

Changing the Narrative About the Geosciences: Connecting Research to the United Nations Sustainable Development Goals

By Phoebe McMellon, CEO GeoScienceWorld

Note: The results of this project were originally presented at the Geological Society of America Connect 2022 conference and has been adapted for the GSIS Newsletter.

Introduction and Background

From a lack of educational requirements and standards, to close association with extractive industries in which employment opportunities are associated with boom-and bust-cycles, to a decline in research and funding, the geosciences are faced with significant challenges in terms of perception. Particularly, younger generations often see fields such as biochem, biotech, nanoscience, material sciences and the computer sciences as more attractive fields of study than the geosciences. According to several reports and studies conducted by the American Geosciences Institute and others over the past decade, the geosciences is perceived as less prestigious, lacking in technical difficulty, and less lucrative relative to other physical and biological science professions and industries (Figure 1).

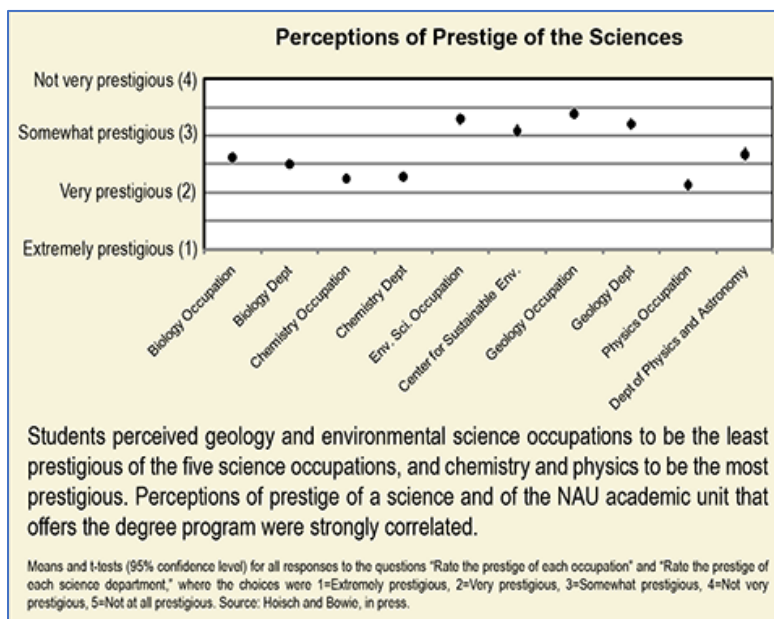


Figure 1. Perceptions of Prestige of the Sciences (Hoisch, 2010).

Analysis published by the American Geosciences Institute indicates that 2019/20 undergraduate and graduate enrollment dropped by 10% and 27%, respectively. More detailed analysis showed that in geoscience graduate programs enrollment in master's degree programs dropped by 23% and enrollment in doctoral programs dropped by 29% (AGI Currents, 2021). These trends are concerning on multiple levels and it is critical for the geosciences community - societies, academic departments (faculty, researchers and students), corporate professionals and librarians and information managers - to work together to change the narrative and to raise

awareness of the many ways (direct and indirect) in which the geosciences contributes and benefits the global community.

Since the development of the UN Sustainable Development Goals in 2015, many geoscience organizations have demonstrated the qualitative contributions of geoscience research and specific subdisciplines support the advancement of the United Nations (UN) Sustainable Development Goals (SDGs). Given the employment and enrollment trends and following on the work of other organizations that have mapped out the qualitative contribution on the UN SDGs, GeoScienceWorld undertook a project in attempt to quantify the contribution and impact of geoscience research on the goals.

GSW SDG Mapping Project – Methods and Results

GeoScienceWorld (GSW) is a nonprofit collaborative, found in 2004, by seven of the leading geoscience societies with the goal of bringing high quality, peer-reviewed society publications together online in a single platform. As a nonprofit, our mission is to strengthen the long-term sustainability and viability of society publishers in the earth and planetary sciences and deliver knowledge and insights to the research community via the GeoScienceWorld platform at affordable price.

Today, our platform supports over 35 society publishers and 50+ journals, delivering over 205,000 articles covering 12 major subject areas and 78 subdisciplines to academic and corporate institutions in over 49 different countries. As a nonprofit, GSW has returned over \$53M in royalties back to the societies so that they can successfully achieve their missions and support their communities. It was the content on the GSW platform that inspired us to see if we can leverage the individual research articles to map to the SDGs to try and quantify the impact of the research being produced.

Using SciVal¹, a research performance analytics tool that reports on emerging trends and the impact of thousands of research institutions and associated researchers, GSW was able to analyze at total of 38,000 articles published from 2012-21 from 49 journals to the UN Sustainable Development Goals.²

Total articles evaluated



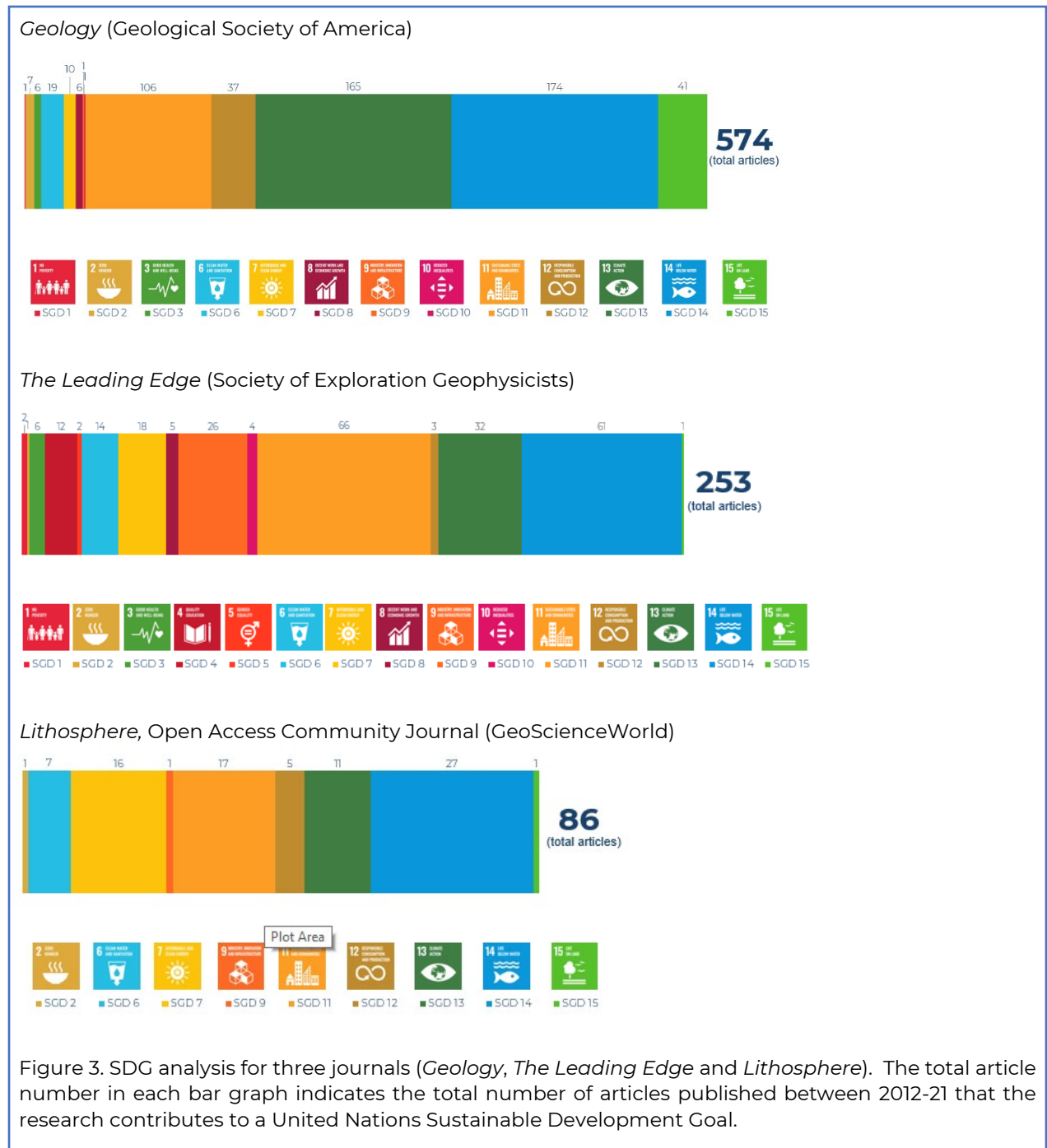
Figure 2. Total articles included in the GSW SDG Mapping Project.

¹ About SciVal Sustainable Development Goal Data - SDG metadata was originally developed in collaboration with The Times Higher Education University Rankings to track and demonstrate institutional research output and progress toward the SDG targets. SDG metadata only includes 16 of the 17 SDGs due to complexity in defining and quantifying SDG 17 accurately. SDG results only include publications that use search query keywords which are matched by machine learning (thus not perfect and can miss publications). More than one SDG can be attributed/tagged to a publication, but no more than four.

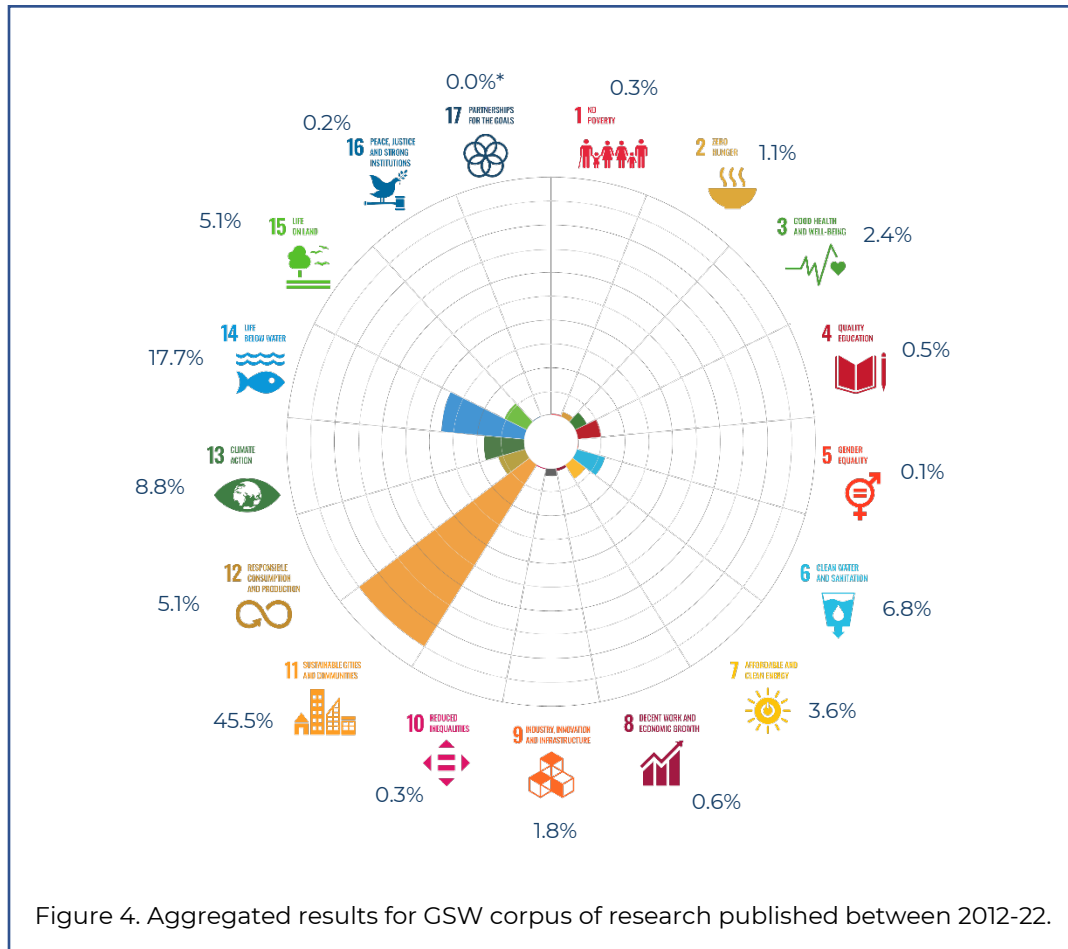
² Note that 3 (Bulletin of Canadian Geology, The Seismic Record, SEG Discovery) of 53 GSW journals could not be included in this analysis because they are not indexed in Scopus. SciVal leverages the metadata generated from Scopus.

SDG data from SciVal was exported and evaluated for each individual journal and for the entire corpus of research aggregated under the GSW platform.

Figure 3 shows the results for three journals: *Geology*, published by the Geological Society of America, *The Leading Edge*, published by the Society of Exploration Geophysicists and *Lithosphere*, published by GeoScienceWorld. For the journal *Geology*, the results show that 20% of articles published between 2012-21 map to 13 SDGs. For *The Leading Edge*, 15% of the articles published between 2012-21 map to 15 SDGs and for *Lithosphere*, 14% of content published between 2012-21 maps to nine SDGs.



When looking at the aggregated results the GSW journals, 22% of 38K articles mapped to 16 SDGs³ as shown in Figure 4, with the largest contribution being on Sustainable Cities and Communities (SDG 11), followed by Life Below Water (SDG 14), Climate Action (SDG 13), Clean Water and Sanitation (SDG 6), Life on Land (SDG 15) and Responsible Consumption and Production (SDG 12).



Conclusion

The GSW SDG Mapping Project is important because it outlines a simple methodology to quantify the impact of geoscience research on society as measured by contribution to the UN Sustainable Development Goals.

Future work includes expanding the number of journals included in the analysis (i.e., all earth science pubs) to further quantify the impact, comparing the results to identify trends within subdisciplines (e.g., hydrology, seismology) and comparing geoscience results with other sciences, e.g., chemistry, physics and biology.

In addition, we will continue to share the data and results with our society partners and the larger community to influence and change the narrative so that we can reverse some of the trends we see in enrollment and inspire the next generation of

³ Note data for SDG 17 data is not currently available in SciVal.

geoscientists to use their work and research further our efforts to eradicate global poverty, promote social equality and economic stability for all.

Connecting the geosciences to the UN SDGs, both qualitatively and quantitatively, is critical for changing perceptions and inspiring the next generation of geoscientists. We need to accelerate our communications and align like-minded organizations across the globe to be persistent in communicating this connection to the younger generations as well as to the politicians and governments that fund scientific research.

References

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