aquaculture research. By providing funding, ASFA has assisted partners in Africa to digitize their grey literature collections and upload on to an open access repository, such as OceanDocs or Aquatic Commons.

FAO, as host of the ASFA Secretariat, has been acknowledged for its dedicated effort to increase the availability of Africa fisheries research in repositories under the ASFA Trust Fund projects. These projects have resulted in the addition of grey literature to the ASFA database with links to full text. The ASFA Trust Fund continues to enable the scanning of historical grey literature from Africa. In 2016 INSTM, Tunisia, for instance, digitized about 400 items from 141 issues of 'INSTM bulletin' (from 1924 to 1999) and other technical reports. Kenya Marine and Fisheries Research Institute (KMFRI) prepared and submitted about 1 800 records from non-ASFA partner countries in Africa, mostly grey literature, to the ASFA database (from 2017 to 2019).

## **CONCLUSION**

Grey literature constitutes a large part of collections in most marine and aquatic research libraries and information centers, both in their physical and digital collections. Researchers are invited to deposit the full text of their works on repositories, much of this work is not yet published by commercial outlets and due to publication bias and other factors, may never come to be published in primary journals despite its use to the scientific community. Fisheries technical report is one of the document types most commonly referred by scientists in their research activities, these reports usually form the baseline information for research in the marine and aquatic research field.

African aquatic sciences and fisheries libraries hold a significant amount of grey literature in terms technical reports, brochures, manuals, posters, project reports which are not normally published in primary journals, and contain lots of useful information which are referred to by scientists, students, extension staff, policy makers and fishers throughout the world. They are normally repackaged in simpler forms and non-English languages to make it easy for the target audience to understand. In order to enable the discovery of grey literature, African aquatic sciences and fisheries libraries have set up institutional repositories and also participate in several initiatives set up by different organizations like IAMSLIC, FAO, IODE. These online initiatives include OceanDocs, Aquatic Commons and the ASFA information System. This paper shows how each of these initiatives contribute to increasing the visibility of African grey literature, however support is also needed to ensure institutions across Africa have the necessary capacity to manage their publications, including the ongoing depositing of newly produced research onto these repositories and database, as well as funding for digitization of historical grey literature that is not available in digital format.

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# An evaluation of the value of grey literature to fishery science students at Mindanao State University, Naawan, Philippines

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## ABSTRACT

This study analysed the value of grey literature to the fisheries students of Mindanao State University - Naawan (MSUN), Misamis Oriental, Philippines. Citation analysis was employed to determine the type of resources cited in the theses of the fisheries undergraduate students that were submitted to the MSUN Library for the period 2000–2015. Emphasis was given to the use of grey literature to determine their relevance among the future researchers in the field of fisheries and aquaculture. The references were encoded in BibExcel and Microsoft Excel for analysis. Furthermore, to determine the trend of the subject areas that were often studied by students a word cloud generator (“wordclouds.com, © Zygomatic”) was used. Results revealed that different types of resources published from 1871 to 2014, were cited by the students. Moreover, it was revealed that grey literature published as books, theses, conference proceedings, websites, technical reports, abstracts, manuals, research papers, newsletters, case studies and manuscripts were as valuable as journal articles, since 50 percent of the total literature cited are grey literature. Furthermore, using the word cloud generator, it was revealed that “growth and survival”, “feeding”, and “juveniles” are the topics that were frequently used for identifying their research study.

**Keywords:** Grey literature, Referencing, Bibliometrics

## INTRODUCTION

Grey literature is a primary source that is not published commercially by vendors. Grey literature is an important source of primary research materials, especially in libraries that support the research activities of a university. Researchers in the Mindanao State University – Naawan (MSUN) have always considered grey literature as their primary source of information due to its coverage of a wide range of nonconventional documents. Grey literature comprises academic papers, which include theses and dissertations, terminal reports, conference proceedings, case studies, abstracts, manuals, newsletters and the like. The growing number of publications on fisheries and marine sciences in the last 50 years has contributed to the development of fisheries and aquaculture. However, the number of fisheries studies among the most-cited papers is fewer than expected. No previous bibliographic study has recently evaluated publications on fisheries and other related fields.

The measurable evaluation of publications is branded as bibliometrics. Bibliometrics can be defined as “the function of quantitative examination and measurements to

publications” (Reuters, 2008). The term “bibliometrics” was first used in 1969, although researchers have been measuring research impact for far longer (Broadus, 1987).

Bibliometrics, according to Asifa and Ridwana (2017), is a research procedure used in library and information science. It is a quantitative study of a particular field of study to gain insight into the dynamics of growth of knowledge in the area under consideration. This can lead a better organization of information sources which is essential for effective and efficient use.

With the surge in publishing volumes of books, journals and grey literature, and with budget constraints being felt by many research and academic institutions worldwide, libraries may have difficulty in purchasing and subscribing to commercial resources. Budget constraints may result in problems relating to collection management and human resource management (American Library Association, 2006). The library has often been strategically placed as heart of the institution which has the major sources of information for research. As a result, librarians are focused on the creation and use of information resources to enhance research and scholarly productivity. As information experts, librarians are challenged to manage research documents and publications so that it is organised and accessible to library users, as well as providing metrics on the use of information resources in a way the researchers would find useful. Budget constraints which impact collection developments and/or staffing, make this challenge greater.

In this study, the author aims to evaluate the value of grey literature and the most-cited articles in the fisheries and marine sciences field, and to describe the characteristics of these studies.

## **REFERENCING PRACTICES AND APPROACHES TO BIBLIOMETRIC ANALYSES**

Correctly referencing information sources and publications is a vital technique in ensuring research is accountable and can be evaluated and measured. Practicing the technique and adopting good referencing practices as a student is helpful in meeting the required referencing standards of various publishers. Adopting the routine practice of documenting sources will make research process easier (University of Oxford, n.d.). Accurate referencing implies that the writer has recognized and credited the source of information. If a writer does not acknowledge the original author of information, then they are liable to the charge of plagiarism (Pecorari, 2013). A writer is expected to observe standards in writing research (Cronan, Mullins and Douglas, 2018).

The practice of referencing starts when students correctly citing works and following the citation format. Based on the study of Yap, Groen, Kamilova, Terzi and Zvonareva (2018) the appropriate format of a reference list is based on a particular citation style. Walker and Taylor (1998) recommended to observe the principles of referencing such as intellectual property, access, economy, standardization and transparency.

In the early stage, the bibliometric analysis was used to identify scholars in different disciplines and connect them by their shared theories and concepts (Hammarfelt, 2012). Derek J. de Solla Price’s *Little Science, Big Science* (1963) introduces the basic concepts of bibliometrics to the scholarly world. In addition, Price developed the Price’s Index (de Solla Price, 1970) as a tool to map trends and patterns derived from citation analysis against the literature of various disciplines. In 1973, Small employed the citation-based mapping bibliometric technique to study the structure of the disciplines and associated sub-disciplines (Small, 1973; Marshakova, 1973). As the development of information science progresses, bibliometric studies have been used to identify theoretical concepts, scholarly works and journals that have the most impact on a discipline, and to acknowledge authors who contributed knowledge to the same field (Heberger, Christie and Alkin, 2010). Bibliometrics is often used to evaluate and rank countries, universities, research institutes, journals, specific research topics and specific disciplines (Huang, Ho, & Chang, 2006). It is also useful to generate benchmark data

for the purpose of monitoring the development of disciplines and identifying needed research areas (Gauthier, 1998).

However, the use of a bibliometric approach in research has been criticized by some scholars. According to Hung (2012), although bibliometric studies allow researchers to gather quantitative information from large amounts of historical data, this approach pays too much attention to the numbers and undermines the importance of the actual content. Van Raan (2005) states that the reliability of bibliometric indicators depends heavily on the level of sophistication of the technical system and the methodology that forms the basis of these indicators. In addition, the data collection procedures and use of quantitative measures in bibliometric studies have been criticized for their limitations to undermine the main characteristics of scholarly production and communication processes.

### **RESEARCH TREND ANALYSIS**

Furthermore, subject dispersion studies are often conducted in the bibliometric analysis to determine the breadth of the subject material covered by authors and to understand the overall structure and development of the discipline (Musib, 1989). Specifically, citation analysis is used in this study to analyze the subject dispersion of citations in Records Management Journal. It is a quantitative research method in the bibliometric study that is widely used to determine the degree of subject dispersion of a discipline. Subject dispersion analysis can identify the interrelationship of different subjects covered in the literature of a discipline and assess their importance for the overall development of the discipline (Musib, 1989). Likewise, Crawley-Low (2006) examined the citations of the of research papers in a particular journal, revealing that the majority of cited items were found to be journals (88.8 percent), followed by books (9.8 percent) and grey literature (2.1 percent).

Similarly, Kumar and Moorthy's paper (2011) revealed that the highest percentage of papers (37.6 percent) was from single authors, followed by two-authored papers (36.9 percent). Web sources were increasingly cited which they thought was to keep in tune with the latest trends in information technology. However, journals received the highest citations (40.3 percent). Moreover, Bapte's study in 2017 showed that of all the information sources cited, journals are the most cited sources followed by websites and books.

Additionally, Becker and Chiware's study in 2015 about citation analysis on doctoral theses revealed that 79 percent of cited information resources used by the researchers are electronic resources and that journals are the most cited information resource. Asifa (2017), analysed 14 699 citations from doctoral dissertations and revealed that a high amount of the citations are from journal articles (83.3 percent). Crawley-Low (2006) also evaluated the citations in the American Journals of Veterinary Research and revealed that journals constitute the highest number of citations (57.6 percent) while books constitute 16.7 percent and proceedings 14.2 percent. Other document forms constitute less than five percent.

### **WORD CLOUD**

Word cloud is an application that emerged as an appealing visualization method for text. It is used to provide an overview of a topic by representing words by size according to their frequency of use and can therefore be an attractive way to summarise text. It is a useful tool for analysis and validation of previous findings (McNaught and Lam, 2010).

This review of related literature is the basis and the motivation of the researcher to draft implications from this review of the referencing process of the students of Mindanao State University – Naawan (MSU-N) which could then be applied to the collection development plan of the library.



## METHODOLOGY

This study is an analytical review of the bibliographical data of resources cited by the fisheries students of MSU-N. This research design was implemented to provide answers to the questions of who, what, when, where, and how the referencing is done. Information and data were obtained through proper referencing and observing the data in a completely natural environment. The author examined the completed theses of the fisheries undergraduate students at the Mindanao State University at Naawan from 2000–2015. In total, 121 theses were analysed in this study. The details of each reference, including number of authors, the name of the author, number of references and document type was tabulated and analyzed using MS Excel. The bibliographic data of the research and its citation reference list was encoded in BibExcel database and the word cloud generator was used for analysis.

## RESULT AND DISCUSSION

### Resources Cited by Fisheries Students

Different sources were cited by the students of fisheries and are presented in Table 4. The table served as tabular presentation of each source used in their studies. It depicted the total number of sources used by the students which were dated from 1871–2014.

TABLE 4  
Types of Resources

TYPES OF RESOURCES	QUANTITY	%
Journal	1 379	50%
Book	1 076	39%
Thesis / Dissertation	174	6%
Proceedings	42	2%
URL	40	2%
Technical Report	35	1%
Abstract	7	0%
Manual	7	0%
Research Paper	5	0%
Newsletter	3	0%
Case Study	2	0%
Manuscript	1	0%
TOTAL	2 771	100%

Based on the table above, there are 12 types of resources that were cited by the students of the fisheries program. The study found out that Journals (50 percent) was the most cited type of resource the students were using for their research. The rest of the sources such as theses, proceedings, URLs, technical reports, abstracts, manuals, research papers, newsletters, case studies and manuscripts or what we call grey literature also has 50 percent citations gathered.

The above results supported Herberger, Christie, & Alkin (2010) saying that as development progresses, bibliometric studies have been used to identify theoretical concepts, scholarly works and journals that have the most impact on a discipline, and to highlight the most influential authors who contributed knowledge to the same field. It is also useful to generate benchmark data for the purpose of monitoring the development of disciplines and identifying needed research areas (Gauthier, 1998).

## Currency of Cited Resources

TABLE 5  
Year-wise break-up of citations

COPYRIGHTED YEAR	NUMBER OF REFERENCE	%
2010–2014	71	3%
2005–2009	173	6%
2000–2004	379	14%
1995–1999	455	17%
1990–1994	443	16%
1985–1989	335	12%
1980–1984	306	11%
1975–1979	233	8%
1970–1974	173	6%
1965–1969	75	3%
1960–1964	44	2%
1955–1959	12	0%
1945–1954	29	0%
1871–1943	28	1%
TOTAL	2 749	100%

Table 5 showed that the highest number of cited references fall on the copyright year 1995–1999 which is 455 (17 percent) of the resources. However, publications from 1945 to 1949 (0 percent), 1950–1954 (0 percent) and 1955–1959 (0 percent) beyond the year 1871 up to the year 1990 got the lowest number of citations, this was probably because research publications in the fisheries subjects are fewer and less relevant to the research conducted by students today. Based on the table above, years 1990–1994, 1995–1999, and 2000–2004 revealed the highest percentage of citations which were 14 percent, 16 percent and 17 percent respectively. This was because journal subscriptions have not been updated and some of the journals were donated from other institutions. This shows the importance of library budgets and collection management on students' research, as students are only able to use the resources that are available to them in their library. Due to the high subscription cost of many journals, students affiliated to libraries who cannot afford to subscribe will not gain access to the latest knowledge and research as published in commercial journals. Bapte's (2017) study also revealed that the quantitative growth of citations is lowering down from 2011–2015.



### **Implications to library usage with regards to research topics**

This study reveals that journals were the most frequent document type to be cited by students, followed by grey literature. This shows that the students in the field of fisheries see the value of information available from primary materials. The information seeking attitude of students implies that the library should acquire, subscribe to and make available all primary sources for students to be able to use the information for their research needs. However, the theses output of the fisheries students should be indexed exhaustively so students can easily retrieve related topics. Under-utilized sources that are available in the library should be disseminated to the thesis advisers and students.

It has also revealed in the study that a number of outdated materials were also used as the references of the students. This implies that the library should continue to acquire updated and suitable materials to improve the collection of the library. Subject to budgetary availability, the library may opt to subscribe to relevant e-journals, databases and the library should coordinate with the deans of each college to ensure that titles acquired would suit the informational needs of the students.

The library's staff must remember that the collection of the library depends on the course offerings of the school and must support the curriculum of the college. With this regard, the usage of the library will be high if its collections support the curriculum offering of the institution not only in fisheries but also with other courses. Promoting the journals and other sources of the library's collection is also needed so that it can be of more use in the study and research process.

The word cloud, with regard to the research trends on the use of topics and titles revealed in this study, clearly implies that there is a need to regularly evaluate the research interests and needs in parallel of the library collections. Drafting a research agenda should be one of the concerns of the advisers as well as students and researchers in order for them to come up good research topics. They must embrace literature and topics that feature new and updated trends in the field of fisheries and aquatic sciences. Students' exposure to these new fields of study can trigger interest that may lead to future research works and new development in the field.

### **CONCLUSIONS**

Based on the results and findings of this study, it can be concluded that sources such as grey literature and journals play an important part in students' research, as indicated by the references analysed in this study. Current and up-to-date sources should be acquired for the library collections. Journals also play a big role in the research process as they contribute to the informational needs of the researcher. Journals represent an authoritative source of information, especially in the field of Science and Technology as these journals contain peer-reviewed research from the world's leading researchers. Grey literature is often neglected in the library's collection development, but the results of the current study confirmed that grey literature is still valuable to researchers. It can also be concluded that the word cloud is an efficient bibliometric tool to determine and track trends of research in a certain field. It can help the researcher to decide on possible and appropriate subject and title for their research. Implications of research trends should be integrated in the research process of students as well as researchers of the field.

Referencing needs to be practiced from the start of any research project. Learning the techniques of referencing is a good academic practice. The habit of documenting all the sources will make conducting research easier. It is hoped that this study will be used to reach a better understanding of the role of referencing in the research work.

## RECOMMENDATIONS

Based on the findings, the author endorses the following recommendations:

- Exhaustive indexing of grey literature and journals is recommended for the library as well as including them on the library's public catalogue (OPAC) so that these sources will be fully utilized by the researchers.
- Journal subscriptions should be acquired and updated to meet the needs of researchers in the field of fisheries and marine sciences. Journals and other serial publications are relevant for researchers because these are peer-reviewed, authored by internationally recognised experts, and represent the latest studies in fisheries, aquaculture and marine science worldwide.
- Researchers should use updated resources as references of their research work. Currency of references is important in the fields of science-related topics.
- Proper referencing should also be taught to students and researchers at the orientation courses so that they adhere to the appropriate standards, respect intellectual property and achieve transparency and accountability in their research.
- Results of this study should be presented to the dean of the School of Marine Fisheries and Technology so they would be aware of the research trends of the fisheries research.

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# Mainstreaming grey literature in the digital age

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**Abstract:** Grey literature is often ignored by researchers. To some extent, information obtained from grey literature is considered unacceptable and unsound. However, grey literature is abundant and exists in many forms. Some hold vital information that could be one of its kind, the other could be the first hand records of unique and significant event. The overarching goal of paper is to outline methodologies to mainstreaming grey literature in the digital age. Proper archiving and indexing by libraries and information service providers may help to make grey literature visible and usable. In order to make grey literature acceptable, the authors may need some help; sufficient review may be done by subject matter expert prior to archiving and indexing. Digital Anthropocene could promote grey literature with the advancement of tomorrows' technology, today.

Defining grey literature was not straight forward and involving several key points. The Twelfth International Conference on Grey Literature in Prague in 2010 provided a practically acceptable definition:

*Grey literature stands for manifold document types produced on all levels of government, academics, business and industry in print and electronic formats that are protected by intellectual property rights, of sufficient quality to be collected and preserved by libraries and institutional repositories, but not controlled by commercial publishers; i.e. where publishing is not the primary activity of the producing body.*

In this definition, several key points were clearly highlighted and to become a grey literature, it should at least be produced by reputable agencies such as the government bodies, academics institutions, businesses and industries that may be printed or in a digital format which the content was intellectually protected with sufficient quality that can be archived by libraries or repositories. In short, a document that was not published by commercial publisher but has met a certain quality is qualified as grey literature.

Following the definition given above, grey literatures were plenty; however some standard need to apply to ensure the material that one referring to is worth it and of sufficient quality. Usually, at least for citation, grey literature is often ignored by researchers in the scientific community because it is considered unacceptable and unsound since these materials were lacking of verification or validation. Sometimes grey literature concerns are “one of its kind” (e.g. factsheets), first hand records of unique and significant event (e.g. magazine article which is scholarly in nature), or a quick update (e.g. online databases) that perhaps lack of peer reviewing process but were done by someone whom are an expert in the field.

Much grey literature that had been produced by these bodies often takes form of reports (e.g. fish and fisheries surveys, environmental impact assessment, technical report), theses or dissertations, conference proceedings (including abstract or extended abstract, pictorial abstract), unpublished manuscripts (often cited as ‘unpublished’), lecture notes, specific lab protocol, field guide, slides, white papers, working papers,



policy briefs and pre-prints. All these materials were highly relevant and can be very useful but were not properly published by commercial publishers and being reviewed prior to publication. With the advent of internet, more and more first-hand information was available, such as internet forums (e.g., PlanetCatfish), website (e.g., Seriouslyfish.com, Fishbase, IUCN), blogs, wikis, video sharing sites (e.g., YouTube), social networking platforms (e.g., Facebook) and photograph archives. All of these materials were not published but contain all the related information to someone. However, because it was not published appropriately, all these became “grey”.

How can we make grey literature visible and usable? By proper archiving, providing permanent storage and facilitating access to these sources are very important. Help from well-known publisher or abstracting services like ASFA are very much needed. The rest is up to the authors or owner of the material – blog writers, photographers, or researchers. What the authors need to do to make their material archived? In order to mainstreaming grey literature, the author should sufficiently review the content of the material (self-review) and then sent it for peer review and this may be done by subject matter experts (SME) or proofreading services. This will add quality to the material. The material in hand may require some simple formatting to ease reading and make it look interesting plus professional.

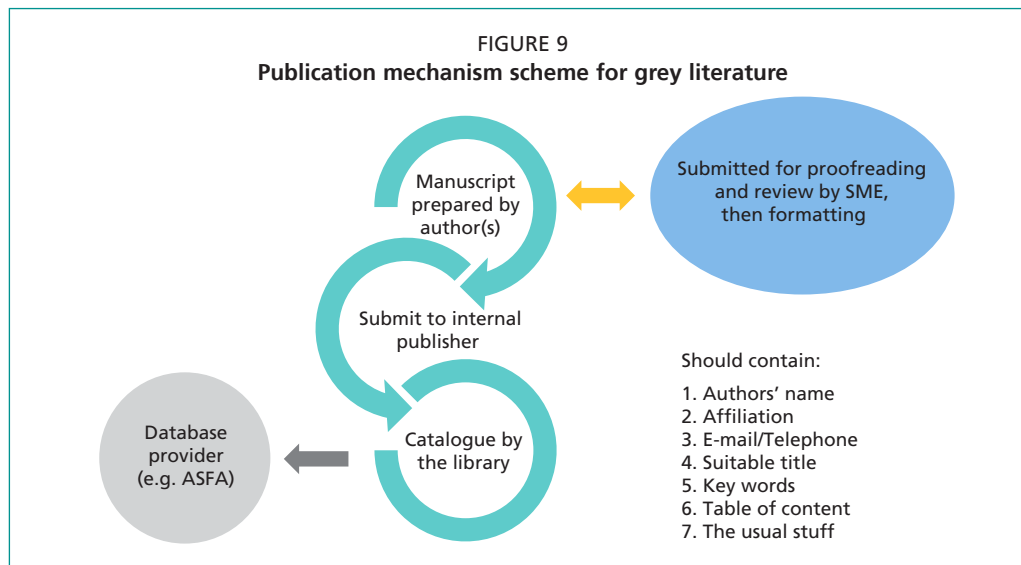
### **What needs to be done?**

#### **1. Authorship and responsibility**

The owner or author(s) should be clearly stated with a complete name of their affiliation. Full name of the author(s) or at least *name de plume* should be given, so that the material can be cited and indexed. They should prepare the manuscript accordingly. The manuscript then should be submitted for *fact check* by their peers and send for proofreading to improve the English language. Contact address, telephone number and e-mail should be provided as this will be useful for further clarification of the content, future collaboration and to ensure the material has its origin.

#### **2. Content**

The content must be appropriated and does not sound *fishy* or incorrect. This is very important so that the material should be of such quality that a person doing scholarly research in the related topic might choose to cite the work regardless of it was published by prominent publisher or just grey literature. The content also needs to be sound and suitable for public. For a scientific article, the heading such as Introduction, Methodology, Results and Discussion or the Introduction – Method – Results – and – Discussion (IMRaD) method may be applied (see Figure 9).



### 3. Publication

Most of the materials used in scientific research were taken or cited from materials published by commercial publishers. These publications were done in such a way that the accuracy of the fact presented is verified and validated. It usually goes through peer review by appointed reviewers before being accepted for publication as a journal article or chapter in book. However, grey literature is the item that would generally not be published commercially, but would be produced in a quantity intended for limited external distribution. They could be the rebinds of technical reports, reports of studies, or conference papers that have been published in full proceedings of meetings. All these items could be published in a proper manner for information dissemination for example by a university publisher.

Publishing may follow the publication mechanism scheme:

Once the manuscript being reviewed, it may be submitted to the internal publisher, who may then assign designer to design the manuscript accordingly. Once it is done, the manuscript is now ready for dissemination and archiving by libraries. Libraries may share this material with reputable database provider such as Aquatic Sciences and Fisheries Abstracts (ASFA) that is known for their great services in the field of fisheries, aquatic and marine sciences for years.

In the digital age, the many shade of grey, at least for the scientific-base literature, it is hope that it may become a little darker, and more visible – assuming that the darker the shade, the more visible and reliable it is. Having said that, we still need to evaluate which shade the literature we find and use is. With that in mind, one must remember, in many instances, grey literature will not always stay. Today it is here, tomorrow it may be gone.

## ANNEX 1

## Opening speeches

**Prof Dato' Dr Nor Aieni binti Haji Mokhtar**

*University of Malaysia Terengganu Vice-Chancellor*

*Assalamualaikum warahmatullahi wabarakatuh, salam sejahtera, Selamat pagi*, very good and blessed morning to everyone, especially to the representatives of Aquatic Sciences And Fisheries Abstracts (ASFA) and University of Malaysia Terengganu (UMT) researchers to the Joint ASFA-UMT seminar today.

Mr Marc Taconet, Head of Branch, Food and Agriculture Organization of United Nations (FAO), FAO ASFA Secretariat; Professor Ir Dr Noor Azuan Bin Abu Osman, UMT Deputy Vice Chancellor (Academic and International); Ms Maria Kalentsits, Acting Editor in Chief for ASFA, Consultant, ASFA Secretariat; Professor Dr Hamdan Suhaimi, Director of Quality and Academic Management Centre; Haji Abu Hassan Ghazali, UMT Chief Librarian; Mr Masaya Katoh, Deputy Chief, SEAFDEC Terengganu, Malaysia; ASFA FAO Secretariat, UMT Senior Officers and respected fellows.

On behalf of UMT, I would like to thank the ASFA Secretariat for organizing a joint conference with UMT in conjunction of the Annual Advisory Board Meeting 2019. The seminar that is going to take place today, highlight the sharing of information findings in the field of aquatic science, fisheries and aquaculture research. Six selected papers will be presented, which will highlight new discoveries of the grey literature in the field of aquatic sciences, fisheries and aquaculture research.

My respected fellows, UMTs' Centres of Excellence (CoE) and Centre for Research Management and Innovation were developed to advocate excellent research, by supporting excellent researchers. Quality research can be used to help local communities, especially fishermen and their families to use the latest methods and techniques of fishing, as well as rearing and marketing of the aquatic and fisheries product as their economic resources. What I'm trying to express - the need for quality research and exploration on potential research that can be adopted from grey literature information is vital to support the development of socioeconomic, especially, the lower income earner. This is the main objective of our university, to collaborate, contribute and transfer the knowledge to the targeted group that I mentioned.

I am urging all the participants, especially UMT researchers, lecturers, postgraduates as well as final year undergraduates to take full attention of the presentations and sharing of new discoveries during the seminar. It will be an excellent platform to establish networking among the academicians, UMT and ASFA partners towards developing a more robust marine and maritime science information resource.

Finally, I was informed that, tomorrow, all ASFA partners will be joining Kenyir Lake trip. It is a very good trip in terms to gain more ideas and knowledge about the real ecosystem of the flora and fauna which I strongly believe, will give the insight in conducting a further research on aquatic resources at Kenyir. This kind of activity will enrich more information resources and hopefully cover a gap in grey literature.

With that I wish all the very best to all and hope to see you again. I really hope that all partners enjoyed the hospitality, facility, meeting and seminars conducted at UMT. We look forward to hear your comments and ideas in making UMT as a best place to do research and collaborate. Thank You. Salam UMT.

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*Marc Taconet, Chief, Fisheries Statistics and Information Branch, FAO*

**Dear Prof Dato' Dr Nor Aieni binti Haji Mokhtar**  
*Vice Chancellor University Malaysia Terengganu*

Dear participants,

I am really honored by this second occasion to make an opening address, thanks so much to yourself and your so nice team of library of the University of Malaysia Terengganu for hosting and co-organizing with ASFA this conference.

The theme of the Conference is “Enabling grey literature discovery to benefit aquatic sciences, fisheries and aquaculture research”. My ASFA colleagues recently wrote “the future of ASFA is Grey”. I thought it was a joke or that they were really depressed. In fact no, they were alluding to grey literature, a fuzzy area which no-one is really able to well define. What I retained is this is literature which is valuable as a public good, but which for various reasons remains hidden and poorly accessible.

Here is where ASFA is, but let me rewind back. ASFA has historically, since 1971 – and we still have a veteran of this time with us – played an essential role in assembling bibliography on worldwide publications on aquatic sciences. With the advent of the internet and of powerful search engines such as Google, making it so easy to everyone to search for information sources, there has been a mistaken perception that rich databases such as ASFA have not anymore the value they once had. Additionally, the disconnect of ASFA with its potential users has increased with the younger generation, simply because young people have grown-up in their world of social media and have created their own sphere of knowledge sharing.

Now despite this perception that everything is available on the internet, there's actually a tremendous wealth of scientific knowledge which still lays non-digital, or when digital inaccessible. This information would highly benefit the world community if it was made accessible. Let me give an example: we at FAO regularly tend to presume that in a number of countries, there is lack of statistical data collected, and when we visit these countries, we discover a lot of scattered data in local reports, drawers or Excel files. I would classify this as grey literature, and this is where the focus of ASFA is moving. This has been strongly encouraged by our FAO Assistant Director General for Fisheries and Aquaculture, and we need to help putting those more visible.

The ASFA partners met during three days and discussed strategies to address this issue and make sure ASFA aligns with users' needs and how to reach them, networking is part of this. These colleagues are very keen about the impact their work can make.

Dear participants, you are students, teachers, or professional policy makers or researchers in the fields of aquatic sciences, fisheries or aquaculture. Believe me, we have in this Conference room an immense capital of knowledge on global aquatic sciences. This capital is the ASFA database and the ASFA partners who maintain this knowledge worldwide. They are meeting their users because they care about the impact which their work of information manager can make, and they are eager to share their experience. This Conference is for all of us a great occasion to learn about grey literature and perhaps for you an occasion to increase the visibility of your work.

I am asking you to enter in live discussions and engage with your librarians and wish you a good conference.

## Enabling grey literature discovery to benefit aquatic science, fisheries and aquaculture

25 September 2019  
Terengganu, Malaysia

Grey literature, which includes policy reports, technical guidelines and dissertations and theses, is produced by many actors within aquatic sciences, fisheries and aquaculture. Many hours of research go into producing these documents, often with the purpose of solving particular environmental, species or socio-economic problems. Whilst the nature of the problem tackled by much grey literature is focused on a specific problem in a specific area, its lessons can often be applied to similar problems or environments around the world. What prevents this taking place is that grey literature can be hard to access – due to the way it is produced and stored, grey literature can often be stored offline, or on institutional websites where it is difficult to access using internet search engines or databases.

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