Education on the Geographic Indicators of the Sustainable Development Goals in Uruguay

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Key words: Education, research, Sustainable Development Goals, geospatial indicators.

SUMMARY

As part of the programs of the degrees of Land Surveying Engineering and Cartography Technologist given by the University of the Republic, two research courses on the measurement of the Sustainable Development Goals (SDGs) in Uruguay have been implemented. Their purpose was to bring students closer both to the research methodology, and to the measurement of SDG indicators, as well as to conduct a study on the use of SDG geographic indicators in Uruguay.

In this sense, a working team, for each course, was created, integrated by students from both careers, who became familiar with the SDGs. The members of the team elaborated the state of the art on the measurement of these indicators with emphasis on the geographical ones. During each course, different methodological guides available to measure indicators were analyzed, the data obtained was systematized, current gaps between the suggested international procedures and the way they are measured in our country were identified and, finally, some methodological proposals were made.
Some of the final products were reports and presentations to both fellow students and as part of an international event to the public in general.
The final product of the first module included a first diagnosis on the measurement of the geographical indicators of the SDGs in our country, the weaknesses detected in the application of the available international guides, as well as future lines of research to further deepen the subject.
As a second stage of this pedagogical proposal, a second course on the subject was held, in which the measurement methodology used in our country and the applicability of the existing methodological guides at a global level were analyzed in detail; some weaknesses in these procedures were identified and proposals and recommendations were made to strengthen and systematize the construction of these geographical indicators.
With these objectives, it has been possible to introduce students not only to the research field but also to the understanding and reflection of the application of different tools and techniques

of spatial analysis that allow measuring the SDGs. Additionally, it was concretized with the application to a specific territory of the country.
It is a pedagogical experience that allows entering the world of the SDGs from a practical perspective that leads each student to specifically foray into geographic indicators, understand their importance and propose alternatives for their correct measurement, follow-up and monitoring.

RESUMEN

En el marco de las carreras de Ingeniería en Agrimensura y del Tecnólogo en Cartografía de la Universidad de la República, se ha implementado el dictado de dos módulos de investigación sobre la medición de los Objetivos de Desarrollo Sostenible (ODS) en Uruguay; la finalidad de estos módulos consiste en acercar al estudiante a la metodología de investigación y al aprendizaje sobre la medición de los indicadores de los ODS, así como realizar un estudio sobre el uso de los indicadores geográficos de los ODS en Uruguay.

En este sentido, se conformó un equipo de trabajo integrado por estudiantes de ambas carreras, que se familiarizaron con los ODS. Los integrantes de este equipo elaboraron el estado del arte sobre la medición de sus indicadores con énfasis en los geográficos, analizaron las diferentes guías metodológicas disponibles para medirlos, sistematizaron los datos obtenidos, identificaron brechas actuales entre los procedimientos internacionales sugeridos y la forma de medición en el país y, finalmente, realizaron algunas propuestas metodológicas. Como entrega final, han elaborado informe y varias presentaciones en otros cursos de la formación, así como en un evento internacional en otra Universidad.
La entrega final del primer módulo incluyó un primer diagnóstico sobre la medición de los indicadores geográficos de los ODS en nuestro país, los puntos débiles detectados en la aplicación de las guías disponibles, así como también futuras líneas de investigación para seguir profundizando en la temática.

Como segunda etapa de esa propuesta pedagógica se realizó un segundo curso sobre la materia, en el que se analizaron detalladamente, para algunos indicadores en particular, la metodología de medición usada en nuestro país y la aplicabilidad de las guías metodológicas existentes a nivel global; asimismo, se identificaron algunas debilidades en dichos procedimientos y se elaboraron propuestas y recomendaciones para fortalecer y sistematizar la construcción de dichos indicadores geográficos. Con estos objetivos se ha logrado introducir a los estudiantes no sólo en la investigación sino en la comprensión y reflexión de la aplicación de diferentes herramientas y técnicas de análisis espacial que permiten medir los ODS, adicionalmente se concretó con la aplicación a un territorio específico del país.

Es una experiencia pedagógica que permite ingresar al mundo de los ODS desde una mirada práctica que lleva, a cada estudiante, a incursionar específicamente sobre los indicadores geográficos, comprender su importancia y proponer alternativas para su correcta medición, seguimiento y monitoreo.

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1. INTRODUCTION

The Sustainable Development Goals (SDGs) are a set of universal goals, targets and indicators that UN member states have committed to use to frame national and international development policies over the next 15 years. They build on the progress made under the Millennium Development Goals (MDGs), which were agreed by governments in 2001 and expired in 2015. While the MDGs focused on reducing extreme poverty in all its forms, the SDGs encompass a broader agenda that includes the social, environmental, and economic aspects of sustainable development, relevant to all countries of the world.
The SDGs form the backbone of the 2030 Agenda for Sustainable Development, which was ratified by all UN member states at the 2015 UN General Assembly. Its 17 goals and 169 targets address crucial issues facing the world today, such as eradicating extreme poverty, combating global inequality and climate change, promoting sustainable urbanization and industrial development, protecting natural ecosystems, and promoting the growth of peaceful and inclusive societies and government institutions. A set of 231 indicators (United Nations, 2021) was developed to measure progress towards the SDGs and related targets, within and across countries. Several of these indicators have a strong geographical component as they have a direct relation with the territory.

Both at the international and national levels, it has been detected that there is a great absence of training in topics related to the SDGs; in particular, this can be affirmed in the case of the careers of Surveyor Engineer and Cartography Technologist in Uruguay. These can be affirmed based on the background knowledge of the author since she is the chair of the Academic Network of UN-GGIM: America and she was the director of the Land Surveying Institute (the unique institution that gives this education in her country). Although the SDGs might be mentioned in some way in some course, they are not the subject of study in any of the mandatory courses included in the curricula of both disciplines. Additionally, the students' academic training in research is very weak.

Supporting these statements, the main conclusion of the UN-GGIM Meeting of the Expert Group on Land Administration and Management in 2017 was that a revision of Land Administration Domain Model was indeed needed in order to provide better tools to improve

tenure security and better land and property rights for all. In addition to this, other authors state that it was noted that land administration is a rather complex domain, and thus the revision will involve many stakeholders, and include providing reliable Land Administration Indicators for the Sustainable Development Goals (SDG) (van Oosterom et al, 2019).

Besides, since 2015, the community, forming the Group on Earth Observation (GEO), has begun to support and implement projects for the development of the Global Earth Observation System of Systems (GEOSS). (Kussul, 2019). Earth Observations (EO) can play an important role both for generating the indicator in countries where it is missing, as well complementing or enhancing national official data sources. (Giuliani et al, 2020). Therefore, it can be stated that our societies require professionals that can deal and manage this geoinformation with special focus on monitoring SDGs.

Hence, as the use of this information is one of the most relevant areas in the knowledge of land surveyors and cartographers, the education of SDGs with focus on the comprehension of the geographical indicators is a must for our universities or academic centers. So, to cover these deficiencies, a pedagogical proposal was designed which includes learning about the SDGs, from a geographical perspective, as well as an introduction to the research methodology.
In particular, the modules presented in this article aim to conduct research on the use of geographic indicators and their measurement in Uruguay.

2. METHODOLOGICAL PROPOSAL

The syllabuses of the Engineering in Surveying (Universidad de la República, 2021) and the Technologist in Cartography (Facultad de Ingeniería, 2021) of the Universidad de la República, offer the possibility of carrying out research modules as an optional activity.
Within the statutes of the study plan, according to the page of the Surveying Career Commission, the research modules are described as follows:

> Research modules is [sic] an optional activity for Surveying students.
> The activity will be developed under the supervision of a professor or a group of them according to the parameters of the proposed research. The person or persons responsible for the supervision must present to the Career Committee a plan of the research and the way in which the students will participate. This plan must contain, at least, the scope of the tasks, the deadlines, the means to carry it out, the objectives of the proposal and the credits to be assigned. It must also inform if the activity has a quota and the form of selection of the [sic] students.
> The approval of the proposal as adequate for the students to carry out the activity is the responsibility of the Career Commission.

> Students will be able to accumulate up to 10 credits in this type of activities, which can be obtained with up to two modules throughout the course. The credits will be assigned to the corresponding area of knowledge according to the subject matter of the module.

It is worth clarifying the concept of credit defined in Article 8 of the Ordinance (Universidad de la República, 2014) of undergraduate studies and other tertiary training programs of the Universidad de la República:

> Credit is defined as the unit of measurement of the academic work time devoted by the student to achieve the training objectives of each of the curricular units that make up the curriculum. A credit value of 15 hours of student work will be used, including class hours or equivalent activity, and personal study hours.

In compliance with these regulations, the program for the research modules "Use of geographic information for monitoring the SDGs in Uruguay" 1 and 2 were presented to the Career Commissions of Surveyor Engineer and Cartography Technologist, who analyzed, considered, evaluated, and approved both modules.

In each module, a team of students was formed to carry out the following activities: study of the state of the art in the measurement of SDG geographic indicators in Uruguay, analysis of the different existing methodological guides for each indicator, understanding of national reports, systematization of the data obtained, identification of current gaps and proposal of alternative procedures.

To form this team, students from the Surveying and Cartography Technologist careers were offered places, requiring a minimum dedication of 10 hours per week for two months. This task implied the assignment of 5 academic credits that were validated for the students of Surveying in the thematic area of Geographic Information Systems. While for the students of the Cartography Technologist the credits have been assigned to the Geomatics thematic area.

Another important aspect, which was informed to the applicants, is that they should be available to attend the general informative meetings, as well as all the specific meetings required by the responsible teacher. For this purpose, weekly group meetings were scheduled. Furthermore, given that the first module started in the second semester of 2020 and the second module in the second semester of 2021, being in the middle of the COVID-19 pandemic, the exchange was carried out virtually, so that active participation in the meetings played a key role in achieving the proposed objectives.

Regarding the didactic units included in each module, a teaching process was designed for each of them, including specific activities to achieve the objectives.

Objectives of the course

The above-stated modules have the following pedagogical objectives:
- Bring students closer to the knowledge of the SDGs;
- Introduce students to research methodologies;
- Promote a critical spirit in the approach to analysis;
- Encourage the development of proactive processes to measure geographic indicators;
- Encourage interdisciplinary work;
- Introduce students to the writing of scientific articles and the dissemination of projects;
- Promote the development of communication activities, through the elaboration and realization of reports, reports, and oral and written presentations at national and international level.

The general objective of the research was to make a diagnosis of the use/measurement of the geographical indicators of the Sustainable Development Goals in Uruguay. Objective that was analyzed by carrying out two consecutive modules.

Under this context, it was proposed to answer the following research question: What is the state of measurement of geographical indicators for monitoring the Sustainable Development Goals in Uruguay?

The specific objectives of module 1 were the following:
- Select which indicators will be considered as geographic indicators for this research, based on the review of international tables, such as the "short list results of the analysis of the Global Indicator Framework with a "geographic location" lens"[1] elaborated by UN-GGIM (2017) and the table related to land issues, shown in the The Land Portal[2] (2022);

- Carry out a diagnosis of the status of the survey of the geographical indicators of the SDG in our country, reviewing academic literature and using the voluntary national reports (Estado Uruguayo, 2021);

- Identify strengths and weaknesses of the measurements carried out;

- Analyze the applicability of the existing methodological guidelines at a global level to our country, by analyzing the existence and accessibility to the geographic data needed to measure each geographical indicator as well as trained professionals;

[1] https://ggim.un.org/meetings/2017-4th_Mtg_IAEG-SDG-NY/documents/WG's_Initial_Shortlist-Table_A_B.pdf
[2] https://landportal.org/node/5226

- Analyze official national documents reporting the measurement of indicators, including the indicators that were measured and how they were calculated;

- Introduce students to the different techniques applied to measure the SDGs and their evaluation through a concrete project in which the different concepts involved would be seen.

As some of the objectives took more time than expected and others were not approached during the first module, therefore they were added to be carried out in the second module.

Therefore, the specific objectives of Module 2 were:
- Identify strengths and weaknesses of the measurement of SDG geographic indicators in our country;

- Analyze, for some specific indicators, the applicability of the existing methodological guidelines at the global level to our national level, by analyzing the existence and accessibility to the geographic data needed to measure each of some selected indicators in a specific region of our country;

- Introduce students to the different techniques applied to measure the SDGs to let them evaluate which of them can improve the way the geographic indicators are being measured and propose suggestions.

Roadmap and Results: Module 1

The teaching process in module 1 included the following activities and their outcomes:

1.Learning about the SDGs, their indicators and identification of geographical indicators.

After students comprehended the relevance of the SDGs, it was necessary to select the indicators that would be considered as geospatial for this course. The definition of geographical indicator, from the point of view of this course, is those related to the location or that can be measured using geospatial analysis. Therefore, after studying each of the indicators a first draft list was made by each of the students and discussed with the whole group. Additionally, other sources and tables were considered to create a final list. The table related to land issues, shown in the The Land Portal[3](2022) and the short list[4] results of the analysis of the Global Indicator

[3] The Land Portal https://landportal.org/node/52263
[4]Shortlist results of the analysis of the Global Indicator Framework with a "geographic location" lens https://ggim.un.org/meetings/2017-4th_Mtg_IAEG-SDG-NY/documents/WG's_Initial_Shortlist-Table_A_B.pdf

Framework with a "geographic location" lens made by the Inter-Agency and Expert Group on the Sustainable Development Goal Indicators[5] (IAEG-SDGS) Working Group on Geospatial Information (2017), were particularly considered in this process.
Finally, these 48 indicators were classified as geographical and selected for this research: 1.1.1, 1.4.1, 1.4.2, 1.5.1, 2.3.1, 2.4.1, 3.9.1, 3.9.2, 3.c.1, 4.5.1, 4.a.1, 5.2.2, 5.4.1, 5.a.1, 5.a.2, 6.1.1, 6.2.1, 6.3.1, 6.3.2, 6.4.1, 6.4.2, 6.5.1, 6.5.2, 6.6.1, 6.a.1, 6.b.1, 7.1.1, 9.1.1, 9.4.1, 9.c.1, 11.1.1, 11.2.1, 11.3.1, 11.5.1, 11.5.2, 11.6.2, 11.7.1, 11.7.2, 11.a.1, 13.1.1, 14.1.1, 14.2.1, 14.5.1, 15.1.1, 15.1.2, 15.3.1, 15.4.1 and 15.4.2.
The above-mentioned indicators included 11 of the 13 indicators presented in The Land Portal and a 100% (all 24) of the indicators identified by the IAEG-SDGS (Figure 1).

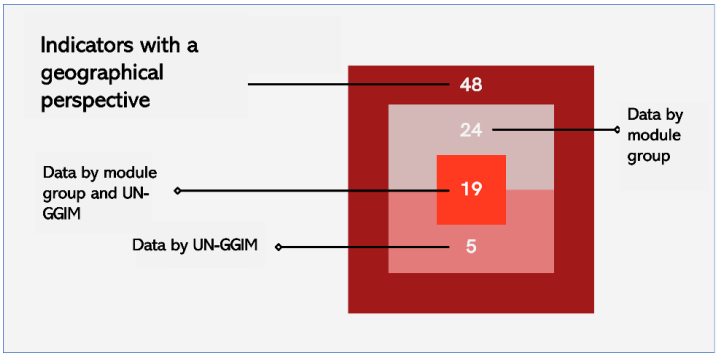

Figure 1: Number of geographic indicators considered in the course and their origin, coming from the students' analysis or from the list made by the Inter-Agency and Expert Group. Source: Presentation made by students of module 2 (2021).

2. Study on the national approach to the SDGs, identifying the institutions responsible and linked to them.
Students reviewed the different existing national, regional, and international literature to understand the scope behind each indicator, and carried out interviews with national referents.

3. Study of the state of the art on the measurement of these indicators in Uruguay, using voluntary national reports (Estado Uruguayo, 2021).
In the website[6] of Presidency of Uruguay national reports regarding the measure of the SDG for the years 2017, 2018, 2019 y 2021[7] are available (seen in Figure 2).

[5] Inter-Agency and Expert Group on the Sustainable Development Goal Indicators: https://ggim.un.org/unggim-wg6/
[6] ODS en Uruguay: https://ods.gub.uy/
[7] Informe Nacional Voluntario 2021
https://ods.gub.uy/images/2021/Informe_Nacional_Voluntario_Uruguay_2021.pdf

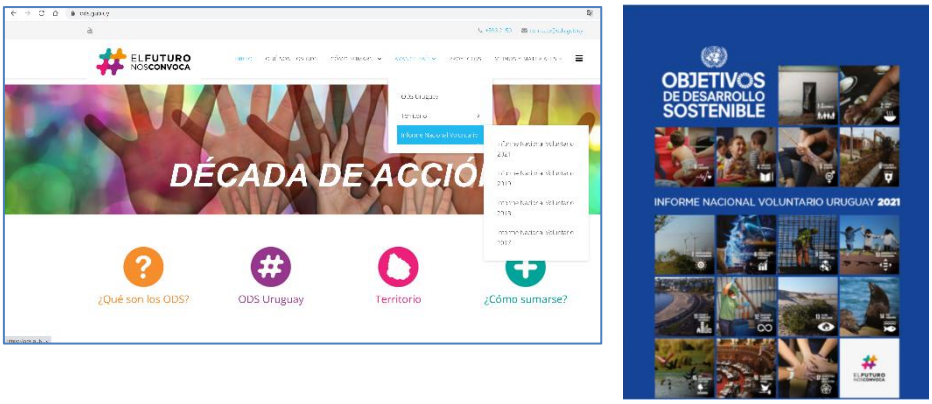

Figure 2: Website of the SDG in Uruguay and the cover page of the Uruguay 2021 National Voluntary Report. Source: Presidency of the Republic, Uruguay (2021).

4. Study of the state of the art on the use of existing international methodological guides in Uruguay.

In table 1 can be visualized the tier status of each indicator (defined by the IAEG-SDGS. Assuming the following definitions for each category: Level 1: The indicator is conceptually clear, has an internationally established methodology and standards are available. Data are regularly generated by at least 50% of the countries and population in all regions where the indicator is relevant. Level 2: The indicator is conceptually clear, has an internationally established methodology and standards are available, but countries do not produce data on a regular basis. Level 3: An internationally established methodology or standards for the indicator are not yet available but are (or will be) developed or tested.

The table also presents if the indicators are being measured in Uruguay and if the international guidelines are being applied for that purpose. The colors show the status of measure of each indicator, green represents that is being calculated and the international guideline is applied, the yellow ones are being measured but not using the international guidelines and the rest highlighted in red are not being measured in Uruguay.

Table 1: Comparative table of the use of international guides for each of the geographical indicator considered in the course.

Indicator	Tier status	Is this indicator being measured in Uruguay?	Using international guidelines?
1.1.1	TIER I	Yes	Yes
1.4.1	TIER I	Yes	No
1.4.2	TIER II	No	

1.5.1	TIER II	Yes	No
2.3.1	TIER II	Yes	No
2.4.1	TIER II	Yes	No
3.9.1	TIER I	No	
3.9.2	TIER I	No	
3.c.1	TIER I	Yes	Yes
4.5.1	TIER II	Yes	No
4.a.1	TIER II	Yes	No
5.2.2	TIER II	Yes	Yes
5.4.1	TIER II	Yes	Yes
5.a.1	TIER II	No	
5.a.2	TIER II	Yes	Yes
6.1.1	TIER II	Yes	Yes
6.2.1	TIER II	Yes	Yes
6.3.1	TIER II	Yes	No
6.3.2	TIER II	Yes	No
6.4.1	TIER II	Yes	Yes
6.4.2	TIER II	Yes	Yes
6.5.1	TIER II	Yes	Yes
6.5.2	TIER I	Yes	Yes
6.6.1	TIER I	Yes	Yes
6.a.1	TIER I	No	
6.b.1	TIER I	Yes	Yes
7.1.1	TIER I	Yes	Yes
9.1.1	TIER II	Yes	Yes
9.4.1	TIER I	Yes	Yes
9.c.1	TIER I	Yes	Yes
11.1.1	TIER I	Yes	Yes
11.2.1	TIER II	Yes	No
11.3.1	TIER II	Yes	Yes
11.5.1	TIER II	Yes	Yes
11.5.2	TIER II	Yes	Yes
11.6.2	TIER I	Yes	Yes
11.7.1	TIER II	Yes	Yes
11.7.2	TIER II	Yes	Yes

11.a.1	TIER II	Yes	Yes
13.1.1	TIER II	Yes	Yes
14.1.1	TIER II	No	
14.2.1	TIER II	No	
14.5.1	TIER II	Yes	No
15.1.1	TIER I	Yes	Yes
15.1.2	TIER I	Yes	Yes
15.3.1	TIER I	Yes	Yes
15.4.1	TIER I	No	
15.4.2	TIER I	No	

Source: Own elaboration.

5. Primary identification of strengths and weaknesses in the measurement of these indicators in our country.

Based on the study of the significance of the variables included in each of the geographical indicators, the analysis of the guidelines and from the interpretation of the national documents regarding the procedures used to calculate those indicators, some comments can be stated. More than 80% of the geographical indicators are being calculated in Uruguay, 60% using recommendations made in the international guidelines, and only less than a 15 % are not being measured, as it is shown in Figure 3.

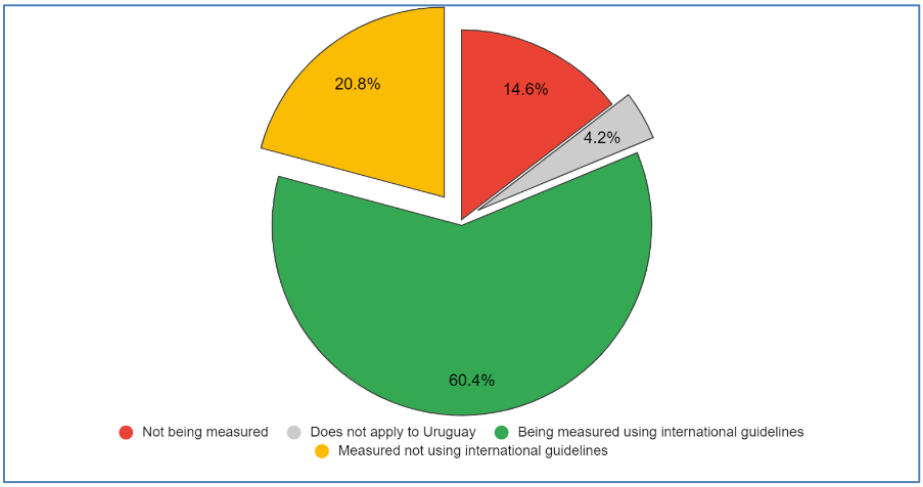

Figure 3: Graph of the results obtained from the analysis of the state of measurement of geographical indicators in Uruguay. Source: Progress Report made by students of module 1 (2021).

Finally, some of the products of this module were:
- Final report including introduction, methodology, results, conclusions, and future lines of research.
- Presentation describing module 1 and video recorded for the annual Engineering Faculty of Engineering dissemination activity (Faculty of Engineering, 2021) (Figure 4).

Figure 4: Website of the Engineering dissemination activity of Engineering Faculty (Left Image) Cover page of the presentation (Right image) Source: Report of Module 1 (2021).

Roadmap and Results: Module 2

The teaching process in module 2 included the following activities and their outcomes:

1. Review of the final report of module 1.

2. Preparation of a publishable article and presentation of module 1, including introduction, methodology, results, suggestions, and conclusions.
As one of the objectives of this course is to make students learn more about researching and writing, creating an article is part of the research process. One of the most difficult challenges the students found when writing the article, was finding the proper words to communicate the results and the knowledge acquired.

3. Review of the geographic indicators studied and selection of the indicators to be analyzed in detail.
After analyzing all the indicators studied on module 1, one was assigned per student (2.4.1, 6.3.2, 6.6.1, 15.1.1 and 15.1.2).

The purpose of this assignment was that each student did a deep comprehension of each of the concepts and variables that make up the indicator. In next figure is presented an example of the concepts considered in the indicators.

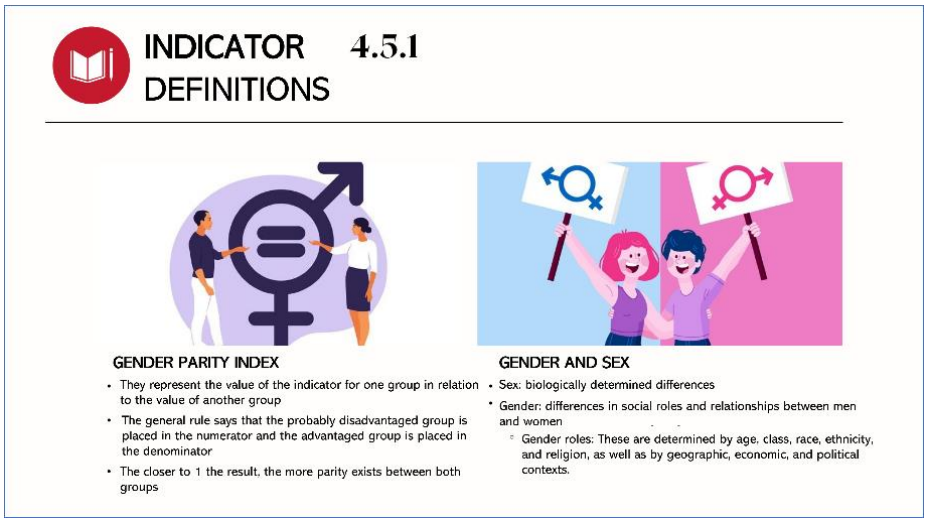

Figure 5: Description of variables used in a specific indicator, 4.5.1: Presentation made by students of module 2 (2021).

4. Study of the measurement of these indicators at national level, analyzing voluntary national reports.

Once students had understood the purpose of each indicator and the concepts involved, they had the knowledge required to analyze the pertinence of the measurement carried out in the country. In order to work on that, they made a draft document with their own proposal describing how to measure this indicator and specifying which geographic data and spatial analysis was suggested.

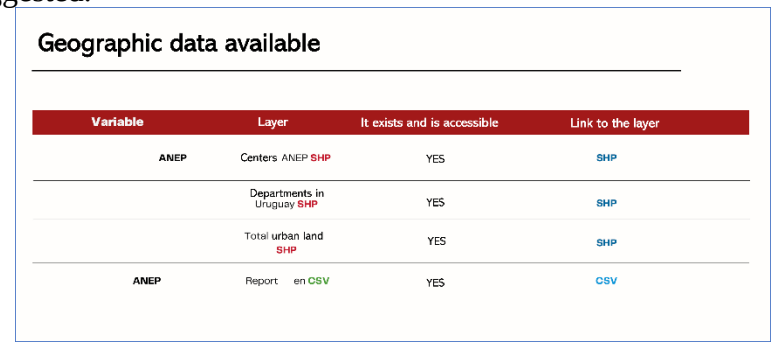

Figure 6: Geographic information used for the calculation of a case study indicator. Source: Presentation made by students of module 2 (2021).

After they had completed this proposal, they proceeded to study the information regarding the indicator in the National Report of the different years[8].

5. Analysis of the different existing international methodological guides to measure the selected indicators.
After the students had acquired the knowledge of what is expected to be measured for each indicator, as well as which is the procedure applied in Uruguay to calculate it, they study the information and recommendations described in the international guide. The international guide used for each selected indicator are shown in table 2.

Table 2: Links to the International Guide corresponding to each of the selected indicators.

Indicator	International Guide
2.4.1	https://unstats.un.org/sdgs/metadata/files/Metadata-02-04-01.pdf
6.3.2	https://unstats.un.org/sdgs/metadata/files/Metadata-06-03-02.pdf
6.6.1	https://unstats.un.org/sdgs/metadata/files/Metadata-06-06-01a.pdf https://unstats.un.org/sdgs/metadata/files/Metadata-06-06-01b.pdf
15.1.1	https://unstats.un.org/sdgs/metadata/files/Metadata-15-01-01.pdf
15.1.2	https://unstats.un.org/sdgs/metadata/files/Metadata-15-01-02.pdf

Source: Own elaboration.

6. Application of the methodological proposal to a specific region in Uruguay.
As it is shown in figure 7, each student analyzed the feasibility of applying the methodology to a particular region of Uruguay, Department of Durazno.

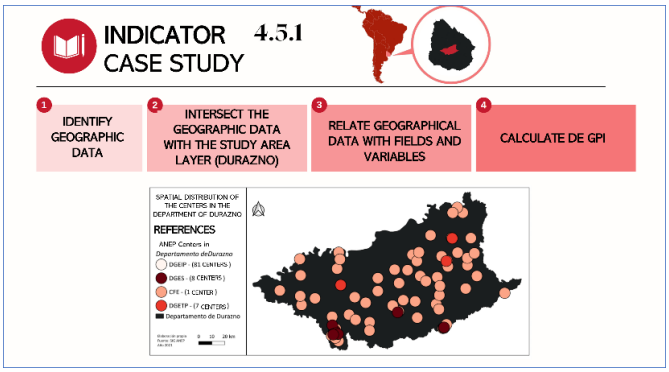

Figure 7: Diagram of the analysis process used. Source: Presentation made by students of module 2 (2021).

[8] ODS en Uruguay: https://ods.gub.uy/

7. Identification of strengths and weaknesses for the application of these guidelines to our country.
Students presented a report describing the process and the strengths and weaknesses found in the measurements of SDGs in Uruguay as well as, presenting a proposal of how to improve it.

Finally, some of the products of this module were:
- Refined database of selected indicators.
- Final report including methodology, specific analysis of each selected indicator, results, and suggestions.
- Descriptive presentation of module 2.

Figure 8: Cover of presentation made at the activity organized by the University of Panama. Source: Presentation made by students of module 2 (2021).

- Proposal for an article to be published in a national or international journal and/or congress.

3. CONCLUSIONS AND RECOMMENDATIONS

Regarding the research itself, interesting conclusions were reached. A 21% of SDG indicators was identified as geographical. Therefore, geospatial knowledge plays a leading role when it comes to monitoring, evaluating, and monitoring the degree of progress achieved in each objective of sustainable development. It becomes clear that specific training and education on the use of geographic information and on SDG are essential.
Each geographic indicator selected is categorized as conceptually clear, has an internationally established methodology and standards are available. But only 60% of them are tier 2, which means that countries do not produce data on a regular basis. This make us think that there are no guarantees that countries are measuring them, either due to lack of data and/or lack of professionals capable of generating them.

Regarding Uruguay, numbers are surprising, since a 81% of the 48 geographic indicators are being measured. Although there are methodological guidelines for all of them, only 60% are

measured using the international proposal. The remaining 21% are using supplementary indicators which differ, in some way, from the concepts presented in the definition of the corresponding indicator.

The results accentuate the importance of having professionals trained in these disciplines to contribute to the measurement of the SDGs and therefore play a leading role in supporting decision making. It highlights the need to include this training in the academic agenda regarding geographic and environmental issues as well as in research.

On the other hand, as the main goal of this article is to disseminate the experience of this course, some comments regarding this pedagogical proposal are included. This course is a proposal that builds links between an environmental, geographic, and academic point of view and allows expert training in the use of geographic information, bringing them closer to the understanding of the measurement of the Sustainable Development Goals.

It has enhanced students' knowledge providing them with new tools both to get started in research and to contribute to the measurement of the SDGs. But as this course is optional and not mandatory for students from the careers of Engineering in Surveying and Cartography Technologist at the University of the Republic, not all of them will receive this knowledge. The future of this course is on the hands of the students and their desires, and whether they understand the impact that knowing these concepts will have in their future life as professionals.

Besides, based on the statements provided by the students, it can be stated that this course had enormous benefits in terms of acquiring new concepts but also it has proved to be beneficial in introducing students to their first research approach. However, some lessons were learnt that could improve future courses. Both modules were ambitious regarding the number of hours and work required to complete the activities proposed initially, especially considering the time required to write an article and a report. This puts a spotlight on the need of improving students' writing skills, as these are not their strongest ability. Additionally, some students stated that more interaction between them and professionals and public institutions working in this thematic would have been helpful but could not be done within the length of the course. Students' comments make visible that they have a huge interest in continuing studying this thematic.

As this was a good overall experience, and the activities involved can be easily applied, it is strongly suggested to incorporate them in the educational curricula from different countries and communities.

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