



# An Educational Gaze From the International Union of Soil Sciences

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A lack of fertile soil is already a serious problem due to its role in access to sufficient food and water, but more serious are the social situations that its deficit engenders: loss of food safety and public health, poverty, displacement, inequality, violence, and injustice as a result of famine. The loss and degradation of the soil resource means the loss of all terrestrial flora, and with it, that of the fauna that it feeds. It also means a terrible loss of biodiversity at the planetary level, a serious destruction of the food chain of which we are a part, as well as the reduction of its capacities of available water reserve and C capture to lessen climate change in the long term and with immediate effects. In this context, the protection of the soil resource and an interdisciplinary and innovative education and practice of sciences to raise citizens' awareness of the importance of its preservation—with all the sciences collaborating as a team in a mediatized world—are keys to achieving the Sustainable Development Goals, and therefore, are the long-term goals and prioritized objectives of the International Decade of Soils of the IUSS, and they form the basis of its educational project.

**Keywords:** soil science, education, awareness, creative literacy, interdisciplinary teaching

## INTRODUCTION

As we know, the International Union of Soil Sciences (IUSS) constitutes 60,000 scientists around the world; however, the number of inhabitants on this planet according to the UN is 8.0 billion (UN, 2024), and the vast majority of them do not know why soil is essential for the provision of food to eat, water to drink, and clean air to breathe, fundamental for the realization of all biogeochemical cycles and therefore an indispensable resource for the existence of life on Earth. This means that less than 1% of the world's inhabitants do not know how important the soil resource is for their daily lives. For this reason, the IUSS's "International Decade of Soils 2015–2024" (Horn, 2015; IUSS International Decade of Soils Programme, 2016) has defined two large priorities: "Stop land degradation as the most insidious and underestimated challenge of the 21st century to be defeated," and to achieve this, the "main the focus of our activities should be on school age children (who will be teenagers and young adults in 10 years' time)." Both tasks entail and demand that IUSS, as a scientific society committed to the sustainability of the resource that is the object of its study, aspires to define and lead both the processes of integral formation of its future scientists, as well as the citizen's awareness for the sustainability of the soil, creating a profound impact on the educational and governance environments (Reyes-Sánchez, 2019).

To achieve both tasks, diverse but concurrent actions that are required are proposed in this document to achieve and enhance the educational objectives declared by the IUSS. Reference is also

## OPEN ACCESS

**Edited by:**

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**Received:** 08 October 2023

**Accepted:** 21 November 2023

**Published:** 05 January 2024

**Citation:**

Reyes-Sánchez LB (2024) An  
Educational Gaze From the  
International Union of Soil Sciences.  
*Span. J. Soil Sci.* 13:12208.  
doi: 10.3389/sjss.2023.12208

made to all those educational actions that have already been undertaken and are currently being carried out.

Similarly to the IUSS, both the “Agenda 2030: an opportunity for people and planet” from (UNICEF, 2017) and the “Reflection Paper Towards a Sustainable Europe in 2030” (EU, 2019), issued by the European Community, recognize that permanent education and learning are indispensable to build a sustainability culture, and that education, science, technology, research, and innovation are a prerequisite to achieve a sustainable economy in the European Union and around the world for compliance with SDGs (UN, 2015).

All these actions are vital to achieve sustainability not only for a continent but at a global level, because there will be no real sustainability for any continent or country if we are not able to build global sustainability. The current challenges to overcome are global challenges.

One of those transcendental challenges is the preservation of fertile soil on the planet and to achieve that, today we need to work to educate and raise awareness about it among the future citizens of the world.

## MATERIALS AND METHODS

### Why Soil?

Because “the soil is a limited resource under increasing pressure” (FAO, 2012), it is “the fundamental basis for food security and the provision of important environmental services” (FAO, 2012), and is also a natural resource in serious danger of loss as a key element for the preservation of all life on the planet, for which it constitutes a common good of humanity (Mar del Plata declaration, 2012).

The soil is a limiting resource because without fertile soil there are no plants or animals to eat, no water to drink, no oxygen to breathe, that is, no life or development to reach or sustain. The soil is therefore the natural resource essential to preserve in order to achieve sustainable development (Reyes-Sánchez, 2018).

### And What Does the Soil Have to do With Achieving the SDGs?

Much, because a lack of fertile soil is already a serious problem due to its role in access to sufficient food and water, but more serious are the social situations that their deficit engenders: poverty, displacement, inequality, and violence and injustice as a result of famine, and our planet is badly hit by these scourges, which is largely due to the degradation of the fertile soils that once produced enough food, and also the consequent lack of fair and honest labor in agriculture. Due to that, this problem is relevant to each one of us because it involves and affects us all (Reyes-Sánchez, 2018).

Sustainable development was defined by the UN (1987) as “development that meets the needs of the present without compromising the ability of future generations to meet their needs.” The 2030 Agenda and its 17 Sustainable Development Goals (SDGs) is a global effort that responds to this definition and expresses the aspiration of the present generation to achieve the proposed goals to improve the lives of all and preserve life on the planet.

The role of the soil resource is, directly or indirectly, an indispensable element to achieving the 17 Sustainable Development Goals. Therefore, preserving the properties and functions of fertile soil through its sustainable management and the preservation of its biodiversity, is essential to making them a reality. However, despite its importance for the existence of life on Earth, in the 17 Sustainable Development Goals, soil is only explicitly mentioned in goal 15.3 of objective 15, which refers to the preservation of life on Earth and terrestrial ecosystems, and in goal 12.4, which corresponds to objective 12 about responsible production and consumption.

It is clear, nevertheless, that without fertile soil, in which clean water is stored and which allows us to produce our food, it is not possible to achieve goal 2 of zero hunger, and therefore, it will not be possible to eradicate poverty to meet objective 1; which, in turn, makes it impossible to guarantee objective 3 of health and wellbeing for all, as well as the provision of drinking water and sanitation according to objective 6, affordable and non-polluting energy as indicated in objective 7, or the mitigation of climate change and preservation of the life of terrestrial ecosystems; as would correspond to the achievement of objectives 13 and 15.

However, none of the 17 SDGs can be achieved if we do not seriously and forcefully implement the SDG that supports and links the other 16: (SDG 4) Quality education and awareness.

Because without quality education and awareness, it is not possible to change knowledge, values, and principles that modify the behavior of a society, nor to build a culture of preservation in it if we do not change the methodology, the contents, and the pedagogical intention of our teaching—scaling it from unidisciplinary practice towards systemic and interdisciplinary teaching (Morín, 1981), and practicing at the same time a teaching committed to social, human, and environmental values (Echeverría, 1995) that build the necessary environmental awareness based on knowledge. Education is, therefore, the link and principle that can allow us to build a new way of living on and with the planet: one that includes respect for humans themselves.

For all these reasons, fertile soil is a common good of humanity that we need to preserve, and whether we do it or not, all our lives depend on it (Declaración de Mar del Plata, 2012).

The protection of the Soil resource and education for its preservation is key to the achievement of Sustainable Development Goals, and for that reason, constitute the long-term goals of the IUSS International Decade of the Soils as its main objectives. That is why, for the International Union of Soil Sciences, addressing soil science education, awareness, and outreach in an interdisciplinary way is fundamental, both to face the environmental challenges of today and to be able to confront those we already perceive for the future.

### Replicating Comenius (1657), in Comenius: 2000, 20–21

*“Man is born as a natural being, but Man is not born. He has to become a Man; in other words, he has to be formed as a Man and will only be a true Man until he has*

*learned to be a Man, but how to transform into a Man?..... To become a Man, he needs to shape through the knowledge of things that come from the experience. If we want to know something, then he has to be learned”.*

For Comenius (2000), the first years of life are compared to soft wax, easy to model, or with small trees that can be transplanted, that is, taken to a new environment so that they can fully develop. According to his pedagogical approach, starting with the energy and interest of children is essential to the educational task that should be carried out in a processual, continuous, and systemic way to build knowledge.

However, in many cases, today’s children are not provided with the richness of teaching environment that allows them to fully develop and acquire the necessary capabilities to respond to the challenges inherent to an environment in crisis. That is why, reflecting on how to educate for sustainability, part of the solution may come from the recognition that, like teaching, learning is not the accumulation of knowledge, and to learn to be a Man, the teacher as well as the student will only be able to be a true Man once they have learned to form themselves as a Man through the knowledge of the things that come from experience.

Therefore, reflecting on why something should be learned is a core issue to deliberate on, not to respond to pedagogical fashions, but because the teacher must define their meta-disciplinary position to reflect, from the adopted worldview, on why teaching is essential and what is the best way to teach children knowledge, so that they can respond to the challenges that life poses to us. But also, to act congruently and carry out an educational practice that allows children to learn to become Man through the knowledge of the things that come from experience, not memorization.

## And How to Become Man?

Educating is not the same as teaching. Educating entails the explicit and implicit formation of values that emotionally and cognitively root the information transmitted, thus making possible the progressive formation of a conscience that in the medium and long term, builds, little by little, a culture (Reyes-Sánchez, 2012).

Educating humans for sustainable development involves training programs in order to improve and deepen knowledge in science, to offer sustainable solutions and defend their own points of view while being able to recognize those of others. However, the idea of the spontaneous regeneration of the soil resource, as well as of all our natural resources and the environment is still deeply rooted in the subconscious of citizens in general and constitutes a serious obstacle to sustainable decision-making; therefore, only an environmental education for the preservation of natural resources from childhood can achieve the changes required for the very existence of resistant and well-managed soils (Gómez and Reyes-Sánchez, 2004).

Educating involves the appropriation of knowledge accompanied by the construction of values that form

principles and constitute the awareness necessary to achieve sustainability (Reyes-Sánchez, 2018; Reyes-Sánchez, 2020). This is the kind of education we need worldwide to achieve sustainability, because as was stated before, there will be no real sustainability for the benefit of some if that sustainability is not global.

This means that science needs to be taught by thinking and working in its teaching as a scientist: teaching science in the classroom, in the field, and in the laboratory; in the same way for children, young people, and postgraduate students, which is congruent with the concepts and methods of the sciences. Choosing questions or problems to define progressive hypotheses or research questions for the problem that we intend to solve, and proposing how to methodologically solve such research questions, helps to delimit the steps that need to be followed in order to respond to it. Therefore, to answer the questions through the progressive hypotheses, science teaching as a scientific activity must have a goal, a method, and an application field appropriate to the school context that allows the answer to the research questions that arise from the observation and definition of problems to study (Reyes-Sánchez, 2009).

In this regard, if the problem is the accelerated loss of the soil resource that makes life on the planet possible, the goal is to achieve their preservation, the method is the environmentalization<sup>1</sup> of knowledge: permeating the school curriculum not as a teaching resource, but as an agglutinating principle for all subjects treated within the everyday classroom; interconnecting the soil knowledge from any disciplinary perspective present in the classroom through a continuous methodological process that allows both the escalation of the cognizance of children and young people from the simple to the complex, and pedagogical organization of all actions in an equally processual way: establishing stages of knowledge construction, with increasing levels of complexity in terms of relationships and interrelations, and thus, closer to a perception of reality (Reyes-Sánchez, 2009), consistently with the goal, method, and the constructivist pedagogical model (Freinet, 1984).

Committing ourselves to the interdisciplinary practice and teaching of soil science in the framework of SDG 4 (Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all) to contribute to building education that advocates the search of alternatives that are ethically acceptable, economically feasible, energetically desirable, and environmentally respectful of the balance of ecosystems as a foundation and building the path of a socially responsible science (Reyes-Sánchez, 2018).

Achieving this requires:

- \* Equal access to inclusive quality education and training in all phases of life and for everyone.

<sup>1</sup>A methodological process that approaches the environmental problems in a cognitive and interdisciplinary way through education and the practice of science with the objective of building a preservation culture and conscience by providing models for the management and exploitation of natural resources towards the development for all (Reyes-Sánchez, 2009).

- \* Work so that educational institutions are places where sustainability skills are not only taught, but also actively practiced, because teaching is not the same as educating.
- \* Overcoming the technological gap: improving ICT<sup>2</sup> skills, basic digital skills, connectivity, the Internet, and cybersecurity against possible negative externalities.
- \* Willingness of governments to assume the United Nations 2030 Agenda and the SDGs.
- \* Respect for the rule of law, democracy, and fundamental rights by countries.
- \* Policy coherence at all levels since the SDGs are conceived as indivisible entities, and most cover several policy areas.
- \* Participation of civil society, the private sector and academia in the dialogue for the construction of sustainability to define specific goals for the application of the SDGs.

All of these are indispensable tasks to be performed in order to educate in science for sustainability, build citizen awareness of the care of natural resources, and achieve the participation of civil society, the private sector, and academia in a respectful and democratic dialogue to define the specific phases of application of the SDGs.

## The IUSS GOES TO SCHOOL

*“Study science first and then follow the practice born of science.”*

Leonardo Da Vinci

According to the main goals of the IUSS “International Decade of Soils: 2015–2024” (Horn, 2015; Horn, 2017), the International Union of Soil Science aspires to define and be a leader in the process of integral formation of our future scientists, as well as in generating the citizen’s awareness for the sustainability of soil; creating a profound impact on the educational and governance environments.

Educating children and young people is a priority for the IUSS, since in 10 years they will be the new citizens of the world and in their hands will be the future of the soil and therefore of life on the planet. However, the responsibility to ensure that children and young people understand what the value of the soil resource is, and commit to its preservation, it is ours and it is now.

Stopping soil degradation will not be possible if only us, the scientists of soil science, know its value for the existence of life on Earth. We need to teach children and young people, as our future citizens, why the soil is important for human wellbeing, how its loss impacts the lives of all living beings, and that for all this, the soil is an indispensable resource for the existence of life.

Citizens do not know or understand what the existence of the soil means, because despite the great importance of the soil resource for the conservation of life on The Earth, and the great amount of accumulated knowledge, there is a general absence of knowledge of the citizens, both in relation to the natural resources that Earth possesses, and

about their value for the existence of life on the planet (Reyes-Sánchez, 2009).

This general unknown, of both the soil system and the functional value and impact that this natural resource has in our daily life, naturally entails the absence of citizen awareness regarding the primary need to preserve it, because although we have the knowledge share it between peers, we not only do it only among ourselves, but we use specialized language to communicate. Language that is excluding for citizenship. Language that does not allow the common citizen to understand the reason and meaning of the initiatives that are generated from the UN, GSP-FAO, and IUSS to preserve the soil, nor participate effectively in them because they do not have the information to understand them or the awareness to join us in this fight.

For all those reasons and in response to the main goals of the IUSS International Decade of Soils: 2015–2024, we committed to creating an educational project that brings together and leads the educative work of the National Soil Science Societies: the IUSS General Educative Project (Reyes-Sánchez, 2019). Consequently, on 5 December 5 2019, the educational project “THE IUSS GOES TO SCHOOL<sup>®</sup>” was launched (IUSS, 2019).

## What is the Educative Proposal From the IUSS GOES TO SCHOOL and What Are Its Actions and Activities?

*“IUSS propose to educate in soil science on a planet that is a natural system, and work all together as a team to put the gaze, heart, and concern of the world on the Soil”*

Reyes-Sánchez Laura Bertha

With the purpose of educating and raising awareness among children and young people; aiming at the same time to allow scientists to find joy in doing so, and in order to achieve their collaboration to open the curriculum of soil science in the medium and long term to the interdisciplinarity and the professionalization of their teaching, as part of the IUSS General Educative Project and the “THE IUSS GOES TO SCHOOL<sup>®</sup>” (Reyes-Sánchez, 2019; IUSS, 2022a), the following lines of work are proposed:

- \* Education and awareness for children and young people
- \* Opening the professional curriculum of soil science to interdisciplinarity
- \* Interdisciplinarize the teaching of soil science
- \* Professionalize the teaching of soil science.

## Education and Awareness for Children and Young People

*“Education is the most powerful weapon which you can use to change the world.”*

Nelson Mandela

<sup>2</sup>ICT: Information and Communication Technologies (ICT).

The proposal is to work as soil scientists and teachers, educating and raising awareness among children and young people. Meanwhile, scientists learn to communicate to the citizen the science we practice and develop, to fight for the preservation of the edaphic resource, strengthening soil science worldwide. The goal is to encourage children and young people to fall in love with soil science as participants and protagonists of activities and cognitive experiences that allow them to understand both the importance of preserving the soil resource for the sustainability of the Earth system, and to understand its value and involve them in a committed way in its preservation.

Achieving that objective and achieving the proposed goal implies recognizing that today's scientists belong to a generation that can decide what to impart, how, and for whom. Therefore, in the collective context and as scientists committed to the teaching of Soil Science, today it is up to us to decide if we continue to limit teaching to professional and specialization levels, or if we are willing to assume a personal commitment, generating and teaching knowledge in an accessible way to those school levels where children and young people are practically blank pages: provoking in them interest, enthusiasm, and love of scientific work. Working together to achieve this, researchers and university professors, along with teachers at all pre-university levels, should integrate school projects that lead to the construction of a new paradigm in the teaching of soil science: a teaching in which the interpretation of human facts converges with the explanation of scientific facts while they are confronted dialectically in the construction of children's learning (Reyes-Sánchez, 2012).

## Opening the Professional Curriculum of Soil Science to Interdisciplinarity

*"It is not so much a matter of opening the frontiers between disciplines, but of transforming what creates those boundaries, the organizing principles of knowledge"*

Morín (2000)

The goal is to understand that the disciplinary divisions of science have a useful methodological value, but we cannot fail to observe and recognize that in reality, there are no simple or isolated problems, and therefore, it is not possible to address them from a partial view, nor only from within the isolated vision of the disciplinary divisions. The approach is to work towards building, through interdisciplinary integration from various fields of knowledge, specialized knowledge in soil science that allows solutions to complex problems to be addressed and proposed, from multicausal and interdependent perspectives (Morín, 1981); contributing to the recognition of natural and cultural values to revalue the small and decentralized, while consequently assuming the prominence of building the development process itself.

When soil science is taught at both professional and postgrad levels, basic and specialized information of various levels is transmitted, with students learning to use that knowledge in a theoretical and practical way; the information obtained is also analyzed, deciphered, and used to make calculations, interpretations, corrections, and projections, but that does not mean that persons have formed an environmental awareness, nor built a culture of preservation (Reyes-Sánchez, 2018). If there is no construction of a culture of preservation, there is no real development. Therefore, if what is wanted is to disseminate knowledge that entails the construction of a citizen consciousness and is reflected in a culture of preservation of the edaphic resource, we need to instruct future scientists and teachers to not only generate knowledge about the soil resource, but educate their students to preserve it as an indispensable element for life.

The really important thing is to train scientists and teachers to explain clearly to every citizen, and at every educational level, why the soil is essential to them and how its loss affects us all regardless of the social class to which we belong. It is important that the contents are taught with a sense of preservation and for the wellbeing of all to create a culture of sustainability. Understanding this is of immense importance when we are talking about forming scientists, not only because those who train them must understand and practice it, but also because they must be able to transmit it at both professional and postgraduate levels in an interdisciplinary way.

The indispensable thing is that every student of soil science understands it, lives it, and transmits it. This is the same in the classroom, in the laboratory, on the field, and as an example throughout their life. Achieving it is our challenge, and it should be our commitment to the next generations.

## Interdisciplinarize the Teaching of Soil Science

*"Most of the fundamental ideas of science are essentially simple and, as a rule, can be expressed in language understandable to everyone."*

Albert Einstein

As was stated before, to contribute to building education that advocates the search for alternatives that are ethically acceptable, economically feasible, energetically desirable, and environmentally respectful of the balance of ecosystems as a foundation and building the path of socially responsible science is a goal for the IUSS. This includes environmentalizing<sup>3</sup> all knowledge through a continuous methodological process that both escalates the

<sup>3</sup>A methodological process that approaches the environmental problems in a cognitive and interdisciplinary way through education and the practice of science with the objective of building a preservation culture and conscience by providing models for the management and exploitation of natural resources towards the development for all (Reyes-Sánchez, 2009).

knowledge of children and young people from the simple to the complex, and pedagogically organizes all actions in an equally processual way, as well as establishing stages of knowledge construction with increasing levels of complexity in terms of relationships and interrelations, and thus coming closer to achieving a perception of reality.

Understanding the complexity of the living world, that is, the medium in which education is meant to construct development, involves grasping that this is in itself a system (Morín, 1981). When we talk about Development Goals, we talk about the development and sustainability of natural and social systems, made up of living beings that exchange matter, energy, and information with the outside; systems that tend to a balance that is dynamic and establish intersystemic, intrasystemic, and system relationships with and towards the totality of its components (Gell-Mann, 1995). These systems are therefore open and dissipative, in constant change, and where change is paid with an increase of the entropy of the system (Reyes-Sánchez, 2018). It is a goal to be addressed and achieved, established in accordance with SDG 17, the Partnership Alliances that may be necessary among the various scientific societies of soil science with every expression, institution, or citizen organization and at all levels; working under the leadership of the UN, with the initiatives, programs and frameworks defined by GSP-FAO, for the achievement of the IUSS “International Decade of the Soils 2015–2024” (Horn, 2015 y 2017) and according to the IUSS General Educative Project (Reyes-Sánchez, 2019).

## Professionalize the Teaching of Soil Science

*“Teaching should be such that what is offered is perceived as a valuable gift and not as a hard duty.”*

Albert Einstein

Moving towards development is not possible without teaching and learning science, which allows us to build today, in children and young people, the citizens of tomorrow. Both the knowledge and the values are necessary for this because as natural resources degrade and are lost, food and water will be insufficient for a population that continues growing in a planet with finite resources (Reyes-Sánchez, 2012).

That is why the UN and UNESCO (1987), UN (1992), UN (2012), UN (2002) summits, have emphasized the importance of training teachers whose activities and decisions significantly influence the education of Future citizens: “preparing them to meet the challenge of responding to present and future environmental problems.”

Achieving it means educating for a sustainable Earth in time and space, implies empowering and sensitizing people so that they recognize that there are no pre-established rules that are always valid, so that they know how to make decisions according to the environment preservation, with friendly life models and with the diversity of cultures and people. It implies ensuring that people can change behaviors according to the circumstances,

publicly defend their own opinion and recognize that of others, dialogue, and negotiate (Gómez and Reyes-Sánchez, 2004).

For that reason, among the primary characteristics to develop in teachers—to transfer them to the student through a process of building them—and as important as knowledge, are the development of values and attitudes as the only way to, in the future, have citizens capable of making and participating in all kinds of decisions; with solid arguments based on knowledge and manifesting firmly through reflective attitudes, but above all, built based on the analysis carried out in the light of the values formed.

Therefore, education for sustainability requires being participatory, affective, multicultural, dialogic, democratic, investigative, interdisciplinary, and activist, capable of turning children and young people into competent workers, reflective citizens, social critics, and agents of change. For that, it is necessary to have teachers capable of transmitting these approaches in order to have, in the future, citizens with both arguments and a thoughtful and determined attitude to promote and carry out the actions leading to the solution of the great environmental problems that we will face (Reyes-Sánchez, 2020).

Citizens aware of the need to preserve natural resources must begin to be formed today in each and every one of the educational levels, but for this, we require at the same time training for teachers and the integration of scientists to teaching with these same conceptions and interests.

## RESULTS

### What Have Been the Main Actions and Activities of the IUSS Educational Project?

From the IUSS, we are discussing how education of sustainability is vital for soil science in order to understand how to finally influence the construction of a citizen consciousness, generate a culture of preservation that allows us to impact long-term public policies, and move on towards the governance of this natural resource (Reyes-Sánchez, 2019). In this regard, with the aim of contributing to informing children and young people about the importance of the soil resource in our lives and the urgency to protect it (IUSS, 2022b), on 5 December 2019, in the frame of the celebration for World Soil Day, the IUSS launched the educative Project “THE IUSS GOES TO SCHOOL<sup>®</sup>” (IUSS, 2019) and created an online space for all children around the world, inviting them to take care of the soils of their Nation and teach their parents and teachers to do so.<sup>4</sup>

To involve soil scientists and soil science societies, research institutions, and universities from around the world in efforts to educate and raise awareness about soil value, the IUSS educative project called Scientists to respond to the theme “Soils, where food begins,” to write “Stories and Crop Cards” for children to teach them to grow their food and raise awareness about the fact that food that arrives on our table is grown in the soil. This material is available in English, Spanish, German, and some are also available in French.<sup>5</sup>

<sup>4</sup><http://www.iuss-goes-to-school.org.mx/>

<sup>5</sup><https://www.iuss-goes-to-school.org.mx/crop-cards/>

“THE IUSS GOES TO SCHOOL<sup>®</sup>” website also has, at this moment, nine children’s books online.<sup>6</sup>

The number of current challenges related to soil protection and sustainable land use, especially those linked to ongoing climate change and its effects on agriculture, food security, human health, social stability, and the global economy, require formal spaces within worldwide Soil Science Societies for the exchange of ideas, actions, and solutions among scientists’ generations.

That is why, for the IUSS, it is not only a priority to educate children and young people but to support the development of early career scientists. In this regard, the International Union of Soil Sciences has declared the empowerment of young soil scientists a high priority to engage young scientists from different disciplines of soil sciences working in interdisciplinary ideas, since they are the upcoming generation in all the Soil Science Societies in charge of reaching their missions (Reyes-Sánchez, 2019; IUSS, 2022a).

Therefore, because the new generation of soil scientists plays a crucial role in soil sustainability achievement, the strength of future Soil Sciences, and the development of the International Union of Soil Sciences itself, in October 2022 the “Young and Early Career Scientists Working Group of the International Union of Soil Sciences” was approved.<sup>7</sup>

“THE IUSS GOES TO SCHOOL<sup>®</sup>” supports and promotes all educational activities carried out by the Soil Science Societies that have joined the project. Participating face-to-face, giving conferences, organizing didactical experiences, promoting teaching materials, supporting them through its Stimulus Fund Program, and giving some didactical materials to children and young people who participate in these events.

In this educational effort, the IUSS has joined forces with the Global Soil Partnership of FAO, launching in 2020, within the framework of World Soil Day, a Booklet contest for children through an annual call for soil scientists to collaborate in the literacy process of children and young people. As a result, the IUSS and FAO have co-published three books: “The magical world of Soil Biodiversity,” “Salty soil adventures” and “Soils, where food begins” each containing the annual collection of 10 children’s stories from around the world (FAO-IUSS, 2021; FAO-IUSS, 2022; FAO-IUSS, 2023).

About our perspectives: The project also seeks to involve soil scientists through their direct participation in soil science education and awareness-raising of future generations to bring soils into our hearts, arriving at the Centenary of the International Union of Soil Sciences with a real commitment of their scientists and teachers to educate children and young people as future citizens of the world, to preserve the resource

that is the object of its study. In this regard, the IUSS scientific community has been called to present their educational actions and activities, innovative ideas, and research during the IUSS Centennial in the Session “Children and Young People Say Present at the IUSS Centenary Celebration”.<sup>8</sup>

On 19 May 2024, celebrating the IUSS Centennial (IUSS, 2023), during the Session “Children and Young People Say Present at the IUSS Centenary Celebration,” the IUSS educative project will launch the book “Soil is a Source of Life, Water, and Food” containing all children’s material in English, Spanish, German, French, and Portuguese.

## DISCUSSION

### Looking to Go From Words to Deeds

Committing to the preservation of life on the planet means committing to the sustainability of the soil resource and requires a firm will, through teaching and research, to initiate an educational process of teaching and learning of soil sciences in an interdisciplinary way with an emphasis on school-age children and youth. In this regard, the educative proposal by the International Union of Soil Sciences corresponds to a vision in which the search for the sustainability of the soil resource is our goal and commitment (Reyes-Sánchez, 2019; IUSS, 2022b).

Therefore, working to make reality the education and awareness of children and young people through an educational project in a network between the National Soil Science Societies in all countries and regions, beyond being a desire, is an invitation to work as a team and participate with the educational project THE IUSS GOES TO SCHOOL<sup>®</sup> to train future citizens of the world with the knowledge and environmental awareness that allows us to teach and learn that the loss of the planet’s natural resources affects us all and that our lives depend on it.

It is a call to scientists and teachers to move from words to facts in order to build, in an organized way, the education and awareness necessary in today’s children and youth to ensure the preservation of the soil resource.

## CONCLUDING STATEMENTS

Educating for sustainability is an objective that goes beyond another subject in the curriculum, and that does not consist of mechanically reproducing or memorizing knowledge and techniques, but in educating for debate and reflection on knowledge, type of technology, and social organization, which allow people to live in harmony with each other and the environment.

The change of beliefs, principles, and values is harder to achieve than any change of statements or legislation, and only

<sup>6</sup><https://www.iuss-goes-to-school.mx/booklets/>

<sup>7</sup><https://www.iuss.org/organisation-people/organisation/working-groups/>, <https://forms.gle/kQRNAitqdijbAP8V9>

<sup>8</sup><https://centennialius2024.org/>

an education for sustainability throughout the planet and at an early age can fulfill the changes required for the accomplishment of soil preservation and the SDG's.

Because children and young people cannot love what they do not know, or understand what they ignore, our scientific tasks are also to teach, educate, and raise awareness.

The school can and should be our ally to achieve soil preservation and Sustainable Development Goals, so we must start by realizing that we need to revalue education against science because education is also a science. Therefore, we must teach science congruently with the concepts and methods of science.

For Einstein, "Most of the fundamental ideas of science are essentially simple and, as a rule, can be expressed in language understandable to everyone." For those of us who today witness soil degradation and the consequent shortages of clean water, loss of biodiversity, and the impacts of climate change, learning to communicate with citizens in that understandable language is an essential task if we want children and young people to understand why the soil is fundamental for the existence of their life and how its loss affects them, their family, and their country.

The IUSS summons scientists and teachers of soil science to move from words to actions and commit to the education and awareness of children and young people that guarantees the sustainability of the soil resource as an indispensable element to preserve life on Earth.

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## DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

## AUTHOR CONTRIBUTIONS

LBR-S wrote the document, reviewed it and is the responsible author.

## CONFLICT OF INTEREST

The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

## ACKNOWLEDGMENTS

To the International Union of Soil Sciences (IUSS), to Ronald Vargas and the entire GSP-FAO team for their collaboration and constants support to work together with "THE IUSS GOES TO SCHOOL<sup>®</sup>" educational project, to ProjeT PAPIIT IN203522, UNAM and AAPAUNAM for their academic support.

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