

Twenty-Fifth International Conference on Grey Literature

Confronting Climate Change with Trusted Grey Resources

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Foreword

CONFRONTING CLIMATE CHANGE WITH TRUSTED GREY RESOURCES

With over a quarter century of research on grey literature carried out by diverse communities of practice in this field of information, a collective challenge emerges. Researchers and authors in sectors of government, non-government, academics, and business spanning manifold disciplines in science, technology, and the humanities are called to action. Their years of work dealing with the production, processing, digital publication, open access, and preservation of research outputs in multiple formats is called upon in confronting climate change.

At this point in time, with the advancements in information technology available to grey literature and in accordance with FAIR data principles, researchers, authors, librarians, and other information professionals and practitioners are tasked to ensure that research outputs are findable, accessible, interoperable, and render potential reuse in furthering research and education in their respective disciplines and sectors of information.

GL25 sought to accept this challenge. To this end, grey literature communities worldwide directed their attention in responding to climate change for the benefit of our vulnerable planet.

Dominic Farace
GREYNET INTERNATIONAL

Amsterdam,
FEBRUARY 2024

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Keynote Address

Prof.dr. Gerard van der Steenhoven
Netherlands Ministry of Interior
and the University of Twente

Gerard van der Steenhoven is a special advisor at the Ministry of the Interior (and Kingdom Relations) in the Netherlands, and part-time professor at the University of Twente in meteorological and climatological disaster risk reduction. From 2014 until 2023 he served a nine-year term as Director General of the Royal Netherlands' Meteorological Institute (KNMI). Previously, he was dean of the Faculty of Science and Technology at the University of Twente (2008–2013), and president of the Netherlands' Physical Society (NNV, 2007–2013). As KNMI director he initiated a multi-annual investment in the renewal of the observational and IT infrastructure of the institute, leading to the development of a national Early Warning Center. Within Europe he served as chair of the EUMETSAT council (2018–2022) and initiated the development of the first European NMHS directors' strategy (2016). At present his activities focus on supporting various climate initiatives in the Netherlands (such as the national Climate Research Initiative NL, and the regional Delta Climate Centre in Vliссingen), various assessment committees, public lectures and advisory work. Gerard van der Steenhoven obtained his PhD in experimental physics at the Vrije Universiteit in 1987 and worked as a postdoc at the Massachusetts Institute of Technology (MIT) thereafter.

In 1989 he started as a senior researcher at the national research institute Nikhef in Amsterdam.

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Welcome Address

Brian Paul Bales
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Brian Paul Bales is Coordinator (Unit Head) of the International Nuclear Information System (INIS) at the International Atomic Energy Agency (IAEA) in Vienna, Austria. INIS is an open access repository for nuclear science and technology literature that has existed for more than 50 years and has over 132 member states and organizations. Brian's special areas of interest include digital preservation, information management, and artificial intelligence to foster knowledge sharing, innovation and progress. Previously, he worked for the archives and records section of the UN's International Residual Mechanism for Criminal Tribunals (IRMCT) in Arusha, Tanzania, as well as an earlier 7-year assignment with the IAEA. He holds a Master's Degree in Information Technology from the University of Denver.

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Opening Address

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Data Archiving and Networked
Services, DANS
Netherlands

Vyacheslav Tykhonov (Slava) was born in Kyiv, Ukraine. With a background in information and computer science, Slava has worked for more than 20 years in the area of software development, research and innovation for national, European and international research infrastructures. Most recently, as a Senior R&D Engineer at DANS-KNAW and FAIR data expert. Slava participated in various European projects funded by the EC. For many years, he has been an active member of the Open-Source community around the Harvard Dataverse platform. As a knowledge engineer and Semantic Web enthusiast, Slava explored and implemented new solutions and data services, from data enrichment to long-term archiving.

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The contribution of grey literature on a pathway to sustainable fisheries: Case studies from Cambodia, Indonesia, Philippines and Viet Nam

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Abstract

During 2022, FAO and SEAFDEC completed a project to identify, record and analyse research under the scope of Sustainable Development Goal (SDG) indicator 14.4.1 – proportion of fish stocks within biologically sustainable levels. Research and data on the status of stocks is essential for their sustainable management and in ensuring they contribute to food security, employment and trade. The challenge of assessing and sustainably managing a country's national stocks is even more critical in the context of climate change given changes to the marine environment. Focusing on four countries in southeast Asia, (Cambodia, Indonesia, Philippines and Viet Nam), this project sought to increase the visibility of research and data sets previously only available at local and national levels. The research and data identified during the project would be analysed to identify knowledge strengths and gaps in the region, therefore contributing to the sustainable management of marine fisheries in the region. At the start of the project, a search methodology was agreed and used to search the ASFA database. Fifteen participants from four countries were recruited with access to, and knowledge of, their institution's holdings, research and data on stock assessments and marine fisheries. Training on the search methodology was given to participants who recorded relevant results on OpenASFA. The project resulted in 1,047 resources being recorded by participants which are now freely searchable on the FAO Fisheries and Aquaculture website. This compares to only 350 results identified using ASFA database- demonstrating the need for efforts to be made to improve the accessibility of research produced in the region. Many of the results recorded by participants could be classed as grey literature which can suffer from a lack of resources to adequately catalogue and make findable, preventing the research and data from informing further research and policy making decisions. Barriers in to sharing data in particular were raised by participants and further work is needed to implement open data policies whilst ensuring adequate protection of data rights, for example by ensuring credit is given to the collecting institute/ researcher. To meet the global challenge of climate change and SDG target 14.4 on sustainable fishing, the capacity to store, share and access research and data on fish stocks is required at local, national and international levels. Whilst improving the visibility of research and data from the region, the project has also highlighted the challenges of ensuring data and information is made FAIR on an ongoing basis.

Introduction

For over fifty years, the Aquatic Science and Fisheries Abstracts (ASFA) partnership has worked to promote the world's research on aquatic environments, with a particular focus on grey literature. The ASFA partnership model, which as of 2023 involves over 100 institutions worldwide, ensures the participation of producers of grey literature, who are themselves best placed to catalogue resources for inclusion on the ASFA database. Having made efforts in recent years to update its technologies and business model, notably with the launch of OpenASFA in 2021, ASFA is able to openly share its records (Castillo, 2023). OpenASFA is a Virtual Research Environment (VRE) for the creation, storage and publication of abstracting and indexing records related to all aspects of aquatic sciences, fisheries and aquaculture. From OpenASFA, records are shared with different information products, including a search interface on the FAO website, (where records are available as JSON-LD), and the full ASFA database which is hosted by ProQuest and available to

subscribers only. Since its launch in 2021, OpenASFA has made further updates including the coverage of datasets and the option to deposit the full text. Although registration is required to deposit records and full text, there is no financial cost to using OpenASFA and all records can be freely searched, without registration, on the FAO Fisheries and Aquaculture website.

Having undergone rapid technological advances, ASFA sought to understand the impact of OpenASFA by conducting a project to meet a specific information need. Following discussions with the Southeast Asia Fisheries Development Center (SEAFDEC) Secretariat, a project was formulated to identify and analyse research and data related to Sustainable Development Goal indicator 14.4.1 – the proportion of fish stocks within biologically sustainable levels. The SEAFDEC is an autonomous inter-governmental body in the regional fishery field with a long history of working closely with the fishery sections of its member countries. As the SEAFDEC works to promote sustainable fisheries in the region through the meetings, training courses, workshops, etc., SEAFDEC was the best supporting organization for ASFA to work with in establishing the connection between FAO and member countries of the region to collect all the research and data, particularly grey literature which requires local knowledge to locate and catalogue.

For a region such as Southeast Asia, reliant on fish and seafood as the primary source of animal protein (FAO and OECD, 2017), adapting to the challenges of climate change is essential in achieving and maintaining food security. In order to sustainably manage fisheries and implement science-based advice, research and data on the status of stocks is needed. However, many stocks in the region have an unknown status due to insufficient data (Sharma, 2021). The project would therefore assess whether research and data on stocks in the region existed; how such research and data is managed; and what role, if any, a service such as ASFA could play in improving the visibility of these resources. Therefore, the project had two goals:

- (1) identifying and analysing the research and data being produced in Southeast Asia of relevance to SDG 14.4.1;
- (2) identifying strengths and gaps in knowledge, as well as making recommendations for enhancing the availability of research and data.

Methodology

The project was split into three stages, each of which are discussed in detail below.

1. Development of project scope and search strategies
2. Identifying and recording research and datasets held in local and national collections
3. Quality control and analysis of results

Stage one: Development of project scope and search strategies

To ensure the focus of the project on SDG indicator 14.4.1, a detailed search strategy was developed that encompassed the geographic, taxonomic and subject keywords that would be used to identify and index relevant resources. Developing the search strategy resulted in a number of additions to the ASFA thesaurus under the theme of stock assessment. Furthermore, a list of 53 taxonomic terms of commercial interest was compiled that participants would be asked to prioritise seeking research and data for. The full search strategy and list of taxonomic terms of commercial interest is contained in the project report: *Identifying research and data related to Sustainable Development Goal (SDG) Indicator 14.4.1. Case studies from Cambodia, Indonesia, the Philippines and Viet Nam*.

Once developed, the search strategy was tested on the ASFA database, hosted on the ProQuest platform, which resulted in just 350 relevant results being identified. These 350 results were shared with participants to give an idea of the kind of resources that were within the scope of the project.

Stage two: Identifying and recording research and datasets held in local and national collections

This stage involved working with fifteen participants, listed in table 1, who were recruited from Cambodia, Indonesia, Philippines or Viet Nam, each with experience in information management or stock assessments. The participants were provided with training on the search methodology and how to identify relevant resources, as well as how to record results on OpenASFA. Participants spent a total of 10 days for training and recording their results, with a total of 1,047 records being created in total.

Name	Institution	Country
Suy Serywath	Marine Fisheries Research and Development Institute (MaFREDI)	Cambodia
Tan Sokhom	Faculty of Fisheries, Royal University of Agriculture (RUA)	Cambodia
Madiareni Sulaiman	BRIN - National Research and Innovation Agency	Indonesia
Ria Ariani	BRIN - National Research and Innovation Agency	Indonesia
Pamela Damayanti	Ministry of Marine Affairs and Fisheries	Indonesia
Duranta Kembaren	Research Institute of Marine Fisheries	Indonesia
Tirtadanu	Research Institute of Marine Fisheries	Indonesia
Ledhyane Ika Harlyan	University of Brawijawa	Indonesia
Martin F Floro	Capiz State University	Philippines
Ethelyn Magdaong Abaday	Mindanao State University – Naawan Campus	Philippines
Joy Geromiano	SEAFDEC/AQD	Philippines
Mary Grace Oliveros	SEAFDEC/AQD	Philippines
Sean Hoang	Fisheries Protection and Development Department Viet Nam Directorate of Fisheries	Viet Nam
To Van Phuong	Nha Trang University	Viet Nam
Hai Yen	Viet Nam Institute of Oceanography	Viet Nam

Table 1 List of participants in FAO-SEAFDEC project

Stage three: Quality control and analysis of results

All records submitted by participants were verified by the project team to ensure they were relevant to SDG 14.4.1 and correctly catalogued. Any duplicates were also removed at this stage. Following this review, a total of 1397 relevant records was identified, whose metadata was exported to Excel to conduct analyses.

A broad analysis of records created by participants and those available on the ASFA database was conducted, followed by a more specific analysis of the taxonomic keywords assigned to records. The analysis is presented in full in the recently published report (Superio et al, 2023), however a summary is presented below.

Of the total 1,397 records identified as part of this project, just under 75 percent came from participants with the rest coming from the ASFA database hosted by ProQuest. This indicates that many resources are missing from ASFA's database and further efforts should be taken to increase the volume of research being recorded on ASFA's database. Just over half of the records were journal articles (702 references or 50.3 percent). Many journals were published by universities or research institutions in the countries and therefore not always easily findable online (see table 2). Dataset was the least recorded type with just under 10 percent (139 references). Datasets were recorded only by participants and not covered on the ASFA database on ProQuest. Despite the project's focus on the importance of data, many participants struggled to identify and record datasets.

Type	Frequency	Percentage
Journal articles	702	50.3
Books	447	32
Book chapters	109	7.8
Datasets	139	9.9
Total	1397	100

Table 2 Distribution of the Gathered Publications and Datasets per Type

Each of the references was assigned one of the subcategories described in table three. Stock information and stock assessment ranked as the most recorded subcategories, indicating high compliance with the search strategy.

Subcategory	Frequency	Percentage
Fishing vessels	31	2.2
Environmental impacts	33	2.4
Catch history	73	5.2
Biological parameters	227	16.2
Fishing gear	252	18
Stock assessment	369	26.4
Stock information	412	29.5
Total	1397	100

Table 3 Distribution of the Gathered Publications and Datasets per Subcategory

All references were assessed as to their online availability. A reference was considered to be available online if the full text was accessible online without subscription or cost. This revealed that 71.6 percent of references were available online, with 873 of these references being recorded by participants and 127 coming from ProQuest. Of the 174 references recorded by participants that were unavailable online, the reason was often due to lack of repository to store the resource, rather than protection due to commercial reasons. Participants requested the option to store the full text of the resource on OpenASFA, which was implemented at the end of the project.

Source	Frequency	Percentage
Available online	1000	71.6
Unavailable online	397	28.4
Total	1397	100

Table 4 Distribution of the Gathered Publications and Datasets per availability

Source	Format	
	Available online	Unavailable online
Participants	873 (87.3%)	174 (43.8%)
ProQuest	127 (12.7%)	223 (56.2%)
Total	1000 (100%)	397 (100%)

Table 5 Distribution of the Gathered Publications and Datasets Grouped according to Source and Format of Publication

An analysis of the taxonomic keywords was undertaken to understand the volume of research and data that could contribute to understanding the status of stocks in the region, particularly for species of commercial interest. The dataset used to perform the taxonomic analysis can be downloaded from here:

<https://data.d4science.net/CW4s>.

The 1397 records identified during this project had a combined total of 6720 taxonomic keywords, giving an average of 4.8 taxonomic keywords per record. Of the 6720 taxonomic keywords, 1556 were for unique names. These high numbers are testament to the care participants took to create detailed metadata to describe the resources.

Despite the high level of taxonomic indexing, analysis revealed a concentration on a small number of species with the top ten most recorded taxonomic terms aggregating 63 percent of all references, which increased slightly to 64 percent of references when looking only at the subcategory stock assessment. Whilst only one species of commercial interest was not assigned as a keyword to any references, when looking only at the subcategory stock assessment, 11 species were not recorded, indicating research efforts are concentrated on a small number of taxa.

Discussion and conclusion

This project provided a snapshot of the research and data available under the scope of SDG indicator 14.4.1 in Southeast Asia. Each participant indicated further resources were available however were unable to record them in the 10 days allotted to this project. The relatively high proportion of materials, just under 30 percent, which were not available online; the number of resources not recorded due to time constraints; and the diverse platforms which resources are stored on, indicates the need for maintaining the OpenASFA collection on SDG indicator 14.4.1. A common barrier to sharing research is the lack of planning and resources to ensure their long-term accessibility. Many reports are published only on a website, available for a short period of time before they disappear or become lost. OpenASFA therefore presents a single and stable platform on which to share research and data. However, whilst creating a record for a resource on OpenASFA is a short task and there is no financial cost to usage, an institution must support the work and ensure sufficient time and resources are allocated to performing this task. A shift in attitudes towards information management is needed to persuade institutions to give the necessary time and resources to making their research and data findable, accessible, interoperable and reusable (FAIR) in the long term. This is required in particular for data, with project participants expressing difficulty in gaining permission to share even the metadata for a dataset due to concerns over ownership.

Describing the benefits of FAIR research and data is critical to achieving this shift and ASFA shall work with its partners to produce materials to highlight the individual and institutional benefits of OpenASFA in promoting and sharing research and data. Whilst libraries have transitioned to digital for many years, the appearance of full text online is in danger of being perceived as a substitute for the traditional library skills of cataloguing and classification, which are vital in ensuring a resource is findable. Making the case for investment in the cataloguing and indexing of a resource as a necessary component of document management needs to take place.

Recommendations for future work and conclusion

To ensure the work of the project is not lost, ASFA formulated four recommendations for future work based on lessons learned:

1. Understand and overcome barriers to sharing data: further work is needed to give institutions the confidence, incentives and technologies to share data. The project recommended compiling best practices for data sharing related specifically to fisheries data.
2. Ensure online accessibility of materials: in addition to digitizing print only materials, producers of grey literature require an information management plan to ensure their publications and data are stored on a sustainable repository and accessible online.
3. Improve the visibility of Doctoral / Master Theses: the project uncovered a high volume of dissertations/ these that are relevant to performing stock assessments. Particular attention is needed to ensure resources are FAIR due to potential language barriers and difficulty of searching and accessing individual university repositories.

4. Maintain and update the OpenASFA collection: ten days was an insufficient time period to record all relevant resources and, in order for the collection to remain useful, regular deposits and records are needed. Ongoing, voluntary contributions from project participants and ASFA partners in the region are needed to ensure the collection remains of use to understanding the status of stocks in the region.

In summary, the project met its goals of identifying and analysing the research and data being produced in Southeast Asia of relevance to SDG 14.4.1 and identifying the strengths and gaps in knowledge, as well as making recommendations for enhancing the availability of research and data. The 1047 records created by participants, compared to the 350 records identified on the ASFA database, reveals the breadth of resources that are not being captured on the ASFA database without projects such as these, and the 28 percent of materials that are not available online, indicates the risk of this research and data being lost. ASFA looks forward to building on the lessons learned as part of this project and working with the authors, producers and publishers of research and data to ensure it is findable and accessible online.

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Realizing the Potential of Grey Literature by Recognizing its Publishers: The PUBGREY Project and the Case of Climate Change

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Abstract

The way to confront climate change is by publishing the results of research dealing with the manifold and diverse topics associated with this complex entity. In response to this, GreyNet sets out to identify among its community of practice organizations that consider themselves publishers in grey literature. This is initiated by designing a standardized template. The acquisition of the data compiled via the online template harvested 25 records. The records captured in this phase of the project now comprise the PUBGREY registry openly accessible on GreyNet's website and via the GreyGuide, GreyNet's web access portal and repository. The organizations that appear in the PUBGREY registry are together seen as a consortium of publishers in grey literature. Together they demonstrate the supply-side of grey literature where its production, publication, and open access adhere to FAIR principles. Following this, a selection of records is made based on three criteria forming the population of this use case. These criteria include: open access compliance, each of the publishing bodies will have already been assigned a ROR ID, and an individual's email address is provided as the point of contact in the record. Ten of the 25 records in the PUBGREY registry adhere to the established criteria and form the population of our study. These are then asked to complete a brief online survey dealing with grey literature. The survey questions used in this study on climate change are the exact same as in a study three years earlier on circular economy. The reuse of the questionnaire was based on a recent [working paper](#) demonstrating how circular economy provides a strategy in achieving goals for climate change. Finally, via the search function on the ten websites of our survey population, a search of the terms: 'climate', 'climate change', and 'circular economy' are carried out. The results from both the survey and the searches from the websites are then analyzed and presented in summary.

Introduction

The way to confront climate change is by publishing the results of research dealing with its diverse and manifold topics associated with this complex entity. In order to demonstrate the role grey literature has in confronting climate change we first seek to identify the publishers of grey literature by compiling and publishing a registry in this field of information. We then seek to acquire the publishers' views on grey literature via a questionnaire. And finally, by means of the survey results, the use of the PUBGREY registry, and results from searches in the websites of the publishers are we then able to record and document our case on climate change. (See Appendix 1: PUBGREY Project Plan)

Step One – Identify the Publishers in Grey Literature

In order to identify the publishers in grey literature, an online template was designed and posted via GreyNet's distribution list and social media. The template consists of 10 fields with accompanying scope notes. It was posted in mid-February 2023 via GreyNet's distribution list and social media, namely Facebook and LinkedIn.

Field #	RECORD FIELD NAME	SCOPE NOTES
1.	Name of Publishing Body	<i>Complete Name and Acronym if applicable</i>
2.	Sector of Information	<i>Government, Academics, Business, Industry, Other</i>
3.	Document Types	<i>Reports, Proceedings, Theses, Datasets, Videos, etc.</i>
4.	Publication Formats	<i>Print, PDF, Datafile, Online, etc.</i>
5.	Main Coverage	<i>Disciplines, Topics, Subjects</i>
6.	Content Contributors	<i>Internal only, External also accepted</i>
7.	Open Access Compliant	<i>Yes, CC License if applicable</i>
8.	Homepage URL	<i>http, https</i>
9.	Identifiers	<i>Date founded, Awards, ROR ID, DOI, Social Media, etc.</i>
10.	Point of Contact	<i>Full Name, ORCID if applicable, Email address</i>

Table 1: PUBGREY Template



In the final week of March 2023, the records submitted until then were compiled, edited, and published on GreyNet’s Web site and in the GreyGuide, GreyNet’s Web Access Portal and Repository. This repository was designed and is managed by my two colleagues in this project. The PUBGREY registry¹ carries an ISBN as well as a DOI. The first edition contains 25 records of publishers in grey literature and is the primary resource that serves in the next phase in our project.

Figure 1 Cover PUBGREY Registry

Step Two – Acquire the Publishers’ Views on Grey Literature

Moving on to the second step in our project, we seek to acquire the publishers’ views on grey literature separate from the views of a combined range of stakeholders that include authors, researchers, editors, sponsors, end-users, etc.

It is here that a selection of records is made based on three criteria: open access compliance, the publisher was assigned a ROR-ID², and the respondent who completed the template provided his/her contact details that could be used in a further line of questioning dealing with their views on grey literature and their response if any to search results acquired from their organization’s website.

Of the twenty-five publishers in the PUBGREY registry 10 met these criteria and they are the population of our study on climate change. The population of the 2020 study on circular economy³ was open to all types of stakeholders in grey literature.

The questionnaire GreyNet designed in 2020 that was used in the study on circular economy was reintroduced in this study dealing with climate change. The decision to reuse the questionnaire was sparked by a working paper by Wang et al⁴ in 2022 entitled “Circular economy as a climate strategy”.

The reuse of the questionnaire is seen as warranted in that the survey questions while referring to grey literature do not mention the term circular economy and neither do they include the term climate change. The ten survey questions (See Appendix 2) both in 2020 and again in 2023 are identical; however, the survey populations differ. This allows for comparison and analysis of the results of both. This would also help to determine whether there is the same or a similar level of consensus among GreyNet’s community of practice with the controlled sub-group of publishers dealing with their views on grey literature.

Survey Year	Survey Population	Survey Reach	Survey Questions	N° of Survey Respondents
2020	GreyNet's Distribution List and social media	Open/ Random	10	72 (NA)
2023	PUBGREY Registry Publishers in Grey Literature	Controlled/ Criteria est.	10	10 (100%)

Table 2: Comparison of the 2020 and 2023 Survey Populations, Survey Reach, and Respondents

There is reason to consider that if a comparison of the results between the two survey populations were to uncover any significant differences, then this would allow us to identify the publishers' views dealing with grey literature juxtaposed to that of a varying range of stakeholders in the field of grey literature.

SURVEY RESPONSES*	
Strongly Agree 2020	Strongly Agree 2023
Q1 - Grey literature resources should be open access compliant 63%	90%
Q4 - The dated mindset regarding grey literature is as much a barrier as broken links 25%	40%
Q5 - Persistent identifiers maximize the use of grey literature resources 36%	60%
Q7 - More consideration should be given to the accessibility of grey literature in its early production and subsequent publication 61%	70%
Q9 - By drawing public awareness to grey literature, barriers facing it will have more prospect in being resolved 39%	20%
*Rounded to the nearest percent	

Table 3: Comparison of Five of the Survey Responses having the highest differential

Here we see a comparison of the results of 5 of the 10 questions in the two surveys exhibiting the highest differential. While four of the five responses compared show a significant increased percentage of strong agreement on the part of the publishers, one of the five responses compared shows a significant decreased percentage of agreement on the part of the publishers. A brief look at the 5 questions and the responses from the two surveys averages a near 19% disparity.

In the study on circular economy, grey literature is shown to be both a driver and a vehicle in research. As a driver, it is counted as one of the industries associated with circular economy namely the information industry alongside textile, agriculture, utilities, and other industries. As a vehicle, grey literature is seen as an important way of publishing by way of numerous document types, thereby communicating research results produced by other industries.

Circular Economy

- **Driver:** Grey Literature is part of the information Industry among other industries in the circular economy such as textile, agriculture, utilities, etc.
- **Vehicle:** Via grey literature's multiple and diverse document types, information produced in all industries in the circular economy is transferable and openly accessible.

Now, if the circular economy can be viewed as a strategy related to climate and climate change as purported by Wang et al, then grey literature may also be seen as a driver and vehicle for climate change.

Step Three – Employ the PUBGREY Registry in the case of Climate Change

Two of the record fields in the PUBGREY template enabled us to address climate change. I refer here to the field Main Coverage in the template in which the disciplines, topics, and subjects of the publishers are recorded and to the field Document Types in the template in which both textual and non-textual document types are recorded.

Grey Literature seen as a driver in climate change

If we look at the coverage of topics compiled from the PUBGREY registry we see that the term climate change is not found among the topics. However, if we look at the host of topics recorded, it is not questionable to assume that many of them are related to climate change e.g., agriculture, coastal management, environment, food security, health, natural resources, sustainable development, etc.

PUBGREY – Multidisciplinary coverage by Publishers in Grey Literature		
Agriculture	Food Security	Nuclear Science
Archaeology	Geography	Nutrition
Caribbean Studies	Grey Literature	Pharmaceuticals
Coastal Management	Health	Policies
Communications	Health Care	Psychology
Development	Health Care Systems	Public Health
Dietetics	Heritage	Public Policy
Diseases	Humanities	Publishing
Drugs	Informatics	Radiation Physics
Economics	Library Science	Science
Economy	Marine Environmental Science	Social Science
Educational Science	Mathematics	Soil Remediation
Engineering	Medical Devices	Steel
Enterprise Architecture	Medical Diagnostics	Sustainable Development
Entomology	Medical Procedures	Technology
Environment	Natural Resources	Telematics
Family Studies	Nuclear Energy	Trade
Florida History	Nuclear Medicine	

Table 4: Overall coverage of topics extracted from the PUBGREY Registry

This is later supported by search results involving the terms: 'climate', 'climate change', and 'circular economy' retrieved via the websites of the ten publishing organizations in our sample.

Organization's Website	Country	Coverage	Climate	Climate Change	Circular Economy	CC & CE
INIS-IAEA	AT	Energy	75733	35335	791	385
UF	US	Multidisciplinary	+10000	+10000	128	80
IFPRI	US	Food Policy	4529	4142	108	40
APO	AU	Public Policy	3173	2675	91	17
SAARLAND	DE	Multidisciplinary	357	104	4	-
MTAK	HU	Multidisciplinary	198	49	-	-
ADS	UK	Archaeology	91	7	-	-
AHS	CA	Health	72	12	2	2
ESTIA	GR	Multidisciplinary	16	3	1	-
NII	JP	Informatics	5	4	-	-

Table 5: Website search results from the sample population (*accessed on 23 April 2023*)

The working paper by Wang et al in 2022 in which circular economy is seen as a strategy in climate change appears to some extent in our web searches. Results shown in the table indicate that all 10 of the publishers' websites contain records on climate and climate change. While 7 of the 10 publishers' websites to some degree include records on circular economy, only 5 include records on climate change and circular economy combined. Topics covered in those five websites deal with energy, food policy, public policy, health, as well as a multidisciplinary coverage of topics.

Grey Literature seen as a vehicle in climate change

When referring to grey literature as a vehicle in transferring information and knowledge dealing with climate change, we need only look at the number of document types in various publication formats that are listed in the PUBGREY registry that accounts for at least fifteen. If we rank them according to the number of times that they are recorded by our survey population, we find that two of the top five are non-textual - those being datasets and audiovisual materials - while the other three in the top five are the more traditional grey literature document types: reports, theses, and proceedings.

Grey Literature Document Types		
Top 5 ranked in order ↑ ↓		
Reports Theses Datasets Proceedings AVMs	Conference Papers Discussion Papers Grant Proposals Guidelines Legislative Material	Maps Policies Protocols Research Papers Standards

Table 6: Coverage of document types listed by the ten publishers in our sample population

Summary of our Findings on Climate Change

From an empirical standpoint, grey literature can be seen as both a driver and vehicle in the field of scientific and technical information. As a driver, grey literature is in the forefront of information produced on all levels of (non)government, academics, business and industry. As a vehicle, grey literature serves in publishing and disseminating that which is produced in diverse and multiple document types both in textual and non-textual formats.

Climate Change

- **Driver:** Grey Literature includes multidisciplinary coverage of topics associated with climate change. As such, it is integral to research in this field.
- **Vehicle:** Via grey literature's multiple and diverse document types, the results of research associated with climate change are published and openly accesible.

We also found through the PUBGREY project, that publishers show more of a degree of consensus on grey literature than a combined range of stakeholders.

Concluding Statement

If we then establish that there is consensus among GreyNet's community of practice as to grey literature's role as both a vehicle and driver in research, what better way to draw awareness to this then through publishing. Hence, those organizations producing and publishing grey literature must publicly acknowledge their role as publishers. It is in this way that they can be seen as an integral factor in confronting climate change as well as other societal problems and issues, whose solutions can best be addressed by way of research and publication. In close, the PUBGREY Registry should be seen as a first step in formalizing a Consortium of Grey Literature Publishers.

References

¹ PUBGREY – Publishers in Grey Literature / compiled by D. Farace, GreyNet International TextRelease : Amsterdam, 2023. - 1st ed. – 15 p. - ISBN 978-90-77484-44-9 [Registry] https://www.greynet.org/images/PUBGREY_1st_ed.,_2023_.pdf

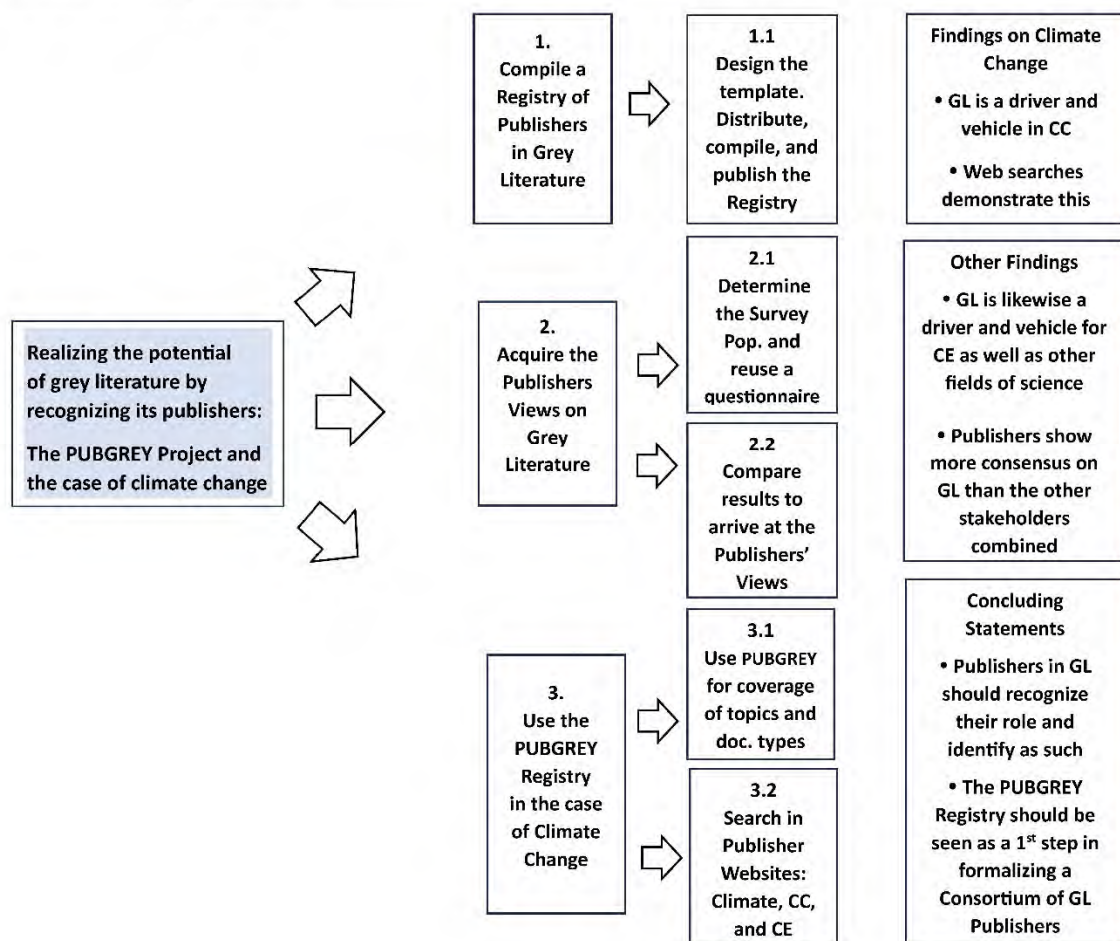
² ROR is a global, community-led registry of open persistent identifiers for research organizations <https://ror.org/>

³ Farace D., & Frantzen J, (2021). Grey Literature Resources generate and drive Awareness to a Circular Economy: An Explorative Research Project. In: Twentieth-Second International Conference on Grey Literature, National Research Council of Italy, - Online Conference 19 November 2020 vol. 22 pp. 26-30. <https://doi.org/10.26069/greynet-2021-000.456-gg>

⁴ Wang, K., M. Costanza-van den Belt, G. Heath, J. Walzberg, T. Curtis, J. Barrie, P. Schroder, L. Lazer, and J. C. Altamirano. 2022. "Circular economy as a climate strategy: current knowledge and calls-to-action." [Working Paper]. Washington, DC: World Resources Institute <https://pacecircular.org/sites/default/files/2022-11/Circular-Economy-as-a-Climate-Strategy-paper-11.22-PACE-WRI-CH-NREL.pdf>

APPENDIX 1:

PUBGREY Project Plan



The scheme above, provides an overview of the project plan. The three cells forming the left-hand column state the goals of the project. The cells in the middle column provide the method of approach and implementation. And, the cells forming the right-hand column discuss the project findings and concluding statements.

APPENDIX 2:

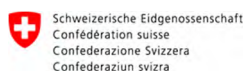
Survey Questions in 2020 and 2023

- Q1 Grey literature resources should be open access compliant
- Q2 Loss of Information is a waste and presents a problem especially for grey literature
- Q3 Information overload contributes to the underuse of valuable grey literature resources
- Q4 The dated mindset regarding grey literature is as much a barrier as broken links
- Q5 Persistent identifiers maximize the use of grey literature resources
- Q6 Knowledge transfer is the primary function of grey literature
- Q7 More consideration should be given to the accessibility of grey literature in its early production and subsequent publication
- Q8 With grey literature research, the reusability of data/sets is more important than their replicability
- Q9 By drawing public awareness to grey literature, barriers facing it will have more prospect in being resolved
- Q10 Optional: Please enter your name and email address, and any other comments or recommendations that would be of benefit for this survey. Thank You!

PUBGREY

Registry of Publishers in Grey Literature

First Edition
March 2023



Algeria

Australia

Austria

Belgium

Canada

France

Greece

Hungary

Italy

Japan

Netherlands

Switzerland

UK

USA

Collection Development and Maintenance of Accurate Grey Literature on Climate Change: A Case Study of the Law and Policy in the United States

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Abstract

Problem: The United States exists in a Post-truth Era with false beliefs such as the moon landing was a hoax, the 2020 presidential election was stolen, the Chinese government created, then distributed the Covid-19 virus and many others. Conspiracy theorists abound in the U.S. cultural and political landscape. Another such belief is that climate change is a myth; it is not occurring.

Research method/procedure: This study explores in a U.S. Constitutional context the ability of public librarians and public libraries to collect and maintain truthful (trusted) grey content regarding climate change. One element of many collection development policies in libraries is accuracy. See, *ACLU v. Miami-Dade County School Board*, 557 F.3d 1177, 1184 (11th Cir.), cert. denied 130 S. Ct. 659 (2009). Accuracy is also used to assess collection maintenance. Prior content including grey literature created and collected at time when climate change was unproven is no longer accurate and should be withdrawn. Likewise requests by patrons to keep or add content presenting an alternative and inaccurate viewpoint regarding climate change should be withdrawn or refused. In the United States the First Amendment guarantees not only the right to speak but also to receive information, including in a public library, the “**quintessential locus** of the receipt of information.” *Kreimer v. Bureau of Police for Town of Morristown*, 958 F.2d 1242, 1255 (3d Cir. 1992). Under First Amendment Forum analysis, a public library collection would be considered a non-public forum while the public spaces within the library are a limited public forum. See, *Faith Center Church Evangelistic Ministries v. Glover*, 462 F.3d 1194, 1204 (9th Cir. 2006). In a non-public forum, government policies that regulate speech must be rationale and viewpoint neutral. See, *Case v. Unified School District No. 233*, 908 F. Supp. 864, 875 (D. Kan. 1995).

The constitutional framework poses the following questions: Do public library patrons have a right to require that inaccurate grey content regarding climate change be retained or added to the collection? Must a public library accept gifts of such content, adding it to its collection? Likewise do those same patrons have the right to object when librarians withdraw inaccurate grey content regarding climate change reflecting an alternative viewpoint?

A textual analysis of the extant case law regarding the rights of public librarians and their patrons is undertaken in order answer these questions. In addition to relevant U.S. Supreme Court, the following cases among others are analyzed and discussed. *ACLU v. Miami-Dade County School Board*, 557 F.3d 1177 (11th Cir.), cert. denied 130 S. Ct. 659 (2009); *Elgi v. Chester County Library System [CCLS]*, (E.D. Pa. 2019); and *Via v. City of Richmond*, 543 F. Supp. 382 (D.C. Va. 1982).

Anticipated results of the research: The cases reviewed should prove instructive regarding the rights and limitations of public librarians and libraries to collect and maintain accurate content including grey literature regarding climate change as well as the rights and limitations of patrons possess to impact that collection development and maintenance process. Strategies and responses to interactions with patrons holding alternative viewpoints on climate change are forwarded to assist public libraries and its librarians in their efforts to collect and maintain truthful, trusted grey content regarding climate change.

Keywords: Free Speech, Public Forum Analysis, Content Challenges and Removal, Library Discretion in Collection Building and Maintenance

Introduction

While climate change impacts every individual, certain individuals have access to avenues to promote literacy and awareness of the climate change phenomenon. Public libraries and public librarians are, in fact, “in a critical position with the potential to be educational leaders in their communities” (Trotter & Komarnytska, 2023, p. 209) on the topic of climate change. However, there are several issues public libraries face when educating individuals on the topic of climate change. These issues include interfacing with individuals who do not believe in the climate change phenomenon, such as climate change denialists living in a “post-truth” era, and, as a result, individuals who wish to remove items from libraries’ collection reflecting the reality about specific conditions which they deny, or adopt inaccurate materials reflecting an “alternate truth.”

This paper is divided into several sections. The first section will explore the foundations of the philosophy of truth and the problem of post-truth. The second section will explore the United States context of post-truth narratives involving the restriction and censorship of sensitive topics as well as science and climate change denial and what that means for in a post-truth world. Third, we will bring forth several legal cases in the United States to analyze the First Amendment, including prior restraint and viewpoint discrimination. Then, we will discuss legislation impacting grey resources and put forth recommendations for library sustainability strategies, as well as for public library collection building and maintenance of trusted climate resources, grey or otherwise. We argue that in terms of collection development and maintenance, accurate grey literature on climate change will guide public libraries’ role in developing awareness of the climate change phenomenon among their patrons.

Part I Truth Theories and the Problems with Post-Truth

Although this paper will not delve deeper into truth theories, a philosophical foundation through truth theories will be discussed in this section, which serves as a basis for the discussion of the concepts of truth and post-truth narratives. These concepts can be evaluated particularly through the correspondence theory, consensus theory, and constructivist theories of truth. The concept of truth is not limited to these theories and is also not limited to the discussion below.

The correspondence theory of truth considers truth as correspondence between a fact, statement, or belief and objective reality (Russell, 1906). As it is arguable that “we have no access to objective reality independent of ourselves against which to match our claims and beliefs,” (Porpora & Sekalala, 2019, p. 940), the concept of objective reality is disputable. This theory is applied to a universal and indisputable reality. Although this theory is applicable to the factual conditions of the planet, it falls short when individuals do not acknowledge the state of the world *is* the reality, in which much of these conditions are the result of human actions. Anthropogenic causes of climate change are the accumulation of the economic usage of fossil fuels and carbon dioxide emissions, resulting in environmental injustice (Oreskes, 2023). There are many who simply deny this reality or believe they play no part in it.

Another truth theory, the consensus theory, considers truth to be agreed upon among a community or society. With the paradox of post-truth, “it appeals to consensus (for post-truth) as a way of undermining another consensus (for truth)” (Bufacci, 2020, p. 355). In an ideal world, elements of Jürgen Habermas’ concept of the public sphere, or a place for discourse to develop public opinion, would apply. However, the concept of the public sphere, with the original rules and expectations of “a collective willingness to cooperate in the search for meaningful agreement on how the world is and should be” (Foust & Pratt, 2021) was reconstructed over time and ultimately faced its downfall. The proliferation and deregulation of sensationalist online news, forums, and other networking sites (including social media) on the Internet “...made consensus on post-truth much easier to manufacture” (Bufacci, 2020, p. 356) even though a superficial means which reflect a

‘public sphere.’ This is inevitably problematic with the evolution of artificial intelligence (AI) to repost misinformation¹, thus increasing the number of these posts available for others to consume and continues to create an echo chamber lacking critical discourse. Misinformation about climate change is also occurring through native advertising, or a form of paid content embedded within real news articles even from widely circulating news distributors, often “misrepresent[ing] the full extent to which fossil fuel companies are responsible for climate change” (Colarossi and Ricciardi, 2023). It is difficult to dismiss the potential attribution of these misinformation reposts and ads to a disinformation campaign. These insidious ads fabricated by predatory companies and sanctioned by traditionally trusted resources ultimately influences individuals into the false and captivating narrative that humans are faultless in their contribution to the problem of climate change.

Finally, constructivist theories of truth can differ depending on the evaluative lens. Building on the concept of reality, this theory of truth does not consider a shared reality as “facts are contingent upon consciousness and human activities and are created or ‘constructed,’” (Brahms, 2020, p. 13) which rejects the correspondence theory of truth. Those who view such ads and articles previously mentioned with false narratives and do not see any physical evidence of climate change around them or do not equate global disasters with climate change may deny that the phenomenon is occurring. This is a point of view, or a perspective, which allows those who deny climate change to shift blame and accountability for climate change conditions away from themselves and to other entities.

Climate change denialists and skeptics fall victim to manufactured arguments as “alternative truths,” allowing doubt to further influence both individual and political decision-making and obstructing the actions needed to combat climate change. This action occurs in what is called post-truth crisis (Sher, 2022) or epistemological crisis (Friedman, 2023), in an era where individuals “believe information that appeals to emotions or existing personal beliefs” (Cooke, 2017, p. 212) and fail to think critically. Post-truth itself is the irrelevance of truth (McIntyre, 2018), where properties of soundness and validity are insignificant. However, the lack of the significance of truth threatens its value, which has profound effects on not only the value of truth but what humanity does because of the loss of the value of truth. Although post-truth is a phenomenon throughout the globe, we will discuss post-truth narratives in the context of the United States in the next section.

Part II United States Context of Post-Truth Narratives

Post-truth narratives are prevalent in post-truth politics and present in any realm where there is evidence; emotions or feelings of an event, phenomena, or such evidence; and a platform to provide feedback. Two post-truth narratives in the United States discussed below, restrictions on library collections and science and climate change denial, will provide a framework for the discussion of several cases exploring First Amendment challenges in the following sections.

Restrictions on Library Collections and Classroom Censorship on Sensitive Topics

The American Library Association (ALA) has seen challenges to nearly 1,915 unique titles and 3,923 total titles in the year 2023 alone (American Library Association, 2023b; American Library Association, 2023c) with the majority occurring at public libraries, school libraries, and schools. These challenges “attempt to remove materials from curricula or libraries, thereby curtailing the ability of others to access information, views, ideas, expressions, and stories” (American Library Association, 2023b). Reasons for book bans or challenges are subjective, but the consensus and those who subsequently participate in authoring legislation, can influence the choices made for their community, predominantly in places that should be providing and promoting access and education. One of the problems with bans or challenges is that it is the attempt to “eliminate

narratives...elucidat[ing] the truths of marginalized groups” (Cooke, 2023) as seen in the United States, where 7 out of 13² of the top challenged books of 2022 reported by the American Library Association centered around LGBTQIA+ content including gender identity and sexuality. Other highly challenged topics are race and critical race theory (CRT), in which these challenges bring forth fallacious arguments such as “the critical race theory is defamatory...forc[ing] feelings of racial guilt and distress upon white students,” (Shearer, 2022) when the goal is to examine racism as a social construct, and historically—particularly the reality of systemic racism. Individuals who identify with a certain group and lack intergroup contact, or contact with other social groups other than their own, may believe certain conditions are lies or that a specific phenomenon is false. These statements are repeated frequently within their group and may be sensationalized on the news. When presented with the truth, these individuals will doubt it, in contrary to the evidence available and even against their own judgment, leading to prejudices.

Challenges continue to arise ranging from claims of obscenity to lifestyle differences in misalignment with the requestor’s moral values. In terms of legality, United States public schools can “exercise discretion to restrict the range of permissible materials,” (Fiore, 2011, p. 98) specifically through decisions made by local school boards. Such valid exercise of discretion can lead to skewed or inaccurate content in the curriculum or library shelves. For example, in one school district in a suburb of Milwaukee, science teachers are forbidden from using the phrase “climate change,”³ but teaching and discussing the impact that humans have on the environment is possible without using the phrase.

The topic of climate change depicted in books is not excluded from the list above, even though it is not the most popular topic to challenge. In Kutztown, Pennsylvania, the attempt to remove a middle-school academic curriculum teaching a book about climate change occurred in early 2023. A school board member spearheaded this attempt by claiming educators were “pushing a politically charged book about climate change [and] questioned if the other side would be presented” (Mitchell, 2023) exemplifying the two-sides fallacy (Froehlich, 2017, p. 8). As discussed in the next section, facts about climate change or any other topic are not opinion, apolitical, or impermissible viewpoint discrimination. As one appellate court posed rhetorically for example, “what about a book that talked about the life of German children during the Third Reich? ...Hitler is out of favor now. Political orthodoxy views his regime as evil... And what about a book about life in the antebellum South ...Would we describe that book as ‘apolitical’?”⁴ It goes without saying that climate change has been observed over many years and that there is evidence for anthropogenic causes. However, some still deny science and climate change regardless of the overwhelming amount of evidence.

Science and Climate Change Denial

Science denial includes many categories such as rejecting the benefit and safety of vaccinations, the theory of evolution, pseudoscientific beliefs about the shape of the Earth (“flat earth”), the revolution of the planets in our solar system, and the human impact on climate change. Individuals who lack the basic literacy of such phenomena may deny scientific evidence at a superficial level. However, post-truth composes another story about those who deny science; not because there is not a lack of understanding, but rather the truth is irrelevant to them.

Lee McIntyre calls the climate change phenomenon, the “most egregious case” (McIntyre, 2018, p. 27) of science denial. Like book bans or challenges due to certain topics, individuals denying climate change believe it is a “direct and intentional assault on their personal lifestyles and moral attitudes” (Rubin, 2017, p. 105). Arguments of the denial of climate change in the era of post-truth can be described by more logical fallacies or biases, such as the appeal to false authority fallacy where opinions of individuals lacking real authority on a subject are treated as authoritative and laypeople put trust in those

opinions. This fallacy is a result of corporate attempts⁵ to create counternarratives such as the fossil fuel industry and its motive of self-preservation or the politics of geography such as states or regions economically dependent upon the fossil fuel industry. Social media posts from Donald Trump who frequently posted about climate change and global warming skepticism before and during his presidency (Matthews, 2017) are other examples of this fallacy, with numerous grey literature reports (Anderson, 2016; Borick et al., 2017; Greenpeace, 2019) which followed in attempt to invalidate his claims and provide input for policy issues the posts would affect.

More recently, the Pew Research Center (2023) released a report noting that Americans' climate change perceptions are tied strongly to their partisan affiliation rather than to the actual conditions of their area. However, it is not just beliefs that set these individuals apart as "ideology trumps science" (McIntyre, 2018, p. 34), because the actions of those who deny science and climate change affect others. Several states possessing a conservative political background or have conservative leadership, including Florida, Montana, and Oklahoma, are partnering with PragerU, a conservative non-profit which developed classroom education materials containing misleading information about climate change and other climate change denial material, further pushing the conservative agenda (Branch, 2023a; Branch, 2023b; Reuters, 2020). These choices will not only affect young individuals learning about climate change for the first time, but also the choices of materials and resources made available through places traditionally prescribed to provide and promote access and education.

In the next section, the issues above will be put into perspective with the discussion of several cases regarding collection development and maintenance the First Amendment.

Part III First Amendment and the Legal Framework for Content Review in Library Collections

In the United States the Free Speech provision of the First Amendment guarantees not only the right to speak but also to receive information, including the right to read. The "public library, the *quintessential locus* of the receipt of information"⁶ plays an important role in facilitating citizens exercise of these right. Under First Amendment Forum analysis, a public library collection would be considered a non-public forum. In a non-public forum, where free speech rights are the least robust, government policies that regulate speech need only be rationale and viewpoint neutral.⁷ Patrons do have a First Amendment right derived from the Free Speech clause to be in a public library due to a Liberty Interest.⁸ Courts view the public spaces of a public library, as opposed to administrative or staff workspaces, as a limited public forum.⁹ In a limited public forum, the exercise of patron speech rights can be limited to that which conforms to the nature of the forum: "Its [public library] very purpose is to aid in the acquisition of knowledge through reading, writing and quiet contemplation... exercise of other oral and interactive First Amendment activities is antithetical to the nature of the Library."¹⁰ While patrons have a Liberty Interest to be in the service areas of a public library, but the nature of the collection itself is that of a nonpublic forum. Where again, the regulations of the speech is subject to a mere reasonableness standard and be viewpoint neutral: "the First Amendment prohibits the removal of books from libraries based on either viewpoint or content discrimination."¹¹ These standards are often expressed in the collection development policy of the library.

In the context of trusted grey literature on climate change the constitutional framework poses the following questions: Do public library patrons have a right to require that inaccurate grey content regarding climate change be retained or added to the collection? Must a public library accept gifts of such content, adding it to its collection? Likewise do those same patrons have the right to object when librarians withdraw inaccurate grey literature or other library content for that matter, regarding climate change that reflects

an alternative viewpoint? A textual analysis of the extant case law regarding the rights of public librarians and their patrons is undertaken in order answer these questions.

As the literature regarding climate change has evolved over the past several decades, there may in fact be outdated or otherwise questionable content that the library desires to deaccession. For example, in one review there were 108 “English-language books that reject the strong scientific evidence that global warming is occurring, that human activities are the predominant cause, and that negative impacts to humans and natural systems may occur” published between 1982 and 2010.¹² What are the legal standards involved in the deaccessioning of such titles? The legal (constitutional) standards are offered by the United States Supreme Court. Writing for the plurality in *Board of Education, Island Trees Union School District No. 26 v. Pico*, Justice Brennan saw a distinction, between the **removal** of school library items and the **acquisition** of school library items: “Furthermore, even as to library books, the action before us does **not** involve the **acquisition** of books. Respondents have not sought to compel their school Board to add to the school library shelves any books that students desire to read. Rather, the only action challenged in this case is the removal from school libraries of books originally placed there by the school authorities, or without objection from them.”¹³ Removals are therefore permissible but must comply with constitutional standards. “Petitioners rightly possess significant discretion to determine the content of their school libraries. But that discretion may not be exercised in a narrowly partisan or political manner... Thus whether petitioners’ removal of books from their school libraries denied respondents their First Amendment rights depends upon the **motivation** behind petitioners’ actions.”¹⁴ The Court cautioned that content may not be removed because of the viewpoint or ideas expressed in the item. “If petitioners intended [motivated] by their removal decision to deny respondents access to ideas with which petitioners disagreed... then petitioners have exercised their discretion in violation of the Constitution.”¹⁵ The Court proceeded to offer examples of the impermissible motivation, whereby there is an attempt to suppress the ideas expressed by the content. “If a Democratic school board, motivated by party affiliation, ordered the removal of all books written by or in favor of Republicans, few would doubt that the order violated the constitutional rights of the students denied access to those books. The same conclusion would surely apply if an all-white school board, motivated by racial animus, decided to remove all books authored by blacks or advocating racial equality and integration.”¹⁶ There are, however, constitutional standards for removal of material from a public school library or public library. “On the other hand, respondents implicitly concede that an **unconstitutional motivation** would **not** be demonstrated if it were shown that petitioners had decided to remove the books at issue because those books were **pervasively vulgar**. Tr. of Oral Arg. 36. And again, respondents concede that if it were demonstrated that the removal decision was based solely upon the ‘**educational suitability**’ of the books in question, then their removal would be ‘perfectly permissible.’ In other words, in respondents’ view such motivations, if decisive of petitioners’ actions, would **not** carry the danger of an official suppression of ideas, and thus would **not** violate respondents’ First Amendment rights.”¹⁷ The Court did not define how much vulgarity rises to a level “pervasively.” However, such content is unlikely to be found in grey literature regarding climate change. “Furthermore, while the Book Review Committee appointed by petitioners was instructed to make its recommendations based upon criteria that appear on their face to be permissible—the books’ “educational suitability,” “good taste,” “relevance,” and “appropriateness to age and grade level,” the Committee’s recommendations that five of the books be retained and that only two be removed were essentially rejected by petitioners.”¹⁸ A court will view library professionals, and in school settings affiliated individuals such as a Reading Specialist, Head of Curriculum, etc., as best positioned to decide if material is educationally suitable or not.¹⁹

When Administrators or Library or School Boards ignore and override the decision of these individuals during a “book challenge” or reconsideration process, courts are more apt to suspect an improper ill-motive, with removal often based on impermissible viewpoint discrimination.²⁰ Likely content that is outdated regarding the topic of climate change is no longer educationally suitable and may be permissibly removed for the collection of a public or public school library.

Part IV Viewpoint Discrimination and its Application in the Accuracy of Library Collections

If the goal is viewpoint neutrality, must a library acquire content that both forwards as well as denies the occurrence of climate change? In other words, must the library present both “viewpoints” or can the outdated climate change content be removed from the collection? To answer this question an understanding of what is meant by viewpoint discrimination is required. Second, a viewpoint must be distinguished from an opinion or belief and a fact.

These issues were addressed by a federal Court of Appeals decision.²¹ The Miami-Dade County School Board collection policy consisted of “fifteen criteria for selecting library materials: educational significance, appropriateness, **accuracy**, literary merit, scope, authority, special features, translation integrity, arrangement, treatment, technical quality, aesthetic quality, potential demand, durability, and lack of obscene material.”²² A book entitled *Vamos a Cuba* was challenged and removal of it from the public school library requested, as it contained *factual errors* on 7 of its 32 pages.²³ As the court observed: “if we find that the Board was motivated by the factual errors in the book, the plaintiffs have no chance of success on the merits, much less a substantial one.”²⁴ The court discussed the relevant standards from the *Pico* decision that applied: “Even assuming that standard [*Pico*] applies, however, the plaintiffs still lose if the School Board removed *Vamos a Cuba* not for those prohibited reasons but instead, as the Board insists, for legitimate pedagogical reasons such as concerns about the accuracy of the book.”²⁵ Factual inaccuracy is a legitimate reason to deaccession of library material whether the inaccuracy stems from “commission or omission. There is no constitutional right to have books containing misstatements of objective facts shelved in a school library.”²⁶ The School Board voted to remove the book as it “contain[ed] factual errors and does not present an accurate picture of life in Cuba.”²⁷ In the words of the court: “What *Vamos a Cuba* fails to mention, and takes great pains to cover up with its ‘like you do’ misrepresentations, is that the people of Cuba live in a state of subjugation to a totalitarian communist regime with all that involves.”²⁸ In the context of climate change as opposed to geography, is the library required to collect material offering, for example, an alternative viewpoint on climate change (denying its occurrence) and could it deaccession material that presents that now outdated view of climate change. As with the factually inaccurate view of Cuba present in *Vamos a Cuba*, the library need not collect and may remove material reflective of that position, i.e., that climate change is not occurring. “A preference in favor of factual accuracy is not unconstitutional viewpoint discrimination.”²⁹ As the court further stated: “Facts about the conditions inside a country are not a viewpoint. They are facts. A book that recounts those facts accurately would not, for that reason, be political in nature.”³⁰ An example of unconstitutional viewpoint discrimination in the deaccessioning process would be found where content that expressed a positive impression of LGBTQIA2+ attitudes or realities is removed but content critical of those attitudes and realities remains untouched.³¹

Post-truth narratives on the fallacy of climate change are simply that, untruths and inaccurate. A library may deaccession such content under the U.S. Constitution and is under no obligation to collect such content in attempt to comport with viewpoint neutral collection building and maintenance objectives. A public library possesses broad

discretion in building and maintaining its collections. Furthermore, the individual collecting and maintenance decisions in a public library reside with the librarians.³²

Pico and its progeny established standards for permissible removals. What if a patron insisted that the library add content to its collection that questions or outright denies climate change? Patrons do not have a constitutional right to command a library to add content to its collection. Even if the item is donated, at no cost to the library. In *Via v. City of Richmond*,³³ the Richmond Public Library was within its discretion to refuse a gift subscription to *The American Atheist* magazine. The senior librarian indicated “that the publication was of **low quality**, that there was little or **no indication of interest** by the reading public, and that the subject matter was dealt with by **better quality** publications and books.”³⁴ These factors parallel the collecting criteria of most libraries. Adherence to these criteria is reasonable. Further as the court observed there was no evidence that the gift subscription offer was refused due to unwillingness to espouse the cause of atheism, i.e., a viewpoint on the existence of a divine being.³⁵ Such refusals are permissible. Likewise, in *Elgi v. Chester County Library System*,³⁶ involving both a book acquisition request and a programming (speaker) request, the library refused to acquire a copy of *The Phantom Ogre; Exploring the Upside-Down World of anti-Semitism*, following its Materials Selection Policy. Programming was also limited to those “that promote and extend the Library’s collections, services, goals and mission [of the library] ... sponsored program must not promote the services, products, or philosophy of an individual group.”³⁷ The court commented extensively on the discretion libraries possess in determining material for its collections; “Libraries have broad discretion in determining the content of their collections... public libraries require and merit ‘broad discretion’ to make content-based decisions in collection and internet management since their purpose is to offer selective access of information to the public... Libraries are not required to accommodate every book or proposed talk.”³⁸ The court found no evidence of viewpoint discrimination in the refusal to acquire Elgi’s book or invite him to speak regarding it.³⁹ Concluding that authors do not have a constitutional right be included library collections or programming the court observed that Elgi “alleges only that his book and proposed talk were not accepted, but as Plaintiff does not have a constitutional right to be included in a library collection...”⁴⁰ The Supreme Court has further stated that in order to “fulfill their traditional missions, public libraries must have broad discretion to decide what material to provide to their patrons.”⁴¹ Alluding to collection criteria employed by a public library the Court added that the goal is to “facilitate research, learning, and recreational pursuits by furnishing materials of requisite and appropriate quality.”⁴² Further, this discretion extends to what content the library makes available online to its patrons. “A library’s need to exercise judgment in making collection decisions depends on its traditional role in identifying suitable and worthwhile material; it is no less entitled to play that role when it collects material from the Internet than when it collects material from any other source.”⁴³

Subsequent lower court decisions have echoed the concept that the Internet and other online sources are an extension of the collection over which the library possesses the same discretion whether to make certain content available or not. A “public library has discretion to make content-based decisions about which magazines and books to include in its collection, it has discretion to make decisions about Internet content.”⁴⁴ Alluding again to use of the collection development criteria when deciding what content to make available online the court observed that viewing the access to content online “not comparable to removal of items from NCRL’s collection, but rather acquisition of materials to add to its collection.”⁴⁵ If a library would not acquire material denying climate change it need not allow patrons to access such content online either. The right to receive information protected by the First Amendment “would still exist only with respect to the materials that are actually in a library’s collection. A patron would not have a right to receive information in a public library if that information was not part of the library’s collection.”⁴⁶ Reaffirming the *Elgi* court, a “patron does not have the constitutional right

to force a public library to acquire a particular book or type of book. Analogously, this right would not exist with respect to Internet sites that have not been added...collection decisions about Internet materials are not... subject to public forum analysis.”⁴⁷ Such collecting and access decisions are permissible under the constitution as such discretion is “reasonable and accords with its mission and these policies and is viewpoint neutral.”⁴⁸ As the physical collection as well as access to online content is considered a nonpublic forum “under rational review, the Court finds NCRL’s use of FortiGuard to filter its patrons, Internet access and its decision to not disable the filter upon an adult patron’s request complies with the First Amendment.”⁴⁹ The physical collection and access to content online are considered one and the same. A public library need not collect material denying climate change nor need it allow patrons to access such content online, if for example, access to such content is blocked by a filter or the library decides not to subscribe to a database from a publisher that espouses that position.

Table 1. Application of legal principles to library collecting practices regarding trusted grey sources on climate change.

Legal Decision	Legal Principle Espoused	Impact on Grey or other Climate Change Content in Library Collections
<i>Board of Education, Island Trees Union School District No. 26 v. Pico</i> , 457 U.S. 853 (1982).	Permissible removal of items from a public school library. Court: “educational suitability” Id. at 871. From Oral Argument Transcript: “pervasively vulgar.” Id. Book Review Committee: “educational suitability,” “good taste,” “relevance,” and “appropriateness to age and grade level.” Id. at 873.	It is constitutionally permissible to deaccession out of date material on climate change / global warming.
<i>United States v. American Library Association</i> , 123 S. Ct. 2297 (2003).	“To fulfill their traditional missions, public libraries must have broad discretion to decide what material to provide to their patrons.” Id. at 204. Library discretion extends to what resources are made available online to patrons as well	A library could use technology (filtering mechanism) to block sites and content denying the occurrence of climate change / global warming. As a library might choose not to not collect such content for its physical collection, it need not make such content available to patrons online either.
<i>ACLU v. Miami-Dade County School Board</i> , 557 F.3d 1177 (11th Cir.), cert. denied 130 S. Ct. 659 (2009).	Inaccurate content, whether by “commission or omission” can be considered educationally unsuitable. Accuracy is an acceptable criterion to use in collection development. “There is no constitutional right to have books containing misstatements of objective facts shelved in a school library.” Id. at 1202. “A preference in favor of factual accuracy is not unconstitutional viewpoint discrimination.” Id. at 1222.	It is constitutionally permissible to deaccession content that is factually inaccurate. Content denying that climate change / global warming is occurring would be considered factually inaccurate. Content denying that climate change / global warming is occurring is not expressive of a viewpoint. Likewise, content that forwards that climate change / global warming is occurring is not a viewpoint, it is a fact.

<i>Via v. City of Richmond</i> , 543 F.Supp. 382 (D.C.Va. 1982).	A library is not required to accept any gifts if the content is inconsistent with its criteria for collection development. Senior librarian indicated “that the publication was of <i>low quality</i> , that there was little or <i>no</i> indication of <i>interest</i> by the reading public, and that the subject matter was dealt with by <i>better quality</i> publications and books.” Id. at 384	A library is not required to accept content denying that climate change / global warming is occurring even if it is offered as a gift, such content would not meet the “quality” or accuracy criterion of a collection development policy.
<i>Elgi v. Chester County Library System</i> , 394 F.Supp.3d 497 (E.D. Pa. 2019).	“Libraries have broad discretion in determining the content of their collections... public libraries require and merit ‘broad discretion’ to make content-based decisions in collection and internet management...” Id. at 504. “Plaintiff does not have a constitutional right to be included in a library collection...” Id.	The discretion of a library in determining the content of its collection extends to the programming it offers. A library, if requested to invite a speaker or provide programming denying that climate change / global warming is occurring, need not fulfill that request.
<i>Bradburn v. North Central Regional Library District</i> , 231 P.3d 166 (Wash. 2010) (en banc).	“Given the traditional and historical role of a public library, and the discretion necessarily entailed to make content-based judgments about what to include in its collection...” Id. at 180. Use of a filter “advances the duty of education and fulfills NCRL’s mission and traditional role.” Id. “A public library has traditionally and historically enjoyed broad discretion to select materials to add to its collection of printed materials... the same discretion must be afforded a public library to choose what materials from millions of Internet sites it will... make available to its patrons. Id. at 181. Standard of Review: “Protecting patrons (including minors) from obscene material and increasing the library’s capacity to provide literary, <i>scientific</i> , historic, and other materials clearly satisfies the rational basis test.” Id. at 182 (Johnson, J., concurring).	Library discretion in collection development extends to the content it makes available online to its patrons. It is constitutionally permissible for a library to refuse to restore or disable a filter blocking access to content denying that climate change / global warming is occurring. Library collection decisions that provide scientific content, including the topic of climate change / global warming are consistent with its educational mission.
<i>Bradburn v. NCRLD</i> , 2012 WL 1200448, (E.D. Wash.) (unpublished).	Standard of Review: “under rational review, the Court finds NCRL’s use of FortiGuard to filter its patrons, Internet access and its decision to not disable the filter upon an adult patron’s request complies with the First Amendment.” Id. at *2.	Library discretion in collection development extends to the content it makes available online to its patrons. It is constitutionally permissible for a library to refuse to restore or disable a filter blocking access to content denying that climate change / global warming is occurring or to refuse to subscribe to a database from a publisher that espouses that position.

Part V Libraries in Green Space: Sustainability Strategies

Since libraries have the right and the ability to choose the items adopted into their library and the right to refuse gifts and donations, this means that libraries also have the responsibility to choose accurate resources reflecting the causes and conditions of climate change. Additionally, libraries must set forth an example for its patrons by participating in practices conducive to the further development of climate change. These actions can occur within the library as an organization or as part of a larger institution, such as reducing carbon footprints by reducing electric use, promoting green programs and services such as gardening or nature walks. Finally, selection of green resources in their library collection, as well as “green de-selection” which involves “recycling or reusing weeded materials” (Kurbanoglu & Boustany, 2014, p. 52). Beyond the public library or school setting, academic libraries may participate in university-led green initiatives to conserve energy through smart technology or by going ‘paperless’ by reducing printing.

At an international level, the United Nations’ Department of Economic and Social Affairs has developed seventeen Sustainability Goals including building safe and sustainable cities, ensuring responsible consumption and production patterns, and providing inclusive and equitable education. With respect to climate change, the concern is lower in the United States than other countries, specifically those with advanced economies (Poushter et al., 2022) that are often reliant on fossil fuels. It was reported that many countries have partisan problems like the United States when it comes to accepting the reality of climate change and the threats of climate change and responses to those threats.

The co-author is also on an ALA Task Force developing core values of the profession. One core value identified is Sustainability, defined as “making choices that are good for the environment, make sense economically, and treat everyone equitably. Sustainable choices preserve physical and digital resources and keep services useful now and into the future. By supporting climate resiliency, library workers create thriving communities and care for our common good for a better tomorrow.”⁵⁰

For individuals in the library profession experiencing eco-anxiety, or the “chronic fear of environmental doom” (Wakeman, 2020), one way to combat this issue is to “improve engagement with the subject of climate change [by] having materials that focus on and encourage sustainability” (Mathur, 2022 as cited in Trotter & Komarnytska, 2023). The ALA’s Sustainability Roundtable (SustainRT) as well as the Sustainable Libraries Initiative (Sustainable Libraries Initiative, 2023) bring together library staff and libraries of all types with the goals of exchanging ideas to build sustainable environments and futures in the library and beyond.

Conclusion and Recommendations for Library Collection of Trusted Climate Resources

In conclusion, libraries may face unprecedented times in terms of adopting accurate climate change resources in the collection development process during the age of misinformation due to existing post-truth narrative its supporters. With the rise of more states choosing to adopt materials reflecting alternative truths or post-truths including the topic of climate change as well as the rise of book bans and challenges, libraries and library professionals have a responsibility to not only develop a collection of accurate resources, but also participate in sustainability strategies. The discussion of various cases on the analysis of the First Amendment and what constitutes free speech regarding library materials acquisitions and removals as well as what does not constitute viewpoint discrimination should empower librarians and library staff to take ownership of their abilities to choose and adopt accurate climate change resources for their patrons. Below are some strategies to be included when creating a library collection development policy as well as trusted grey resources to assist in the collection development process.

Library Collection Development Policy

- Review the library collection development policy ensuring that “climate change as a priority factor in a library’s collection policy ... Collections must also acknowledge the barriers that exist in getting people to engage with climate change in a sustainable way, some of the most difficult factors to overcome being climate change denial and the resulting climate change denial materials.” (Trotter & Komarnytska, 2023)
- Include accuracy as a criterion in the collection development policy, applying to acquisition and deaccession decisions as well as acceptance of gifts; using it to judge whether material on climate change is accurate. Deaccession or refuse to add material that does not meet this standard and is not trusted.
- Be aware keep abreast of sources that produce and disseminate questionable material regarding climate change.
- Vest collection or programming decisions with trained professionals, librarians and not with elected official or some subset of the service population.⁵¹

Trusted Resources to Assist in Collection Development and Design of Literacy Programs on Climate Change

Library staff develop relationships with their patrons and develop an understanding of the types of resources they seek over time. In their case studies, Trotter & Komarnytska (2023) described the launch of a climate change collection at Thunder Bay Public Library in Ontario, Canada, which was “formed due to requests from Thunder Bay community members who wanted to see better access to climate change resources” (Hardy, 2022). Although the Thunder Bay community specifically requested these types of materials in their library, it serves as an example of how the library can partner with climate-focused organizations who can assist them in suggesting and gathering accurate materials, which will still require collection development expertise for the adoption process. Based on the suggested policies above, libraries can determine whether a climate change collection is missing and what might be needed to develop it, along with any accompanying literacy programs. From a practical standpoint, Connell (2010) discussed ‘green’ practices in collection development, including the consideration of the environmental impacts of print and electronic resources, areas in which collection development staff must also develop awareness.

In the matter of keeping abreast of adjacent areas of collection development and climate change, several non-profit organizations have created their own databases to track book bans and censorship attacks (Magnusson & EveryLibrary Institute, 2023; PEN America, 2023). Just like databases to track library book bans and book challenges, there is a need for individuals to track challenged climate change resources. On the legal side, there is a Climate Change Litigation Database which tracks both United States and global climate change litigation, breaking the items up into appropriate categories such as claims, regulations, and suits (Sabin Center for Climate Change Law & Arnold & Porter Kaye Scholer LLP, 2023). These grey resources advocate for the systems thinking methodology and encourage library professionals to think outside of the box.

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Endnotes

¹ Disinformation attacks are performed by using artificial intelligence (AI) to create human-like accounts which bypass the verification process. After these accounts are created, followers are gained (both attacker-controlled and real individuals) and the accounts post disinformation and allow it to “propagate...through replies and likes.” See Villasenor, 2020.

² Three books tied for 10th place in this list. The books on this list challenged for LGBTQIA+ content included other challenge reasons, such as providing sexual education, claimed to be sexually explicit, containing depictions of sexual abuse, drug use, and profanity. See American Library Association, 2023a.

³ Author conversation with Kim Liepert, Library Technology Lead at Pilgrim Park Middle School, Elmbrook Schools, Brookfield, Wisconsin, United States (October 13, 2023).

⁴ “It confuses interest with motive...the argument, for example, render constitutionally suspect the votes of Jewish school board members to remove our hypothetical book about life in the Third Reich. It would do the same to the votes of any African American board members who wanted to remove our hypothetical book about life in the antebellum South. Interest does not necessarily equate with improper motive.” *Id.* a 1224.). See *ACLU v. Miami-Dade County School Board*, 557 F.3d 1177, 1223-1224 (11th Cir.), cert. denied 130 S. Ct. 659 (2009).

⁵ In *Post-truth*, McIntyre discussed the creation of the Tobacco Industry Research Committee created in the 1950s to promote a “positive value of scientific skepticism of science itself.” See McIntyre, 2018, p. 25. See also Brandt, 2011.

⁶ *Kreimer v. Bureau of Police for Town of Morristown*, 958 F.2d 1242, 1255 (3d Cir. 1992).

⁷ See, *Case v. Unified School District No. 233*, 908 F. Supp. 864, 875 (D. Kan. 1995).

⁸ *Little v Llano County*, 2023 WL 2731089, *9 (W.D. Tex.) (“The Court follows our many sister courts in holding that there is a protected liberty interest in access to information in a public library...”).

⁹ *Kreimer v. Bureau of Police for Town of Morristown*, 958 F.2d 1242, 1259 (3d Cir. 1992) (“In our view... the [public] Library constitutes a limited public forum, a type of designated public fora.”).

¹⁰ *Kreimer v. Bureau of Police for Town of Morristown*, 958 F.2d 1242, 1261 (3d Cir. 1992).

¹¹ *Little v Llano County*, 2023 WL 2731089, *9 (W.D. Tex.), citing *Board of Education, Island Trees Union School District No. 26 v. Pico*, 457 U.S. 853 (1982).

¹² Christine Russell, Attack of the climate-denial books: Conservative think tanks fuel publishing boom that spreads misinformation. *Columbia Journalism Review* (March 12, 2013), https://archives.cjr.org/the_observatory/climate_change_denial_skeptic.php.

¹³ *Board of Education, Island Trees Union School District No. 26 v. Pico*, 457 U.S. 853, 862 (1982).

¹⁴ *Board of Education, Island Trees Union School District No. 26 v. Pico*, 457 U.S. 853, 871 (1982).

¹⁵ *Board of Education, Island Trees Union School District No. 26 v. Pico*, 457 U.S. 853, 871 (1982).

¹⁶ *Board of Education, Island Trees Union School District No. 26 v. Pico*, 457 U.S. 853, 870-871 (1982).

¹⁷ *Board of Education, Island Trees Union School District No. 26 v. Pico*, 457 U.S. 853, 871 (1982).

¹⁸ *Board of Education, Island Trees Union School District No. 26 v. Pico*, 457 U.S. 853, 873 (1982).

¹⁹ *Sund v. City of Wichita Falls, Texas*, 121 F. Supp. 2d 530, 541 (N.D. Texas 2000) (“Linda Hughes, the Library Administrator... is the real heroine... of the censorship of two children’s Books-and the unconstitutional interference with her ability to perform her duties in running the Library as a trained, skilled, and very competent professional...Ms. Hughes has a master’ degree in library science, and she follows the code of ethics that governs professional librarians.”). See also, *Fayetteville Public Library v Crawford County Arkansas*, 2023 WL 4845636, *3 (W.D. Ark.) (finding unconstitutional an Arkansas statute that shifted collection decisions “from **professional librarians** to the politically elected members of local county quorum courts and city councils... empower a vocal minority to dictate to the entire community what its citizens may and may not read”).

²⁰ See, e.g., *Case v. Unified School District No. 233*, 908 F. Supp. 864, 875 (D. Kan. 1995); *Parents, Families, and Friends of Lesbians and Gays, Inc. v. Camdenton R-III School*, 2012 WL 510877 (W.D. Mo. 2012); *Hunter v. City of Salem*, 2012 WL 1205137, *1 (E.D. Mo.) (unpublished) (decided on other grounds but the complaint claimed impermissible viewpoint discrimination).

²¹ *ACLU v. Miami-Dade County School Board*, 557 F.3d 1177 (11th Cir.), cert. denied 130 S. Ct. 659 (2009).

²² *ACLU v. Miami-Dade County School Board*, 557 F.3d 1184 (11th Cir.), cert. denied 130 S. Ct. 659 (2009).

²³ *ACLU v. Miami-Dade County School Board*, 557 F.3d 1184, 1207 (11th Cir.), cert. denied 130 S. Ct. 659 (2009) (a list of errors is recounted on pages 1211-1214 of the opinion).

²⁴ *ACLU v. Miami-Dade County School Board*, 557 F.3d 1184, 1198-1199 (11th Cir.), cert. denied 130 S. Ct. 659 (2009).

²⁵ *ACLU v. Miami-Dade County School Board*, 557 F.3d 1184, 1202 (11th Cir.), cert. denied 130 S. Ct. 659 (2009).

- ²⁶ *ACLU v. Miami-Dade County School Board*, 557 F.3d 1184, 1202 (11th Cir.), cert. denied 130 S. Ct. 659 (2009).
- ²⁷ *ACLU v. Miami-Dade County School Board*, 557 F.3d 1184, 1206 (11th Cir.), cert. denied 130 S. Ct. 659 (2009).
- ²⁸ *ACLU v. Miami-Dade County School Board*, 557 F.3d 1184, 1213 (11th Cir.), cert. denied 130 S. Ct. 659 (2009).
- ²⁹ *ACLU v. Miami-Dade County School Board*, 557 F.3d 1184, 1222 (11th Cir.), cert. denied 130 S. Ct. 659 (2009).
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- ³² *Fayetteville Public Library v Crawford County Arkansas*, 2023 WL 4845636, *4 (W.D. Ark.) (Librarians—much like doctors and lawyers—are afforded significant professional responsibility and deference with respect to their area of expertise.”).
- ³³ *Via v. City of Richmond*, 543 F.Supp. 382 (D.C.Va. 1982).
- ³⁴ *Via v. City of Richmond*, 543 F.Supp. 382, 384 (D.C.Va. 1982).
- ³⁵ *Via v. City of Richmond*, 543 F.Supp. 382, 384 (D.C.Va. 1982).
- ³⁶ *Elgi v. Chester County Library System*, 394 F.Supp.3d 497 (E.D. Pa. 2019).
- ³⁷ *Elgi v. Chester County Library System*, 394 F.Supp.3d 497, 501 (E.D. Pa. 2019).
- ³⁸ *Elgi v. Chester County Library System*, 394 F.Supp.3d 497, 504 (E.D. Pa. 2019), citing *United States v. American Library Association*, 123 S. Ct. 2297 (2003) and *Pico* by footnote.
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- ⁴⁰ *Elgi v. Chester County Library System*, 394 F.Supp.3d 497, 514 (E.D. Pa. 2019).
- ⁴¹ *United States v. American Library Association*, 539 U.S. 194, 204 (2003).
- ⁴² *United States v. American Library Association*, 539 U.S. 194, 206 (2003).
- ⁴³ *United States v. American Library Association*, 539 U.S. 194, 207-208 (2003).
- ⁴⁴ *Bradburn v. North Central Regional Library District*, 231 P.3d 166, 178 (Wash. 2010) (en banc).
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- ⁴⁶ *Bradburn v. North Central Regional Library District*, 231 P.3d 166, 179 (Wash. 2010) (en banc).
- ⁴⁷ *Bradburn v. North Central Regional Library District*, 231 P.3d 166, 179-180 (Wash. 2010) (en banc).
- ⁴⁸ *Bradburn v. North Central Regional Library District*, 231 P.3d 166, 180 (Wash. 2010) (en banc). See also, “collection decisions to allocate scarce resources are not subject to strict scrutiny, but instead are subject to the rational basis test... increasing the library’s capacity to provide literary, scientific, historic, and other materials clearly satisfies the rational basis test.” *Id.* at 182 (Johnson, J., concurring).
- ⁴⁹ *Bradburn v. North Central Regional Library District*, 2012 WL 1200448, *2 (E.D. Wash.) (unpublished).
- ⁵⁰ ALA Core Values Task Force December 2023 draft goals and preamble (Not for public distribution as the Core Values are yet to be adopted by the ALA Council. The final draft will be presented to Council for review at LibLearnX in Baltimore, Maryland in January, 2024, citing “ALA Task Force on United Nations 2030 Sustainable Development Goals,” ALA, accessed November 28, 2023, <https://www.ala.org/aboutala/ala-task-force-united-nations-2030-sustainable-development-goals..>
- ⁵¹ See, *Sund v. City of Wichita Falls, Texas*, 121 F. Supp. 2d 530, 533-534 (N.D. Texas 2000) (Finding unconstitutional a Library Board resolution that allowed anyone collecting 300 signatures from adults in the service population to request relocation of library materials); and *Fayetteville Public Library v Crawford County Arkansas*, 2023 WL 4845636 (W.D. Ark.) (politically elected members of local county quorum courts and city councils). See also, *Little v Llano County*, 2023 WL 2731089 (W.D. Tex.) (“the Commissioners Court also voted to dissolve the existing library board and to create a new one...residents who advocated for book removals were appointed to the new board... Board then instituted a policy that all new books must be presented to and approved by the board before purchasing them.” *Id.* at *3.)

When trusted sources don't help us address climate change: A grey dilemma

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Abstract

This paper delves into the limitations of trusted grey literature in tackling climate change by scrutinizing available information through case studies on recycling, biomass, and ESG investments, and revealing challenges consumers face relative to the messages they receive about climate change. The recycling scenario reveals the illusion of plastic recycling, with a mere 5% effectively recycled in the U.S., prompting a reevaluation of consumer choices. Examining aviation's pursuit of sustainable fuels, the biomass scenario exposes hurdles in reducing greenhouse gas emissions. The ESG investment scenario probes the impact of anti-ESG political rhetoric, highlighting the clash between environmental responsibility and opposing ideologies.

The author emphasizes the messages consumers receive about their pivotal role in greenhouse gas emissions reduction, citing the significant sway of Scope 3 emissions. The author also stresses the necessity for a new consumer-centric narrative adapting to current climate realities, and advocates for a message that encourages investment in innovative, scalable solutions, aligning with the International Monetary Fund's priorities for achieving net-zero by 2050 through global cooperation, incentivizing clean technologies, and supporting vulnerable nations. The paper issues a call to action for a more impactful and inclusive approach to address climate change, transcending traditional literature and academic discourse.

The Peanut Butter Paradox

Peanut butter is not the first thing one would expect to see in a paper on sustainability or climate change or any of the other topics contained in the amorphous concept Environmental, Social and Governance, ESG for short. However, it is a great place to start an examination about what “we” as in we consumers, are up against when we try to make sustainable choices and buy from companies who care about this planet and its inhabitants. Why peanut butter? It is a staple here in the United States and if there is not a jar in the pantry, it is probably on this week's grocery list. From here, things get pretty complicated, pretty fast. Maybe the trip to the grocery store is by mass transportation, an electric car, or maybe it is easier to use an app and have everything delivered to the front door. Plastic bag? Paper bag? Reuseable bag? Another decision and they just keep coming. Once at the store, there are brand names, private labels, and organic options; enough to fill at least five or six shelves. The catch, almost every single peanut butter choice is in a plastic jar. Reducing plastic use? Need to go with glass. For those who are aware that harvesting palm oil is resulting in deforestation and destroying orangutan habitats, the ingredients list is the next decision point. Only one brand left, and it is one of the most expensive, a sigh of relief, at least it is organic. Not in the budget, take a deep breath, pick another brand, and put it into the shopping cart. When all is said and done, does it really matter which one?

So much to unpack already and we have not even gotten to the supply chain behind every jar of peanut butter.

Doing “our part” can be overwhelming for all of us including this author, a research librarian who prepared a weekly curated news brief on ESG for 18 months for an audience comprised of attorneys and consultants. This paper offers three additional scenarios illustrating dilemmas faced by consumers who are told they need to do their part to prevent global warming, to save the ocean, to ensure a living wage and safe working

conditions for employees, and to pay for sustainable, smart cities that run on clean energy and so much more.

That introduction is a bit dramatic, but purposeful. The ideas included here are supported by grey literature, but are also based on the author's experience, reading about ESG or climate change every day as well as being an informed consumer and voter living in the United States.

The GL25 pre-conference announcement says, *"grey literature communities worldwide are called upon to direct their attention in responding to climate change for the benefit of our vulnerable planet."* Reminding us, *"In accordance with FAIR data principles, researchers, authors, librarians, and other information professionals and practitioners are tasked to ensure that research outputs are findable, accessible, interoperable, and render potential reuse in furthering research and education in their respective disciplines and sectors of information."* This purpose is inspired and when it comes to climate change, these efforts are beyond critical. The statement is also insular in that grey literature furthers the aims of scholarship within the academy or other public and private research institutions and government agencies. This paper contends that grey literature does not always clarify issues or lead to a useful course of action, especially for the broader audience we also need to serve, everyday people. Grey literature tells us consumers play an enormously vital role in reducing emissions through direct action and by wielding their influence as customers and voters. Helping them understand what is needed, where investment should be made is just as critical as contributing to the innovative technologies needed to save us. The right message is essential and if the status quo tells us anything at all, it tells us the current narrative is ineffectual.

The Backstory on Emissions

Reducing greenhouse gas emissions is key to reaching global aims including the transition to the net-zero economy or more specifically an agenda like the Paris Climate Accord. Many organizations are working toward providing credible, scientific information about what is happening to the planet and to us. One of the most recognizable is The Intergovernmental Panel on Climate Change. The panel was set up by the World Meteorological Organization and the United Nations to provide an objective source of scientific information. In March 2023, it released the final version of its sixth assessment report, AR6 Synthesis Report: Climate Change 2023 (Climate Change 2023).

In unequivocal terms, Climate Change 2023 says that human beings are responsible for global warming and the chief culprit is greenhouse gas emissions. Page 8 of the 40-page summary (!) for policy makers says, *"Global greenhouse gas emissions have continued to increase, with unequal historical and ongoing contributions arising from unsustainable energy use, land use and land-use change, lifestyles and patterns of consumption and production across regions, between and within countries, and among individuals."* Moving to the next page, the summary goes on to say, *"Widespread and rapid changes in the atmosphere, ocean, cryosphere and biosphere have occurred. Human-caused climate change is already affecting many weather and climate extremes in every region across the globe. This has led to widespread adverse impacts and related losses and damages to nature and people...Vulnerable communities who have historically contributed the least to current climate change are disproportionately affected."*¹

At a more granular level, there are organizations like the International Sustainability Standards Board (ISSB) who help companies to measure and disclose their greenhouse gas emissions along with their plans to mitigate or off-set these emissions. The ISSB is a private, independent body established in 2021 and is charged with developing and

¹ (Intergovernmental Panel on Climate Change, 2023)

approving IFRS sustainability disclosure standards under the auspices of the IFRS Foundation. On June 30, 2023, the inaugural standards, IFRS S1 and S2 launched.²

These are standards that guide companies on what to disclose to investors and regulators about their sustainability and climate risks and how they are mitigating these risks or in more business-friendly terms, taking advantage of new opportunities in the green economy.

Regulators themselves, like the US Securities and Exchange Commission (SEC) are also working on standards for business. The commission proposed highly controversial sustainability and climate disclosure rules for publicly traded companies in March 2022. Like the IFRS standards, the rules require companies to disclose prospective risk and material impacts to their business caused by climate change including impacts on the company's strategy and outlook. These rules have been delayed for more than a year.³

The SEC rules are for publicly traded companies and this matters. Consider privately held, Minnesota-based Cargill. Established in 1865, the company started out as a grain storage facility. It is now an international producer and distributor of agricultural products such as sugar, refined oil, chocolate, and turkey. It also provides risk management, commodities trading, and transportation services. Employing 155,000 people, Cargill's 2022 revenue is reported to be \$165B.⁴

For private companies it is up to the executive team or board of directors to govern the company's actions around sustainability. Fortunately, Cargill, like many companies, has voluntarily taken a positive stance on ESG. *"Our Executive Team is dedicated to building a company that nourishes the world in a safe, responsible and sustainable way...Together, they are working to make Cargill the most trusted partner in food, agriculture and nutrition."*⁵ How successful Cargill and other companies will be with their ESG efforts requires attention to greenhouse gas emissions.

The Greenhouse Gas Protocol, another voluntary sustainability standards organization, provides the following greenhouse gas (GHG) emissions definitions and classifications usually called scopes.

●Emissions

- Direct GHG emissions are emissions from sources that are owned or controlled by the reporting entity.
- Indirect GHG emissions are emissions that are a consequence of the activities of the reporting entity but occur at sources owned or controlled by another entity.

●Scopes

- Scope 1: All direct GHG emissions.
- Scope 2: Indirect GHG emissions from consumption of purchased electricity, heat, or steam.
- Scope 3: Other indirect emissions, such as the extraction and production of purchased materials and fuels, transport-related activities in vehicles not owned or controlled by the reporting entity, electricity-related activities (e.g., T&D losses) not covered in Scope 2, outsourced activities, waste disposal, etc. (Greenhouse Gas Protocol, 2023)⁶

Scope 3 emissions also include 'use of products sold' which refers to the scope 1 and scope 2 emissions of end users. End users include both consumers and business customers that use a company's final products. Direct-use emissions by end users includes:

² (Deloitte, 2023)

³ (PricewaterhouseCoopers, 2023)

⁴ (Forbes, 2023)

⁵ (Cargill, 2023)

⁶ (Greenhouse Gas Protocol, 2023)

Products like automobiles, aircraft, engines, motors, power plants, buildings, appliances, electronics, lighting, data centers, and web-based software.

Fuel and feedstocks like petroleum products, natural gas, coal, biofuels, and crude oil.

Greenhouse gases and products that contain or form greenhouse gases emitted during use include CO₂, CH₄, N₂O, HFCs, PFCs, SF₆, refrigeration and air-conditioning equipment, industrial gases, fire extinguishers, and fertilizers.

Including indirect-use-phase emissions by end users is optional when reporting out on scope 3 emissions under the Greenhouse Gas Protocol. These emissions include products that indirectly consume energy (fuels or electricity) during use. Examples:

- Apparel (requires washing and drying)
- Food (requires cooking and refrigeration)
- Pots and pans (require heating), and
- Soaps and detergents (require heated water)⁷

Scope 3 emissions may account for as much as 70% of a company's emissions or more. This is exceptionally problematic because Scope 3 emissions are beyond the individual company's control. In terms of the supply chain, purchasing decisions and product designs by individual suppliers have greater influence over reducing emissions than the company for whom they supply products or materials. Companies have the option of switching suppliers, turning to those whose practices align with the company's net-zero or other sustainability targets, but this strategy is limited at best and extraordinarily difficult for companies that manufacture products. Manufacturers must contend with emissions stemming from extraction and manufacture of raw goods. Companies have even less control over direct-use emissions by the end-user which brings us back to the consumer.⁸

Scope 3 emissions are the foundation of the compelling argument on the large and critical role consumers play in achieving the net-zero economy. However, these now decades old messages, laced with moral imperatives, are not working. The following case studies, or scenarios, provide plausible reasons as to why.

The Scenarios

The **Recycling Scenario** considers the ease at which consumers in the United States can recycle materials relative to how successful these efforts are at keeping materials especially plastics out of landfills here and abroad.

People in the United States are happy to recycle, hauling out their overflowing, ubiquitous blue bins to the curb on the designated day of the week, confident that the contents will be recycled and that they are doing the right thing. A tangible sign that the mythology that plastic is being recycled into something new persists. As of 2021, only about 5% of US plastic waste was recycled while the rest wound up in a landfill, the bulk to be exported with other municipal waste to developing countries where the most likely outcome for plastic is either open dumping or incineration.⁹

How did we get here?

The United States is one of the world's largest consumers of plastics, a habit that has grown consistently since the 1980s. By 2019 on a per capita basis, the US created five times as much plastic waste as their global counterparts. Given the mythology plastic can be recycled, it is easy to see why US consumers keep buying plastic. We only need to look

⁷ (Greenhouse Gas Protocol, 2022)

⁸ (Deloitte, 2023)

⁹ (Statista, 2023)

at the bottom of container to find the familiar recycling symbol. Created in the 1970s by Gary Anderson, a senior at Southern California University, who submitted his logo to a competition sponsored by the Container Corporation of America. An uncomplicated design of three arrows chasing each other round and round in a closed loop. The first arrow represents materials collected, the second represents the manufacture of new products from those materials, and the third the purchase of those products by the consumer.¹⁰ This works well for things that can be readily recycled like paper and glass, but for plastics and other consumer goods like textiles or clothing, reduce and reuse are the only options. Sheer volume shows the impracticality of reuse and returning to our peanut butter example, reducing plastic consumption is difficult at best especially for anyone on a budget.

There is sufficient and readily accessible literature that explains why plastic recycling is not a scalable solution. It comes down to plastic itself. There are all kinds of different plastics. Plastics with different additives and colorants that cannot be recycled together, and separating plastics is prohibitively expensive. Plastics may also contain or absorb toxic chemicals. All of which means that mechanical recycling—the grinding and melting down of plastic—is limited and investment in plastic recycling innovation is needed.¹¹

From a sustainability perspective, until plastic recycling is practicable, plastic production needs to be drastically curtailed, but this is not going to happen any time soon. Per Statista, *“The plastics market is projected to grow in the coming years to reach a value of more than 810 billion U.S. dollars by 2030, registering a CAGR of 3.7 percent during the forecast period of 2022 to 2030.”*¹²

Encouraging consumers to take companies to task on reducing plastic use and efforts to pass legislation to inhibit manufacture of certain plastics might make us feel better but are no more likely to succeed in solving the problem with plastic now than they were before. Plastic products are all too frequently the only economically feasible or available option and that is why people keep buying them. The recycling message keeps us wheeling brightly colored bins full of rubbish to the street, but so far, it is not getting us to net-zero and nothing indicates it ever will.

The **biomass scenario** examines alternatives to fossil fuel starting with aviation as an example. While aviation’s contribution to greenhouse gas emissions is minor compared to other travel and transportation, it is an industry that is growing at a fast pace, and it is difficult to decarbonize. If it is going to meet 2050 net-zero goals, aviation needs to find lower-emissions fuels and increase aircraft efficiency. This may not be enough, which means there is also a need for demand constraint solutions. Bringing the focus even tighter, sustainable aviation fuel (SAF) is coming to the fore; however, based on planned production only a fraction of jet fuel demand in 2027 will be met by sustainable fuel. What is more, according to the US Department of Energy, SAF must be blended with Jet A fuel prior to use in aircraft.¹³ Just like biofuels blended with gasoline for automobiles, SAF causes less pollution, but is still dependent on the fossil fuel industry. Despite the dependence, SAF investment is expected to be worthwhile. The U.S. Department of Energy, the U.S. Department of Transportation, and the U.S. Department of Agriculture are invested in research, development, and analysis of SAF. The widespread adoption of SAF seems likely. If it goes the way of blended biofuels for cars and trucks, the average customer does not have any control over what is in their 747 if they are thinking about it all.

¹⁰ (The Origin of the Recycling Symbol, 2023)

¹¹ (Enck, 2022)

¹² (Statista, 2023)

¹³ (IEA, 2023)

Sustainable fuel is not just about moving people and things around the planet. There are also economical and moral quandaries associated with sustainable long-term use of land for fuel and food. Finding a balance is another “must” because “feeding a growing and increasingly affluent population is clashing with efforts to conserve habitat and natural resources.”¹⁴

Recently, there was a natural experiment around what it would take to reduce greenhouse gas emissions at scale—the COVID-19 pandemic. Diminished leisure and business travel led to well publicized reductions in pollution. Post-pandemic, this simply is not how people live their lives. Previously remote workers have been required to return to the office three days a week or more. The devastated travel and leisure industry is putting out all the stops to encourage people to visit family or take that special vacation. Not to mention celebrities like Taylor Swift taking to the skies in her own private jet to meet the fans who missed live music during lock down. Not “hating on” Taylor here, the point is, it took a global pandemic to reduce greenhouse gas emissions at a scale sufficient to meet net-zero goals. No clever consumer campaign, no narrative, no carpool incentive, has ever come close to what is needed.

The **ESG investment scenario** ostensibly asks whether climate change risk should inform investment decisions and it does. No bait and switch here, but if we move this case study out into the real world, it brings us full circle, ultimately testing our collective ability to provide a trustworthy narrative about climate change, sustainability and other ESG topics as a counter to other messages like the Anti-ESG political rhetoric heard throughout the United States. An executive from the investment giant Morningstar succinctly explains this rhetoric, “Anti-ESG [is] a proxy for opposition to the spread of ‘liberal values’ in civil society.”¹⁵

Pragmatically, investment in sustainability from novel research work to companies bringing innovative technological solutions to the market is the only path to saving the planet because consumers can only choose sustainable options if they are available. When it comes to ESG investment “our part” should lean toward understanding and taking action about where the money goes. However, in recent years, many Republican leaders have turned sustainability into a “liberal agenda” and actively campaigned against ESG. Those who were elected are leading efforts to eliminate consideration of ESG in investment decisions on Capitol Hill and in state houses across the country.

Calling for a specific narrative against a political agenda may feel like a slippery slope, but as film maker Michael Moore is quoted as saying “*Librarians see themselves as the guardians of the First Amendment. You got a thousand Mother Joneses at the barricades!*” Moore is a little more colorful than your average librarian might be, but he is correct that providing information necessary to addressing actions by the government is an ethical obligation and part of the field’s overall advocacy and commitment to intellectual freedom or “the rights of library users to read, seek information, and speak freely as guaranteed by the First Amendment. Intellectual freedom is a core value of the library profession, and a basic right in our democratic society.”¹⁶

Coming from this perspective, we should provide trustworthy information. Gaining an understanding what ESG investment is, what its critics say and what anti-ESG investment laws could mean to the future is the dilemma this scenario presents.

First an incredibly brief history lesson from Harvard Business Review, “*The idea of screening investments on environmental and social issues goes back decades. But in recent years, a critical mass of investors clearly decided that global mega-challenges like climate*

¹⁴ (Sustainable Intensification of Agriculture, 2023)

¹⁵ (Winston, 2023)

¹⁶ (Support for Intellectual Freedom, 2023)

change create economic and business risk that they should understand and include in decision-making.”¹⁷

The ESG agenda has taken its fair share of criticism with commentators reminding everyone at large that the purpose of business is to make as much money as possible while still conforming to basic social norms. Concerns about how companies and their investors could tie ESG to the bottom line is also warranted given how difficult it is to accurately measure, let alone mitigate greenhouse gas emissions as discussed elsewhere in this paper. Another critique involves companies using ESG for marketing and public relations to enhance their reputations or to satisfy customer preferences. Unsurprisingly, this gives rise to accusations of greenwashing, which is a false impression of what or how well a company is doing around its sustainability efforts.

Despite the criticism, ESG is a driving force. According to McKinsey & Company, 90% of companies on the S&P 500 are providing some type of ESG reporting as of December 2022. McKinsey’s consideration does not stop here. Their analysts go on to explain that *“true ESG is consistent with a judicious, well-considered strategy that advances a company’s purpose and business model.”* Moreover, while it may be correct that businesses are in the business of making money, strategy has evolved into companies looking toward long-term value for shareholders. With this comes the need to *“manage and address, massive, paradigm-shifting externalities”* including climate change.¹⁸

As mentioned previously, there is an insistent group of political leaders in the United States who are adamant that investors and the companies in which they invest should not be permitted to consider ESG when it comes to making decisions. By the 2023 legislative cycle, ESG investment was highly politicized to put it mildly with Republicans making good on promises to move forward an anti-ESG agenda. This has played out in 37 states with 165 pieces of proposed legislation including 9 resolutions. The overarching goal, to restrict ESG-related risk considerations in decision-making, often using pension fund and government contract regulation as the means to an end.

Pleiades Strategy is tracking these 165 bills, as of June 2023:

- 83 bills are dead, across 23 states:
 - In 17 states where legislation was introduced, no laws passed. 10 of these states are controlled by Republicans.
- 3 bills were vetoed by the governor in Arizona.
- 42 bills that did not pass will carry over into the 2024 legislative session.
- 22 bills and 6 resolutions were approved by state governments:
 - 19 laws and 6 resolutions have passed in 14 states this year.
 - 3 enrolled bills await governor action in 3 states.
- 12 active bills are pending. 6 have not had committee hearings.

According to Pleiades, there are real world costs to this legislation including higher costs to municipalities and lower pension returns coupled with increased administrative costs. As to government contracts, there was a surge of proposed legislation that if enacted would block states and local governments from contracting with financial institutions that limit engagement with certain industries by categorizing this refusal as a “boycott” or “discrimination.” These industries include fossil fuels, mining, agribusiness, timber, and firearms with all but the last inextricably linked to climate change.¹⁹

¹⁷ (Winston, 2023)

¹⁸ (Perez, 2022)

¹⁹ (Pleiades Strategy, 2023)

The New Narrative

Consumers have been asked to do their part for decades. Ordinary people have been told in many different ways, they can save the planet by recycling, by driving less, by voting for the right people. Yet here we are. The planet is getting too hot. It does not take a meteorologist to recognize extreme weather events are having devastating effects on our lives. Though there is plenty of optimism, we are not moving towards net zero fast enough and the case studies here make it clear, calling for individual action is not adding up as promised.

Fight me on this, as popular memes argue, and I will, armed with nothing more than a plastic straw. Well, more like 127 school buses filled with them every day. The anti-straw movement began more than a decade ago. Started by a nine-year-old, the idea caught fire and it became virtuous to say no thank you to the individually wrapped straw that accompanied your soda. The message was clear, straws do not recycle, they wind up in the ocean, and you do not really need one to drink your soda. To be fair, EU countries and a few others have banned plastic straws and other single use plastic items. Kudos on an amazing grassroots campaign, but yet here we are.

In November 2022, confronted with the reality that the world is not on track to meet net-zero goals by 2050, the International Monetary Fund suggested three priorities, *“steadfast policies to reach net zero by 2050, strong measures to adapt to the global warming that’s already locked in, and staunch financial support to help vulnerable countries pay for these efforts.”* They go on to say that these priorities *“will require a mix of incentives to push firms and households to prioritize clean goods and technologies across all their decisions.”* While the IMF mentions households, these priorities and recommended actions do not mention individual actions or call for everyone to do their part:

- An international carbon price floor agreement
- Private investment in low carbon technologies
- Public investment in green infrastructure
- Broader investment in resiliency—infrastructure, social safety nets, early warning systems, and climate-smart agriculture and the like
- Climate financing—including unlocking capital from pension funds, insurance companies and other long-term investors that collectively manage over \$100 trillion of assets.²⁰

The need for a new consumer narrative, one that focuses on adapting to current climate realities and encourages investment in innovative, scalable solutions, is evident.

²⁰ (Georgieva, 2023)

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Information, Public Decision-Making, and Climate Change: The Many Roles of Grey Literature

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Abstract

The far-reaching effects of climate change are among the leading global concerns today. The impacts of changing climate manifest in rising global temperatures (on land and in the ocean), escalating destructive extreme weather events, increasing biodiversity loss, shifting biomes, growing food insecurity, greater health risks (physical and mental), and involuntary migration of people, among other interconnected factors. The complexity of these problems individually and collectively is receiving extensive consideration in research and public arenas. Concerns about the influences of climate change have been increasing since the 1950s and through the last half of the twentieth century scientific understanding reached a consensus of the causes and numerous negative outcomes. The impacts have become clear in the first decades of the twenty-first century. Researchers in many disciplines are cautioning that the world is rapidly reaching a tipping point in the overall health of the planet, after which recovery will be very difficult. In addition, decision makers are grappling with how to evaluate multiple and sometimes competing calls for action and to decide how to address the issues best.

In both research and decision-making settings, grey literature has been a prominent information genre about the multifaceted aspects of climate. Large quantities of grey literature on climate and climate change subjects have been produced. Academic institutions, governmental and intergovernmental bodies, non-governmental organizations, professional associations, think tanks, and news media have turned out grey literature ranging from brochures to hefty technical reports. These materials have been generated in print and digital formats to fulfil a suite of roles: 1) to report research findings, 2) to compile and synthesize literature on research and professional practice, 3) to inform policymakers and the public, 4) to advocate for policy development, 5) to implement policy, 6) to promote change in professional and individual practice, 7) to educate; 8) to broker information and promote networking, and 9) to counter misinformation. In this paper we draw on research about decision making in public policy and management practice about coastal and marine environments to illustrate how grey literature on climate subjects has been deployed in delivering on these roles. Grey literature is widely used in many decision-making contexts. Recognizing its numerous roles can inform citizens, managers, planners, and policy- and decision-makers in addressing the climate challenges facing society today.

The far-reaching effects of climate change are among the leading global concerns today. In 2023, for example, devastating storms, droughts, floods, and record heatwaves and wildfires occurred in many locations around the world (European Environment Agency, 2023; Osaka, 2023; Owens, 2023; Ripple et al., 2023; Voosen, 2024; World Meteorological Organization, 2024; You, 2024). The costs of the destruction stemming from these weather extremes, which are becoming more frequent, are massive (Bowman & Sharples, 2023; Ness, 2023; Newman & Noy, 2023). In 2022, for instance, 18 separate disastrous events in the United States caused damages totalling US \$165 billion (Rott, 2023; Smith, A. B., 2023). The World Meteorological Organization estimated that economic losses due

to “extreme weather, climate and water-related events” between 1970 and 2021 totalled US \$4.3 trillion globally (World Meteorological Organization, 2023). Coupled with over two million human deaths in this period, due to these extreme events, and escalating major distresses on wider biodiversity (Díaz & Malhi, 2022; Isbell, et al., 2023), the implications of climate change for human and environmental health of the planet are without any question serious (Pörtner & Roberts, 2022),

Abundance of Information on Climate Change

Literature in all research areas, particularly scientific domains, has increased markedly over the past century. In 2018, the STM: International Association of Scientific, Technical, and Medical Publishers reported that more than three million scientific papers were being published each year rising at a rate of 4% annually (Johnson et al., 2018). Over the next two years that rate increased to between 5% and 6.5% (STM global brief 2021, 2022). UNESCO reported in 2021 that between 2015 and 2019 scientific publications increased by 21% (Schneergans et al., 2021; see also Castillo et al., 2023). Notably, these publication statistics do not include grey literature.

The quantity of information on climate and climate change subjects (both primary peer-reviewed journal articles and grey literature) has also rapidly spiralled upward since the early decades of the twentieth century following the discovery that rising global temperatures were primarily caused by carbon dioxide emissions (Dessler, 2022; UKRI, n.d.). It is difficult to estimate the total number of publications related to climate subjects. One quite rough measure of the extent is determined by a simple Google search of the term “climate change,” which returns results exceeding 1.2 billion (e.g., a Google search returned 1,260,000,000 hits on 12 January 2024). Many different aspects of climate change are found in this substantial output and it is likely that grey literature constitutes a sizeable portion (possibly the largest).

Grey literature has been defined as “that which is produced on all levels of government, academics, business and industry in print and electronic formats, but which is not controlled by commercial publishers, i.e., where publishing is not the primary activity of the producing body” (Schöpfel & Farace, 2010, p. 2029). While this definition is widely accepted, in practice other organizations, in addition to the types explicitly listed in the definition, produce grey literature. For example, large numbers of non-governmental organizations, many of which focus on environmental issues, annually turn out grey literature publications by the score.

Decision-Making Processes

To gain an appreciation of this vast body of grey literature, understanding the contexts in which the information is produced and used is essential. In an earlier iteration of this series of conferences on grey literature, we described the importance of grey literature in public policy development processes (MacDonald et al., 2015). Most policy decision-making processes are notoriously complex, as Sir Peter Gluckman, then Chief Science Advisor to the New Zealand Prime Minister, illustrated in a policy cycle diagram that he presented at a conference of the International Network for Government Science Advice in Brussels in 2016 (reproduced and expanded in Gluckman, 2018). That diagram vividly highlights the “messiness” of public policy development processes (Castán Broto, 2020; Lewis et al., 2023). The public arena of policy decision making at all levels of government is populated with many different actors and actions where information of many types and formats supports decision-making processes (SAPEA, 2019). It is important to recognize that this environment is where much of the climate-related grey literature functions.

Evidence (information) can be and is introduced at many different entry points in decision processes, e.g., in public hearings and consultations, in legislative committees, etc., by distinctly separate actors, e.g., researchers, policy analysts, journalists, citizens, etc.

(MacDonald et al., 2016). The context surrounding each access point often dictates the type and format of information that is used. For the evidence to be effective it must be relevant and be presented in a usable form at each location (Cairney & Kwiatkowski, 2017; Mitchell et al., 2006; Sarkki et al., 2014). Once introduced, the format of the information may evolve as it moves along the various pathways in the decision processes. For example, information may enter as a briefing note prepared by a researcher, which is presented to a policy analyst or a resource management committee, then transmitted through a variety of pathways in the hierarchical structures of government and concludes the course of its travel as a reference in a policy document. Most information transmission routes, however, are less straightforward and are drawn-out and convoluted with potentially numerous hurdles or blockage points. Typically, grey literature figures in every one of the pathways (Bogenschneider & Corbett, 2021; Cairney, 2016).

Types of Climate Change Grey Literature

As is well known by grey literature researchers, the types of grey literature are varied and extensive (see Table 1). This diversity is largely related to how and where information is used in decision-making processes, as noted above. Some types are widely used in organizational settings, e.g., briefing notes, often specifically designed and formatted to meet the contextual requirements. While some types are very common at both operational and political branches of governmental bodies, they may not be publicly accessible by default. Grey literature used within government ministerial cabinets in Westminster styles of government, for example, is considered confidential unless explicitly made publicly accessible (Campagnolo, 2018). In other organizational contexts, e.g., private think tanks or companies, grey literature used in decision processes can also be labelled confidential and not made available publicly.

Table 1. Types of Grey Literature about Climate Change

- Blog Posts
- Briefing (Policy) Notes
- Conference & Workshop Papers
- Databases and Data Sets
- Fact Sheets
- Government Publications (many types)
- Industry / Consultant Reports (many types)
- Infographics
- Literary and Artistic Works
- Maps
- Media Releases
- Meeting Records
- Newsletters
- News Media Reports (several types)
- NGO Publications (many types)
- Patents
- Photographs and Graphic Images
- Reports (many types)
- Social Media Posts
- Standards
- Theses / Dissertations
- Think Tank Publications (many types)
- Video & Audio Posts
- Websites – *and more ...*

The types listed in Table 1 also illustrate a range of producers of grey literature: individual authors, governmental and non-governmental organizations, intergovernmental bodies, news organizations, private companies, etc. The diversity of types and producers points to numerous roles that this literature fulfills.

Roles of Grey Literature in Climate Change Decision Processes

In this section we describe a suite of roles that grey literature performs in decision processes (see Table 2). As Petzold et al. (2023) point out, grey literature can be the main type of information facilitating consideration of options to address the implications of climate change:

Many on-the-ground responses to climate-related hazards may not be included in peer-reviewed literature but documented in other forms of literature (that is, grey literature), for example, reports by the private sector or civil society actors. (p. 1528)

Table 2. Roles of Grey Literature in Climate Change Decision Processes
To Report Research Results
To Synthesize Information (e.g., Research and Professional Literature)
To Inform Policy Makers and the Public
To Advocate for Policy Change
To Implement Policy
To Promote Change in Professional and Individual Practice
To Educate
To Broker Information and Promote Networking
To Counter Misinformation

To illustrate each role, we present examples of grey literature published by a variety of different organizations: governments at different levels, NGOs, and policy institutes.

To Report Research Results



Figure 1. Examples of Research Reports

From a research perspective, initial reports of results may be published as grey literature (Figure 1). Technical reports, for example, have been produced by governments and other organizations in very large numbers and in various formats for many decades. This type of grey literature has received extensive attention by grey literature experts, librarians, and authors alike (e.g., Bielskas et al., 2022). Technical reports are often the first documentation of research results and usually contain more details than is included in journal articles arising from the research. Sometimes, the resources required to produce technical reports can be substantial.

To Synthesize Information (e.g., Research and Professional Literature)

Figure 2. Examples of Syntheses

As noted above, research and professional literature about climate change is extensive and growing rapidly. This large volume of literature is scattered among many publications, which has prompted the production of syntheses that vary in scope and comprehensiveness (Callaghan et al., 2020; Smith, L. C. 2023) (Figure 2). Governments and intergovernmental agencies produce syntheses, and probably the best known are the major periodic reports of the Intergovernmental Panel on Climate Change. Xuemei Bai recently emphasized that IPCC “reports primarily synthesize existing literature, and as such, ...[are] largely influenced by the existing body of knowledge” (Bai, 2023). As these syntheses are very large, global, and comprehensive, the IPCC also produces Summaries for Policy Makers to facilitate mobilization of research into policy.

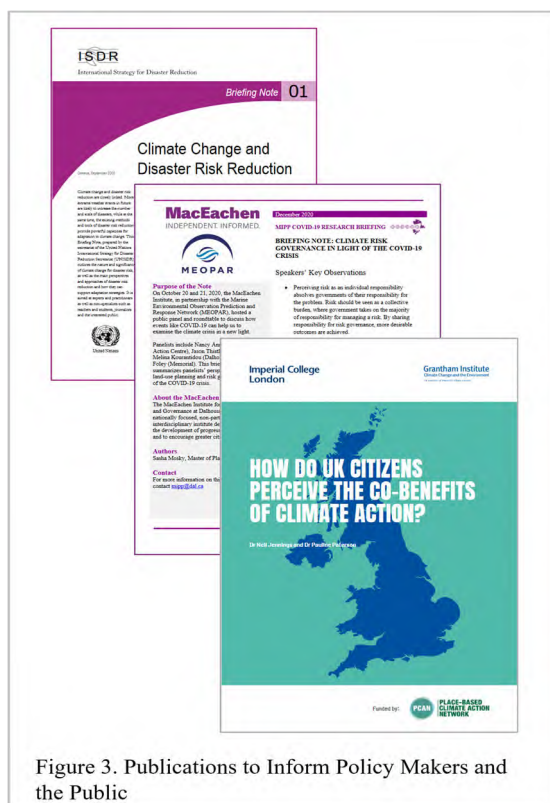
To Inform Policymakers and the Public

Figure 3. Publications to Inform Policy Makers and the Public

The prominence of grey literature is evident in the significant role of informing both policymakers and the public (Figure 3). Briefing notes are widely deployed to serve in this capacity. Such publications are frequently used to convey information to politicians and decision makers in many, if not most, governmental organizations. While briefing notes are common, due to confidentiality and the typically short life span of the documents, they may not be readily accessible. Briefing notes are used both within and outside governments primarily because the format (short documents, often two pages) fits the important role of informing. In addition, readability in an accessible manner is a key characteristic of these publications.

To Advocate for Policy Change



Figure 4. Publications to Advocate for Policy Change

Grey literature fills a fourth role by serving as tools for advocacy (Figure 4). Non-governmental organizations, such as WWF [Worldwide Fund for Nature], Nature Conservancy, and many others, pursue advocacy agendas as a matter of their mandates. They carry out their objectives by directing information specifically to governments and/or to wider publics. Frequently, these organizations maximize use of digital resources in this work. Grey literature in the form of multifunctional websites and active social media platforms, for example, are commonly used.

To Implement Policy

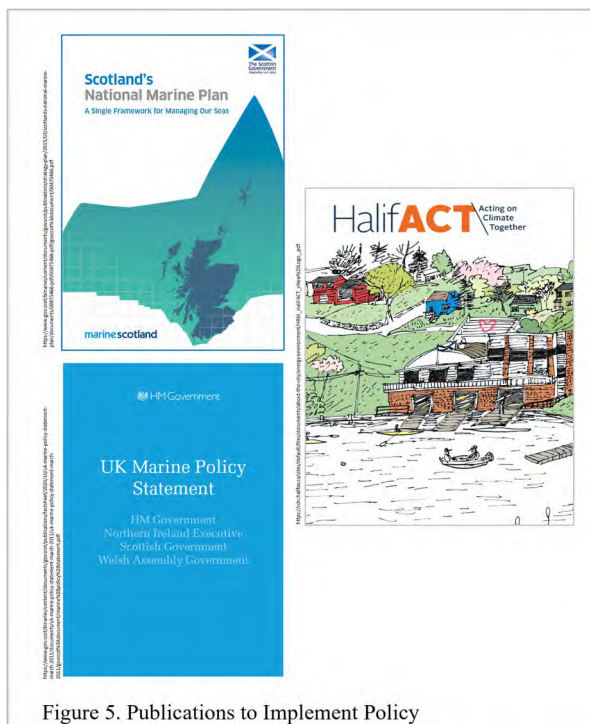


Figure 5. Publications to Implement Policy

Once policies have been approved, implementation follows and grey literature fills yet another role, namely, to support the implementation of policies in diverse sectors (Figure 5). Planning documents are a prime example of this role. Plans are designed for local to international levels. The policy itself is set out in an approved plan and further grey literature is used to specify the steps and actions to implement the plan. The examples of planning documents included in Figure 5 range from an urban municipal climate action plan for the city of Halifax, Nova Scotia to a country level marine spatial plan for Scotland.

To Promote Change in Professional and Individual Practice

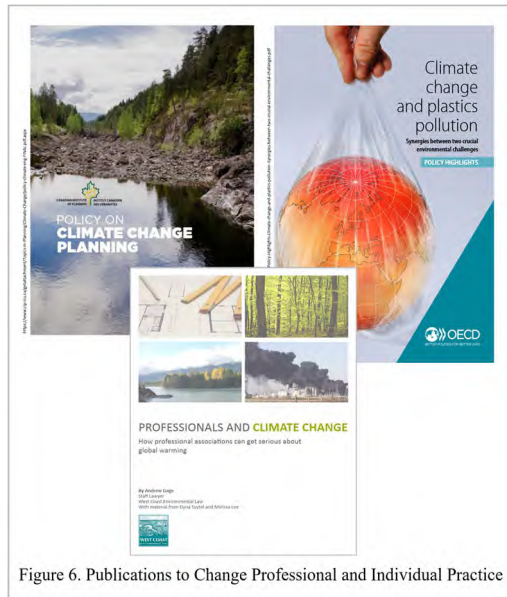


Figure 6. Publications to Change Professional and Individual Practice

Grey literature also serves to promote change in professional and individual practice (Figure 6). To mitigate and combat the increasing risks caused by climate change, academic institutions and professional organizations are examining their practices and implementing changes in their operations to achieve positive outcomes.

Many governmental and non-governmental organizations disseminate grey literature to deliver prominent messages, often with engaging graphic images, about the urgency of the issues and to encourage changes in individual habits and practices.

To Educate



Figure 7. Publications for Education

Complementing initiatives to promote change in professional and individual practices, non-governmental organizations have been set up explicitly to fill educational roles (Figure 7). Invariably, these organizations develop and distribute educational materials in the form of grey literature. A full toolkit of educational strategies may be used in designing such grey literature in order to be effective at different educational levels from grade school to adults. To promote awareness of and raise understanding about climate change and efforts to build resilience, governments also use grey literature for educational purposes.

To Broker Information and Promote Networking



Figure 8. Publications to Broker Information and Promote Networking

The next role for grey literature may not be as obvious as the preceding examples. Some organizations, either intentionally or unintentionally, take on the responsibility of information brokers among groups, e.g., between stakeholders and governments (Willems & Giezen, 2022; Willems et al., 2023) (Figure 8). They may also serve as information brokers between levels of governments when particular departments or agencies are not on “speaking terms” with their counterparts in other levels of government. Grey literature generated by brokering organizations can serve as boundary objects between levels of government since the organizations and the grey literature are viewed as “neutral” and not directly tainted by negative characterizations of government units (Cadman et al., 2020).

In addition, non-governmental organizations may be trusted and carry greater credibility than governmental bodies in the eyes of some stakeholders. In such situations, the NGOs can use grey literature in their brokering and networking role.

To Counter Misinformation

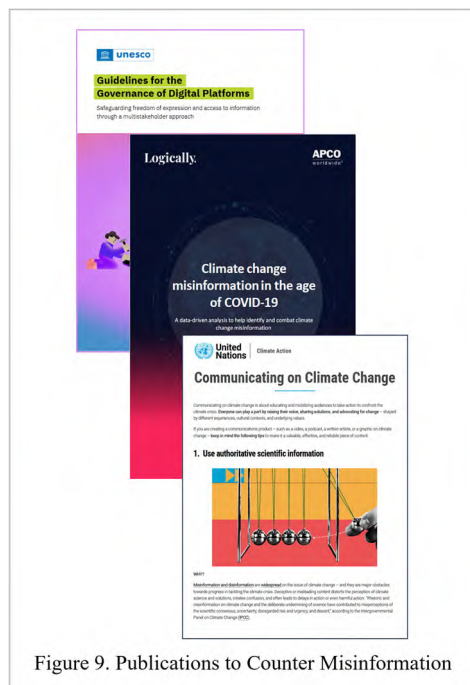


Figure 9. Publications to Counter Misinformation

The ninth role we have identified in our assessment of climate change grey literature has become increasingly important over the past decade as digital communication technologies have evolved and become widely used. Misinformation is a growing concern in dealing with the implications of climate change and more and more initiatives are being implemented to mitigate the effects of this problem (Henley, 2023) (Figure 9).

Many governmental, intergovernmental, and non-governmental organizations have focused greater attention on this issue and are producing reports and other types of grey literature designed to understand and counter the effects of misinformation.

Conclusion

Our survey of grey literature related to climate change has identified a suite of significant roles that this literature fulfills globally in all levels of society. This wide range is available to inform and support policy- and decision-making processes. Due to the complexity and messiness of these processes and almost countless contexts, grey literature is produced for different purposes, in different formats, and for different audiences. Many actors, both individuals and organizations, are involved in producing and using grey literature on climate and climate change topics. In a recent paper about developing resilience to climate disasters, the relevance of grey literature was described as “where perspectives of community based organizations and marginalized citizens are more likely to appear on their experiences of local governance participation” (McNaught, 2024, p. 13; see also Piggott-McKellar, 2019). Similarly, Brubacher et al. (2024) state that the “community voices” included in grey literature can extend understanding about health and well-being in the midst of climate change and biodiversity loss (p. 7).

The roles that grey literature fulfil are typically connected to specific stages or actions in the many interconnected information pathways in policy- and decision-making processes that we outlined above. These roles play out at many levels of decision making. Thalheimer et al. contend, for example, that grey literature is important because it “contextualises adverse impacts of climate change” on various industry and societal sectors (2021, p. 8). Moreover, as Galappaththi et al. point out, giving attention to grey literature is “essential...because much of the evidence on climate change adaptation is documented there” (2022, p. 6).

Due to its different roles, grey literature products can consist of a diversity of components and may fulfil different roles simultaneously. For example, a multipart website can serve to inform, to advocate, and to educate. This flexibility ensures that grey literature can reach various audiences with different education levels and understanding more easily and likely more effectively than peer-reviewed research literature. Although the latter may be accessible, it is read and understood in much narrower circles (see, for example, Sampson et al., 2024).

Finally, due to its ubiquity and accessibility, many people (probably all people) encounter grey literature in their daily lives. Consequently, given its roles in informing and educating, this genre may have far greater societal influence than other types of information. People of all levels of society need accurate and accessible information to make decisions necessary to avert climate disaster. Thus, recognizing the numerous roles that grey literature fulfills can inform citizens, managers, planners, and policy- and decision-makers in addressing the climate challenges facing society today.

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- Systematic collection of metadata and digital documents
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- Cooperation with foreign repositories

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Conference on Grey Literature and
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A Review of French PhD Theses on Sustainable Development

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Abstract

The purpose of our study is to assess the French PhD theses on sustainable development, with two objectives: to give a scientometric overview on the French PhD landscape in the field of sustainable development; and to show how PhD theses (as a major part of grey literature) and related tools can be helpful for the scientometric study of science. The review is based on data from the French national portal theses.fr. The results of our study provide a detailed review of the French PhD research on sustainable development, including the main French research universities in the field of sustainable development and the most eminent academic scholars, the disciplinary distribution of the research on sustainable development, and the accessibility of the PhD theses on sustainable development (open science).

Keywords Sustainable development, PhD theses, grey literature, scientometrics, open science, France

Introduction

For more than 30 years, sustainable development has become a major challenge for mankind. Sustainable development refers to a concept that emphasizes meeting the needs of the present without compromising the ability of future generations to meet their own needs. It involves balancing economic, social, and environmental considerations to ensure that development occurs in a way that is equitable, responsible, and respectful of the planet's natural resources and ecosystems. The concept of sustainable development gained significant attention after the publication of the Brundtland Report in 1987 by the World Commission on Environment and Development (WCED). The report defined sustainable development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (Brundtland, 1987).

Sustainable development is often pursued through policies, practices, and strategies that promote renewable energy, responsible consumption and production, biodiversity conservation, social inclusivity, poverty alleviation, and climate action. The United Nations' 2030 Agenda for Sustainable Development, with its 17 Sustainable Development Goals (SDGs), provides a comprehensive framework to guide global efforts toward achieving sustainable development in various areas. Key principles of sustainable development include economic prosperity, social equity, environmental protection, inter-generational equity, participation, and collaboration, in a long-term perspective.

In particular, the UN 2030 Agenda calls for enhanced scientific research capacity to achieve the targets of the SDGs. Scientific research and development are required to produce solutions for problems like climate change and global warming, air and water pollution, land degradation, loss of biodiversity or limited resources. Grey literature is part of the solution, insofar it is a vector of fast and rich communication of research results through communications, working papers, reports, posters, theses and so on (Schöpfel & Farace, 2018). Moreover, grey literature is also a reliable and relevant way to learn more about the topics, institutions, and actors in the field of research on sustainable development.

For this last purpose, PhD theses are of particular interest because they offer a representative perspective on the current academic research at universities worldwide¹

¹ See the thesis resources of the Networked Digital Library of Theses and Dissertations <https://ndltd.org/thesis-resources/find-etds/>

and because many theses are freely available in open repositories². PhD theses are generally the result of 3-4 years of research and the first valuable document in the career of a researcher; at the same time, they are administrative documents necessary to obtain the doctoral degree. Sometimes, they are considered as the result of teamwork; in any case, they contain information about supervisors and institutions delivering the diploma (Stock & Paillassard, 2010).

Up to day, there are several hundreds of systematic reviews on sustainable development and related topics. They generally focus on journal articles and neglect (if not exclude) what they call “unpublished and not peer reviewed literature”, i.e., grey literature (Schöpfel & Prost, 2021). By way of illustration, here are some recent highly cited reviews, retrieved with the Web of Science Core collection. From eight reviews published between 2019 and 2023, only one includes grey literature, such as PhD and Master theses, reports and conference presentations (Mensah, 2019). The other reviews exclusively analyze journal articles and (less often) academic books (Findler et al., 2029; Hallinger & Chatpinyakoo, 2019; Corona et al., 2019; Di Vaio et al., 2020; Rasoolimanesh et al., 2020; Ranjbari et al., 2021; Ruggerio, 2021). Another systematic bias is the focus on English, excluding other languages like Chinese, Spanish, German or French.

What we want to show is that, especially in the field of sustainable development, a complementary review of grey literature can produce reliable and valid results. The following study will provide a scientometric analysis of French PhD theses on sustainable development, based on a public dataset from the French Bibliographic Agency for Higher Education³. The objective is twofold: to give a scientometric overview on the doctoral research in France in the field of sustainable development; and to show how PhD theses, as a major part of grey literature, can be useful for the scientometric study of science.

Methodology

The review is based on data from the French national portal theses.fr⁴. This portal gives access to 446,579 PhD theses defended in French universities since 1971, together with 78,109 theses under preparation (accessed August 23, 2023). For our study, we downloaded the dataset “Thèses soutenues en France depuis 1985” which contains the metadata of French doctoral theses defended since 1985 and which is available on the French public open data platform data.gouv.fr⁵. The dataset has been produced by the French Bibliographic Agency of Higher Education (ABES)⁶ and was last updated on January 20, 2023. It is published under an Open Licence (Licence Ouverte) version 2.0.

The ABES data file was downloaded in csv format on August 16, 2023. It contains metadata of 431,997 theses. The metadata includes information about the author, the jury (supervisor, other members), the institution (university, graduate school), the content (title, abstract, discipline, subject), the year and the accessibility (embargo, open access).

The csv dataset was processed with the business intelligence and data analytics software Omniscope (Visokio). We built up the sample in two stages:

1. The search for “sustainable development” or “développement durable” in all metadata, including title, abstract, subject indexing, and graduate school produced 2,326 theses.
2. Additional search for entry terms and related concepts of the preferred term “sustainable development” of the UNESCO thesaurus⁷ produced 1,141 other theses (see Appendix).

² See the statistics of the global Directory of Open Access Repositories OpenDOAR <https://v2.sherpa.ac.uk/opensoar/>

³ ABES <https://abes.fr/>

⁴ Theses.fr <https://theses.fr/fr/>

⁵ *Thèses soutenues en France depuis 1985* <https://www.data.gouv.fr/fr/datasets/theses-soutenues-en-france-depuis-1985/>

⁶ Agence bibliographique de l'enseignement supérieur (ABES) <https://abes.fr/>

⁷ UNESCO Thesaurus <https://vocabularies.unesco.org/browser/thesaurus/en/>

The final sample consists of 3,467 theses which represent 0.8% of the total number of theses in the ABES file.

Results

Evolution

We identified 3,467 French doctoral theses defended since 1985 on sustainable development and/or related concepts. The annual number steadily increased from 8 in 1985 to a ceiling of 180 to 200 theses from 2011 on (figure 1).

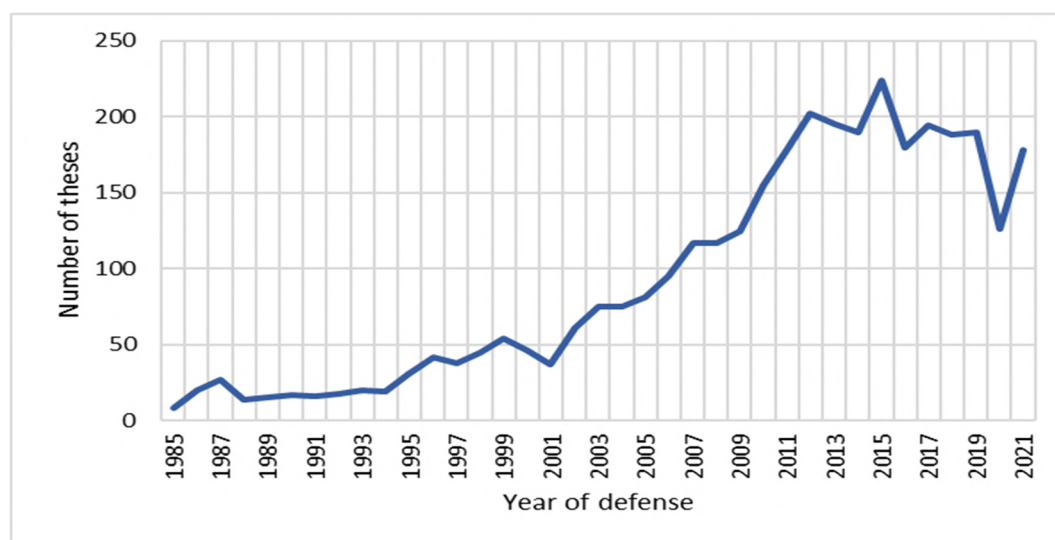


Figure 1. Evolution of defended theses on sustainable development (1985-2021)

The decline in 2020 is attributable to the COVID-19 pandemic; the figures for 2022 (53 theses) and 2023 (1 thesis) are not complete and have been excluded.

Until 2001, the theses on sustainable development represented 0.1 to 0.5% of all defended theses. This percentage increased steadily over the years, reflecting a growing interest for this topic. The actual percentage is 1.4 to 1.6%.

85% are written in French, 13% in English, 2% in other languages.

Institutions

The doctoral theses in the field of sustainable development have been defended in 166 universities and other Higher Education Institutions (HEIs). Their distribution is similar to a long tail; while 20% of the institutions represent 52% of all theses, 80% of theses have been defended in 42% institutions (figure 2).

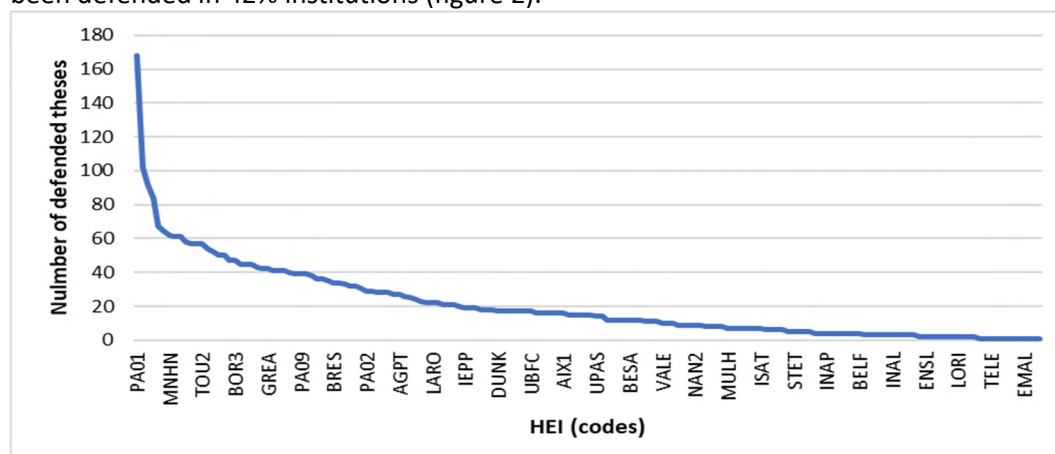


Figure 2. Number of theses per HEI (N=166 institutions)

In other words, we can identify some important universities with doctoral research in the field of sustainable development, i.e., a couple of universities with more defended theses than others (table 1). These ten institutions together represent 819 theses on sustainable development (23.6%). However, we cannot speak of a kind of excellence cluster of some highly significant institutions because doctoral research related to sustainable development has been conducted in roughly 80% of all French HEIs.

Universities	Number of theses	In %
Paris 1	168	4,8
Compiègne	102	2,9
Nice	92	2,7
Paris 10	84	2,4
Aix-Marseille	67	1,9
Montpellier	64	1,8
Muséum d'Histoire Naturelle	62	1,8
Strasbourg	61	1,8
Reims	61	1,8
Lyon	58	1,7

Table 1. The ten most important institutions (N=166 institutions)

Six institutions of table 1 are members (or part of members) of the Udice union of ten leading French universities working for excellence in research, performance in higher education and the development of attractive innovation ecosystems⁸. Paris 10 (Nanterre) is a large university with a focus on social sciences and humanities, with more than 1,500 PhD students; while the University of Montpellier puts forward environmental issues and social responsibility, hosts the technical support unit coordinating an assessment supported by the United Nations' Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), and defines its scientific attractiveness through its recent Montpellier Advanced Knowledge Institute on Transitions (MAK'IT) aiming to stimulate the contribution of scientific communities to the analysis, support and acceleration of the transitions necessary to achieve the Sustainable Development Goals (SDGs) in the fields of agriculture and food, environment and health. The University of Technology of Compiègne is ranked among the leading French engineering schools and pursues forms of technological research that answer societal questions generated by environmental issues; and the University of Reims Champagne-Ardenne is a multidisciplinary training and research university positioned and recognised nationally and internationally in the bioeconomy field, with an excellence cluster focused on agriscience, the environment, biotechnology, and the bioeconomy.

The institutional long tail distribution is confirmed by the analysis of the graduate schools (*écoles doctorales*)⁹. The dataset contains information about graduate schools for 2,066 theses (60%). The PhD students have been registered with 280 graduate schools. Their

⁸ Udice <https://www.udice.org/?lang=en>

⁹ See the national registry of graduate schools <https://doctorat.campusfrance.org/phd/dschools>

distribution is like a long tail, as 20% of the graduate schools (56) represent 57% of the defended theses (1,174) (figure 3).

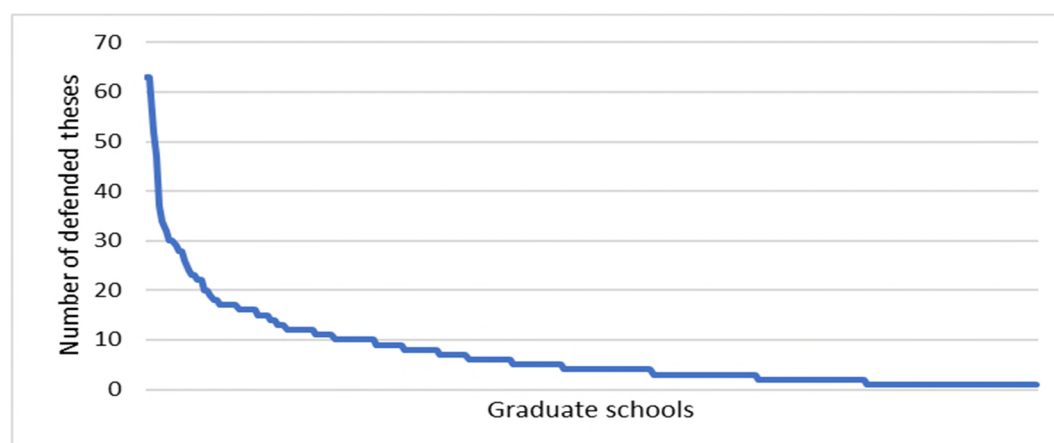


Figure 3. Number of theses per graduate school (N=280 graduate schools, with 2,066 theses)

Table 2 shows the ten most important graduate schools, in terms of number of defended theses. Each of these graduate schools represents between 30 and 60 theses related to sustainable development, in agricultural and environmental sciences, civil engineering, social sciences and humanities, and chemistry.

Graduate school	Domain	Town	Number of theses	In %
Sciences de la nature et de l'Homme - Évolution et écologie	Agricultural and environmental sciences	Paris	63	3,0%
Sciences pour l'ingénieur	Civil engineering	Compiègne	63	3,0%
Sciences pour l'Ingénieur	Civil engineering	Troyes	52	2,5%
Sciences de l'homme et de la société	Social sciences and humanities	Reims	47	2,3%
GAIA	Agricultural and environmental sciences	Montpellier	37	1,8%
Sciences de la matière, du rayonnement et de l'environnement	Chemistry	Villeneuve d'Ascq (Lille)	34	1,6%
Chimie	Chemistry	Lyon	32	1,5%
Géographie	Humanities	Paris	30	1,5%
Temps, Espaces, Sociétés, Cultures	Humanities	Toulouse	30	1,5%
Sciences sociales	Social sciences	Lyon	29	1,4%

Table 2. The ten most important graduate schools (N=280 graduate schools)

But again, this is just the top of the chart; actually, the official registry contains 287 graduate schools, which means that nearly all graduate schools are involved in the organization and follow-up of doctoral research in the field of (and/or related to) sustainable development.

People and partners

The dataset allows the identification of 6,819 members of a thesis jury. This membership means that they can be considered to a certain extent scientific experts in sustainable development and/or related topics. However, this involvement appears for most of them occasional, not very important, as 88% has been members of only one or two juries. Their distribution follows more a Pareto than a long tail curve, as 20% of the expert members (1,367) have been involved in the juries of 70% theses.

Only 36 experts have been involved in 10-20 theses, most often as thesis supervisor, representing together 446 theses (7%).

Additionally, we identified 2,457 academic supervisors of theses in the field of sustainable development or related topics. Here, the distribution is clearly a long tail distribution: 20% of the supervisors (491) have directed 41% theses (1,422), while 80% theses (2,764) have been directed by 72% supervisors (1,766) (figure 4).

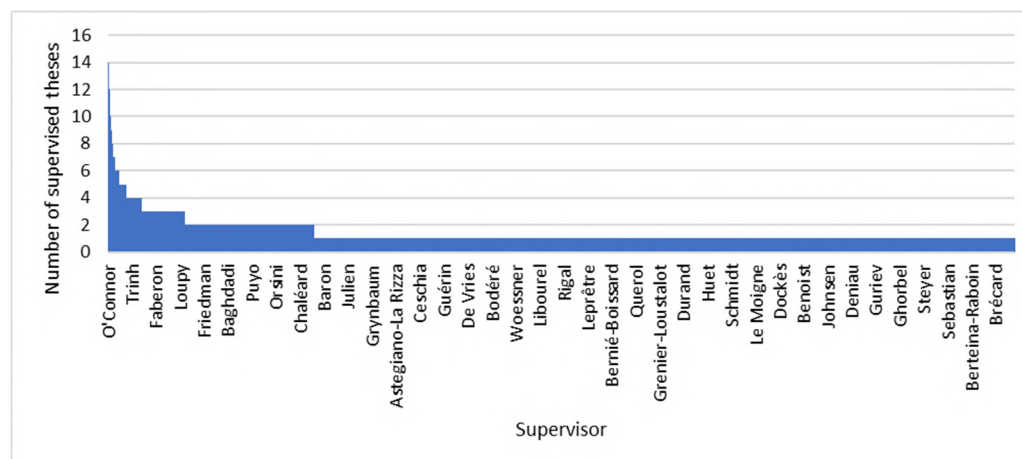


Figure 4. Number of theses per supervisor (N=2,457 supervisors)

Figure 4 also shows the name of some supervisors, selected at random. More interesting, table 3 contains the names of the ten most important supervisors.

First name	Last name	Institution	Discipline	# of supervised theses
Martin	O'Connor	University of Paris Saclay	Economics, sustainable development	15
Alain	Piquemal	University of Nizza	International law	14
Eugène	Vorobiev	University of Compiègne	Process Engineering	12
Sylvie	Faucheux	Conservatoire national des arts et métiers (CNAM)	Economics, environment	12

Christophe	Len	University of Compiègne, Chimie ParisTech	Chemistry	11
Michel	Prieur	University of Limoges	International law, environment	11
Raphaël	Romi	University of Nantes	Public law, environment	10
Nathalie	Machon	Muséum National d'Histoire Naturelle	Biodiversity	9
Christian	Brodhag	Ecole des Mines Saint Etienne	Civil engineering, corporate social responsibility, sustainable development	9
René	Passet	University of Sorbonne	Economics, development	9

Table 3. The ten most important supervisors

Table 3 likewise gives an idea of the diversity of the doctoral research but also, of the supervisors' status and expertise. Some examples.

- Martin O'Connor is professor of economics at the University of Paris-Saclay. With research degrees in natural sciences, humanities and economics, and former director of the REEDS laboratory (Research in Ecological economics, Eco-innovation and Tool Development for Sustainability), he works at the interface society-nature, ecological economics, political economy, and social epistemology.
- Alain Piquemal is state councilor and permanent representative of the Principality of Monaco to the United Nations Environment Program (UNEP). He is emeritus professor of international law at the University of Nice Sophia Antipolis (France), former vice-president of this university, in charge of environment and sustainable development and former dean of the faculty of international and european law (IDPD).
- Sylvie Faucheux is a French academic specializing in environmental economics and sustainable development. She is the founder of the Fondaterra partnership foundation (European Institute for Sustainable Development) and chaired the European Association for Ecological Economics, before becoming a board member of the International Society for Ecological Economics. She was a member of the European Consultative Forum on the Environment and Sustainable Development for the European Presidency, and she took charge of the working group on climate change.
- Michel Prieur is a French associate professor specializing in environmental law and honorary dean of the faculty of law at the University of Limoges. He is active in a number of international organizations, including the International Union for Conservation of Nature (IUCN), where he was vice-chairman of the environmental law commission. He is president of the International Centre of Comparative Environmental Law (CIDCE), an international NGO accredited to the Rio (1992), Johannesburg (2002) and Rio+20 (2012) Conferences. He represents France on the European Council of Environmental Law.
- Christian Brodhag is a French politician, environmentalist and academic, professor emeritus at the École nationale supérieure des mines de Saint-Étienne. He has been national spokesman for the Greens, chairman of the French Sustainable Development Commission and interministerial delegate for sustainable

development, and he is chairman of the French AFNOR Commission on Sustainable and Intelligent Cities and Territories.

- René Passet is a French economist and development specialist. Professor emeritus at the Sorbonne, he was the first chairman of ATTAC's scientific council. He is considered one of the leading specialists in the new complex or transdisciplinary approaches.

Despite the diversity of their research fields, they share two common points: a personal and outstanding concern for the future of society and environment in the long term, and a civic, public and/or political commitment to sustainable development. We cannot speak of a cluster of excellence, of course; there is no clearly identified group of scientists working together in the same field; but the analysis of the defended theses reveals a “pool of expertise” capable of meeting the challenges of our time, through research, academic work, and education of future scientists.

The dataset contains also information about scientific partnerships for 1,921 theses (55%), including 588 (17%) with several partners. Most partners are public research laboratories, research institutes and specialized HEI; less than 20 theses have been prepared with an industrial partner.

Disciplines

Nearly all theses' disciplines have been indexed with the Dewey Decimal Classification system (ddc), with three whole numbers making up the main classes and subclasses. The complete dataset (all theses) contains 98 different ddc codes while the sustainable development sample has been indexed with 70 ddc codes (71%).

All domains are covered; however, the most important scientific domains covered by our sample are social sciences (ddc:300), pure science, i.e., natural sciences and mathematics (ddc:500), technology (applied sciences) (ddc:600), and history and geography (ddc:900). Together, these four domains represent 90% of all theses related to sustainable development (figure 5).

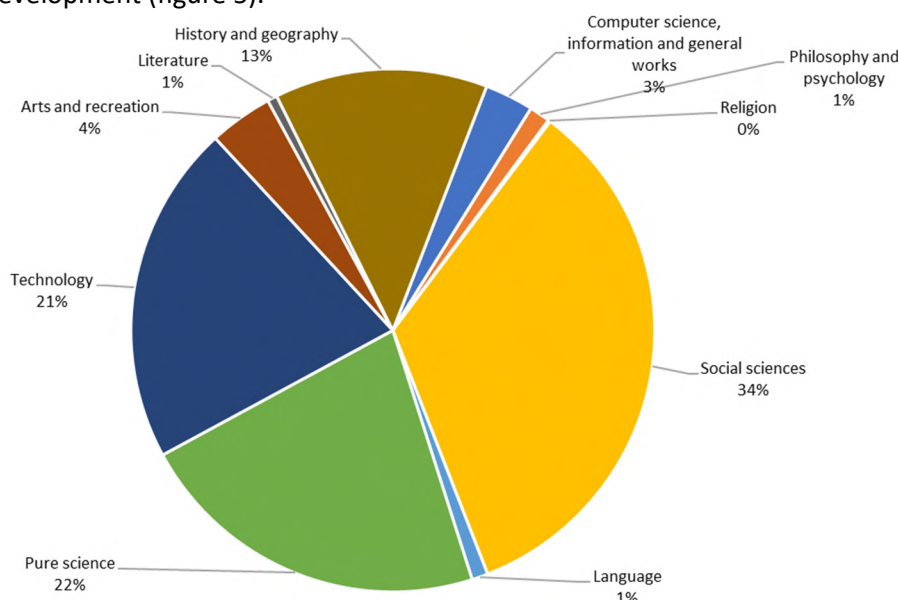


Figure 5. Scientific domains (ddc classes) (N=3810 theses)

A look on the ddc subclasses provides more detailed results of the academic disciplines (table 4). The most important disciplines are economics (15% of the sample), geography (10%), law (10%), chemistry (9%), engineering (8%), biology (7%) and management (7%). Together, the theses defended in these disciplines represent two-third of all theses in the field of sustainable development.

ddc class	Domain	ddc subclass	Discipline	# of theses
300	Social sciences	330	Economics	554
		340	Law	370
		300	Social sciences, sociology, anthropology	140
500	Pure science	540	Chemistry, mineralogy, crystallography	338
		570	Life sciences, biology, biochemistry	282
600	Technology	620	Engineering	319
		650	Management and office management	261
700	Arts and recreation	710	Urban planning	113
900	History and geography	910	Geography and travel	376
		900	Geography and history	91

Table 4. Scientific disciplines (ddc subclasses) (N=3,810 theses)

When compared to all defended theses, theses on (or related to) sustainable development represent a relatively more important part in some disciplines. While our sample represents 0.8% of the total number of theses in the ABES file (see above), this percentage is significantly higher in the following five disciplines:

- Urban planning (8.8%)
- Geography (6.6%)
- Social problems and services (5.4%)
- Buildings (4.9%)
- Economics (4.4%)

Figure 6 shows the evolution of the number of defended theses for each of the ten most important disciplines (ddc subclasses, see table 4).

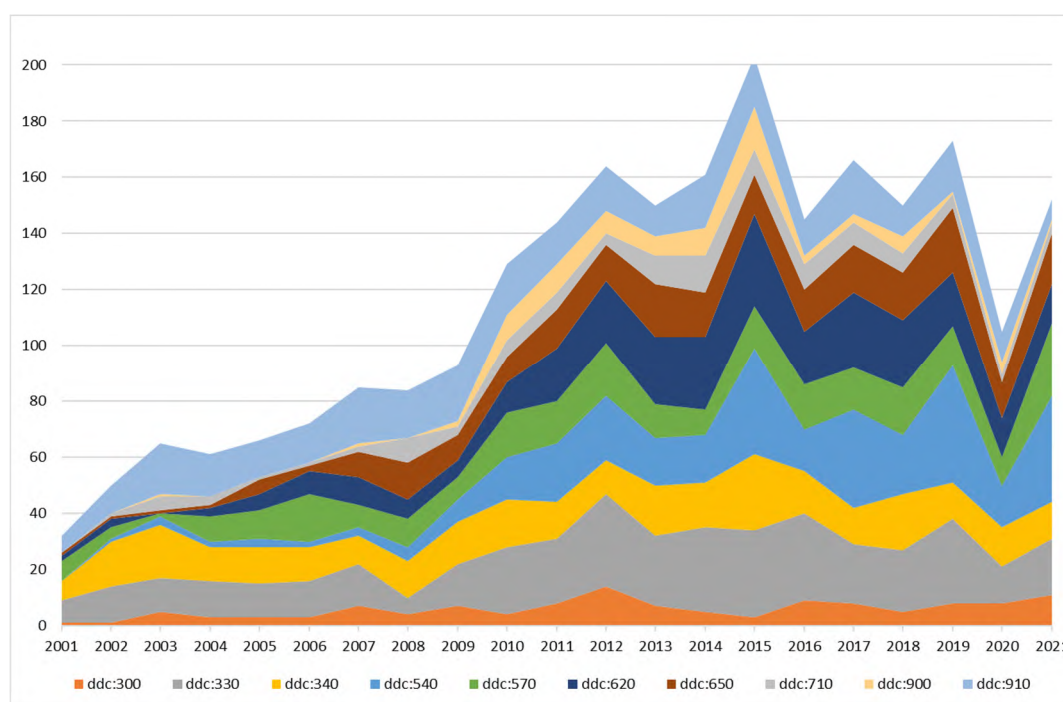


Figure 6. Evolution of the number of defended theses per discipline (ddc subclasses) (2001-2021)

- The importance of natural sciences, in particular chemistry and biology, is increasing over the years. Less but still on a significant level, the number of theses in management and social sciences is also increasing.
- On the other side, the importance of economics and law and (less) geography is decreasing, with less defended theses than expected.
- Third, we can't observe a significant increase or decrease of theses in the field of urban planning and engineering.

Beyond disciplines, other metadata enable a more detailed analysis of the themes studied, e.g., title, abstract, and key words. One part of the key words is based on RAMEAU, a French subject indexing language, a derivative of the Library of Congress Subject Headings LCSH), and which is used in France by the Bibliothèque nationale de France, university libraries, numerous public reading and research libraries, and several private organizations¹⁰.

Except for 143 (4%), all theses of our sample have been indexed with one or more RAMEAU subject headings. The complete list is made up of 2,536 headings. Most of them (93%) describe only one or two theses, and only 2% (= 49 headings) are used for the indexing of 10 or more theses. In other words, this list of headings reflects a large diversity of subjects studied, rather than a homogeneous corpus of research. Figure 7 illustrates the 100 most important subject headings.



Figure 7. The 100 most important RAMEAU subject headings (N=3,324 theses)

The research subjects are extremely wide-ranging, covering economic and legal topics as well as management, politics, engineering, technology and even ethics. We didn't match each thesis against the United Nations' 2030 Agenda for Sustainable Development, but we were able to identify for each of its 17 SDGs (including, for instance, Gender equality, Sustainable cities and communities, Responsible consumption and production, and Life below water) one or more subject headings. In other words, the doctoral research of our sample covers the whole range of the international agenda for sustainable development.

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Table 5 shows the 15 most important subject headings, the French RAMEAU terminology along with an English translation.

Subject headings (fre)	Subject headings (eng)	# of theses
Développement durable	Sustainable development	288
Responsabilité sociétale	Social responsibility	54
Biodiversité -- Conservation des	Biodiversity -- Resource	36
Écologie chimique	Chemical ecology	36
Chimie verte	Green chemistry	33
Conservation des ressources	Conservation of resources (biology)	33
Biodiversité	Biodiversity	26
Gestion de l'environnement	Environmental management	26
Urbanisme durable	Sustainable urban planning	26
Aménagement du territoire	Regional planning	23
Éducation au développement	Education for sustainable	22
Environnement -- Droit	Environment -- Law	21
Changements climatiques	Climate change	20
Environnement -- Droit	Environment -- International law	20

Table 5. The 15 most important RAMEAU subject headings (N=3,324 theses)

This table illustrates some of the most important doctoral research subjects in France, in particular:

- Political action and management: social responsibility, environmental management, sustainable urban planning and regional planning, education for sustainable development;
- Life sciences: biodiversity, and conservation of resources;
- Chemistry: chemical ecology, and green chemistry;
- Law: environmental and, in particular, international environmental law.

Climate change is another, transversal subject of research.

Accessibility

Nearly half of the defended theses on sustainable development are accessible on the Internet. In figures: 1,644 theses can be accessed online (47%), 1,823 are not disseminated in open access but are available in the academic libraries in print format or on microfiche (53%). The percentage of theses in open access increased steadily, from 4% before 2000 to 71% for theses defended between 2020 and 2023 (figure 8).

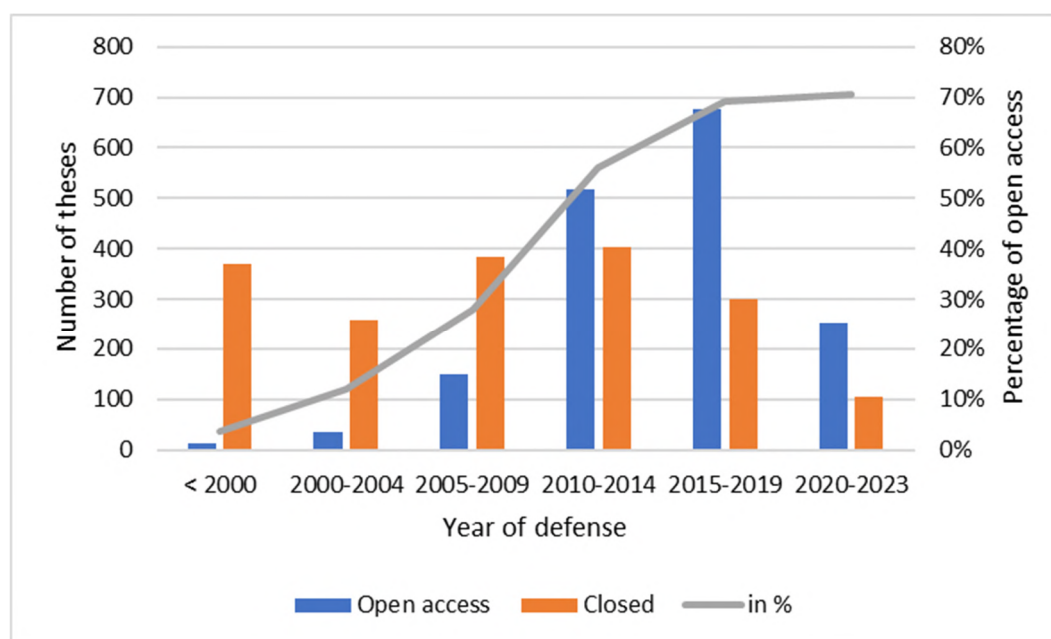


Figure 8. Accessibility of theses on sustainable development (1985-2023)

The open access part of theses in this field is higher than for all French theses over the whole period (31%) but similar for the last four years 2000-2023.

Two complementary observations: For 223 theses (6%), the document which is accessible in open access is not the same as the archived version. 188 theses (5%) have been released under embargo.

Discussion

Our results confirm that a scientometric analysis of grey literature can produce reliable and valid results in a given scientific field, especially regarding disciplines and subjects, institutions, experts, and accessibility. PhD theses are particularly interesting for such a review insofar they are the result of doctoral research projects at most if not all universities. Also, there are two other reasons for their specific interest: one part of the results will not be published elsewhere, in academic journals or books; and, depending on countries and institutions, one part of these results is (only) disseminated in languages other than English. That is to say, PhD theses can provide complementary scientometric information outside of usual systematic review methodology.

However, the scientometric potential of PhD theses and, more generally, of grey literature requires rich metadata, controlled terminology for disciplines and subjects, and standard identifiers for persons and organizations. It requires, too, metadata accessibility and reusability, and a certain degree of representativeness, if not exhaustiveness of the corpus.

From our study with a very rich and complete dataset, we can identify some limitations, on three levels:

- Metadata
 - We identified some errors (probably human errors in cataloging), for instance regarding the institutional identifiers (codes).
 - Some identifiers are missing or not standard, which makes it sometimes difficult to link the data with other information sources, to get complementary information about persons or institutions.
 - The indexing of disciplines and subjects is not based on international standards, or only partly (LCSH).
 - We also identified a language bias, as some metadata is provided in two or more languages, but may be more complete in French than in English, for instance.

- Methodology
 - We retrieved bibliographic records with the term “sustainable development” and other related concepts from the Unesco thesaurus. We hope that this approach has enabled us to identify as many relevant theses as possible but we cannot exclude that we missed some significant theses which do not use this terminology. Some retrieved theses may also be less relevant for the topic, especially those retrieved with related terms.
 - Another limitation of our study is that we did not analyze all relevant metadata. For instance, we did not analyze the thesis’ title, the abstract or the specific role of each member of the thesis jury. We were limited by time and resources, but it is obvious that content analysis of titles and abstracts would have produced a more detailed insight not only into subjects but also into applied methodologies and even into results.
- Context
 - A specific problem with doctoral research is the dynamic academic environment; universities are merging and changing names, graduate schools disappear or are launched, and so on. Static metadata does not reflect such changes which makes, for instance, a longitudinal assessment a little bit complicated.

A last observation: What about the future, what can be said about actual tendencies? The ABES dataset contains only defended theses, not doctoral research in preparation. Some information about theses in preparation can be found on the national Theses.fr portal¹¹, based on declarative metadata (title, abstract, subject, discipline...) produced by the PhD students themselves. As of September 12, 2023, the portal announces 544 theses in progress; 14 will be defended before March 2024. It is not certain whether all other projects will be finalized. However, based on available data, we can make two observations.

The most important universities with doctoral research in progress are Paris-Saclay (= the highest ranked French university appears in the world’s top 20 universities according to the Academic Ranking of World Universities 2022), Reims, Bordeaux (another Udice member, see above), Lorraine and Montpellier. Created in 2019 in direct competition with the MIT and other high-level international HEIs, Paris-Saclay is a newcomer, with 9,000 scientists and 4,800 PhD students, 230 research laboratories and 17 graduate schools. Its scientific output represents 13% of the French public research. So, it is more than likely (and not surprising) that this university will take the lead in doctoral research in the field of sustainable development in the coming years.

Similar to the past years, the most important scientific disciplines (ddc sub-classes) of these projects are Management and office management, Economics, Law, Geography and travel, and Social sciences, sociology, anthropology. However, all disciplines are covered as before, including information and communication sciences with research, e.g., on media and education for sustainable development (at Bordeaux), on the role and skills of local environmental associations in communication for sustainable regional development, or on the role and values in the communication processes of industrial companies faced with the risks of climate change and the challenges of sustainable development (both at Aix-Marseille).

Concluding remarks

The paper highlights the value of grey literature for the research on sustainable development, in addition to usual systematic review methodology. Our approach can be applied to other resources and document types, on condition of access to quality metadata.

¹¹ Theses.fr <https://theses.fr/en/accueil.jsp>

Further perspectives are on two levels:

A content analysis of the title and abstract metadata, a mapping of subjects against institutions and graduate schools, and a mapping of experts. In other words, data analytics as a kind of expert system (or research information management system) based on the ABES dataset.

An exploration of other datasets, such as conference presentations, preprints, reports, Master dissertations or working papers, to identify other data sources for similar complementary scientometric studies.

Data availability

The reused initial dataset is available at the following address: *Thèses soutenues en France depuis 1985* <https://www.data.gouv.fr/fr/datasets/theses-soutenues-en-france-depuis-1985/>

The dataset of our sample is available on the French research data platform *recherche.data.gouv* <https://doi.org/10.57745/M119IV>

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Appendix

Search terminology

The sampling strategy was based on the UNESCO Thesaurus, a “controlled and structured list of terms used in subject analysis and retrieval of documents and publications in the fields of education, culture, natural sciences, social and human sciences, communication and information”¹². We limited the search to the French UNESCO vocabulary, as all metadata of the ABES file contain French information about the content (title, abstract...).

Preferred term

Développement durable

Entry terms

Développement écologique

Développement soutenable

Développement viable

Durabilité de l'environnement

Durabilité écologique

Écodéveloppement

Viabilité écologique

Related concepts

Autosuffisance

Bien public mondial

Chimie verte

Conservation de l'environnement

Conservation des ressources

Économie bleue

Économie verte

Ecotourisme

Éducation pour le développement durable

Équilibre écologique

Évaluation de l'impact sur l'environnement

Gestion de l'environnement

Ressources non renouvelables

Source énergétique non renouvelable

¹² UNESCO Thesaurus <https://vocabularies.unesco.org/browser/thesaurus/en/>

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Grey literature on climate change studies at the International Nuclear Information System

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Abstract

Established in 1970 by the International Atomic Energy Agency (IAEA), the International Nuclear Information System (INIS) has since served as a major subject repository in all areas related to nuclear science and technology. Despite its name, INIS has also made significant efforts in harvesting, categorizing, and publishing records on subjects of broader interests like energy in general or climate change studies. As a result, more than 4.5 million bibliographic records are now stored and made publicly online by INIS with topics ranging from like general studies of nuclear reactors, instrumentation related to nuclear science and technology, to energy planning, policy, and economy, or environmental science. This paper will present an analysis on the grey literature on climate change-related subjects that have been harvested by INIS, as well as the interest of INIS users on these subjects. For example, 50% of records in the INIS repository mentioning climate change in their abstracts can be considered grey literature, or according to the categorizing system of INIS (the INIS Thesaurus), the repository has 1656 reports on “climate change”, 685 on “greenhouse effect”, and 24 on the Paris Agreement. On the other hand, INIS users have showed their increasing interest in climate change-related subjects via the more prominent appearance of search terms like “climate change” or “climate change and nuclear power”. The analysis results show that INIS has become a useful bibliography bridge for users to connect their interest in topics directly related to nuclear energy, and in studies on climate change. As INIS currently receives about 150,000 unique searches every month with users coming from all over the world, especially from developing countries with lesser access to credible studies on climate change or other energy-related topics, INIS can play an important role in bringing grey literature on climate change closer to the public, and thus support in raising better public awareness on this timely and important topic.

Introduction of INIS

In 1957, the International Atomic Energy Agency (IAEA) was established to “accelerate and enlarge the contribution of atomic energy to peace, health and prosperity throughout the world”¹. To carry out this objectives, seven functions of the IAEA have been outlined by its Statute, of which the third and fourth directly focus on the exchange of scientific and technical information on the peaceful use of nuclear energy. These functions of the IAEA are further emphasized in Article VIII of the Statute on exchange of information, namely the Agency “shall take positive steps to encourage the exchange among its members of information relating to the nature and peaceful uses of atomic energy and shall serve as an intermediary among its members for this purpose”. Accordingly, the creation of the International Nuclear Information System (INIS) under the auspice of the IAEA was authorized by its Board of Governors in February 1969, which had its first product – the monthly bulletin “INIS Atomindex” Vol. 1, No. 1 in May 1970.² After decades of exclusivity of usage among INIS Member States, the database of INIS was opened to public on a free, open, and web-based access via its Repository³ in April 2009 and it has been since become one of the largest custodians on the Internet of conventional and non-conventional literature published in the nuclear field.

¹ IAEA, The Statute of the IAEA, url: <https://www.iaea.org/about/statute>

² C. Todeschini, “The International Nuclear Information System (INIS): The First Forty Years 1970-2010”, International Atomic Energy Agency, October 2010.

³ INIS Repository, url: <https://inis.iaea.org/search/>

As of 2023, the INIS Repository hosts more than 4.5 million bibliographic records, about 2 million of which are full-text records with 600,000 full-text PDFs stored by the Repository itself. This significant reserve of nuclear-related literature has been expanded years with more than 100,000 new records thanks to the collaborative effort between INIS, its 132 Member States, and 17 organizations, which pool decentralized inputs from scientific publishers, national and international institutions, or relevant entities into one centralized storage that is the INIS Repository for further processing and public dissemination. The number of inputs to the INIS Repository is provided in Figure 1.

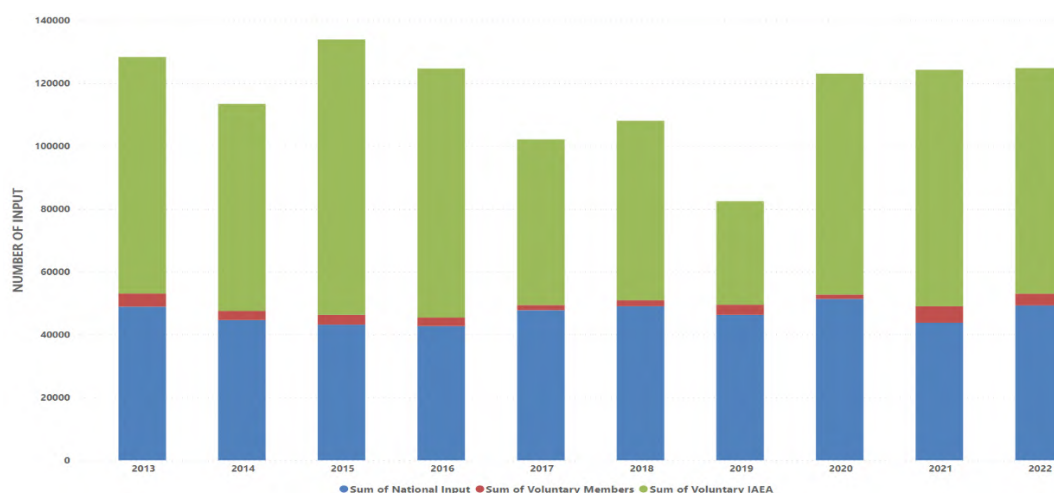


Figure 1. Number of inputs to the INIS Repository, 2013 – 2022.

Climate change, scientific publication, and grey literature

In recent decades, climate change has gradually become one of the most important issues with global impact that receives significant attention not only from the scientific community but also policy makers and the public, especially since the more and more negative effects of climate change could be observed in every country, especially ones with long coastlines and/or close to the Equator. For example, all the countries most affected by extreme weather events in the period between 2000 and 2019 as identified by the Global Climate Risk Index are ones with large maritime interfaces and mostly of developing economic status, namely Puerto Rico, Myanmar, Haiti, the Philippines, Mozambique, the Bahamas, Bangladesh, Pakistan, Thailand, and Vietnam.⁴

Recently, the link between scientific findings and policy making, especially with regards to emerging issues that require a high level of science and technology inputs like climate change, has been emphasized by policy makers, media outlets, and the public in general.⁵ Thus, one might assume that there would be a causal relation between a country's level of exposure to climate change and its interest in climate change studies and consequently its scientific output in climate change research, namely climate change-related peer-reviewed papers or books. However, this is not the case as most publishing countries on climate change have also been the traditional powerhouses in scientific publication like the United States, United Kingdom, China, Australia, Germany, Canada, France, the Netherlands, Spain, and India, all of which are not among the most vulnerable countries affected by extreme weather.⁶

To explain such a significant discrepancy between the need and interest in climate change research and actual scientific output in this field, one should recognize the pressing nature

⁴ D. Eckstein et al., *Global Climate Risk Index 2021*, Germanwatch e.V. 2021.

⁵ P. Callow, "Storylistening's role in policy advice", *Science* vol. 379, iss. 6638, p. 1198 (2023); N. Light et al., "Knowledge overconfidence is associated with anti-consensus views on controversial scientific issues", *Science Advances* vol. 8, iss. 29 (2022).

⁶ D. Klingelhöfer et al., "Climate change: Does international research fulfill global demands and necessities?", *Environmental Sciences Europe* vol. 32, 137 (2020).

of the climate change issue, which sometimes requires a more rapid and unconventional format of publication for timelier communication among the scientific community, policy makers, and the public via channels like social media or grey literature.⁷ According to the Grey Literature International Steering Committee, grey literature is “information produced on all levels of government, academics, business and industry in electronic and print formats not controlled by commercial publishing”.⁸ Thus, by investigating the production and usage of grey literature on climate change via records like government policies, dissertations and theses, conference proceedings, technical reports, or think tank materials, we could achieve a more accurate picture on the interest in climate change research from countries highly vulnerable to this global emergency.

Climate change grey literature in INIS Repository

Although INIS was established first and foremost as a channel for IAEA Member States to exchange scientific and technical information in the nuclear field, IAEA in general and INIS in particular have for a long time recognized the close linkage between such nuclear energy and climate change, as well the need for INIS to broaden its scope to climate-related subjects. For example, IAEA Director General Rafael Mariano Grossi in 2021 stated that “governments, industries and international organizations have important roles to play in supporting innovation and the early deployment of all clean energy technologies. This is particularly critical because almost half of the emissions reductions needed to reach net zero by 2050 will have to come from new low carbon technologies, including advanced nuclear reactors. Clearly nuclear must have a seat at the table anytime energy and climate policies are discussed”.⁹ Beyond its power application for electricity generation, other non-power applications of nuclear technologies have also been recognized for their important roles in sustainable development, from sustainable agriculture, water desalination, to fighting cancer and diseases, and biodiversity support.¹⁰

Thus, among the 49 one-level broad subject categories of the scope of INIS, many have direct or indirect links to climate change, including the most assigned subject areas and citation rate of peer-reviewed papers identified by the Web of Science platform, including environmental sciences and ecology, biodiversity and conservation, meteorology and atmospheric sciences, geology, physical geography, water resources, or agriculture¹¹. These relevant subject categories are presented in Figure 2.¹²

Besides subject categories, the link between a record in the INIS Repository and climate change can also be identified by the descriptors assigned to this record by INIS, namely the technical terms from the controlled terminology of the INIS Thesaurus that were used to represent the information content of the aforementioned record.¹³ As a result, more than 30,000 records in the INIS Repository are identified to be directly related to climate change, of which 45% are journal articles, 11% are books, 22% are reports, and the rest

⁷ A. Lawrence, “Influence seekers: The production of grey literature for policy and practice”, *Information Services & Use*, vol. 37, no. 4, pp. 389-403 (2017).

⁸ Grey Literature International Steering Committee (GLISC), “Guidelines for the production of scientific and technical reports: how to write and distribute grey literature” (Nancy style), Version 1.0, March 2006, url: <http://eprints.rclis.org/7469/2/index.html>.

⁹ IAEA, “Nuclear Energy for a Net Zero World”, International Atomic Energy Agency, September 2021, url: <https://www.iaea.org/sites/default/files/21/10/nuclear-energy-for-a-net-zero-world.pdf>.

¹⁰ UNECE, “Application of the United Nations Framework Classification for Resources and the United Nations Resource Management System: Use of Nuclear Fuel Resources for Sustainable Development - Entry Pathways”, United Nations Economic Commission for Europe (UNECE), March 2021, url: <https://unece.org/sustainable-energy/publications/nuclear-entry-pathways>.

¹¹ Klingelhöfer et al., idem.

¹² IAEA, “Subject Categories and Scope Descriptions”, INIS/ETDE Joint Reference Series No. 2 (Rev. 1), International Atomic Energy Agency, January 2021, url: <https://inis.iaea.org/search/subject-categories/>.

¹³ IAEA, “INIS/ETDE Manual for Subject Analysis”, INIS/ETDE Joint Reference Series No. IAEA-INIS/ETDE-03, International Atomic Energy Agency, August 2012, url: <https://www.iaea.org/sites/default/files/manual-subject-analysis.pdf>.

could be categorized as grey literature, including conference proceedings, thesis, numerical data, progress report, legislative material, preprint, software, multimedia, and audio-visual files. The addition of these records to the INIS Repository is presented in Figure 3.

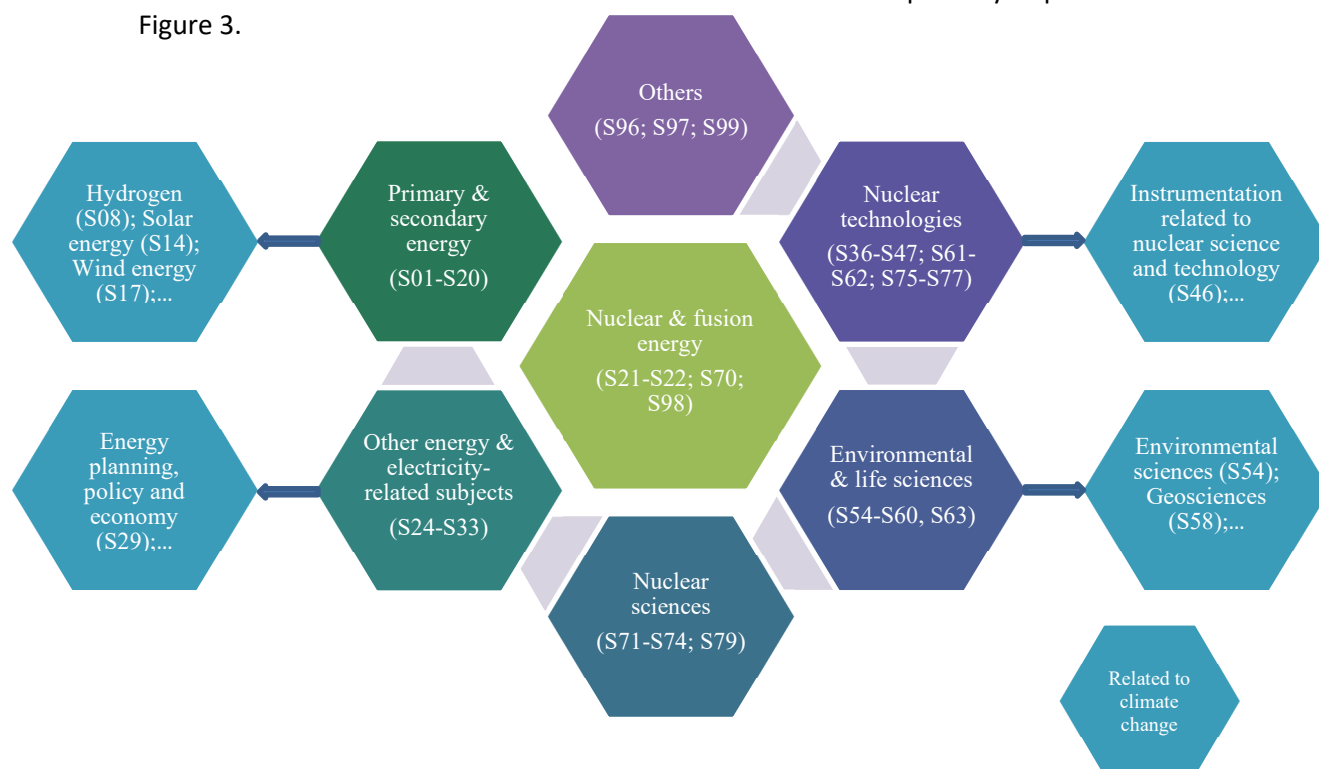


Figure 2. Subject categories within the INIS Scope and its relations to climate change-related subjects.

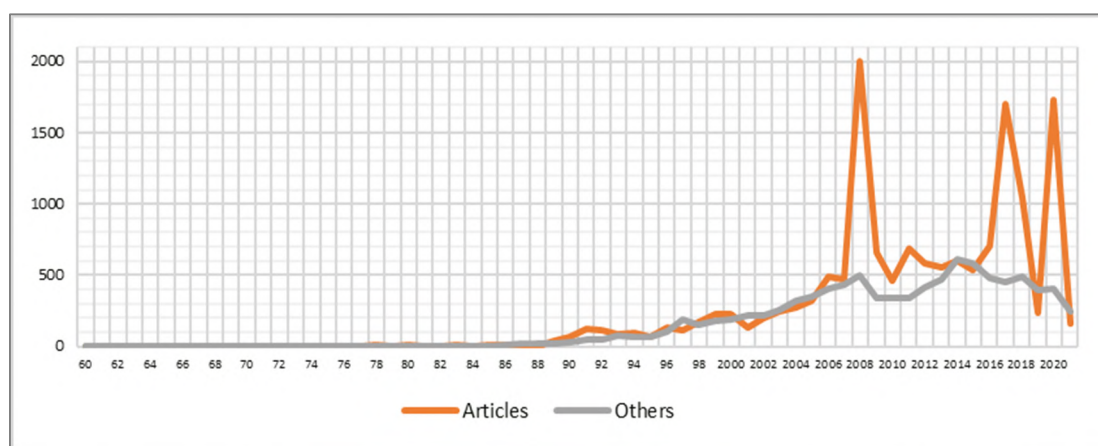


Figure 3. INIS Repository records directly related to climate change of the journal article “Articles” type, and of “Others” type, namely grey literature.

Since the main goals of grey literature are to provide evidence for policy making, to communicate with the public on policy and practice, and to translate scientific knowledge into more accessible information for the public,¹⁴ it is also necessary to examine the link between the climate change grey literature hosted by INIS and subjects of great interests by the public. On this aspect, research done by Haunschild et al. in 2019 used instances of climate change papers being mentioned on the Twitter (now X) platform to identify the recurrent terms and themes related to climate change that attract public attention, including keywords like “climate”, “climate change”, “adaptation”, “diversity”, “sustaina-

¹⁴ Lawrence, *idem*.

bility”.¹⁵ As presented in Figure 4, although records indexed with similar descriptors by INIS are still largely journal articles, grey literature also contributes to some extent, especially on major keywords/descriptors like “climate change”, “greenhouse gases”, “sustainability”, or “greenhouse effect”.

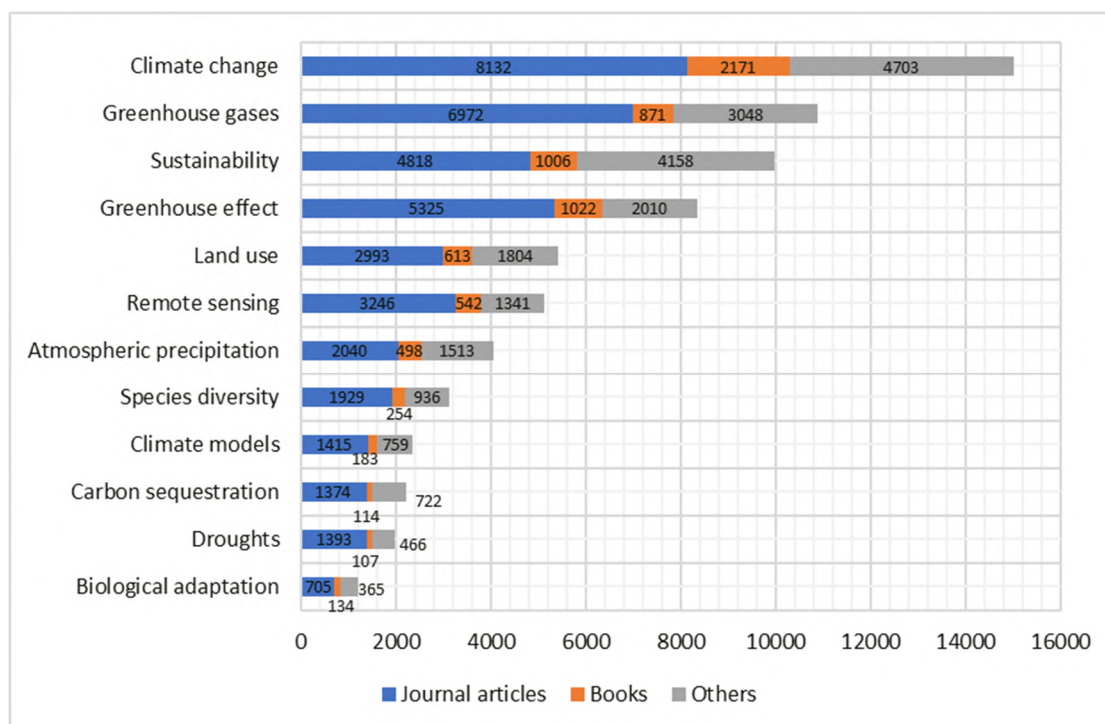


Figure 4. Climate change-related INIS Descriptors sorted by number of INIS Repository records.

Conclusions

The analysis in this paper showed that INIS has made significant effort to harvest climate change-related scientific knowledge to its Repository, including grey literature on this subject. Such effort has received positive response from public users, as two among INIS subject categories with most unique searches from 2020 to 2023 are directly related to climate change, namely Environmental Sciences (S54) and Energy Planning, Policy and Economy (S29). In addition, 25% among the top 50 INIS Repository records with most unique searches from 2020 to 2023 are climate change-related records, including not only journal articles but also grey literature pieces like conference papers or reports, on a variety of subjects like soil moisture, cow dung, waste management, burning spilled oil, or the comparison between nuclear energy and other types of clean energy.

Recently, the significant disadvantages for non-native English speakers to conduct and publish in environmental sciences were highlighted in a study done by Amano et al.¹⁶ This might be one of root causes for the interest-publication output discrepancy mentioned earlier in this paper. Therefore, despite its initial success in gaining public interest in climate change via grey literature, INIS should harvest more and in a timelier manner grey literature in languages other than English, and from lesser-exposed institutions and sources, particularly from countries heavily affected by climate change. Such approach will provide INIS with a chance to further communicate and highlight with the importance and urgency of climate change, of the linkage between nuclear energy and sustainable development, and of the role grey literature can play in scientific information exchange and climate change mitigation.

¹⁵ R. Haunschild et al., “Does the public discuss other topics on climate change than researchers? A comparison of explorative networks based on author keywords and hashtags”, *Journal of Informetrics*, vol. 13, iss. 2, pp. 695-707 (2019).

¹⁶ T. Amano et al., “The manifold costs of being a non-native English speaker in science”, *PLoS Biol*, vol. 21, iss. 7, e3002184.



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Charcoal Burning in Zambia: User Narratives for Successful and Equitable Information Services

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Abstract

The International Nuclear Information System (INIS) is a repository managed by the International Atomic Energy Agency that provides bibliographic information and full-text documents related to nuclear science and technology. This repository is an open platform that receives contributions of grey literature from its member states and is accessible to the public through the INIS Repository Search website.

Site administrators use Google Search Console to track the queries that led users to specific documents or bibliographic references within the repository. Administrators have observed that certain queries recur dozens to hundreds of times in a matter of a few days, then disappear. The queries use an identical phrase or slight variations and come from a single country. Examples include, “How is Carbon 13 used in medicine?”, or “What are methods for detecting heavy metals in water”, or “What is the environmental effect of charcoal burning in Zambia.”

Through the data gathered from these queries, it is possible to construct user narratives to determine if the repository is meeting the needs of its various audiences. A user narrative is an extended description of the user, their circumstances, and their wants, which is distinct from a user story – a more formal and short description of a user’s needs used in system design.

As an example, consider the query related to charcoal burning in Zambia. Based on the frequent queries related to this topic, it can be inferred that the user is likely a student researching a school assignment. Additionally, it is possible that the user is accessing the repository from a mobile device or school computer and is seeking authoritative and user-friendly information that answers their specific question. By accessing the repository as the described user, we can understand their experience and identify areas where the repository could be improved.

In a repository, success can be defined as meeting the user’s needs and providing information in a user-friendly manner. By conducting this exercise for underrepresented or non-represented groups and addressing the problems identified, the repository can increase its success, equity, and opportunity. Overall, constructing user narratives based on actual queries can provide valuable insights into how to improve information services and make them more equitable and accessible.

Keywords: Repositories; Grey Literature Resources; System Design; User Narratives

Background

The International Nuclear Information System (INIS) has existed since 1970. It provides grey literature and bibliographic records to the public through the INIS Collection Search website. Approximately 435,000 PDFs are available to the public, and in 2023 there were over 15 million downloads through this open platform. In all, 4.7 million knowledge products (both full text and bibliographic-only) are available. The content is either provided to INIS by member states or is harvested from online publishers.

For bibliographic records, approximately 84% of sessions are the result of a Google search, including on Google Scholar. A user has searched for a topic by typing in a keyword or series of keywords. A record in INIS has appeared as a result, and the user has clicked on the result, sending them to an HTML page or PDF in INIS.

Google Search Console provides website administrators with reports on queries that led to a particular page on the subject website. Using this, administrators can monitor trends,

and derive cumulative statistics on site usage. Another commonly used tool is Google Analytics. However, direct PDF downloads are not easily tracked, so the Search Console is used.

In Search Console, administrators noticed that there were sometimes identical long textual queries, all happening within a day or two, and all from the same country. Table 1 lists some of the queries, the countries where users accessed the site, and the page linked by Google. The Table also lists, only for general interest, the contributing country of each item.

Query	User Country	Linked Page	Contributing Country
What is the history of nuclear power in Asia	India	Nuclear Power in Asia: Experience and Plans	Rep. of Korea
How can we provide dry season feeding of ruminants in Africa	Nigeria	Some Tools to Combat Dry Season Nutritional Stress in Ruminants Under African Conditions	United Kingdom
How is Carbon 13 used in medicine	United Kingdom	C 13 Application in Medical Diagnostics	Uzbekistan
What are methods for detecting heavy metals in water	Nigeria, India	A Laboratory Manual for The Determination of Metals in Water and Wastewater By Atomic Absorption Spectrophotometry	South Africa
How long does it take to build a nuclear power plant	United States	Construction time of PWRs	Brazil
What is the environmental effect of charcoal burning on the environment in Zambia	Zambia	Environmental Impact Assessment of The Charcoal Production and Utilization System in Central Zambia	Sweden

Table 1: Selected Queries and Resulting Pages

Taking one or all the examples, we can construct “user narratives” to see what the user experience is like in interacting with the system. More importantly, we can determine if the system is meeting the needs of the user, or if the system needs to be improved.

User Narratives

User narratives are a way to visualize or imagine the experience of a user going through their usage of a product or website. Developers and administrators have natural biases and their own preferred ways of using information technology products. The result is that a product most closely matches and meets the needs of the developer, and not necessarily other audiences of users. User narratives are a way to break out of the developers own experiences through an empathetic journey of a disparate group’s usage of the product.

As Kelly Payne (2016) writes, “A user narrative describes a particular person’s (i.e. persona’s) fictionalized journey through the use of your intended product. Aptly named, it reads more like a short story. Most user narratives are between 500 and 1,500 words.”

Jack Dorsey (2011), the founder of Twitter, is also a great advocate of user narratives writing, “If you do that story well, then all of the prioritization, all of the product, all of the design, and all of the coordination that you need to do with these products just falls out naturally.”

Charcoal Burning in Zambia

Taking the last query as an example, a user narrative can then be built to assess whether the repository is meeting the needs of the user. First, it could be supposed that the identical wording, timing, and length of the phrase, indicates that the searches were done as part of a school assignment. All queries came from Zambia, so we can begin to construct the user narrative as below:

I am a 14-year-old student in Zambia. I was given an assignment at school, to write a one-page paper on “the effects of charcoal burning on the environment in Zambia.” I used my...

At this point, some research may be required. Did the student use a mobile phone or a computer? Looking at International Telecommunications Union statistics on mobile phone uptake in Zambia, it shows that there are over 100 mobile subscriptions per 100 people.

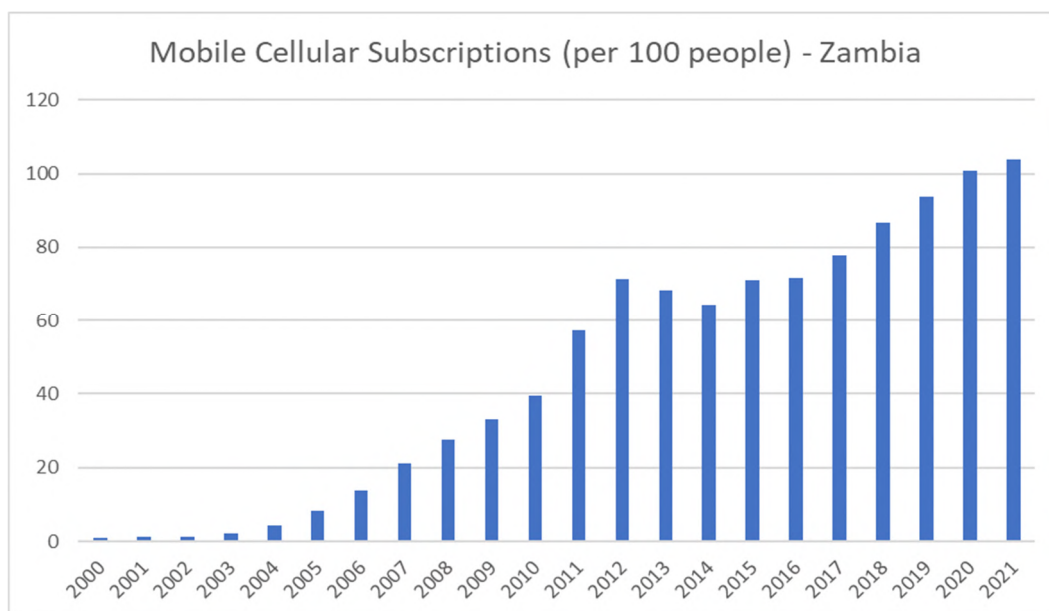


Figure 1: International Telecommunications Union, CC BY-4.0
<https://creativecommons.org/licenses/by/4.0> , via World Bank

It can be supposed, therefore, that the student was likely to use a mobile phone, or perhaps a school computer, to do the research. The narrative is now:

I am a 14-year-old student in Zambia. I was given an assignment at school, to write a one-page paper on “the effects of charcoal burning on the environment in Zambia.” I used my mobile phone to search for that phrase in Google. I clicked on one of the links and it took me to a PDF on the INIS Repository.

Trying the Narrative

With the user narrative created, site administrators can put themselves in the place of a user and experience the repository as they would. Using a mobile browser, an identical search can be performed, “the effects of charcoal burning on the environment in Zambia”. The search produces the result in figure 2.

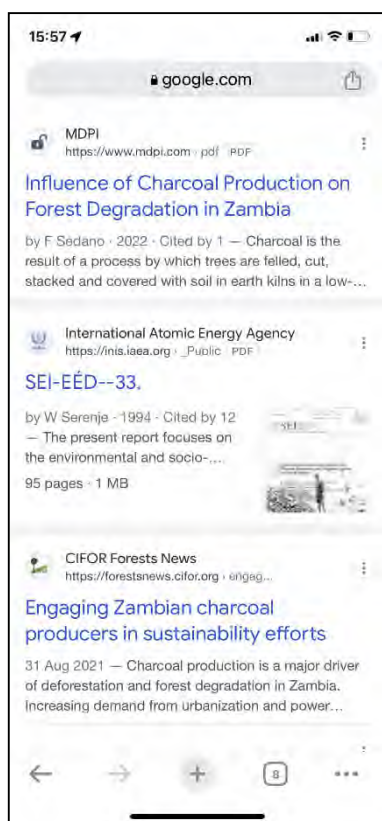


Figure 2: Result of the Google Search



Figure 3: PDF viewed on a mobile phone

The result in Google is unsatisfactory from the user perspective. First, the PDF from INIS (the second result) has an odd title, “SEI-EED—33”. This comes from the PDF metadata and represents the report number. It is not descriptive for the user.

Clicking on the link provided, the user is presented with a PDF of 95 pages. The document, which is a detailed study of the practice of charcoal burning and its environmental impacts, does not give a straightforward answer to the question posed. The student doing research would have to sift through the document, scanning for an answer. For this audience, the PDF provided is also unsatisfactory. For such a user, it would be preferable to be able to pose a question, and receive a citable, authoritative, yet concise answer.

Potential Improvements

Having looked at the user experience and determined that the current configuration does not meet the needs of the audience, solutions can be proposed. One quick improvement would be to edit PDF metadata to match the title given for each record. This would eventually improve the entries on the Google search.

One possibility for improving the overall user experience would be to provide a wiki with pages on various topics. The pages could be developed and edited by experts. This could serve for a limited number of topics. However, for the example topic – that of charcoal burning in Zambia – it is very specific and on the edge of topicality for the organization. It is unlikely that a wiki could meet all such needs.

One possible solution would be the use of Large Language Models (LLMs) such as ChatGPT. Such models are conversational in nature and can provide condensed and direct answers to questions. However, as Irons et. al. (2023) write, “the well-known limitations of LLMs, particularly their ability to ‘hallucinate’ (create factually incorrect information), may make them ill-suited for science work.” Among other problems, such as biases caused by materials used in training, LLMs fabricate references and facts so that their products cannot be trusted or cited. It is to be hoped that this problem will be addressed in coming years.

Conclusion

User narratives can be helpful in designing grey literature repositories, so that other user perspectives are considered. In the selected case, the repository does not currently meet the needs of the audience. Some small improvements can be made. However, there is not currently a satisfactory technical solution. It is hoped that future enhancements to artificial intelligence will make further improvement possible.

References

Payne, Kelly (2016). *Should You Be Writing User Narratives?*. LinkedIn Pulse. <https://www.linkedin.com/pulse/should-you-writing-user-narratives-instead-stories-kelly-payne/>

Dorsey, Jack (2011). *Becoming a Better Storyteller*, Stanford eCorner. Video Lecture. <https://ecorner.stanford.edu/clips/becoming-a-better-storyteller/>

International Telecommunications Union (2023), ITU Datahub, Zambia Mobile-cellular Subscriptions <https://datahub.itu.int/data/?e=ZMB&i=178&u=per+100+people>

Irons, J., Mason, C., Cooper, P., Sidra, S., Reeson, A., & Paris, C. (2023, July 13). Exploring the Impacts of ChatGPT on Future Scientific Work. <https://doi.org/10.31235/osf.io/j2u9x>

Drops in a bucket: contributions of the IAEA Lise Meitner Library to the INIS database

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IAEA Lise Meitner Library, Austria

Abstract

No library can have it all. It is the job of the Inter Library Loan/Document Delivery Service to get elsewhere what is not in a Library's collection. That is also the case in the IAEA Lise Meitner Library (ILML). Most of the topics the ILML deals with are nuclear related (albeit not only), and so are the "known" or specific items requested to the ILL/DD Service.

The ILML is therefore a heavy user of the INIS database, among other nuclear related databases. Many relevant documents are to be found there. In any case, it is a source that must be checked. Then again, it also happens that a given item is not in INIS. Realizing that, the ILML ILL/DD service took the initiative to report those "missing drops" to the INIS proverbial bucket. (ILML and INIS are two different units within IAEA's Nuclear Information Section).

One may wonder if a drop in a bucket is worth it. It is in this case because INIS, as other topical databases/repositories, aims for the wider possible coverage within its topical scope. Since 1972, records in INIS come from member states contributions, IAEA contributions, and yet, some documents escape the coverage, something learned by the experience of looking for requested materials like old conference papers, unpublished thesis, reports from nuclear agencies and institutions, etc.

As a relatively cheap by-product of the search of an item, every month or so, a report in RIS format with items found elsewhere than INIS is sent to INIS, including basic bibliographic information, report ID, searches performed in INIS (not finding it), and location of the material: URL of a site, library catalogue, publisher, or agency. Occasionally, a reported item may lead to the inclusion of many others, a conference paper to the proceedings, a chapter to a book, a paper to a journal, etc.

The reporting is easily replicable: any other library that stumbles upon an item not covered by INIS is welcome to inform about it.

These are items that escaped prior systematic coverage, added to INIS because some user needed it, and ILL/DD located it elsewhere. Reporting to INIS is a way of compensating the relatively high cost of looking for a specific item, hopefully avoiding others looking for it again, but finding it in INIS.

The IAEA Lise Meitner Library

The IAEA Lise Meitner Library is the IAEA (International Atomic Energy Agency) library. It has recently been named after Lise Meitner, the Austrian/Swedish physicist.

The library orients its services mainly to IAEA Staff, and therefore covers mainly Nuclear Science and Technology but also many other topical areas, such as Management, Diplomacy, Computer Science.

It can be said that it has an important collection on Nuclear related topics, including both non-grey and grey literature.

The Inter Library Loan/Document Delivery (ILL/DD) Service

Then again, regardless of its size and scope, no library can have it all; therefore, it is the job of the Inter Library Loan/Document Delivery (ILL/DD) Service to search/locate/obtain elsewhere the items requested by its users that are not in a Library's collection. That is also the case in the IAEA Lise Meitner Library (ILML). Most of the topics the ILML deals

with are nuclear related (albeit not only), and so are the “known” or rather specific items requested to the ILL/DD Service.

Many of the documents requested come in some shade of grey: conference papers, thesis, reports. Others are more commercially available, like books and parts of books, as well as journal papers. It is probably interesting to note that the time-span of the publications requested is very wide and can go as far back as the 40s and 50s...

In order to provide the document to the user, the library’s own collection is naturally checked first, as sometimes the items requested are, after all, already in the collection; otherwise, other resources are used, like catalogues of other libraries and different kinds of databases, depending on the item requested, and its subject.

The INIS database

In the nuclear field, the INIS database is unavoidable, close to mandatory. Let us just highlight here that INIS is a repository that constitutes the world’s largest collections of published information on the peaceful uses of nuclear science and technology, with over 4 million records¹, which may include the full-text, and brings useful referential information.

Within that context, for nuclear related topics, the ILML is a natural heavy user of the INIS database, among other nuclear related databases. Many relevant documents are to be found there. In any case, it is a source that must be checked. Then again, it also happens that a given item is not in INIS. Realizing that, the ILML ILL/DD service took the initiative to report those “missing drops” to the INIS proverbial bucket. (ILML and INIS are two different units within IAEA’s Nuclear Information Section).

The Reports

After one year of working at the ILML, that is, starting November 2019, it has been realised that some of the items requested were actually not included in INIS (whether full-text or referential), but found elsewhere.

It was asked to Brian Bales, Head of INIS, if some kind of report of those cases would be of interest and/or useful.

Note that the IAEA Library and the INIS database are two separate things, but both are under the same organizational Head of Section, hence closely related.

The first report was sent to INIS October 2020, with a rather loose textual format, and a kind of alert to INIS established as a by-product of actual requests for specific materials.

Examples

The following are **some examples** of items requested by users to the ILML, that were not found in the INIS database, but located in the IAEA Library or elsewhere, afterwards reported to INIS, and finally added to the INIS database (that is, the bibliographic reference, and a link to the source). All of them falling within the scope of INIS, peaceful uses of nuclear science and technology.

Occasionally, a reported item may also lead to the inclusion of many others, a conference paper to the proceedings, a chapter to a book, a paper to a journal, etc.

Example A)

Debeauvais, M., Tripier, J., & Jokic, S. Schopper, E. (Ed.). (1978). Fission Cross Sections of Heavy Nuclei Induced by 300 GeV Protons with the Help of Plastic Detector. United Kingdom: PERGAMON PRESS.

This is a paper from a 1978 conference; fortunately, the proceedings were in the library. Actually, the conference was partially covered by INIS, but this particular paper was not.

https://inis.iaea.org/search/search.aspx?orig_q=RN:53113349



Everywhere "international conference on solid state nuclear track detectors" AND Neuherberg AND Fission Cross Sectic Search

☐ Limit to results with full text

Primary Subject

- INSTRUMENTATION RELATED TO NUCLEAR SCIENCE AND TECHNOLOGY (10)
- NUCLEAR PHYSICS AND RADIATION PHYSICS (4)
- GEOSCIENCES (3)
- 9 More

Subject Area

- Engineering & Instrumentation (10)
- Life & Sciences (6)
- Environmental & Earth Science (5)
- 5 More

Record Type

- Report (24)
- Miscellaneous (5)
- Journal Article (2)
- 1 More

Literature Type

- Conference (16)
- Bibliography (4)
- Progress Report (4)
- 1 More

Conference Title

- 9. international conference on solid state nuclear track detectors and meeting of the Working Group on Space Biophysics of the Council of Europe (7)
- 9. international conference on solid state nuclear track detectors (3)
- 10. international DOE neutron dosimetry workshop (1)
- 6. International Workshop on Microbeam Probes of Cellular Radiation Response (1)
- 9. international conference on solid state nuclear track detectors (1)
- Advisory group meeting on comparison of nuclear analytical methods with competitive methods

Results 1 - 32 of 32. Search took: 0.226 seconds Sort by: date | relevance

☐ Select All ☐ Expand All

Fission Cross Sections of Heavy Nuclei Induced by 300 GeV Protons with the Help of Plastic Detector
DOI
Debeauvais, M.; Tripier, J.; Jokic, S.
Solid State Nuclear Track Detector, Proceedings of the 9th International Conference, V. a
1978

Cross section of ternary fission of Al, Ti, Co and Zr nuclei induced by 0.8 - 1.8 GeV photons
PDF
Lima, D.A. de; Sousa, E.V. de; Milomen, W.C.C.; Tavares, O.A.P.
Centro Brasileiro de Pesquisas Fisicas, Rio de Janeiro, RJ
1988

Application of glass solid state nuclear track detectors in the measurement of charged particle fission cross-section of uranium
META
Mubarakmand, S.; Chaudhry, P.; Khan, H.A.
1977

Fission of Bi, Pb and Au induced by 0.65, 1.74 and 4.12 GeV alpha particles
META
Grabec, B.; Todorovic, Z.; Antanasijevic, R.
1977

Fission fragment detector by thin film capacitors. Pt. 1
META
Tommasino, L.; Klein, N.; Solomon, P.
1976

Electron microscopic investigations of tracks of Cr²⁵² - fission fragments in quartz glass
META
Werba, T.; Granzer, F.
1976

Geologic analysis by track etch method
META
Liehu, A.E.
1976

Example B)

Bowen, P.H., Cox, G.C., Huxtable, G., Langsford, A., Scanlon, J.P., Stafford, G., & Thresher, J.J. Power, E.A. (Ed.). (1960). Neutron-Proton Angular Distributions and Polarization Measurements in the Energy Range 20 To 120 MeV. United Kingdom: The Whitefriars Pres Ltd.

In : Griffith, T.C Power, E.A. (Ed.). (1960). International Conference on Nuclear Forces and the Few-Nucleon Problem Vol 1. United Kingdom: The Whitefriars Pres Ltd.

This is a paper in a conference held in 1959: Nuclear Forces and the Few-Nucleon Problem. Which was also in the library's collection. What is interesting here is that the request of one paper led to the inclusion of all the papers of the conference into INIS.

https://inis.iaea.org/search/search.aspx?orig_q=RN:54028539

The screenshot shows the INIS-IAEA search interface. The search query is "International Conference on Nuclear Forces and the Few-Nucleon Problem AND year:1960". The results are sorted by date/relevance, showing 45 results. The left sidebar contains filters for Primary Subject, Subject Area, Record Type, Literature Type, Conference Title, Journal Title, Publication Year, Publication Year Range, and Country of publication. The main results list includes:

- International Conference on Nuclear Forces and the Few-Nucleon Problem. Vol. 1** by Griffith, T.C; Power, E.A. 1960.
- Three-Nucleon Forces According to Chew-Low Theory** by Sharp, R. T.; Smith, R. C. 1960.
- The Meson Theory of Nuclear Forces** by Brueckner, K. A. 1960.
- Dispersion Relation Approach to the Nucleon-Nucleon Interaction** by Chew, Geoffrey F. 1960.
- Recent Work Done in Japan on the Two-Nucleon Interaction** by Iwadare, Junji. 1960.
- Experimental Status of the Nucleon-Nucleon Interaction** by Wilson, R. 1960.
- Photo-Disintegration of Deuterons in the Presence of the Pion-Theoretical Potential** by Iwadare, J.; Matsumoto, M.; Otsuki, S.; Tamagaki, R.; Watari, W. 1960.

Example C)

Argonne National Laboratory report ANL-7837.

Siemssen, R.H., & Morrison, G.C. (1971). Heavy-Ion Scattering Proceedings of the Symposium (ANL--7837). Schiffer, J.P. (Ed.). United States.

This conference proceedings identified as a report was digitized by Google from an original made available by University of Minnesota. Now it also has its record in INIS.

Papers inside were also included separately.

https://inis.iaea.org/search/search.aspx?orig_q=RN:53109178

Search interface showing results for "Heavy-ion scattering proceedings of the Symposium (ANL--7837)".

Search criteria: All words, Heavy-ion scattering proceedings of the Symposium (ANL--7837), AND, Publication Year: 1971, AND, Title: Heavy-ion scattering.

But do not include: Anywhere.

Search results: 1 result found. Search took: 0.083 seconds.

Primary Subject: NUCLEAR PHYSICS AND RADIATION PHYSICS (1)

Subject Area: Nuclear Physics (1)

Record Type: Report (1)

Literature Type: Conference (1)

Conference Title: Symposium on Heavy-Ion Scattering (1)

Journal Title:

Publication Year: 1971 (1)

Publication Year Range: 1971 - 1975 (1)

Country of publication: United States (1)

Language: English (1)

Descriptors: ABSTRACTS (1)

Abstract:

[en] The **Symposium on Heavy-Ion Scattering** was held March 25-26, 1971, at **Argonne National Laboratory**. The **Symposium** was organized by the Physics Division of the **Laboratory** and was sponsored by the **Laboratory** under the auspices of the U.S. Atomic Energy Commission. The **scattering** of heavy ions has received much renewed interest recently. Extensive work, both experimental and theoretical, has led to new insights into the **heavy-ion**-nucleus interaction but also to conclusions sometimes contradictory to each other and to other findings. It was therefore felt worthwhile to bring together all those actively working in the field of heavy ions: **scattering** in an informal and not too large meeting, in which much time was given to discussions. The emphasis of this rather specialized meeting, which was restricted to elastic and inelastic **heavy-ion scattering** (Coulomb excitation excluded), was on the mechanism of the **scattering** process and on the nucleus-nucleus interaction. The meeting was attended by 100 physicists, with 8 from abroad. A list of the participants is given at the end of the proceeding. The Proceeding contain only the invited and contributed papers which have been directly reproduced from the copies submitted by the authors. For practical reasons it was not feasible to include the discussions.

Primary Subject: NUCLEAR PHYSICS AND RADIATION PHYSICS (573)

Source: Mar 1971: 321 p; **Symposium on Heavy-Ion Scattering; Argonne, IL (United States); 25-26 Mar 1971**; Available on-line: <https://hdl.handle.net/2027/umn.31951000315192c>; Country of Input: **International Atomic Energy Agency (IAEA)**; Illis, tabs.

Record Type: Report

Literature Type: Conference

Report Number: ANL--7837

Country of publication: United States

Example D)

Kulleck, James Gerard. Neutron Particle Hole Structure in ^{208}Pb through Isobaric Analog Resonances. Thesis (Ph. D.)--University of Texas at Austin, 1970.

The dissertation/thesis of Mr Kulleck, presented at the University of Texas Austin in 1970, which has its record in the University of Texas Library catalog, now has its record in INIS too.

https://inis.iaea.org/search/search.aspx?orig_q=RN:53114381

Everywhere Standard Search

☐ Limit to results with full text

Primary Subject

- MATERIALS SCIENCE (4)
- NUCLEAR PHYSICS AND RADIATION PHYSICS (4)
- INORGANIC, ORGANIC, PHYSICAL AND ANALYTICAL CHEMISTRY (2)
- 2 More

Subject Area

- Nuclear Materials (4)
- Nuclear Physics (4)
- Chemistry (2)
- 2 More

Record Type

- Journal Article (9)
- Book (1)
- Miscellaneous (1)
- 1 More

Literature Type

- Conference (5)
- Thesis/Dissertation (1)

Conference Title

- International conference on nuclear physics (1)
- International meeting on chemical analysis by charged particle bombardment (1)
- MH2006: International symposium on metal-hydrogen systems: fundamentals and applications (1)
- 2 More

Journal Title

- AIP Conference Proceedings (2)
- Journal of Alloys and Compounds (2)
- Journal of Radioanalytical Chemistry (1)
- 4 More

Publication Year

- 2007 (1)
- 2006 (1)
- 2004 (1)

Results 1 - 12 of 12. Search took 0.02 seconds Sort by: date | relevance

☐ Select All

Neutron Particle Hole Structure in ^{208}Pb Through Isobaric Analog Resonances
 Kulleck, James Gerard
 University of Texas, Austin (United States)
 1970

Limitations and improvements of trace element analysis with proton induced x-rays
 Verba, J.W.; Sunier, J.W.; Wright, B.T.; Slaus, I.; Holman, A.B.; Kulleck, J.G.
 1971

Limitations and improvements of trace element analysis with proton-induced X-rays
 Verba, J.W.; Sunier, J.W.; Wright, B.T.; Slaus, I.; Holman, A.B.; Kulleck, J.G.
 1972

Use of decay protons to study the $^{94,95,96}\text{Mo}(p,n)$ charge exchange reaction
 Whitten, C.A. Jr.; Dunlop, W.H.; Grover, S.N.; Igo, G.J.; Kulleck, J.G.; Thompson, R.M.
 1972

High-resolution study of $^{46}\text{Ca}(p,t)^{46}\text{Ca}$ at $E_{\text{sub } p} = 39 \text{ MeV}$
 Crawley, G.M.; Miller, P.S.; Igo, G.J.; Kulleck, J.
 1973

Experimental evidence for a decay mode of highly excited $T >$ levels
 Whitten, C.A. Jr.; Chai, J.; Dunlop, W.H.; Igo, G.J.; Kulleck, J.G.
 1973

Evidence for the $(2n,p)$ decay of $T_{\text{sub}}(>)$ nuclear states
 Whitten, C.A. Jr.; Chai, J.; Dunlop, W.H.; Igo, G.J.; Kulleck, J.G.
 Proceedings of the International Conference on Nuclear Physics held at Munich, Germany, 27 Aug - 1 Sep 1973
 1973

The thermal stability of sodium beta'-Alumina solid electrolyte ceramic in AMTEC cells
 Williams, Roger M.; Ryan, Margaret A.; Homer, Margie L.; Lara, Liana; Manatt, Ken; Shields, Virgil; Cortez, Roger H.; Kulleck, James
 1999

Example E)

Eisma, D., Berger, G.W., Wei-Yue, C., Jian, S. (1989). Pb-210 as a tracer for sediment transport and deposition in the Dutch-German Waddensea. In: van der Linden, W.J.M., Cloetingh, S.A.P.L., Kaasschieter, J.P.K., van de Graaff, W.J.E., Vandenberghe, J., van der Gun, J.A.M. (eds) Coastal Lowlands. Springer, Dordrecht

This is a chapter of a book on Coastal Lowlands Geology. Only the on chapter on Pb-210 as a tracer is relevant to the INIS database.

https://inis.iaea.org/search/search.aspx?orig_q=RN:53101900

The screenshot displays the IAEA INIS search interface. At the top, the header includes the IAEA logo, '50+ years of INIS', and the text 'International Nuclear Information System'. Navigation links for 'Home', 'INIS Home', 'Thesaurus', and 'Browse' are present. The search bar is active, showing the query 'Pb-210 as a tracer for sediment transp'. Below the search bar, there are options to 'Include' (Exact Phrase) and 'But do not include' (Anywhere). A 'Search' button is visible. To the right, there are language selection options: Arabic, English, Deutsch, Русский, Chinese, Français, 日本語, and Español. Below the search bar, the results section shows 'Results 1 - 2 of 2. Search took: 0.139 seconds'. The first result is 'Pb-210 as a tracer for sediment transport and deposition in the Dutch-German Waddensea' by Eisma, D.; Berger, G.W.; Wei-Yue, Chen; Jian, Shen, published in 'Coastal Lowlands' in 1989. The second result is 'Investigation of heavy metal concentration profiles in selected North Frisian saltmarshes using radiological methods' by Meyer cordt, J., published in 1992. The interface also includes a sidebar with filters for 'Primary Subject', 'Subject Area', 'Record Type', 'Literature Type', and 'Conference Title'.

The reports to INIS include the following information:

- Identifying bibliographic data, Just what is necessary to clearly identify the item, not a full citation nor cataloguing record
- Searches performed in INIS showing that the item was NOT FOUND in the database
- The source where the item and/or its bibliographic data was found (URL, Library or call number for the ILMML)
- In August 2022 this was more formalized, adopting an implementation of the text based RIS format.

Examples of provided records

```

TY - THES
AN - 7511
TI - Neutron Particle Hole Structure in 208Pb Through Isobaric Analog Resonances
AU - Kulleck, James Gerard
PP - University of Texas, Austin
PY - 1970
C1 -
https://inis.iaea.org/search/search.aspx?num=10&orig_q=author%3aKulleck&lang=en-US&login=false&user=External&src=ics&search-option=Everywhere&sort=date%3AD%3A%3Ad1&sortorder=ascending
C2 - author:Kulleck
UR - https://search.lib.utexas.edu/permalink/01UTAU_INST/9e1640/alma991036205999706011
ER -

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TY - CONF
AN - 7538
TI - International Conference on Nuclear Forces and the Few-Nucleon Problem
DA - 8-11 July 1959
PP - Physics Department, University College, London
C1 -
https://inis.iaea.org/search/search.aspx?search-option=BibliographicOnly&orig_q=%22Nuclear%20Forces%20and%20the%20Few-Nucleon%20Problem%22&mode=Advanced&translateTo=
C2 - "Nuclear Forces and the Few-Nucleon Problem"
C1 -
https://inis.iaea.org/search/search.aspx?num=10&orig_q=International+Conference+on+Nuclear+Forces+and+the+Few+Nucleon+Problem&lang=en-US&login=false&user=External&src=ics&search-option=Everywhere&sort=date%3AD%3A%3Ad1&sortorder=ascending
C2 - "International Conference on Nuclear Forces and the Few-Nucleon Problem"
C1 -
https://inis.iaea.org/search/search.aspx?search-option=everywhere&orig_q=International%20Conference%20on%20Nuclear%20Forces%20and%20the%20Few-Nucleon%20Problem%20AND%20year%3A1960&mode=Advanced&translateTo=
C2 - International Conference on Nuclear Forces and the Few-Nucleon Problem AND year:1960
M1 - Search for specific paper with title Light Particle Reactions. by J. M. LeBlanc
C1 -
https://inis.iaea.org/search/search.aspx?num=10&orig_q=Light+Particle+Reactions+AND+author%3aLeBlanc&lang=en-US&login=false&user=External&src=ics&search-option=Everywhere&sort=date%3AD%3A%3Ad1&sortorder=ascending
C2 - Light Particle Reactions AND author:LeBlanc
CN - IAEA Circulation 539.141 I615 v.1 and v.2
UR - http://libenc.iaea.org/iii/encore/record/C_Rb1168702_SNuclear%20Forces%20and%20the%20Few-nucleon%20Problem_Orightrresult_U_X6?lang=eng&suite=def
ER -

```

How many drops in the proverbial bucket? Is it worth?

During 2022, after several reports, 55 citations in total were contributed to INIS by the ILMML

This raised concerns as to whether this was useful at all, with the feeling of dropping drops in a bucket, and just a few.

For the sake of the illustration, let's put this figure of speech into numbers, and have a quick look at the proverbial drop in a bucket...

How many drops there are in a bucket depends of course on the size of the drops and the size of the bucket. Supposing a 20 Litter bucket, and a drop of 0.05 ml, this makes 400.000 drops in a bucket.

$$20.000 \text{ mL} / 0.05 \text{ ml/drop} = 400.000 \text{ drops in a bucket}$$

So how does the IMLM reports to INIS compare to that? In year 2022, INIS added almost 125.000 new records², so that's 55 contributions within the 125.000 new records in INIS in year 2022.

That would be equivalent to 175 drops if in a bucket of 400.000 drops. Considerably more than "just 1 drop" in a bucket. In other words, quite decent... if compared to the drop in the bucket.

But actually, to be fair, it is a participation of 0.044% compared to the annual INIS bucket of new records.

So that is not completely reassuring.

Modest, but worth it

On the reassuring side, though, let's keep in mind that this is a by-product of searches in the library. Not a harvesting, nor a collection development policy. Therefore, from the library's point of view, it is not that expensive, since searches have to be performed anyway. It is also a token of relevancy to the items searched, since they were requested.

More important, following the drop in a bucket figure of speech, each drop here has a title. If considered solely as a contributed numbers for a bigger total, then it's drops in a bucket. But if you put a title on each drop, then you get one step closer to "Yet another customer satisfied". But this is a given document identified and located for a given reader. Consider also that if somebody had done this before, documents requested would have been found in INIS to begin with. Now that they have been found maybe the searching burden is sparing to others, avoiding some duplication of efforts. These little searching efforts are being capitalized.

Since 1972, records in INIS come from member states contributions, IAEA contributions, and yet, some documents escape the coverage, something learned by the experience of looking for requested materials like old conference papers, unpublished thesis, reports from nuclear agencies and institutions, etc.

As stated by Brian Bales, head of INIS, in a presentation in 2022 ... among several principles a Repository should aim to, one of them is comprehensiveness (or completeness): <<Characteristics, such as timeliness, openness, user-friendliness, accuracy, and completeness, are proposed as those which meet user and institutional needs and define the degree of development for a given repository. [...] Finally, **completeness** describes how well a repository encompasses its scope.>>³

The contributions of the IAEA Lise Meitner Library to the INIS database are, therefore, tiny steps towards completeness.

Finally, it is worth mentioning that the reporting is easily replicable: any other library that stumbles upon an item not covered by INIS is welcome to inform about it, contributing to completeness too.

Conclusion

These reports to INIS are a relatively cheap by-product of searches for requested items that can be capitalized. Modest as it may be, it still is a useful contribution that aims for comprehensiveness and avoiding duplication of efforts. Within the Nuclear Science and Technology community, other librarians may face a similar situation. It would be useful for if those extra efforts were collected and information included in INIS, as this is probably easy to replicate by other Nuclear-related libraries that likely already use or recommend using INIS.

References

¹ INIS 50th anniversary poster https://www.iaea.org/sites/default/files/20/08/inis_50_anniversary_poster_web.pdf

² INIS Information Letter No. 436. INIS Progress and Activity Report 2022.

³ Bales, Brian. Characteristics of a Well-Developed Grey Literature Repository. 2022. Pp 11-16
http://www.textrelease.com/images/GL2022_Conference_Proceedings.pdf
<https://av.tib.eu/media/59873> at 13mn30s and 17mn26s

Grey Literature Supporting the Right to Knowledge

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Abstract

One of the principal areas of interest of the Library of the CNR Area in Pisa is in authors' Rights Retention. Indeed, the staff regularly supports the personnel in the publication process, from choosing the publication venue to depositing their products in the institutional archive, finding that many researchers need to be made aware of their rights and how to retain them. For this reason, the library staff participates in the CLAKP and Right2Pub initiatives. CLAKP (Copyright Law and Access to Knowledge Policies Group) is a research group aiming to strengthen the right to knowledge as essential for education, innovation, and cultural access. Right2Pub (The Authors' Voice from the Italian Research Community) project aims to build an awareness of the importance of Secondary Publishing Rights and Rights Retention in the Italian Research Community.

In our work, we describe the two ongoing initiatives and the contribution of our library to them. We also illustrate the first results of a preliminary study on the role of Grey Literature on this topic and how some European countries approach it.

Keywords: *Right to knowledge, Rights retention, Secondary Publishing Rights, CLAKP, Right2Pub, KR21*

1. Rights Retention: the context

The human right to science is defined in some crucial norms of international law, specifically in Article 27 of the Universal Declaration of Human Rights and Article 15 of the International Covenant on Economic, Social and Cultural Rights. One idea emerges from both norms: the balance between intellectual property rights (exclusivities) and rights to access, exploit and develop scientific knowledge. Maintaining this balance is a fundamental aspect of fully democratic societies¹.

The Open Science movement upholds the principle that the entire process and all results of publicly funded research should be publicly available. It is based on the cooperation and sharing of all research outputs, from literature to data, software to protocols and technologies. *Open Access to scientific publications and Open Science are [therefore] integral parts of the human right to science²*. The major cultural shift introduced by the Open Science movement significantly accelerated deep reflection on maintaining authors' rights to their works in scientific research carried out within universities and research institutions.

Scientists do not publish to receive compensation but to communicate the results of their research. To do so, researchers usually publish articles in scientific journals, often owned by major commercial publishers. Indeed, with the advent of the digital age, the editorial market has become oligopolistic because a few influential publishers primarily run it. In return for the service offered, these publishers make the authors sign a publishing contract that entrusts all economic rights to the publisher. In contrast, only the moral right of authorship remains to the author³.

One problem authors may face is that changing a publisher's standard contract could be difficult. If the authors are not lawyers (and, in some cases, it may be difficult for the lawyers themselves if they are not experienced in the subject matter), it may be challenging to know exactly what revisions to request. If successful, a scenario will likely

¹ Binda F., Caso R. (2020). *Il diritto umano alla scienza aperta*. Trento Law and Technology Research Group. Research Paper n. 41, p.1. <https://zenodo.org/records/4053531> (the English translation is ours).

² *Ivi.*, p. 3 (the English translation is ours).

³ It is worth mentioning that Italian copyright splits the authors' rights into moral (or intellectual) and property rights.

show different situations between authors who know how to negotiate and those who do not. As Peter Suber said⁴, the author's addendum was introduced around 2004 as the first solution to authors' Right Retention. It is a proposed amendment to the contract with the publisher. Lawyers write the addendum and, in this way, negotiation between the publisher and authors becomes unnecessary.

1.1. Rights retention: the Italian context

Before entering more details, we must make an initial consideration: the Italian law on copyright does not imply that authors must cede all their rights to the publisher. Therefore, we should ask ourselves why they agree to sign contracts that transfer all economic rights to a publisher, granting them complete control over their work.

First and foremost, scientists must publish to circulate their ideas in prestigious venues, i.e., journals with a high impact factor or labelled as "excellent". This action is essential to advance in their careers and meet the criteria used in research evaluation exercises. To assess the quality of research, the Evaluating Agencies rely on commercial bibliometric evaluation services. These services measure it through mathematical and statistical indices based on the number of citations received by an article or journal rather than on the actual relevance of that research and its spin-offs on science and society.

These evaluation criteria primarily increase the bargaining power of large oligopolistic publishers because they own the prestigious publishing venues to which authors turn.

A need for more awareness and attention and a lack of sensitivity to the problem compounds the first factor mentioned above. Indeed, it is not necessarily the case that authors, especially younger ones, know that by transferring commercial rights to the publisher, they implicitly authorize the publisher to make different uses of the manuscript without the author's permission, such as modifying it for commercial purposes, rearranging the content to publish it in another type of source, translating it into other languages. In most cases, the authors' institutions of affiliation do not have a role in the author-publisher contractual relationship, so they are unaware that their researchers are voluntarily transferring their copyrights at the expense of themselves, the institution, and the general public. Moreover, these same institutions must pay publishers expensive subscriptions to allow access to scientific results produced by their authors. Finally, the closure of science makes it inaccessible to society and other scholars who operate in less economically fortunate settings and who cannot afford to pay to learn about the work done by their peers.

In this context, it has become imperative to draw the attention of all actors to the issue of authors' retention of rights. It is crucial to retain the right to publish one's work in open access to further the principles promoted by open science.

Two prominent "actions" at the center of European and international debate are identified to achieve this goal: the Rights Retention Strategy and Secondary Publishing Rights.

Rights retention refers to applying strategies that allow authors to retain certain fundamental rights over their work, such as the right to reproduce, distribute, and reuse for noncommercial purposes, when they sign a publishing contract with a publisher. On the other hand, the term Secondary Publishing Rights implies action to change national intellectual property laws so that authors are guaranteed the right to re-publish their work, freely and free of charge, in open access repositories.

Universities and research institutions in Italy have long issued policies supporting open access. However, they are often not mandatory and specific policies on copyright

⁴ More on: <https://erc.europa.eu/news-events/magazine/rights-retention-and-open-access>

retention are not detectable. To facilitate the transition to open access and protect authors' rights, Italian institutions have adopted the model of transformative contracts, which has spread throughout Europe, i.e., agreements between libraries and publishers that include a fee for publishing in open access, in addition to the reading one.

Italy has published the National Plan for Open Science⁵ and participated in defining the European Agreement for the reform of research evaluation, which currently represents a significant obstacle to affirming the right to knowledge, as stated before. Important open access publishing initiatives have also been implemented as viable alternatives to the commercial publication of journals and series. These are no-profit publishing systems run by academic or research institutions, which take charge of the entire publication process. In such publishing systems, the rights remain with the author, and there are no costs to the authors or readers.

Regarding legislation on Secondary Publishing Rights, there is already a proposal for a law in Italy rooted in the 2016 proposal of the Italian Association for the Promotion of Open Science (AISA⁶). The proposal aims to amend Italian law on copyright by including a specific article that gives the author the unwaivable and inalienable right of republication in open access, following a regulatory model already adopted in other European countries.

The transitional nature of transformative agreements, the high costs they require, and which prevent institutions from totally covering their scientific production make it necessary to think about different forms of opening science, such as the implementation of strategies or norms that intervene in authors' rights and which, as we will see below, are still totally absent in the Italian landscape.

2. The Library of CNR in Pisa

2.1. The interest in Rights Retention: supporting researchers in the publication process

The Library of the CNR Area in Pisa collects the bibliographic and documentary resources of the Institutes located in the Area. It supports the informational needs of the scientific community. The principal tasks of the service focus on library automation, digital libraries, Open Science and Open Access, Grey Literature, and web-based information services⁷.

The library's main activities include managing scientific production, supporting the authors for publication, and depositing their works in the institutional archive.

In this respect, the library staff:

- provide authors information about the publication venues (e.g., metrics, APCs, etc.);
- guide authors in the deposit of their scientific production in the institutional archive;
- verify the compliance of the deposited versions with either funders' or publishers' policies on self-archiving;
- inform authors about the various strategies for green OA;
- inform authors about good practices for Open Science;
- support authors in the research evaluation exercises.

Such actions require us to be constantly updated about the evolution of publishers' policies and the strategies authors may adopt to retain their rights. Thus, over the years, we have developed a growing interest in the issues concerning authors' Rights Retention and the informational resources and strategies that may guide this difficult purpose.

⁵ https://www.mur.gov.it/sites/default/files/2022-06/Piano_Nazionale_per_la_Scienza_Aperta.pdf

⁶ <https://aisa.sp.unipi.it/>

⁷ <https://library.isti.cnr.it/index.php/en/library>

2.2. The Italian approach to Rights Retention: the initiatives CLAKP and Right2Pub

Secondary Publishing Rights, Rights Retention and, more in general, fair access to knowledge are at the core of the international initiative Knowledge Rights 21 (KR21), which focuses on *bringing about changes in legislation and practice across Europe that will strengthen the right of all to knowledge*⁸.

The programme, sponsored by IFLA, IFLA Foundation, Arcadia, LIBER, and SPARC Europe, aims to mobilise the potential of Europe's knowledge institutions, particularly libraries, to engage with others across the spectrum of the access to knowledge movement to build momentum towards long term copyright reform that benefits library users and researchers in the 21st century⁹.

KR21 supports and finances national actions to improve public awareness on the issues of access to knowledge, publishing rights, and promoting substantial changes in law.

In Italy, two initiatives can be included in this framework: CLAKP and the project Right2Pub - *Balancing Publication Rights. The Authors' Voice from the Italian Research Community*.

CLAKP¹⁰ is a national research group created within IGSG-CNR to reinforce the right to knowledge as an essential component of education, innovation, and cultural participation. This is also implemented through the support for regulatory reform of copyright for the benefit of libraries, users, and researchers.

CLAKP's main areas of interest concern the retention of rights by authors of scientific content, open norms, Secondary Publishing Rights, e-books, and controlled digital lending.

The IGSG research group works within the KR21 initiative, supporting the national coordinator for Italy (Avv. Deborah De Angelis) in collaboration with the Creative Commons Italian Chapter and the Libraries of the CNR Research Areas of Pisa and Bologna.

The project Right2Pub¹¹ aims to build an awareness of the importance of Secondary Publishing Rights and Rights Retention among the Italian Research Community. Its primary objectives are:

- to strengthen advocacy for the formal recognition of Secondary Publishing Rights at the legislative level;
- to direct attention toward the inherent limitations of current national legislation, which does not explicitly confer Secondary Publishing Rights upon authors;
- to enhance awareness within the national research community regarding Rights Retention.

In the project, the role of the two libraries lies in supporting and advising researchers on how to exercise their rights as authors and accompany them during the publishing process.

2.3. The contribution of our Library to CLAKP and Right2Pub

In CLAKP, our principal interest is how strategies for rights retention are currently approached and how they may be implemented. Accordingly, our contribution focuses on collecting policies, strategies, and experiences adopted in the field of Rights Retention. We mainly rely on grey materials to understand how authors can protect their rights.

⁸ <https://www.knowledgerights21.org/>

⁹ <https://www.knowledgerights21.org/about/>

¹⁰ <https://www.igsg.cnr.it/progetti-2/clakp/>

¹¹ <https://www.right2pub.eu/>

More into practice, a series of videos¹² on the main topics of CLAKP have been realised so far, as well as a preliminary study on how grey literature approaches the subject and how it is managed in some countries.

In Right2Pub, the two libraries involved in the project are expected to collect existing resources on Rights Retention and Secondary Publishing Rights and to produce informative materials useful for the authors when choosing the publication venue to guarantee their rights.

In addition, two training sessions, one in Pisa and one in Bologna, are planned to provide authors with an overview of these topics and practical information on how to maintain their rights and make Open Access, e.g., depositing their materials in an open repository and being compliant with the publisher policy on Green OA.

As in CLAKP, we will count on grey materials (e.g., infographics, videos, reports, etc.) that have been realized to achieve our purposes.

3. The methodology

At the beginning of our analysis, we looked for any kind of material (both published and grey) concerning Rights Retention and collected them. We also examined how laws in some European countries act in that regard. In addition, we considered initiatives such as the *Retain* project sustained by SPARC Europe, which focuses on the topic, and assessed some of its grey outputs (e.g., reports and whitepapers).

We found grey materials at four levels: the legislative level, the institutional level, the funders' level, and the initiatives/projects level.

Finally, we reviewed a list of funders and institutional policies in different countries. We compared them in our analysis to understand how grey materials could support Rights Retention and the Right to Knowledge.

4. How Rights Retention is approached in (some) EU countries and how GL supports the Right to Knowledge

Letting authors¹³ to retain fundamental rights to their publications helps them and promotes Open Access because to make Open Access and re-use their publications, authors must remain owners of their rights. The policies of funders and universities can make maintaining rights automatic and much easier than it would be for a single author in a negotiation with a publisher.

The analysis of the materials listed in the previous paragraph led us to group the strategies and documentation supporting authors to retain their rights into four categories. Indeed, grey materials on Rights Retention may be addressed at the legislative, institutional, funder and initiative/project level.

In the following sections, we will describe each scenario in more detail and illustrate how grey materials are fundamental in building and disseminating such strategies. There are four manners - supported by grey materials - to help authors retain their rights: at a legislative level, through some international initiatives, through the intervention of funders, and through authors' institutions. Analyzing the different approaches to Rights Retention in various countries, we found examples of national laws and grey materials that may help authors retain their rights during the phases of the publication process.

¹² https://www.youtube.com/playlist?list=PLmW_xhy00luZhOQP3Nm_Gn9BvIMkLeL36

¹³ More on: <https://erc.europa.eu/news-events/magazine/rights-retention-and-open-access>

4.1 The legislative level

The already cited AISA (Italian Association for the Promotion of Open Science) in paragraph 1, produced an analysis, at a legislative level, to search laws in some European countries¹⁴ regarding Rights Retention and provides also, in some cases, a translation in English and Italian. For example, European countries already have operational laws dealing with authors' Rights Retention:

- Germany¹⁵
- France¹⁶
- Belgium¹⁷
- The Netherlands.

In Germany, “Copyright is not transferrable¹⁸” by law; Section 15 of the German law on Rights Retention, states that “the author has the exclusive right to exploit his or her work in material form; this right includes:

1. the right of reproduction (section 16),
2. the right of distribution (section 17),
3. the right of the exhibition (section 18)¹⁹”.

First, the *Right of reproduction* stands for the right to produce copies of the work, whether on a temporary or permanent basis, regardless of the process or quantity in which they are made. Accordingly, transferring the work to devices for repeated communication of video and sound sequences (video and audio recordings) also constitutes reproduction, regardless of whether it is the recording of the communication of the work on a video or audio recording medium or the transfer of the work from one video or audio recording medium to another.

Instead, the *Right of distribution* means offering the original or copies of the work to the public or putting them into circulation. The German law states that if the original or copies of the work have been put into circulation by sale with the consent of the person authorized to distribute them in the territory of the European Union or another Contracting Party to the Agreement on the European Economic Area, their dissemination is permitted, except for rental. For German law, rental is defined as a transfer for a fixed period for use that serves directly or indirectly for profit. However, the rental does not include the transfer of originals or copies

1. of buildings or works of applied art or
2. used in the context of an employment or service relationship for the exclusive purpose of fulfilling obligations resulting from the employment or service relationship.

Right of exhibition means the right to publicly display the original or copies of an unpublished artistic work or an unpublished photographic work. By specifying each type of right, German law leaves no room for misunderstanding regarding preserving rights.

On the other hand, in France, article L. 533-4.-II-III-IV, it is stated that (II) data resulting from a research activity that is at least half-funded by grants from the state, local authorities, public institutes, subsidies from national funding agencies, or EU funds may be freely re-used as long as a specific right or regulation does not protect them and have been made public by the researcher, institute or research organization. (III) The publisher of a scientific publication may not restrict the re-use of research data made public as part

¹⁴ <https://aisa.sp.unipi.it/attivita/diritto-di-ripubblicazione-in-ambito-scientifico/testi-di-riferimento/>

¹⁵ <https://www.gesetze-im-internet.de/urhg/>

¹⁶ <https://www.legifrance.gouv.fr/jorf/id/JORFTEXT000033202746>

¹⁷ http://www.ejustice.just.fgov.be/cgi/article.pl?urlimage=%2Fmopdf%2F2018%2F09%2F05_1.pdf%23Page81&caller=summary&language=fr&pub_date=2018-09-05&numac=2018031589

¹⁸ Section 29. Transfer of copyright, in German Rights Retention Law: <https://www.gesetze-im-internet.de/urhg/>

¹⁹ *Ivi*.

of its publication. (IV) The provisions of this article are a matter of public policy, and any clause to the contrary is deemed unwritten²⁰.

The situation in Italy is different because copyright could be transferable. As anticipated in paragraph 1, the Italian Gallo Law has never been approved. The foreseen²¹ authors' Secondary Publishing Rights remain to them unless the publisher and authors have a different agreement.

Specifying every issue by law - or by a policy - could let people better understand authors' Rights Retention and may help authors raise their awareness. Authors' Rights Retention is concerned with how authors use repositories for self-archiving. We found several examples regarding grey materials on Rights Retention and Secondary Publishing Rights. Among them, we searched different types of documentation on authors' Rights Retention and Secondary Publishing Rights produced in some countries, also at an institutional level, intending to verify if and how the grey literature may support these topics.

4.2 The Institutional level and Policies

As this paper states in different sections, some examples of grey literature are policy documents or organizational reports. At a national level, in note 9, we have already mentioned several policies (by AISA) concerning Rights Retention strategies. Instead, at an institutional level and following the University of Harvard policy (the first IARPP: Institutional Author Rights Retention Policies²²), other universities²³ adopted the same approach. IARRPs (Institutional Author Rights Retention Policies) are an initiative that produces essential policy instruments to support researchers in the phases of the publication process. The Harvard Faculty of Arts and Sciences did the first university-level rights-retention OA policy. Other universities followed this model.

In addition, the *UK Research and Innovation* (UKRI)²⁴ produced an OA policy (August 2021), a rights-retention provision on the Plan S²⁵ model.

Also, in the UK, researchers are covered by different Open Access policies of funders and publish in journals with various OA policies, sometimes different depending on who is funding the research. This variety of policies is complex, causes confusion, and is difficult to manage. Researchers run the risk that their results will not be eligible for submission to the UK Research Excellence Framework post 2021 (REF2021)²⁶. In the UK, policy development and connection among institutions, funders, and publishers is overseen by a steering group of experts representing various aspects of Open Access publishing.

²⁰ II.-Dès lors que les données issues d'une activité de recherche financée au moins pour moitié par des dotations de l'Etat, des collectivités territoriales, des établissements publics, des subventions d'agences de financement nationales ou par des fonds de l'Union européenne ne sont pas protégées par un droit spécifique ou une réglementation particulière et qu'elles ont été rendues publiques par le chercheur, l'établissement ou l'organisme de recherche, leur réutilisation est libre.

III.-L'éditeur d'un écrit scientifique mentionné au I ne peut limiter la réutilisation des données de la recherche rendues publiques dans le cadre de sa publication.

IV.-Les dispositions du présent article sont d'ordre public et toute clause contraire à celles-ci est réputée non écrite. In the already cited <https://www.legifrance.gouv.fr/jorf/id/JORFTEXT000033202746>

²¹ By the existing law (the above cited n. 633/1941 Law).

²² <https://osc.hul.harvard.edu/policies/fas/>

²³ https://cyber.harvard.edu/hoap/Additional_resources

²⁴ The *UK Research and Innovation* (UKRI) is a non-departmental public body of the UK government that directs research and innovation funding, financed through the science budget of the Department for Science, Innovation and Technology. Established on 1 April 2018 by the Higher Education and Research Act 2017, the UKRI merged nine (Arts and Humanities Research Council, Biotechnology and Biological Sciences Research Council, Engineering and Physical Sciences Research Council, Economic and Social Research Council, Medical Research Council, Natural Environment Research Council, Science and Technology Facilities Council, Innovate UK, Research England) organizations into a single body. The UKRI was created following a report by Sir Paul Nurse, President of the Royal Society, who recommended the merger in order to increase interdisciplinary integrative research. More on https://en.wikipedia.org/wiki/UK_Research_and_Innovation

²⁵ <https://www.coalition-s.org/>

²⁶ <https://results2021.ref.ac.uk/>

The Harvard model is different, as Peter Suber states:

On the Harvard model, faculty vote to grant a set of nonexclusive rights to the university, which uses the rights to authorize OA through its institutional repository. At the same time, it grants the same set of nonexclusive rights back to the faculty authors²⁷.

The Harvard model showed that institutional Rights Retention Policies are more effective than asking authors to retain rights independently. Indeed, institutions have more negotiating power than a single author in a contract with publishers. The Harvard-style Rights Retention policies represented a successful model for more than 80 universities or college units worldwide, which voted to adopt similar strategies. We also found that preserving a broader set of nonexclusive rights may be more useful than retaining only those necessary to comply with Open Access policies. In the *Good practices for university open-access policies*²⁸ some points are fixed:

- *The institution must have an institutional repository or participate in a consortial repository. Most schools launch a repository before adopting a policy to fill it, but some do it vice versa.*
- *Institutions with the kind of policy recommended here will want the grant of nonexclusive rights in the policy to prevail over a later publishing contract inconsistent with the policy. Adopting the policy may suffice to attain that goal. However, to be more certain, practically and legally, that the policy license survives any later transfer, US institutions should get authors to sign a “written instrument” affirming the policy.*
 - *Here’s why: Under US copyright law (17 USC §205(e)), a “nonexclusive license...prevails over a conflicting transfer of copyright ownership if the license is evidenced by a written instrument signed by the owner of the rights licensed or such owner’s duly authorized agent.”*
 - *This provision doesn’t say that a written instrument is the only way to make a nonexclusive license prevail over a later contract inconsistent with the policy. The nonexclusive license in the policy may prevail in any case, especially if the university policy is sufficiently well known. But to be safe, it’s best to get a written affirmation of the grant of rights (or license) as specified by 17 USC 205(e)²⁹.*

This is the main difference between the Harvard model and the others. The Harvard model is centralized, and, above all, the nonexclusive licenses prevail over a conflicting transfer of copyright ownership if the license is evidenced by a written instrument signed by the owner of the rights licensed.

A report from the *Retain* project states³⁰:

Different factors have contributed to the rapid adoption and type of policies developed across Europe over the last 3 years. Providing support for researchers is a major (if not the major) element, but other aspects are also important. The context in which the policy is developed, and specifically the legal jurisdiction and publishing culture, are affecting the pace and nature of policies which are developed.

The same report contrasted Harvard-style Rights Retention Policies and those developing in Europe. In the Harvard model, there is a centralized system. The European model has different approaches based on every institution’s culture, procedures, laws, and history.

²⁷ Suber P. (2021) *Rights retention and open access*, European Research Council magazine, October 28, 2021: <https://erc.europa.eu/news-events/magazine/rights-retention-and-open-access>

²⁸ [https://cyber.harvard.edu/hoap/Good practices for university open-access policies](https://cyber.harvard.edu/hoap/Good_practices_for_university_open-access_policies)

²⁹ [https://cyber.harvard.edu/hoap/Implementing a policy](https://cyber.harvard.edu/hoap/Implementing_a_policy)

³⁰ SPARC EUROPE, *Opening Knowledge: Retaining Rights and Open Licensing in Europe in the RETAIN PROJECT*, June 28, 2023: <https://zenodo.org/records/8084051>

Analyzing some IARPP (Institutional Author Rights Retention Policies), the *Retain* project states:

European research institutions are exploring and increasingly implementing policies which retain rights over the outputs of research for researchers and the institutions themselves. They should continue to do so, working closely with their researchers to ensure policies have support and that the benefits to authors are clear.

There is no one size fits all approach - different policies are more appropriate and stronger in different contexts dependent on legislation, publishing culture, funding requirements and other factors. However, generally, policies are stronger where the institution itself retains and exerts certain rights for achieving more openness and not just the researcher if a clear legal basis for such a policy exists. According to legal advice received by institutions in the UK, British copyright law recognises earlier licences where prior knowledge of the licence can be demonstrated, and thus a carve out in contract law is applicable to publishing contracts.

Advice suggests that such a mechanism does not apply in continental legal jurisdictions, and so alternative mechanisms or legislative reform may be required to achieve the same effect, whether that is at national level or as part of broader EU consideration of copyright harmonisation³¹.

4.2.1 Institutional Policies List

As mentioned above, we found grey materials such as laws and institutional policies. The following table contains a list of institutional policies representing examples of IARPPs:

Nation	University	Policy	link	last visit
Germany	Germany, Leibniz University Hannover	Open Access Policy at Leibniz University Hannover	https://www.uni-hannover.de/en/universitaet/profil/leitbild-und-strategien/forschung/open-science/open-access/open-access-policy	January 18, 2024
Iceland	Bifröst University	Open Access Policy	https://www.bifrost.is/english/about-bifrost/policies-and-regulations/open-access-policy	January 18, 2024
	TU Dublin	Open Access Policy for Publications & Data for Technological University Dublin	https://arrow.tudublin.ie/open_access_policy.pdf	January 18, 2024
Norway	Tromsø, UiT, The Arctic University of Norway	Principles for open access to academic publications at UiT	https://uit.no/Content/762228/cache=1643633369000/PRINCIPLES%20FOR%20OPEN%20ACCESS%20TO%20ACADEMIC%20PUBLICATIONS%20AT%20UIT.pdf	January 18, 2024
	NTNU, Norwegian University of Science and Technology	Self-archiving and Rights Retention Strategy	https://i.ntnu.no/wiki/-/wiki/English/Self-archiving+and+Rights+Retention+Strategy	January 18, 2024
	The University of Bergen	The University of Bergen Policy for Open Science	https://www.uib.no/en/fcoremployees/142184/university-bergen-policy-open-science#open-access-to-research-publications-and-artistic-research	January 18, 2024

³¹ Ivi, p. 2.

Nation	University	Policy	link	last visit
Sweden	Stockholm University	Open Science Policy	https://www.su.se/staff/organisation-governance/governing-documents-rules-and-regulations/research/open-science-policy-1.628566	January 18, 2024
	Chalmers University of Technology	Open Science Policy		
	Lund University	Open access policy for publications and artistic works	https://www.staff.lu.se/sites/staff.lu.se/files/2021-09/Open-access-policy-for-publications-and-artistic-works.pdf	January 18, 2024
	University of Skövde	Guidelines for open access and registration of publications in DiVA	https://www.his.se/globalassets/styrdokument/utbildning-forskarniva/riktlinjer-diva.pdf	January 18, 2024
UK	University of Edinburgh	Research Publications and Copyright Policy (2021)	https://www.ed.ac.uk/information-services/about/policies-and-regulations/research-publications	January 18, 2024
	University of Cambridge	Rights Retention Pilot / Self-Archiving Policy	https://www.openaccess.cam.ac.uk/publishing-open-access/self-archiving-policy-guidance	January 18, 2024
	Birkbeck University of London	Open Research Policy	https://www.bbk.ac.uk/about-us/policies/open-accessresearch	January 18, 2024
	Sheffield Hallam University	Open access and rights retention	https://libguides.shu.ac.uk/OpenAccess/rightsretention	January 18, 2024
	The University of Manchester	Intellectual Property ("IP") Policy	https://documents.manchester.ac.uk/display.aspx?DocID=24420	January 18, 2024
USA	Harvard University	A Model Open-Access Policy	https://osc.hul.harvard.edu/	January 18, 2024

Figure 1: a list of IARPP³²

4.3 The funders' level

At the funders' level, the cited *Retain* project report explains:

Having strong Open Access positions of national research funders and national policy - or lawmakers can both have a decisive influence on the national level³³.

The Horizon Europe funding program for 2021-2027 differs from Horizon 2020 in part by adding a rights retention requirement³⁴. Unlike the initiative cOAlition S, Horizon Europe does not require grantees to apply for an open license to their accepted manuscripts upon submission. Horizon Europe only encourages grantees to notify the publisher of their obligations under the grant agreement.

³² All the links of the institutional policies are also listed in the finale webliography.

³³ *Ivi*, p. 13.

³⁴ https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/common/guidance/aga_en.pdf#page=152, p. 278, in article 17.

4.4 The initiatives/projects level

Other initiatives/projects aimed at protecting authors' rights are:

- cOAlition S Rights Retention Strategy³⁵: cOAlition S has released its Rights Retention Strategy (RRS) to allow authors to retain their rights and to enable compliance with their funders' OA policy through dissemination in a repository. cOAlition S has developed a Rights Retention Strategy to give researchers - supported by a cOAlition S organization - the chance to submit their manuscripts for publication to journals of their choice, including subscription journals while remaining fully compliant with Plan S. As part of this strategy, cOAlition S organizations modified their grant conditions to ask the application of a Creative Commons Attribution (CC-BY³⁶) license to all Author Accepted Manuscripts (AAM) or Versions of the Record (VoR).
- Ouvrir la Science³⁷ (France); the rights retention strategy is part of France's Second National Plan for Open Science. The Plan, supported by the European Union, concludes with research evaluation and strategies to implement Open Science, favoring authors' Rights Retention, allowing them to comply with several funding agencies' mandates.
- The already cited - in paragraphs 3 and 4 - *Retain* project (a KR21 funding program project³⁸), led by SPARC Europe, intends to accelerate the uptake of Rights Retention and open licensing to enable researchers to share their work openly. It will do this by calling for publisher, institutional, and funder policy change and empowering authors to refuse to transfer their rights. They carried out research to provide a solid and informed basis for this change and then campaigned and supported a transformation in copyright policy that embraces OA amongst publishers, funders, and institutions.

The project Right2Pub and the CLAKP group have planned to produce grey materials to provide authors with powerful and practical instruments to inform on Rights Retention and Secondary Publishing Rights. Examples are toolkits, leaflets, infographics, reports on the results of surveys and Focus Groups, and more videos in the wake of those already published. For example, a recent survey about Rights Retention and Secondary Publishing Rights was administered to the CNR scientific community in November 2023. In December 2023, two Focus Groups were held in the CNR Research Areas of Pisa and Bologna. The data analysis is ongoing, and the results will be published on the project website³⁹.

5. Conclusions

Rights Retention is closely connected to Open Science as it favors more transparency, allowing the authors to share their research. Consequently, avoid expensive duplicates and accelerate scientific progress for a more inclusive society. On the other hand, Open Science represents a fundamental component of the right to education, an essential element of a democratic society, as highlighted by the UN 2030 Agenda⁴⁰ in the statement, *No one will be left behind*.

In paragraph 1, we already mentioned that when publishers hold fundamental rights, they decide on OA. On a practical level, the retention of rights by authors allows not only access to the literature but also guarantees the possibility of extracting and reusing content in different contexts and for different purposes. When authors want OA and hold their rights, they avoid the delays and efforts required⁴¹ to obtain permission. They also avoid the risk of a negative response.

³⁵ <https://www.coalition-s.org/rights-retention-strategy/>

³⁶ <https://creativecommons.org/licenses/by/4.0/>

³⁷ <https://www.ouvrirlascience.fr/release-of-the-english-version-of-the-rights-retention-strategy-guide/>

³⁸ Retain Project and Right2Pub project are both funded by KR21 programme, sharing objectives and strategies.

³⁹ <https://www.right2pub.eu/>

⁴⁰ <https://sdgs.un.org/2030agenda>

⁴¹ Suber P. in <https://erc.europa.eu/news-events/magazine/rights-retention-and-open-access>

Adopting institutional Rights Retention policies is more effective than asking, encouraging, or requiring authors to retain rights independently. In this way, authors benefit from greater protection when negotiating with publishers to retain their rights, thus overcoming the restrictions imposed.

Adopting institutional Rights Retention policies is more effective than asking authors to retain rights by their own. In this way, authors benefit from more protection when negotiating with publishers to retain their rights, going beyond the restrictions imposed. At a legislative level, grey materials are the stronger instruments supporting authors' Rights Retention. At an IARPP level, grey materials are stronger if they use a national law, too. Regarding this kind of instrument, every nation (and every IARPP) must follow its way according to its laws, procedures, and culture.

CLAKP and the Right2Pub project are important initiatives in Italy aiming to raise interest in the topic. Much grey materials have been produced on this topic, and much more will likely settle in the future. It would be worthwhile to collect and systematize it so that the international scientific community can easily reuse all the valuable outputs to support the right to knowledge. The use of grey material is the basis of the regulatory mechanisms for maintaining such a fundamental right as free access to knowledge.

Note: This paper's cited links were revised on January 18, 2024.

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All In the Mind - Adopting an Agile Mindset as the Prerequisite to Agile Transformation

Alistair Reece, GeoScienceWorld

Abstract

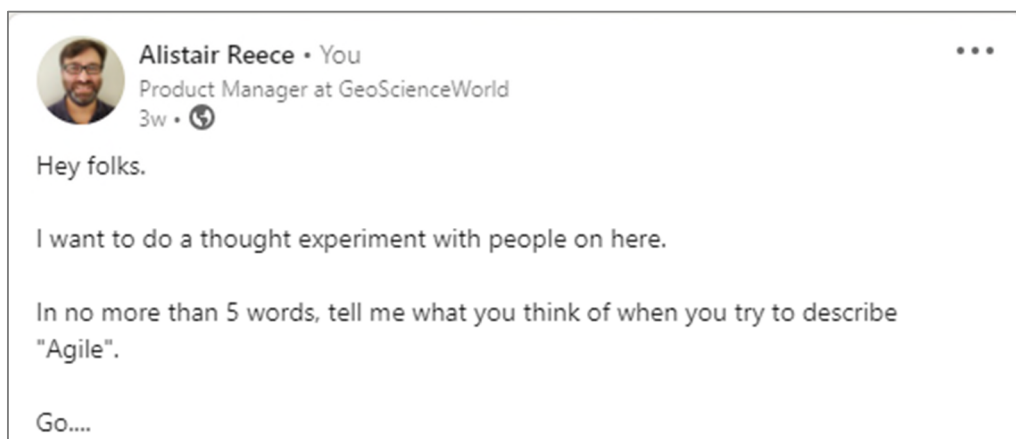
In today's rapidly changing world, the ability to adapt and thrive is crucial for success. To navigate the ever-changing needs of stakeholders and communities, many organizations seek to implement Agile methodologies. However, the true catalyst for meaningful transformation lies in fostering an Agile Mindset within these organizations.

This paper explores the indispensable role of an Agile Mindset as a prerequisite for successful Agile transformation. We will explore the core principles and values that shape the Agile Mindset, emphasizing how this way of thinking cultivates a culture of collaboration, adaptability, and continuous improvement. By embracing this mindset organizations enhance their impact, drive innovation, and effectively address the evolving needs of their communities.

Using GeoScienceWorld as an example of an organization undergoing Agile transformation and seeking to adopt an Agile Mindset, we will discuss how keeping the 4 values of Agile to the forefront of our thinking has impacted our internal, and external, business practices, paying particular attention to product development and prioritization.

What is Agile?

Regardless of industry or sector, we often hear the word "Agile" used to describe business processes, especially around project management. However, the use of the word is rarely, if ever, qualified by what is meant, exactly, by "Agile". In an attempt to gauge the various uses of the term among my own contacts, I presented the following challenge to my connections on LinkedIn:



The challenge provoked a diverse array of responses, including:

- A philosophy many don't understand
- Learning to work better, efficiently
- Pivoting
- Confirming what is most valuable
- Structure, ceremonies (sometimes too much)
- Outcomes through learning, not over-planning
- MVP, discovery, alpha, beta, kanban
- Empowered teams evolving the solution
- Fail fast then iterate; repeat

Each of the responses from the connections that took part is valid, and in many ways useful. Looking through the responses, I was able to group them into 4 general thematic buckets:

- Project management methodology
- Sprints
- Daily stand up
- Retrospectives

Those buckets all have value in and of themselves, however I am convinced that they actually miss the key point of what it means to be “Agile”.

There was one respondent, though, who understood fully the task that I had set, and that person gave me a simple, single word, answer:

- Mindset

In the rest of this paper, we will look at what it means to have an Agile mindset, and how that mindset impacts our work and business processes, both with colleagues internally and stakeholders externally.

The Four Values

The origins of Agile are in a meeting of leaders working in the software industry, who met in February 2001 in Utah in order to discuss how to improve working processes in software development.¹ Software projects prior to the adoption of Agile methods often failed to complete, and those that did usually exceeded their budgets. The ultimate aim of Agile, and the Agile Manifesto was to uncover “better ways of developing software”. As a result of this aim the attendees in Utah developed the Four Values.

The Four Values are value statements in which the Agile Manifesto notes that certain ideas are to be valued over other ideas. Although the Four Values have their origins in software development, they can be extrapolated and applied to every area of an organization.

The Four Values² are:

- **Individuals and interactions** over processes and tools
- **Impactful outcomes** over comprehensive documentation
- **Customer collaboration** over contract negotiation
- **Responding to change** over following a plan

The second of the Four Values in the original text says “Working Software over comprehensive documentation”. I replaced “working software” with “impactful outcomes” as I believe the Agile mindset should not be limited to just software development.

It is important to understand that while adopting an Agile mindset places more value on the clauses on the left side, in bold, of the statements above, it does not say that the clauses on the right have no value at all.

Mindset before Practice

Given that we have identified that the core of Agile is a mindset, how an individual or organization thinks and perceives their work, we need to address the concept of “Agile methodologies”.

There are several popular ways of working that are associated with Agile, including such well known methodologies as:

- Scrum³
- Kanban⁴
- Scaled Agile Framework⁵

These methodologies share common features, roles and ceremonies, including:

- Dividing work periods into “sprints”
- Having a daily standup meeting to discuss progress and blockers
- Performing retrospectives to learn what has gone well and what can be improved

Despite these common features, and the perception that these methodologies are inherently “Agile”, there is no guarantee that an organization is actually Agile, and lives up to the Four Values.

The Agile Manifesto doesn’t prescribe any particular methodology as being a definitive approach to “being Agile”, as such it is perfectly possible for an organization to implement an “Agile” methodology, such as Scrum, and yet remain resolutely not-Agile. When the business values process and tools, for example, over interactions and individuals, but practices Scrum, they are not Agile. When an organization ignores the reality of change in their situation and doggedly sticks to their detailed, laid out, plan but has adopted Scaled Agile Framework, they are still not an Agile organization.

Such organizations have put the cart before the horse, having adopted the practices of Agile methodologies without internalizing the values of the Agile mindset, and it is no surprise that in such a situation the phrase “Agile doesn’t work” becomes common.

Agile Mindset in Practice

Having discussed the attributes of an Agile Mindset, I now want to show how we at GeoScienceWorld have put it into practice within our own organization, in particular in the team that I lead, the Product Management Group.

The Product Management Group, PMG, in GeoScienceWorld is responsible for the creation and prioritization of our product backlog. PMG also oversees the development of new products and enhancements to existing products, such as our publishing platform.

In 2022, PMG spent a lot of time and resources working on plans to revitalize an existing tool on our publications platform called OpenGeoSci, which is a content search tool that has a map based interface to allow users to navigate through available content based on geography rather than traditional keyword search. When the tool was originally launched, it existed as a separate website from our publishing platform, however when we migrated to our current platform provider, OpenGeoSci was integrated into the main website.

As a result of the work that PMG had undertaken in 2022, we came into 2023 ready to start development work with our various software development partners. We had created wireframes for the user interface, the technical architecture had been defined and documented, and the tools required to meet the requirements had been identified. We had also applied for an Amazon Imagine grant to offset the cost of development to some extent.

PMG meets on a quarterly basis to discuss and plan our work in the upcoming months as well as create our roadmap for where we think we are likely to concentrate our efforts further out. When it came to prioritization though, we usually worked on whatever was most appealing to us at any given time, as such we weren’t necessarily providing value back to our various stakeholder groups.

Having been asked by our CEO how exactly we went about prioritizing our work, PMG set about creating a more data based approach, which resulted in our “Prioritization Matrix”. For each project that PMG needed to prioritize, we awarded points based on the following criteria:

- Number of target personas who would benefit
- Number of business metrics impacted
- Number of customer service issues reported in the previous 12 months

- Potential market value of the project
- Level of effort

The highest score possible using this matrix would be 14.

The image below shows the matrix after the first time PMG assigned points to each of the extant projects in our backlog as of March 2023.

Project	Category	Value Proposition	Target Personas	Business	Customer Satisfaction	Scale of Impact	Level of Effort	Score
Content Access and Communication Streamlining	Tech Debt	Seamless access, reducing frustration, and more communication around access and subscriptions.	4	2	3	0	0	9
Registered User Experience	Enhancement	TBD	3	3	1	1	1	9
Revised Checkout Process	Enhancement	Overhaul the ecommerce checkout experience so that users can easily purchase content and maintain their library of past purchases. Drive more revenue through ecommerce channel.	2	2	2	1	2	9
Deposits to Discovery Services	Tech Debt	Would encompass whole-book PPV and bulk PPV enhancements as well as other enhancements around the shopping cart and shop.geoscienceworld.org.	3	2	2	0	2	9
Institutional IDP Access	New Product Development	Improve discoverability through a streamlined deposit to major discovery services.	2	3	0	1	2	8
Infoscience Technologies TDM Tool	New Product Development	Allow institutions to be set up in the database as IDPs so their employees can use SAML to authenticate.	3	3	0	1	0	7
Article Page UX Enhancement	Enhancement	Help corporate researchers find insights and data and seamlessly integrate into worktools	4	2	0	1	0	7
Deep Learning Q&A Tool	New Product Development	Increasing usability on article and book chapter pages by smoothing out the UX and integrating new features.	3	2	0	1	1	7

Assigning points to all of our projects showed that despite the amount of work PMG had put into planning and creating the specifications for a new version of OpenGeoSci, the project scored incredibly low in the Prioritization Matrix. With this information, and with a commitment to working in an Agile manner, PMG responded to this change rather than blindly following the original plan that had been laid out. The Prioritization Matrix had shown PMG that:

- OpenGeoSci had limited value when compared to other projects in the backlog
- PMG needed to pivot to focus on the work that would have more impactful outcomes
- PMG's plan for 2023 needed to be re-configured

As mentioned above, GeoScienceWorld's Product Management Group meets in person once a quarter to review the work undertaken in the preceding few months and to re-prioritize our backlog, taking into consideration new information, changes in our industry, fresh opportunities, and how we can provide value back to our stakeholders.

Conclusions

From this very brief overview of the values that underpin a truly Agile organization it is possible to draw three conclusions for those organizations looking to adopt Agile ways of working.

Given that Agile is first and foremost a way of thinking rather than a way of doing, it is imperative that an organization understand that Agile is about culture. To be Agile is to place the customer, whether that be internal or external, at the very heart of everything we do. It is after all to the customer that organizations ultimately need to provide value.

Secondly, it is clear that Agile is not a one-size fits all approach, and that extends to within an organization. Some Agile teams will adopt a Scrum approach, while others will decide that Kanban is the right choice for them. Yet other teams will decide that none of the prescribed methodologies work for them in their sitz im leben, thus they will design and implement ways of working that are imbued with the Four Values but don't have any particular framework underpinning them. When organizations begin to value their Scrum

or Kanban processes and tools over the individuals and interactions they encounter, that organization is no longer Agile.

Thirdly, and finally, adopting an Agile mindset requires constant reflection and the willingness to constantly refer back to the Four Values as our ultimate guides to how an organization works. As the Agile Manifesto itself says in its first sentence:

“We are uncovering better way of developing software by doing it and helping others do it.”

It is possible to replace the phrase “developing software” such that the goal of an Agile organization is that:

“We are uncovering better ways of working by doing it and helping others do it.”

The process of becoming Agile is ongoing and iterative, such that it requires an ever present willingness to change and adapt to the changing world in which we find ourselves working.

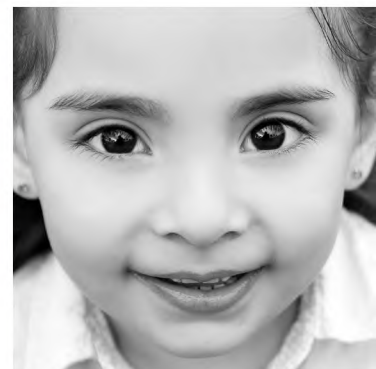
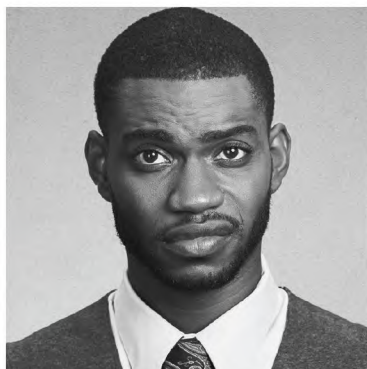
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Harnessing the Power of AI for Managing Grey Literature

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Abstract

The use of artificial intelligence (AI) is already redefining the ways we engage with various types of information and data. In the wake of AI's unprecedented influence, its impact on grey literature (GL) remains an important yet underexplored domain. It is up to all GL professionals to integrate AI into their work and harness its power. This paper delves into the innovative applications of AI to bolster the efficiency of GL management, elevate metadata quality, and enhance user experiences. Four fundamental GL management facets, namely collection of GL, metadata creation, summarization, and user experience, offer great potential and a good starting point for using the power of AI. By harnessing AI's transformative capabilities, GL professionals can spearhead a paradigm shift in managing grey literature, promising extensive and far-reaching implications for the field.

Keywords AI, artificial intelligence, ChatGPT, grey literature, digital transformation

Introduction

When encountering a new topic in an article, book, illustration, or presentation, there are typically three questions that come to mind. Firstly, we often wonder, "What is this all about?" This paper focuses on the power of ChatGPT and related AI systems, which belong to a group of Large Language Models (LLMs).

Immediately following is a somewhat provocative question: "So what?" Many experts predict that 30 percent of all jobs will be replaced by AI in just a few years, while many others will undergo substantial transformation. Enough reasons to take this topic seriously.

Lastly, we might ask ourselves, "What's in it for me?" This paper caters specifically to information and knowledge managers operating in the realm of grey literature management. Apart from providing a brief overview of ChatGPT, it offers insights into potential ways of managing grey literature using this new technology, transitioning from current information management practices to AI-driven transformations.

Importance of Grey Literature

Let's briefly look at the definition of GL, its main facets, and some advantages.

Grey literature refers to any recorded, referable, and sustainable data or information resource of current or future value made publicly available without undergoing the traditional peer-review process (Savić, 2018).

According to GreyNet, there exist over 150 types of grey literature (GreyNet, 2004). These encompass reports, feasibility studies, dissertations, proceedings, news releases, newsletters, brochures, notes, posters, blogs, datasets, databases, and various others.

Grey literature originates from diverse sources, including individuals, businesses, public institutions, research centers, and local, national, or global organizations. It can exist in electronic or paper-based formats, generated by either machines or individuals.

The volume of GL is vast and boundless. Millions upon millions of GL items are already accessible, with more being generated daily.

However, a significant challenge lies in locating and identifying specific GL documents. One of the primary reasons for this challenge is that search engines lack mechanisms to distinguish GL specifically.

Nevertheless, GL offers several significant advantages (Exeter, 2023):

- **Diverse Perspective:** GL provides valuable insights from non-traditional sources such as government reports, conference proceedings, and unpublished research, thereby offering a broader perspective on a given topic.
- **Filling Information Gaps:** It often contains specialized and niche knowledge not readily available in mainstream publications, helping to address gaps in existing research.
- **Timely and Current Information:** GL is typically produced more rapidly than formal publications, serving as a valuable resource for staying abreast of the latest developments and trends in a particular field.
- **Supports Evidence-Based Decision-Making:** Access to GL empowers researchers, policymakers, and practitioners to make well-informed decisions by incorporating a wider range of evidence beyond peer-reviewed journals and books.

The Power of ChatGPT

Let's now delve into the capabilities of ChatGPT, beginning with a concise overview.

Chat Generative Pre-trained Transformer (ChatGPT) represents a sophisticated AI machine learning model adept at executing natural language processing (NLP) tasks with remarkable precision. It simulates human conversation, exhibiting a level of fluency that enables it to pass the Turing Test (McKinsey & Company, 2023).

Developed by OpenAI in 2021 and launched in November 2022, ChatGPT rapidly garnered an immense user base (OpenAI, 2023). Within a week of its release, it accrued 1 million users, reaching a staggering 57 million users in its inaugural month. By January 2023, it surpassed the 100 million user milestone. While over 180 million individuals have created ChatGPT accounts to date, approximately 100 million remain active users. Currently, the website experiences a staggering 1.8 billion visitors per month.

GPT-3 was trained on 175 billion parameters. However, its successor, GPT-4, launched on 14 March 2023, was trained on a colossal 170 trillion parameters (Bastian, 2023).

Notably, ChatGPT isn't the solitary Large Language Model (LLM) in circulation. Numerous major IT corporations have either developed or are in the process of developing their own iterations (Akshay, 2023). For instance, Baidu has the Ernie bot, Google's AI is referred to as Bard, Microsoft Bing incorporates GPT technology, Amazon unveiled Bedrock with Titan Text, similar to ChatGPT, and Elon Musk's AI startup, xAI, recently introduced its inaugural AI model named Grok.

This prompts the question: What attributes contribute to ChatGPT's widespread popularity, and how can it benefit us?

The scope of potential applications for ChatGPT is extensive (Nazarov, 2023):

- Integration and utilization of extensive knowledge from diverse sources like books, articles, and websites.
- Providing comprehensive answers across various topics.
- Generating coherent and contextually relevant texts, drafting emails, and crafting creative written content.
- Assisting in coding by offering snippets, code suggestions, explanations, and debugging aid.
- Facilitating multilingual text translation.
- Engaging in simulated conversations with users.
- Automating customer support, offering round-the-clock assistance sans human intervention.
- Categorizing, classifying, tagging, and auto-generating metadata.
- Summarizing lengthy texts, extracting pivotal information into concise summaries.

- Expanding users' knowledge base by delivering insights on diverse subjects, historical events, scientific concepts, and current affairs.
- Facilitating meetings by providing summaries and identifying key decisions and action items.
- Generating diverse content including images, jokes, stories, and poems.
- Adapting explanations to specific styles and successfully executing a multitude of other tasks.

The Power of ChatGPT - Examples

Here are just some notable instances showcasing the diverse applications of ChatGPT:

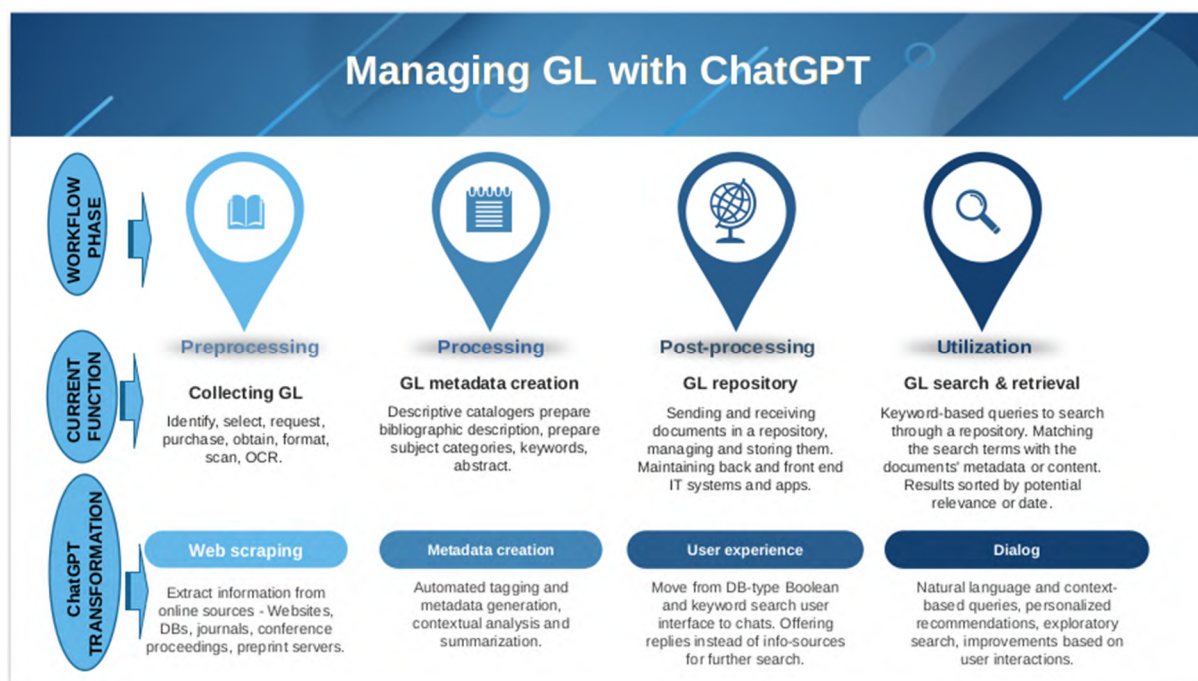
- Microsoft effectively employs ChatGPT to enable users to conduct searches and obtain results using a conversational interface.
- Duolingo, recognized as the world's largest platform for learning foreign languages, leverages ChatGPT to offer students comprehensive explanations in natural language, akin to guidance from a human tutor.
- Slack integrates ChatGPT to streamline workflow management, project administration, enhance productivity, and facilitate communication among team members.
- Octopus Energy, a prominent British renewable energy group specializing in sustainable energy solutions, delegates 44 percent of its customer inquiries to ChatGPT.
- Cheggmate harnesses ChatGPT's capabilities to assist students with assignments, providing support akin to interacting with human professionals.
- Freshworks significantly slashed the development time for complex software applications from 10 weeks to less than a week by utilizing ChatGPT.
- Udacity employs GPT-4 to craft an intelligent virtual tutor capable of delivering personalized guidance and feedback to students.
- Air India utilizes ChatGPT to elevate customer-centric offerings on their website, including FAQs, pilot briefings, and other related services.

These examples underscore the versatility and effectiveness of ChatGPT across diverse industries and applications, showcasing its ability to enhance processes, improve user experiences, and streamline operations.

Managing GL with ChatGPT

Upon reviewing the fundamental characteristics of GL and the capabilities of ChatGPT, let's explore how ChatGPT can enhance the management of GL.

To achieve this, we will first examine the primary workflow phases involved in managing GL. Subsequently, we will outline the current key functions performed within each phase. Finally, we'll explore the potential role ChatGPT can play in transforming these phases while fulfilling the necessary functions associated with each.



A high-level overview of the workflow for GL reveals four primary phases: preprocessing, processing, post-processing, and the utilization phase.

The preprocessing phase, involving the collection of grey literature, encompasses key functions such as identification, selection, acquisition (purchasing or requesting), obtaining items, formatting, and scanning, if necessary.

The processing phase is pivotal for creating metadata, achieved primarily through descriptive cataloging, preparing bibliographic descriptions, assigning subject categories and keywords, and crafting abstracts.

Post-processing activities entail managing a repository for grey literature. This includes sending and receiving documents, repository management, and maintaining associated IT systems on both the back and front ends.

The utilization phase, the final and probably the most important phase, is the phase when GR becomes available for search and retrieval. The search is typically accomplished through keyword-based queries that match search terms with document metadata or content. Results are usually sorted by potential relevance or date.

After identifying the basic phases, let's explore how ChatGPT can transform each phase of GL management and the improvements and benefits it can offer.

The traditional preprocessing phase, involving the collection of GL, can transition towards web scraping. ChatGPT, when appropriately directed, can efficiently extract information from various online sources like websites, databases, journals, conference proceedings, and preprint servers.

Metadata creation can potentially be replaced by automated tagging and metadata generation, alongside contextual analysis and summarization. This approach is already widely adopted by several information database and repository providers.

A significant shift in user experience will occur, moving from a database-style Boolean and keyword search user interface to conversational interfaces. A ChatGPT-based interface will offer specific replies through dialogue instead of merely providing a list of information sources for further search.

Closely related to user experience and maximizing the use of valuable information resources is ChatGPT's ability in natural language processing. It can comprehend context-

based queries, conduct exploratory searches on related subjects, offer personalized recommendations, and expand searches in unforeseen directions, uncovering unexpected facets and possibilities for the user's attention.

Web Scraping

Let's delve deeper into the techniques of web scraping, particularly exploring its significant features that render it highly valuable for enhancing the management of GL.

Web scraping offers **direct targeting of GL**. By fine-tuning the ChatGPT model through pertinent training data and specific prompts relevant to GL, it can effectively aid in retrieving and extracting targeted information from websites. This encompasses a wide range of parameters, including different geographical locations, organizations, specific journals, topics, and other predefined access frequencies.

ChatGPT possesses the ability to **cross-reference and verify** scraped information against reputable sources, ensuring the accuracy and reliability of publications. This validation process ensures that the gathered information is credible and meets requisite quality standards.

Another notable feature of ChatGPT is its capacity for **knowledge integration**. It can seamlessly integrate scraped grey literature with its existing knowledge base, providing supplementary context, related articles, historical data, or scientific background. This enrichment significantly enhances the overall comprehension of the topic.

Furthermore, ChatGPT's **multilingual capabilities** empower it to scrape grey literature from websites in diverse languages. This versatility broadens the scope of data collection and analysis, enabling a more comprehensive understanding across various linguistic domains.



Metadata Creation

Metadata creation stands as an area where leveraging ChatGPT can yield swift and substantial benefits. Through an analysis of specific document content and context, ChatGPT can automatically generate pertinent metadata, including author names, publication dates, journal titles, and other essential citation information. This automated process significantly streamlines cataloging and referencing of grey literature, resulting in considerable time and effort savings.

Capitalizing on its adept **contextual comprehension**, ChatGPT excels in identifying relationships between concepts, detecting nuances in terminology usage, and establishing connections across various research domains. Such capabilities empower researchers to attain comprehensive insights into specific topics, pinpoint knowledge gaps, and explore potential research trajectories.

The process of **automated tagging** involves ChatGPT analyzing the content of grey literature to extract key topics, concepts, and keywords that precisely represent the document's subject matter. These tags, when integrated with relevant knowledge organization systems, serve as invaluable metadata, enhancing efficient document organization, searchability, and retrieval.



ChatGPT's ability to **generate concise summaries** encapsulating the essence of lengthy scientific articles proves immensely beneficial. These summaries furnish researchers with an overview of a document's content, expediting the review of pertinent literature. They aid in filtering relevant resources and significantly contribute to informed decision-making concerning the document's relevance and significance.

Metadata Creation - Example

Here is an illustration of how ChatGPT can effortlessly generate Dublin Core (ALA, 2003) metadata from an article.

In this instance, the article under consideration was one of my previous works titled "When is 'grey' too 'grey'? A case of grey data." This article was featured in the Conference Proceedings of the Twentieth International Conference on Grey Literature held in New Orleans, USA, in December 2018.

When is 'grey' too 'grey'? A case of grey data

Dobrica Savić, Nuclear Information Section,
International Atomic Energy Agency, NIS-IAEA, United Nations

Abstract

Conformity to facts, accuracy, habitual truthfulness, authenticity, information source reliability, and security have become important concerns. Trustworthiness of news and information, and of grey and other literature types has become of interest to the public, as well as to many information science and technology researchers. Starting with a definition of grey literature, and continuing with white, dark and grey data, this paper concentrates mainly on grey data as an emerging grey literature data type and its various 'shades' of trust. Special attention is given to data in the context of grey systems theory, anonymous data, and unstructured and unmanaged data. Based on a review of relevant literature and current practices, trustworthiness of grey data is analysed and elaborated. Guidelines and warning signs of grey data trustworthiness are identified, and conclusions offered.

Keywords: grey literature, grey data

Why are we concerned about the greying of grey data?

Recent research by the European Broadcasting Union (EBU) on misinformation shows that only 59% of people in the European Union (EU) believe what they hear on the radio, 51% believe the television news, and only 47% believe what they read (Financial Times, 2018). Widespread fake news, misinformation, disinformation, spam emails, computer bots, botnets, web spiders, crawlers, and viruses erode our trust in the information and data we encounter in our daily lives, making trustworthiness a concern.

To further illustrate the concern of trustworthiness, consider that 269 billion emails are sent and received each day, of which 60% is spam. 56% of all internet traffic is from automated sources — hacking tools, scrapers and spammers, bots, and other malicious programs. Therefore, conformity to facts, accuracy, habitual truthfulness, authenticity, information source reliability, and security are of increasing importance.

Another factor impacting trust is the amount of data surrounding us. 2.5 exabytes of data are produced every day, the equivalent of 250,000 Libraries of Congress and 90% of all the data in the world that has been generated over the last two years. 13 million text messages are sent every minute, 4.4 million videos are watched on YouTube every minute and 1.7 megabytes of new information are created every second for each human being on the planet. Although the amount of information and data¹ around us is enormous, 99.5% of all data created is not currently being analysed and used. Still, we are hungry for information, as demonstrated by over 6.6 billion Google queries daily, 15% of which have never before been searched.

Uncovering deception and
estimating the veracity of
information and data is difficult
now and will be even more so
in the future.

Grey literature

Various definitions of grey literature exist. The 12th International Conference on Grey Literature (GL12), held in Prague in 2010, defined it as "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 library holdings or institutional repositories, but not controlled by commercial publishers, i. e., where publishing is not the primary activity of the producing body" (Farace, D. and Schoepfel, J., 2010).

¹ Data is 'facts or figures from which conclusions can be drawn'. Information is 'data that have been recorded, classified, organized, related, or interpreted within a framework so that meaning emerges'. www.statcan.gc.ca

Please create Dublin Core metadata from the article?

```
{
Full-text of the following article:
When is 'grey' too 'grey'? A case of grey data by Dobrica Savić.
Conference Proceedings: Twentieth International Conference on Grey Literature. New Orleans,
USA. December 3-4, 2018.
}
```

Here is the ChatGPT output which captured a comprehensive set of Dublin Core metadata.

DUBLIN CORE RECORD

Title: When is 'grey' too 'grey'? A case of grey data

Creator: Dobrica Savić

Contributor: Nuclear Information Section, International Atomic Energy Agency, NIS-IAEA, United Nations

Abstract: This paper discusses the importance of trustworthiness in news and information, particularly in the context of grey data. It covers various aspects of grey data, including its definition, characteristics, and challenges in ensuring its veracity and usability.

Keywords: grey literature, grey data, trustworthiness, information reliability, data integrity

Date: 2019

Type: Text

Format: PDF

Identifier: ISBN 978-90-77484-33-3

Source: Conference Proceedings: Twentieth International Conference on Grey Literature. New Orleans, USA. December 3-4, 2018.

Language: English

Coverage: European Union, United States, Russia, China, Japan

Rights: © TextRelease 2019

Beyond its proficiency in creating valid Dublin Core data records, ChatGPT showcases its capability to generate the entire metadata in a JSON format (w3schools.com, 2023) with a simple command. Here is an example of such a record in JSON format.

JSON format

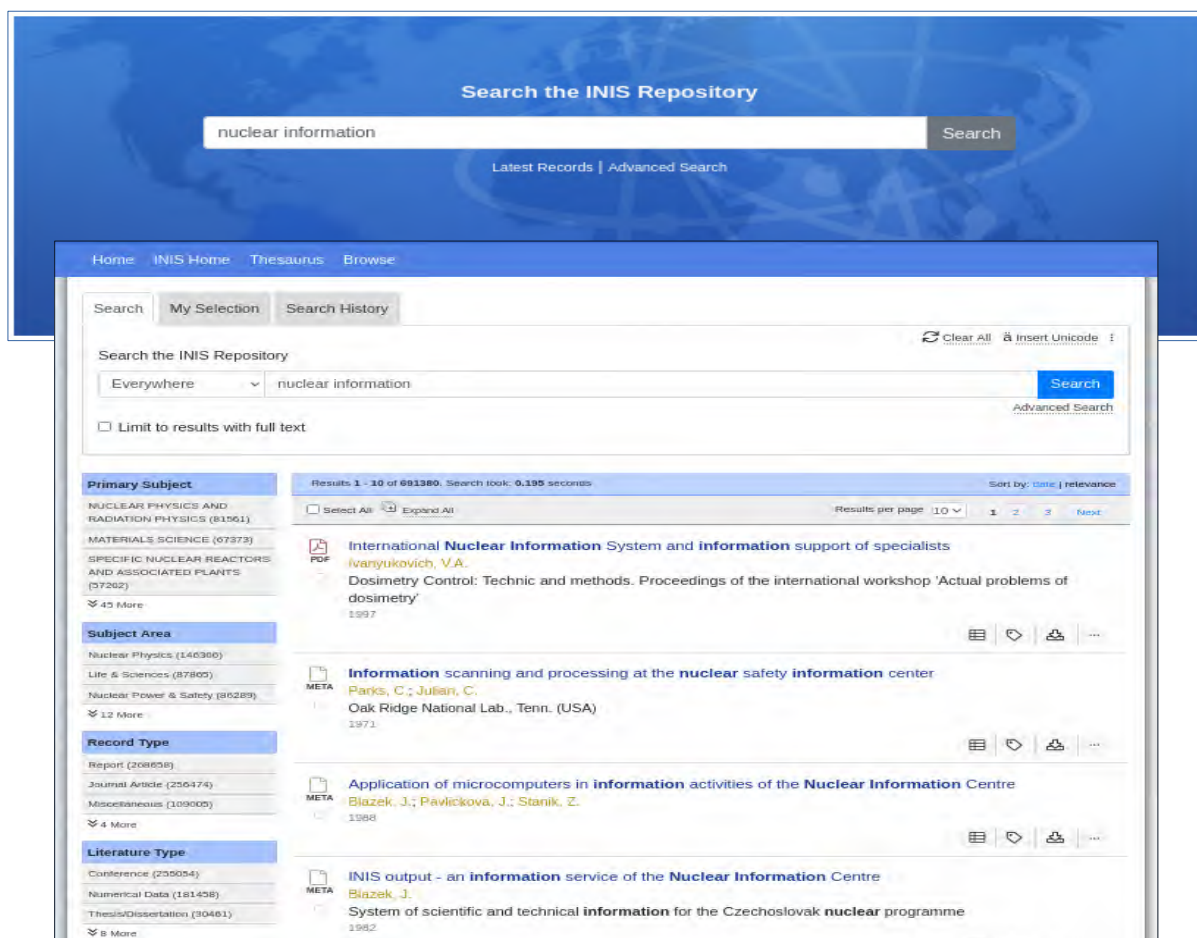
```
{
  "Title": "When is 'grey' too 'grey'? A case of grey data",
  "Creator": "Dobrica Savić",
  "Contributor": "Nuclear Information Section, International Atomic Energy Agency, NIS-IAEA, United Nations",
  "Abstract": "This paper discusses the importance of trustworthiness in news and information, particularly in the context of grey data. It covers various aspects of grey data, including its definition, characteristics, and challenges in ensuring its veracity and usability.",
  "Keywords": "grey literature, grey data, trustworthiness, information reliability, data integrity",
  "Date": "2019",
  "Type": "Text",
  "Format": "PDF",
  "Identifier": "ISBN 978-90-77484-33-3",
  "Source": "Conference Proceedings: Twentieth International Conference on Grey Literature. New Orleans, USA. December 3-4, 2018.",
  "Language": "English",
  "Coverage": "European Union, United States, Russia, China, Japan",
  "Rights": "© TextRelease 2019"
}
```

User Experience

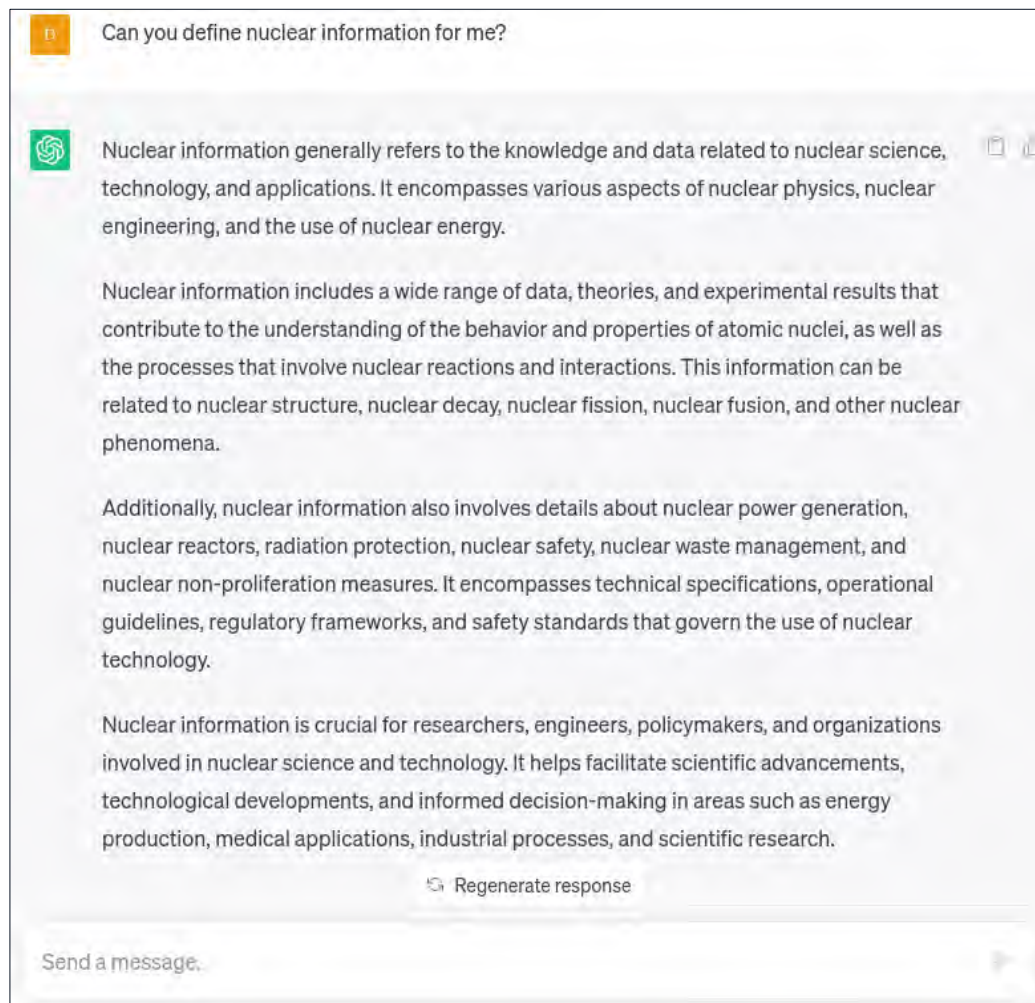
To illustrate the disparity between future user experiences and current interfaces, let's examine a sophisticated and widely used search interface within the INIS (International Nuclear Information System) repository (INIS, 2023). Additionally, we'll explore an example of utilizing ChatGPT to inquire about the same subject, specifically, 'nuclear information.'

The INIS repository's search interface offers diverse search options, allowing users to explore all content, bibliographic records, or exclusively access full-text content. Furthermore, it provides the ability to refine results to those with full-text access. Boasting nearly 700,000 identified results, users can sort findings by relevance, date, and the number of records displayed per page. Further granularity is available through primary subjects, subject areas, record and literature types, conference and journal titles, publication years and ranges, country of publication, language, descriptors, and INIS volume. It stands as a robust and all-encompassing search engine offering numerous

search facets. However, the user's specific requirement was simply a definition and potential clarification of 'nuclear information.'



In contrast, ChatGPT swiftly analyzed the search prompt, providing a succinct definition of nuclear information accompanied by a descriptive overview of its coverage, associations, likely related areas, and significance. This stark contrast in output signifies the potential time-saving for searchers aiming to grasp the initial definition and core elements of nuclear information. In contrast, ChatGPT swiftly analyzed the search prompt, providing a succinct definition of nuclear information accompanied by a descriptive overview of its coverage, associations, likely related areas, and significance. This stark contrast in output signifies the potential time-saving for searchers aiming to grasp the initial definition and core elements of nuclear information.



It's important to note that this comparison doesn't establish superiority but highlights a distinct approach. Ultimately, users can determine which method best aligns with their needs. A blend of both interfaces might present the most advantageous and practical solution.

Dialog

Moving from a DB-type Boolean search (Socialtalent, 2023) user interface to a ChatGPT interface offers several advantages. Here are five major benefits of a search system that provides replies instead of simply pointing to external info-sources:

Natural language interaction: ChatGPT's conversational interface allows users to interact with the system using natural language queries and receive responses in a conversational manner. This eliminates the need for users to formulate complex Boolean queries or understand the underlying database structure. It also makes the search process more intuitive and user-friendly, resembling a conversation with an expert rather than navigating through a rigid search interface.

Contextual Understanding: ChatGPT's advanced language model enables it to understand the context of user queries and provide relevant and contextualized responses. Instead of providing a list of potential sources for further search, ChatGPT can directly address user queries, offer explanations, or provide specific information within the conversation. This contextual understanding enhances the user experience by reducing the cognitive load associated with searching for and evaluating multiple sources.

Personalized recommendations: ChatGPT can leverage its understanding of user preferences and previous search queries to offer personalized recommendations. By analyzing user behavior and feedback, the system can adapt and refine its responses,

ensuring that the information provided aligns with the user's needs and interests. This personalized approach enhances the user experience by tailoring the search results to individual requirements and increasing the relevance and usefulness of the information provided.

Improved efficiency and time saving: With a ChatGPT interface, users can quickly obtain relevant information without the need to browse through multiple sources or sift through lengthy search results. The conversational interface allows users to directly ask questions and receive concise answers or summaries, saving time and effort. Additionally, the system can provide additional context, related information, or follow-up questions to further refine the search and provide a more comprehensive understanding of the topic.

Collaboration and knowledge sharing: ChatGPT can facilitate collaboration among users by enabling features like document sharing, commenting, and annotation. Users can engage in discussions, share insights, and collectively contribute to the repository's content.

Conclusions

In conclusion, it is evident that grey literature is a valuable information resource. It provides diverse perspectives, bridges existing information gaps, delivers timely and current information, and substantiates evidence-based decision-making.

ChatGPT presents an exceptional opportunity for leveraging grey literature. It boasts outstanding natural language processing capabilities, contextual understanding, human-like response generation, widespread use across diverse domains, and immense potential to revolutionize information systems while enhancing user experiences.

The collaboration between grey literature and ChatGPT can yield excellent synergy. ChatGPT can enhance all phases and functions of information management, offering web scraping for pertinent publications, automatic tagging, and metadata creation. It augments user experiences with improved interfaces and valuable natural language dialogues.

The future of grey literature remains a shared responsibility. While acknowledging the need for further enhancements and developments in grey literature management, progress must be built upon the successes already attained. Advocacy for the significance of grey literature needs amplification alongside the development of standards and guidance materials. The potency of grey literature hinges on collective cooperation, necessitating innovative leadership. In summary, the future of grey literature is contingent upon our collective actions.

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Institute of Information Science and Technologies, ISTI-CNR	Italy
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University of Twente	Netherlands
University of Wisconsin—Milwaukee	USA

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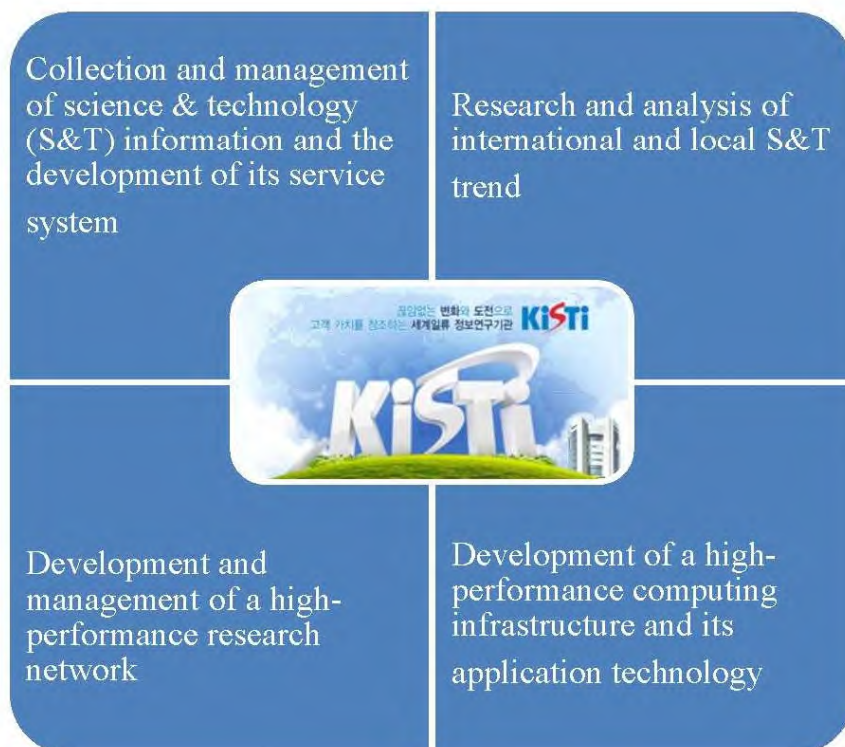
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