«4 pour 1000 Initiative: Soils for Food Security and Climate»

ACTIVITY REPORT OF THE SCIENTIFIC AND TECHNICAL COMMITTEE

2016 - 2021

EXECUTIVE SUMMARY

The Scientific and Technical Committee (STC) is the scientific body of the "4 per 1000" Initiative. The STC was installed on November 17, 2016 during COP22 in Marrakech. It is multidisciplinary group, with a balanced composition in terms of geographical origin and gender, made up of **14 high-level scientists** of international renown, nominated by the Consortium of Members on the proposal of the Executive Secretariat after voluntary application by each scientist. Since 2017, the Chair of ITPS (Intergovernmental Technical Panel on Soils attached to the Global Soil Partnership hosted by FAO), is a permanent invitee of the STC. The STC has met twice per year in face-to-face meetings or virtually to advocate for the best available knowledge and technical information to support the Secretariat and carbon sequestration project holders. Up to June of 2022, the STC has had 13 meetings since its launch. New meeting will be hold in Sharm el Sheik, in the framework of the COP 27.

Present members of the STC are: Farshad AMIRASLANI (Iran), Deborah BOSSIO (USA), Claire CHENU (France), Alejandro FUENTES ESPINOZA (Chile), Beverley HENRY (Australia), Lydie-Stella KOUTIKA (Republic of Congo), Jagdish LADHA (India), Beata MADARI (Brazil), Budiman MINASNY (Australia), Adesola OLALEYE (Nigeria), Cornelia RUMPEL (Germany, Yasuhito SHIRATO (Japan), Jean-François SOUSSANA (France), Consuelo VARELA-ORTEGA (Spain). Other members has been: Magali GARCIA-CARDENAS (Bolivia), Martin KAONGA (Zambia), Saidou Nourou SALL, Pete SMITH (United Kingdom), Brahim SOUDI (Morocco), David WHITEHAND (New Zealand), Lini WOLLENBERG (USA).

Paloma MELGAREJO is one of the members of the Executive Secretariat, funded by the Spanish Government, whose function is to support the STC.

Among the **main deliverables** of the STC in its their 6 years of existence are "**The International Research and Scientific Cooperative Program**" to address the knowledge gaps to best enhance global SOC stocks, while also ensuring food security and climate change adaptation and the "**Reference Criteria and Indicators for SOC Project Assessment**" to provide guidance to project holders and to provide formative assessment of projects.

Every year, the "4 per 1000" Initiative launches a **call for formative assessment of projects**. Until now forty two projects have been submitted from all the continents which shows the interest of the different actors in implementing the objectives of the Initiative on the ground. After evaluation for the STC, 13 were considered in line with the objectives of the Initiative "4 per 1000" (the 4th call has not been not evaluated yet).

The STC has written three high profile **"opinion" papers** to clarify the objectives of the "4 per 1000" Initiative with regard to the ongoing discussion in the literature and to evolved thinking since the launch of the initiative. The STC is editing a **special issue** in the international journal "Regional Environmental Change" with the title "Sustainable management practices to increase soil carbon sequestration: what are their contribution to climate change mitigation, adaptation and food security in different ecosystems and regions of the world".

The STC has made an **analysis of the Intentionally Determined Contributions (INDCs) and NDCs** in order to gather information on the importance of SOC in the countries' NDCs in the UNFCCC negotiations.

On the **Koronivia Joint Work on Agriculture** (KJWA) the STC, together with a group of research and higher education institutions and programs, submitted their science-based views, to the workshops taking place at SBSTA/SBI 5&6 on topic 2 (c), 2(d), 2(e) and 2(f).

The STC has contributed to **writing and reviewing several GSP documents** such as the Technical Manual on SOC Management, the "Protocol for Measurement, Reporting, Verification and Monitoring to assess soil organic carbon sequestration and greenhouse emissions in agricultural landscapes (GSOC-MRW), the Carbon Sequestration potential map and the GSOCseq Technical report.

The STC members have presented several papers in **regional or international conferences** and has contributed to and co-organized several **workshops and events** around the world. It also **revises** continuously **papers** sent by the Executive Secretariat and recommends to include them or not in the resource center of the webpage.

On June 15th 2020, the **"4 per 1000" Strategic Plan** for the next 30 years was endorsed by the Consortium. The STC contributed to the development since the start of the process. For developing a plan of actions to implement the strategic Plan the STC members contribute to different objectives and task forces.

Entering its sixth year in 2022, the STC is looking forward to renewing its research strategy and activities while increasing its presence on the global stage.

1- INTRODUCTION

The Scientific and Technical Committee is the scientific body of the "4 per 1000" Initiative. The Scientific and Technical Committee (STC) was installed on November 17, 2016 during COP22 in Marrakech.

The STC is made up of **14 high-level scientists of international renown**, nominated by the Consortium of Members on the proposal of the Executive Secretariat after voluntary application by each scientist.

It is a **multidisciplinary group**, with a balanced composition in terms of geographical origin and gender. Each member must regularly produce a declaration of interests.

The STC has met thrice or twice per year in face-to-face meetings or virtually to:

- propose a set of benchmarks for the evaluation of projects and actions based on the principles and objectives of the Initiative, as well as on the Sustainable Development Goals
- formulate proposals for the guidelines of the international program for scientific research and cooperation and for any cross-cutting issue
- define the vision and mission of the Initiative
- provide scientific and technical advice on the implementation, monitoring, reporting and verification of field projects, actions and programs
- assess and advice projects submitted to the “4 per 1000” Initiative
- discuss issues related to the implementation and the outreach of the Initiative
- provide advice for the participation of the Initiative in the high-level political process and the establishment of its relation to other international bodies
- elaborate a roadmap

2- THE SCIENTIFIC EXPERTS OF THE STC

Founders members:

- **Farshad AMIRASLANI** (Iran)
- **Claire CHENU** (France)
- **Magali GARCIA-CARDENAS** (Bolivia)
- **Martin KAONGA** (Zambia)
- **Lydie-Stella KOUTIKA** (Republic of Congo)
- **Jagdish LADHA** (India)
- **Beata MADARI** (Brazil)
- **Cornelia RUMPEL** (Germany)
- **Yasuhito SHIRATO** (Japan)
- **Pete SMITH** (United Kingdom)
- **Brahim SOUDI** (Morocco)
- **Jean-François SOUSSANA** (France)
- **David WHITEHAND** (New Zealand)
- **Lini WOLLENBERG** (USA)

In 2018, Pete Smith resigned and was substituted by **Beverley HENRY** (Australia)

In 2019, David WHITEHAND, Brahim SOUDI, Magali GARCIA-CARDENAS and Martin KAONGA resigned and were substituted by **Budiman MINASNY** (Australia), **Saidou Nourou SALL** (Senegal), **Consuelo VARELA-ORTEGA** (Spain) and **Alejandro FUENTES ESPINOZA** (Chile)**.**

In 2021 Cornelia RUMPEL was substituted as chair by Beverley HENRY and Farshad AMIRASLANI.

In 2022, Saidou Nourou SALL and Lini WOLLENBERG resigned and were substituted by **Adesola OLALEYE** (Nigeria) and **Deborah BOSSIO** (USA).

The biographies of the STC members and their roles is available in the link

https://4p1000.org/wp-content/uploads/2022/05/updated_4-per-1000_-STC_Presentation.pdf

3- THE ROLE OF RESEARCH IN THE "4 PER 1000" INITIATIVE

The "4 per 1000" Initiative is a multi-stakeholder initiative built around two main sectors of actions:

1. **A multi-actor action program for better soil carbon management** to combat poverty and food insecurity, while contributing to adaptation to climate change and mitigation of emissions
2. **And an international scientific research and cooperation program**: "Carbon in soils": a food security challenge" covering four complementary scientific questions:
   - The study of mechanisms and estimation of carbon storage potential in soils of different regions and agro-climatic systems
   - The assessment of the performance of sustainable economically viable agricultural practices in terms of soil organic carbon sequestration and other production and regulatory services
   - The support of innovations and their incentivization through appropriate policies
   - The monitoring, reporting and verification (MRV) of results, in particular at farm-scale.

The STC will support, in particular at an international level, the coordinated development of the four matters described above, in synergy with the CIRCASA project (https://www.circasa-project.eu/) (and consequently with the ORCASA project) and the FAO RECSOIL program (https://www.fao.org/global-soil-partnership/resources/highlights/detail/es/c/1237415/):

- Knowledge of soil carbon stocks and storage potential
- Impacts of agricultural and forestry practices on carbon storage in soils
- Methods for monitoring the carbon sequestration in soils
- Identification and upscaling of region-specific good practices.

4- STC MEETINGS

Up to the start of 2022, the STC has had twelve meetings since its launch.

Since 2017, the Chair of ITPS (Intergovernmental Technical Panel on Soils attached to the Global Soil Partnership hosted by FAO), is a permanent invitee of the STC. It was Luca MONTANARELLA (Italy), then Rosa POCH (Spain).

1st Meeting: Marrakesh (COP22), 17 November 2016

The first STC meeting was convened during the UNFCCC COP22 in Morocco in 2016 (Figure 1). It was an introductory meeting held under the auspices of the French Government. During the first meeting, one person was selected as the Chair (Magali GARCIA-CARDENAS, replaced by Cornelia RUMPEL IN

2017) and two (Jean-Francois SOUSSANA and Claire CHENU) as Vice-Chairs based on STC internal voting and the benefit of age.

Figure 1. First STC meeting, Morocco, 2016

2nd Meeting: Rome, 24-25 March 2017

The year 2017 was the first actual activities of STC. Three STC meetings were held in Italy, France and Germany (Figures 2-4). A major plan was to propose STC Research Strategy and first version of the set of indicators and criteria for projects evaluation for the subsequent years.

Figure 2. 2nd STC meeting in Rome (Italy), 2017

3rd Meeting: Montpellier, 28 June 2017

Figure 3. 3rd STC meeting in Montpellier (France), 2017

4th Meeting: Bonn (COP23), 14-15 November 2017

Figure 4. 4th STC meeting in Bonn (Germany), 2017

5th Meeting: Madrid, 5-7 June 2018

The year 2018 can be regarded as a good year for STC in publications. A commentary paper was published in *Nature*. The paper reviewed existing literature and proposed eight strategies to improve soil carbon sequestration. STC held two meetings in Spain and Poland.

Figure 5. 5th STC meeting in Madrid (Spain)

6th Meeting: Katowice (COP24), 11-12 December 2018

Figure 6. 6th STC meeting during the UNFCCC COP, 2018 (Katowice, Poland)

7th Meeting: Montpellier, 22-24 June 2019

In 2018, some of STC members attended regional events to proactively promote the idea of soil carbon enhancement including the 5th International Rice Conference and 21st World Conference of the Soil Science. Also, STC formulated the final version of a set of "4 per 1000" reference criteria and indicators for the formative assessment of projects.

IRRI

5TH INTERNATIONAL RICE CONGRESS

SINGAPORE 2018

STC members evaluated seven representative proposals that were selected based on geographical regions, practices, and project scale. The outcomes of assessments and procedures were discussed with funders and project holders. STC also promoted the raising ambition for countries to include actions on SOC in their NDCs by signing collective submissions to the Koronivia process.

Figure 7. 7th STC meeting in Montpellier (France)

STC launched a topic collection of scientific articles on Soil carbon sequestering practices as an important knowledge gathering step.

8th Meeting: Madrid (COP25), 9-10 December 2019

Figure 8. 8th STC meeting during the UNFCCC COP25, 2019 (Madrid, Spain for Chile)

9th Meeting: On line, 15-17 June 2020

The Covid-19 Pandemic interrupted all global activities, including those of the STC. The planned in-person meetings were cancelled and three virtual meetings were convened. STC published two papers in Ambio. The first one was related to the opportunities of the Initiative, while the second short paper was a response to another paper that questioned the name of the Initiative.

10th Meeting: On line, 17, 18 and 19 November 2020

Figure 9. 10th STC On line meeting, 2020

11th Meeting: On line, 16-17 June 2021

12th Meeting: in-person and virtually on November, 8-9, 2021

The meeting was held in a hybrid way where STC members attended in-person and virtually in Glasgow (UNFCCC COP 26).

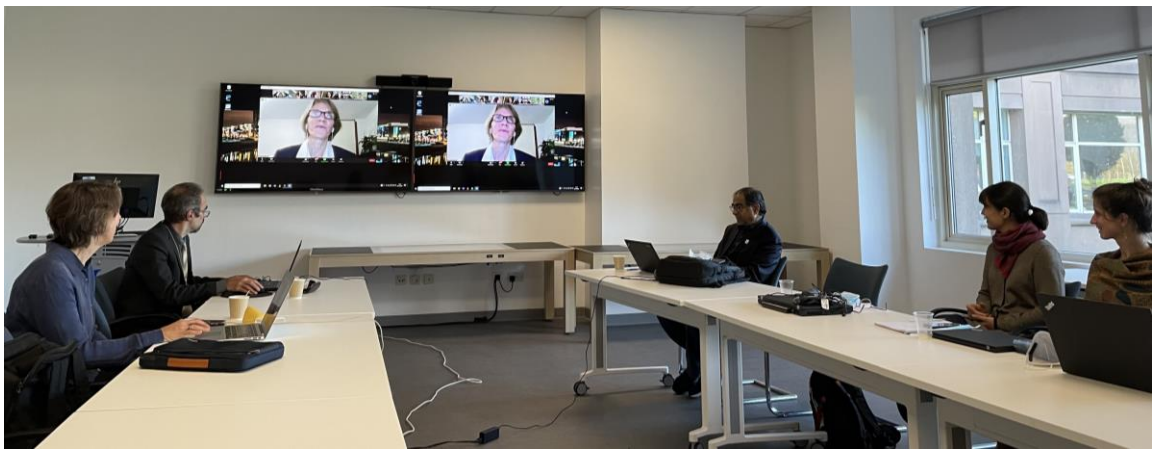


Figure 10. 12th STC meeting during the UNFCCC COP26, 2021 (Glasgow, UK)

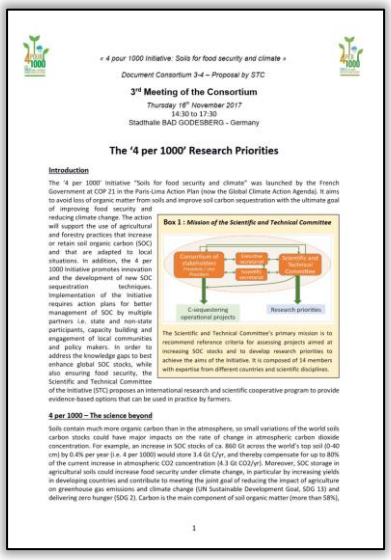
STC members attended side-event at the French Pavillion in the COP26 Hall and, as panel speakers, talked about the relationship between food security and climate change. The central proposition of how to translate research into real action in the field was discussed. Such debate enticed the STC to publish a paper on this crucial global issue.

Figure 11. Panel on the French Pavillion at UNFCCC COP26, 2021 (Glasgow, UK)

5- MAIN ACTIONS AND DELIVERABLES

A- International scientific research and cooperation program

In order to address the knowledge gaps to best enhance global SOC stocks, while also ensuring food security and climate change adaptation, the STC proposes an international research and scientific cooperative program.


« 4 pour 1000 Initiative: Soils for food security and climate »

Document Consortium 3-4 – Proposal by STC

3rd Meeting of the Consortium

Thursday 16th November 2017

14:30 to 17:30

Stadthalle BAD GODESBERG - Germany

The '4 per 1000' Research Priorities

Introduction

The '4 per 1000' Initiative "Soils for food security and climate" was launched by the French Government at COP 21 in the Paris-Lima Action Plan (now the Global Climate Action Agenda). It aims to avoid loss of organic matter from soils and improve soil carbon sequestration with the ultimate goal of improving food security and reducing climate change. The action will support the use of agricultural and forestry practices that increase or retain soil organic carbon (SOC) and that are adapted to local situations. In addition, the 4 per 1000 Initiative promotes innovation and the development of new SOC sequestration techniques. Implementation of the Initiative requires action plans for better management of SOC by multiple partners i.e. state and non-state participants, capacity building and engagement of local communities and policy makers. In order to address the knowledge gaps to best enhance global SOC stocks, while also ensuring food security, the Scientific and Technical Committee of the Initiative (STC) proposes an international research and scientific cooperative program to provide evidence-based options that can be used in practice by farmers.

Box 1 : Mission of the Scientific and Technical Committee

The Scientific and Technical Committee's primary mission is to recommend reference criteria for assessing projects aimed at increasing SOC stocks and to develop research priorities to achieve the aims of the Initiative. It is composed of 14 members with expertise from different countries and scientific disciplines.

4 per 1000 – The science beyond

Soils contain much more organic carbon than in the atmosphere, so small variations of the world soils carbon stocks could have major impacts on the rate of change in atmospheric carbon dioxide concentration. For example, an increase in SOC stocks of ca. 860 Gt across the world's top soil (0-40 cm) by 0.4% per year (i.e. 4 per 1000) would store 3.4 Gt C/yr, and thereby compensate for up to 80% of the current increase in atmospheric CO2 concentration (4.3 Gt CO2/yr). Moreover, SOC storage in agricultural soils could increase food security under climate change, in particular by increasing yields in developing countries and contribute to meeting the joint goal of reducing the impact of agriculture on greenhouse gas emissions and climate change (UN Sustainable Development Goal, SDG 13) and delivering zero hunger (SDG 2). Carbon is the main component of soil organic matter (more than 58%),

1

The suggested program aims to obtain the scientific knowledge to provide evidence-based options for countries' stakeholders and support the development of region-specific policies that are specific for each country. While much information is already available, action-oriented research to guide policy is needed. This requires a multidisciplinary and integrated approach, including facilitation by the international scientific community to strengthen complementarities and synergies. Engagement with local communities, stakeholders and policy makers together with enhancement of education and capability building is also needed. The STC will recommend research priorities, promote their adoption among partners of the initiative, and facilitate engagement with existing initiatives and research programs to implement action plans. As a first step, the STC defined a set of research priorities, to provide the framework for implementing the goals of the Initiative.

Research priorities are grouped into four pillars

1) estimating the SOC storage potential

2) developing management practices and strategies

3) defining the enabling environment

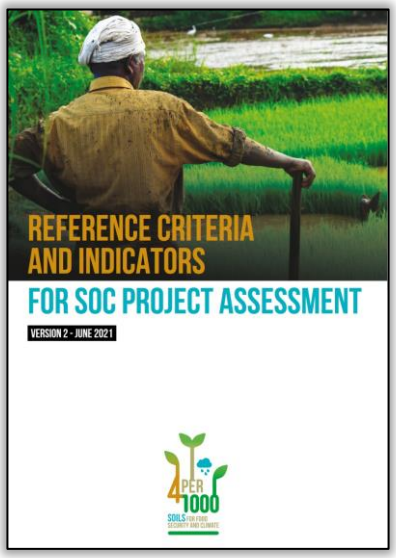
4) developing a monitoring, reporting and verification strategy with an initial focus on agricultural land use systems.

This focus was adopted, because agricultural soils are frequently low in soil organic matter content and play a crucial role in food security. Work on other ecosystems such as forests and peatlands will be included in the future. Research under these priorities should consider (i) the timescale for the impact on short-term, medium-term and long-term increases (ii) the risk of reversibility of practices and negative direct or indirect side effects of practices at different scales and (iii) the alternative uses of existing organic carbon inputs and the competition for this resource.

To see the aims and key knowledge gaps of each pillar you can enter in the link

https://4p1000.org/wp-content/uploads/2021/01/gov_cst_en_consortium_3-4_research_priorities.pdf

B - Reference criteria and indicators for project assessment



The overarching goal of the "4 per 1000" Initiative is to assist contributing countries and non-state organizations in the development of evidence-based projects, actions and programs to promote and encourage actions towards reducing greenhouse gas emissions through protecting and increasing SOC stocks, the target rate of a 4/1000 (0.4%) per year being an aspirational goal.

The principal mandate made by the Consortium to the STC was to propose a set of reference criteria, for the formative assessment of projects to meet the principles and goals of the Initiative as defined in the Paris Declaration and the UN Sustainable Development Goals (SDGs), with particular focus on SDG 2 on zero hunger, SDG 13 on climate action and SDG 15 on land conservation and restoration.

An ensemble of criteria, indicators, methods and units of measurement, has been developed by the STC to provide guidance to project holders and to provide formative assessment of projects. After being validated by a Task Force group, formed by members of each college of the Consortium, the document was endorsed by the Consortium at the UNFCCC meeting of Katowice in December 2018. The formative assessment provides guidance for actions, and recommends improvements, to ensure that the projects are consistent with the aims of the Initiative, and that methods are in place to monitor progress during project implementation.

The proposed SOC project assessment approach comprises four sequential steps, with each step being defined by distinct category of reference criteria. Assessment will proceed to the next step only if the criteria are met for the previous step. If not, the project proposer will be informed of the reasons why the project is not assessed fully. Step 1 includes safeguard criteria to ensure that actions to increase SOC do not restrict human rights, or negatively affect land rights and poverty alleviation. Step 2 refers to direct reference criteria and assesses the direct effects of projects on i) SOC stocks and land degradation neutrality (SDG 15), ii) climate change adaptation and iii) climate change mitigation (SDG 13), and iv) food security (SDG 2). Step 3 comprises indirect reference criteria and assesses indirect effects of projects on a range of other economic, social and environmental dimensions, including welfare and well-being (SDG 12), biodiversity and ecosystem services (SDG 15), water and nutrient cycles (SDG 6), etc. Finally, Step 4 assesses cross-cutting dimensions of projects such as training and capacity building, participatory and socially inclusive approaches.

This first document was revised during the year 2020 and re-edited in 2021.

The entire document can be found following the link

https://4p1000.org/wp-content/uploads/2021/12/4p1000_reference-criteria-and-indicators-for-project-assessment_V3_2021_EN.pdf

C - Scientific and technical advice for projects

Every year, the "4 per 1000" Initiative launches a call for formative assessment of projects. This original idea aimed to identify and support field projects in the spirit and framework of the objectives of the "4 per 1000" Initiative. After STC evaluation, projects that received a positive appraisal, the project holder will receive advice to improve his project in view of submission to major international donors who will submit them to their own selection criteria for funding.

The objective of this assessment is double:

- Modality 1 goes to new projects looking for funds to be implemented. In this case the aim is to improve project actions and increase the chances for approval by funders. There will be no commitment from the “4 per 1000” Initiative to ensure funding for the projects.
- Modality 2 goes to on-going projects looking for "recognition" within the framework of the "4 per 1000" through the STC assessment. In this case the aim is to aid projects, through expert advice, in achieving goals that are in conformity with the aims of the “4 per 1000” Initiative and that methods are in place to monitor progress during project implementation.

The procedure is applicable for the implementation of an agricultural practice, for the development or implementation of a project (e.g. soils restoration in a given area) or of a policy proposal. Research projects may be assessed if they include an implementation aspect. The call for project addresses project holders (individuals or organizations) from various regions and conditions.

The assessment is carried out by the STC of the “4 per 1000” Initiative, with help from external reviewers if required, using the set of criteria, indicators methods and units developed by the STC and approved by the Consortium.

After completion of the assessment process, the project holders receive a report including the assessment result and recommendations from the STC. A short description of the projects that are in conformity with the aims of the “4 per 1000” Initiative is published on the website of the initiative and receives a final report recommending it for funding from funders compatible with the goal of the Initiative.

More information with the link https://4p1000.org/calls-for-projects/?lang=en

a. First call of assessment of projects

In response to the first call closed in September 2019, 13 projects have been received. The projects were assessed by the STC members and the summary report of the assessment, together with the recommendations to improve the project, were sent to the project holders at the end of January 2020. Taking into account the summary report and the recommendations from the assessment of all projects, the STC and the Executive Secretary of the “4 per 1000” Initiative consider that the following four projects are in line with the objectives of the Initiative and recommend each of these projects for support by appropriate funding from funders compatible with the goal of the Initiative. The remaining nine projects received recommendations on how to improve the project in order to be in line with the objectives of the “4 per 1000” Initiative.

Selected projects were:

PFA-1, Resilient Agricultural Markets Activity – Beira Corridor (RAMA-BC), was submitted by Nicholas Dexter, Chief of Party of Land O’Lakes Venture37 (address: Talhão 166, Bairro 4 ao lado do Triângulo, Chimoio, Manica, Mozambique; tel: +25 8844933937; email: ndexter@la,dolakes.org) as

Modality 1. The project aims to increase agricultural yields through climate smart agricultural practices. It is based on continuous ground cover and minimum interventions. Thereby it reduces soil disturbance and erosion and reduces land degradation. The project holders plan to restore 8500 ha of degraded lands. Increased agricultural yields and integration of fertilizer trees reduces the need to clear fresh forest areas for agricultural production. It further ensures a long-term soil health and carbon sequestration. Soil cover and minimum tillage improve soil physical properties improving soil water infiltration and retention, and reduce soil surface runoff, temperature and evapotranspiration. The increase in agricultural productivity results in increased household income and hence the family can send children to school and afford better sanitation. Dietary diversity ensures the family the family has a more balanced diet than could be afforded from predominantly cereal diets. Training of staff and local partners will incorporate valuable lessons learned through our partnership with the "4 per 1000" initiative, particularly related to the development of protocols and the implementation of trials and monitoring processes.

PFA-3, Land for Life, was submitted by Michael RALPH HANDS, Program Director of INGA Foundation (address: Higher Penhale, PL22 0HY, Lost Withiel, Cornwall, UK; Tel: +44-1208-872321; email: mhands400@btinternet.com) as Modality 2. The project aims to implement environmentally, socially and economically sustainable production for local vulnerable communities in an area of 750 ha of severely degraded land in Honduras in about 7 years. The project, although does not directly aim SOC increase, would get strong SOC gain. It is, in addition, positive on other aspects such as addressing family farming, the way of implementation (seeds, fertilizers, training and monitoring offered…). The project plans planting N-fixing trees as alleys

and it is very likely to have positive outcomes on biophysical soil aspects. Priority is yields, second erosion and land degradation and third soil carbon. It will offer real field options to small farmers.

PFA-6, Wheat for People and Climate (WPC), was submitted by Patrick KAKA NGENDO, Coordinator of GIERI asbl / Landcare Network Democratic Republic of Congo (address: 201 Av, Bukavu, Sud Kivu, RD Congo; Postal Code: 577 CYANGUGU, RWANNDA; Tel: +243856436279; email: Patrickkaka@gieri.org) as Modality 1. This WPC project aims to popularize farming practices that increase soil carbon, minimize physical, chemical and biological disturbance of the soil and promote functionally efficient biological diversity in the soil, thereby improving overall soil health. In order to achieve this goal, this project will wrap the best practices around the cultivation of wheat (*Triticum spp.: common*) with a rotation of beans (Phaseolus Vulgaris) with farmers in the Eastern Kivu provinces of the Democratic Republic of the Congo. The project will promote the food security in the region with improved soil function, increased amount of carbon stored in the soil and reduced GHG emissions while maintaining or increasing yields.

PFA-7, Soil restoration and multi-functionality of degraded forest landscapes in Ivory Coast (TERRI4Soil), was submitted by Julien Demenois, researcher of CIRAD (address: TAB 02/115, 34398 Montpellier Cedex 5, France; Tel: +33 467615560; email: Julien.demenois@cirad.fr) to Modality 1. The TERRI4Soil project intends to contribute to the preservation and restoration of organic carbon stocks by taking into account the multi-functionality of territories combining agricultural, forest and post-forest dimensions and the implementation of a national strategy "4 per 1000" / "Triple A" in Ivory Coast. Considering the intended practices and methods (improved agroforestry, improved carbon input into the soil, reduced mineral N fertilizer) and the circular approach, the project will likely accumulate SOC or diminish SOC loss and at the same time potentially reduce GHG emissions and / or increase CO2 removal from the atmosphere. The latter supposes that improved agroforestry would result in greater biomass synthesis. The improved management will likely increase the water household of the production systems; and higher SOC levels should increase soil health / soil quality. This can lead to better resilience and adaptation capacity to climate extremes. The project does not directly affect the production of food products as it concerns cocoa production. Indirect effects on the supply and stability of food products are expected due to income stability. Moreover, the project results may remove pressure on land and therefore preserve food producing areas. The strength of

the project is its inclusive approach involving stakeholders from the ministry to the land owners.

A questionnaire was sent to the project holders to evaluate their degree of satisfaction with the assessment process. Nine out of 13 responses were obtained, indicating satisfaction with the process, easiness to send the information, usefulness for improving the project and recommend the assessment to others.

b. Second call of assessment of projects

The success of the first call in 2019, the " 4 per 1000" Initiative and the World Agroforestry (ICRAF) launched the second call for formative assessment of projects. The call opened on May 15, 2020 and closed on July 15, 2020 and fifteen projects were submitted to the call. After a first revision of the information by the Executive Secretariat, fourteen projects were assessed by the STC. Taking into account the summary report and the recommendations from the assessment of every project, the Scientific and Technical Committee and the Executive Secretary of the "4 per 1000" Initiative consider that four projects are in line with the objectives of the "4 per 1000" Initiative and hope that these projects will be supported by appropriate funding from funders compatible with the goal of the Initiative.

This information has been transferred to the project holders of each project.

PFA_14_2020_Ecuador_Restorative Forest of Guayraloma- Submitted to Modality 1 by "Asociación de Productores de Semillas y Alimentos Nutricionales Andinos, Mushuk Yuyay", the project operates in Sector Izavieja, Comunidad de San Rafael, Cantón Cañar (Ecuador), and tries to remove eucalyptus trees (planted In 1969 by the newly formed cooperative of Guayraloma) to implement a multifaceted agroforestry solution by planting agave and broom and to introduce native camelids to graze among the bushes.

PFA_20_2020_India_Restoration of Soil Fertility – Entitled "Restoration of Soil Fertility by Adopting Sustainable Agriculture Practices for Food Security and Climate Change (RSF) and submitted to Modality 1 by BAIF Development Research Foundation, Pune (India)", the main objective of the project is food security through the approaches of soil restoration, climate change adaptation and mitigation to rejuvenate landscape ecosystem for sustainable livelihood. The project includes the integrated soil restoration management in 1000 Ha and agri-horti-forestry transformation (wadi) in 2700 Ha.

PFA_24_2020_Iraq_Planting Million Trees - Submitted to Modality 2 by the Ministry of Higher Education and Scientific Research this project tries to develop the seeds of tree types and shrubs suitable for growth in different environmental sites throughout Iraq and according to their requirements to ensure the spread of the forest cover and education on the importance of the tree environmentally and economically along with the introduction of other types that contribute to achieving the project goals (desertification control, food security and environmental and water security) through planting a million trees .

PFA_26_2020_ Mexico_Soil Restoration - Submitted to Modality 2 by the Municipio de San Miguel de Allende (Mexico) and entitled "Programa regeneracion de suelos, agua y ecosistemas, reforestacion, empleo y reconversion productiva: la adaptacion y mitigacion del cambio climatico en San Miguel de Allende, Guanajuato (ACCSMA) this project aims to respond to the existing ecological hazards of the municipality and is designed based on the functioning of micro-watersheds and their environmental and social impact on the inhabitants (humans, flora and fauna).

c. Third call of assessment of projects

The third call of projects for formative assessment was launched on May 15, 2021 and closed on July 15, 2021. 17 projects were received, 12 of which were complete and were evaluated by STC members.

Project in line with the 4p1000 Initiative objectives were:

PFA_30_2021_Nursery Demo Farm_MOZAMBIQUE: Namaita Central Food Security Nursery and Demonstration Farm (N.C.F.S.N.D.F.).
Main aim is to promote agroecology/agroforestry farms with a cashew orchard at its core.

PFA_31_2021_ARSV_MAURITANIA: Agriculture Régénérative des Sols Vivants. Développer des Modèles Agroécologiques pour le Sahel (ARSV).
The objective is to develop sustainable and replicable agroecological models, based on soil regeneration, to achieve food self-sufficiency in desert environments, through four areas of intervention: experimentation, production, training and direct support to local farmers. Final numbers are 1,600 hectares of soil restored, 300,000 tonnes of COS stored, the production of 75,000 tonnes of fodder per year and the creation of almost 1,300 jobs.

PFA_35_2021_REGAGR _THE NETHERLANDS: Soil Heroes Foundation – Regenerative Agriculture Experience Field.
The aim is to prove to farmers that adopting regenerative farming practices will solve their most pressing issues, among which is soil's water retention capacity.

PFA_40_2021_HELLERUD _NORWAY : Conventional to Carbon: Updating Hellerud Farm's Paradigms (C.C.U.H.F.P).
The project is the conversion of Hellerud Farm in Skjetten in Norway (30m NE of Oslo) from conventional grain and grass production to regenerative (carbon farming), with a focus on documentation and optimisation of the process to benefit others.

PFA_41_2021_AZURA _MAROCCO : Compostage et valorisation des déchets agricoles dans la région de Souss-Massa pour assurer une faible émission du système de production de la tomate dans les fermes AZURA afin d'adopter une approche d'économie circulaire et réhabiliter l'écosystème arganier (AZURA 4 ADAPTATION ATTENUATION, A4AA). The objective is to compost of annual waste which totals 83,000 tons.

D - Contribution and validation to the construction of a database for the digital resource center (https://4p1000.org/the-resources/?lang=en)

One requirement of the Consortium to the STC was to contribute and validate the construction of a database for the digital resource center. The STC revises continuously papers sent by the Executive Secretariat and recommends to include them or not in the resource center of the webpage. There are three different sections: a) news (33 papers included currently), b) thematic papers (21) and scientific papers, reference and technical papers (44). a) articles in mainstream media (30), b) thematic articles in specialized media (23), c) reference scientific and technical publications (54).

E - Scientific contributions

a. Opinion papers

The STC has written three high profile "opinion" papers to clarify the objectives of the "4 per 1000" Initiative with regard to the ongoing discussion in the literature and with regards to evolved thinking since the launch of the initiative:

RUMPEL C, AMIRASLANI F, KOUTIKA L-S, SMITH P, WHITEHEAD D, WOLLENBERG L , CHENU C, GARCIA -CARDENAS M, KAONGA M, LADHA J, MADARI B, SHIRATO Y, SOUDI B, SOUSSANA J-F (2018) Put more carbon in soils to meet Paris climate pledges. Comment in *Nature* 564, 32–34; 2018 *https://www.nature.com/articles/d41586-018-07587-4*.

After remarking the importance of soils managing climate change the paper call on countries involved in the Koronivia process to establish a body to monitor soil carbon in farmland, map changes to it and reclaim degraded areas. All involved should focus on the following eight steps: stop carbon loss, promote carbon uptake, monitor, report and verify impacts, deploy technology, test strategies, involve communities, coordinate policies, provide support.

RUMPEL C, AMIRASLANI F, CHENU C, GARCIA-CARDENAS M, KAONGA M, KOUTIKA L-S, LADHA J, MADARI B, SHIRATO Y, SMITH P, SOUDI B, SOUSSANA J-F, WHITEHEAD D, WOLLENBERG E (2020). The "4 per 1000" Initiative: Opportunities, limitations and challenges for implementing soil organic carbon sequestration as a sustainable development strategy. Ambio 49,350–360; (https://link.springer.com/article/10.1007/s13280-019-01165-2)

Climate change adaptation, mitigation and food security may be addressed at the same time by enhancing soil organic carbon (SOC) sequestration through environmentally sound land management practices. This is promoted by the "4 per 1000" Initiative, a multi-stakeholder platform aiming at increasing SOC storage through sustainable practices. The scientific and technical committee of the Initiative is working to identify indicators, research priorities and region-specific practices needed for their implementation. The Initiative received its name due to the global importance of soils for climate change, which can be illustrated by a thought experiment showing that an annual growth rate of only 0.4% of the standing global SOC stocks would have the potential to counterbalance the current increase in atmospheric CO_2. However, there are numerous barriers to the rise in SOC stocks and while SOC sequestration can contribute to partly offsetting greenhouse gas emissions, its main benefits are related to increased soil quality and climate change adaptation. The Initiative provides a collaborative platform for policy makers, practitioners, scientists and stakeholders to engage in finding solutions. Criticism of the Initiative has been related to the poor definition of its numerical target, which was not understood as an aspirational goal. The objective of this paper is to present the aims of the initiative, to discuss critical issues and to present challenges for its implementation. We identify barriers, risks and trade-offs and advocate for collaboration between multiple parties in order to stimulate innovation and to initiate the transition of agricultural systems toward sustainability.

RUMPEL C, AMIRASLANI F, CHENU C, GARCIA-CARDENAS M, KAONGA M, KOUTIKA L-S, LADHA J, MADARI B, SHIRATO Y, SMITH P, SOUDI B, SOUSSANA J-F, WHYTHEAD D, WOLLENBERG E (2020) Response to ''The ''4p1000'' Initiative: A new name should be adopted'' by Baveye and White (2019). Ambio 49: 363-364 (https://doi.org/10.1007/s13280-019-01209-7)

RUMPEL, C., AMIRASLAI, F., BOSSIO, D., CHENU, C., HENRY, B., FUENTES ESPINOZA, A., KOUTIKA, L.-K., LADHA, J., MADARI, B., MINASNI, B., OLALEYE, A.O., SHIRATO, Y., SALL, N.S., SOUSSANA, J.-F., VARELA-ORTEGA, C. (2022): The Role of Soil Carbon Sequestration in Enhancing Human Resilience in Tackling Global Crises including Pandemics. Soil Security, 8, 100069; (https://www.sciencedirect.com/science/article/pii/S2667006222000351)

b. Special issue

To identify suitable region specific practices globally, the STC is editing a special issue in the international journal "Regional Environmental Change" (Springer Nature, impact factor 3.1) with the title "**Sustainable management practices to increase soil carbon sequestration: what are their contribution to climate change mitigation, adaptation and food security in different ecosystems and regions of the world**". The special issue is divided in five sections from different regions of the world (America, Asia, Europe, Africa and Oceania) and editors were nominated grouping the STC members. A call for contributions resulted in the selection of 41 potential papers. The submission of papers is in

progress and the publication of the special issue is planned for 2022. The STC is preparing an Editorial article for the Issue.

The following 18 regional papers have already been published under STC supervision for the Regional Environmental Change journal- Regional management practices with positive effects on soil carbon to meet the goals of the 4p1000 Initiative. ISSN: 1436-3798 (Print) 1436-378X (Online):

1. David Whitehead, Stephen J. E. McNeill, Paul L. Mudge. Regional and national changes in soil carbon stocks with land-use change from 1990 to 2016 for New Zealand.
2. Lydie-Stella Koutika, Kalulu Taba, Martin Ndongo. Nitrogen-fixing trees increase organic carbon sequestration in forest and agroforestry ecosystems in the Congo basin.
3. Audrey Leopold, Julien Drouin, Elia Drohnu, Hélène Kaplan. Fire-fallow agriculture as a sustainable cropping system for maintaining organic carbon in Maré Loyalty Island (New Caledonia, southwest Pacific)
4. Johannes Biala, Kevin Wilkinson, Beverley Henry. The potential for enhancing soil carbon levels through the use of organic soil amendments in Queensland, Australia.
5. Shoji Matsuura, Reiko Kazama, Hiroshi Hibino. Manure application in managed grasslands can contribute to soil organic carbon sequestration: evidence from field experiments across Japan
6. Sophie Drexler, Andreas Gensior, Axel Don. Carbon sequestration in hedgerow biomass and soil in the temperate climate zone
7. Oscar Pascal Malou, Patricia Moulin, Tiphaine Chevallier. Estimates of carbon stocks in sandy soils cultivated under local management practices in Senegal's groundnut basin
8. Júnior Melo Damian, Mariana Regina Durigan. Deforestation and land use change mediate soil carbon changes in the eastern Brazilian Amazon
9. Rodrigo Antón, Francisco Javier Arricibita. Soil organic carbon monitoring to assess agricultural climate change adaptation practices in Navarre, Spain
10. Francisco S.M. Araujo, Hugo Fantucci, Sergio Henrique de Oliveira Lima, Mônica Cavalcanti Sá de Abreu, Rafael M. Santos. Modeling Canadian farmer's intention to adopt eco-friendly agricultural inputs and practices
11. Álvaro Doblas-Rodrigo, Patricia Gallejones, Ainara Artetxe. Grassland contribution to soil organic carbon stock under climate change scenarios in Basque Country (Spain)
12. Pierre Chopin, Jorge Sierra. Potential and constraints for applying the "4 per 1000 Initiative" in the Caribbean: the case of Guadeloupe
13. Narindra H. Rakotovao, Angelina R. Rasoarinaivo. Organic inputs in agroforestry systems improve soil organic carbon storage in Itasy, Madagascar
14. Armand W. Koné. Soil organic carbon storage and contribution of management strategies to the "4 per 1000" target in a wet savanna, Côte d'Ivoire
15. Gavi Alavi-Murillo, Jan Diels, Jere Gilles, Patrick Willems. Soil organic carbon research in Andean high-mountain ecosystems: Importance, challenges, and opportunities for carbon sequestration
16. Maria Lucrécia Gerosa Ramos, Robervone Severina de Melo Pereira do Nascimento, Antonio Marcos Miranda Silva, Stefany Braz Silva, Manuel Pereira de Oliveira Júnior. Carbon and nitrogen stocks in cultivation systems of a Quilombola community in the Brazilian Cerrado
17. Daniele Costa de Oliveira, Stoécio Malta Ferreira Maia, Rita de Cássia Alves de Freitas, Carlos Eduardo Pellegrino Cerri. Changes in soil carbon and carbon sequestration potential under different types of pasture management in Brazil
18. Thayse Aparecida Dourado Hernandesa, Ricardo de Oliveira Bordonala, Daniel Garbellini Dufta, Manoel Regis Lima Verde Leal. Implications of regional agricultural land use dynamics and deforestation associated with sugarcane expansion for soil carbon stocks in Brazil.

c. Papers presented in regional or international conferences

Rumpel C, Amiraslani F et al. (2019) *The 4p1000 initiative: science for sustainable development between political and economic interests*, June 2019, Conference on 'Food security and Climate change: 4 per 1000 initiative new tangible challenges for the soil 18-20th June 2019, France

Rumpel, C. Amiraslani et al : *The role of the 4p1000 initiative in implementing soil organic carbon sequestration under the sustainable development agenda*. 7th international SOM symposium, 6-10th October 2019, Adelaide, Australia.

Chenu C, Amiralani F. et al Promoting carbon sequestration in soils: the 4 per 1000 initiative. 6th international SOM symposium, 3-7th september 2017

- Rumpel C, Amiraslani F et al. (2020). Soil organic carbon sequestration as a strategy to enhance soil health and ecosystem resilience to mitigate future pandemics and global change. American Geophysical Union (AGU) 7-11 Dec 2020
- Smith P, Rumpel C, Amiraslani F et al. (2018). The 4 per mille Initiative is promoting the implementation of sustainable development goals through science-policy-practice interactions. *Terra Envision*, 27th Jan- 2nd Feb 2018, Barcelona, Spain
- Rumpel C, Amiraslani F et al. (2017). Criteria and Indicators for project assessment under the 4p1000 Initiative - soils for food security and climate. *Agroecology: Methods to evaluate conditions for its development and to assess its effects*. 14-15th December 2017, France

F - Involvement of the Initiative in high level global actions

NDC project

In order to gather information on the importance of SOC in the countries' Nationally Determined Contributions in the UNFCCC negotiations, an analysis of the Intentionally Determined Contributions (INDCs) and NDCs has been done. The analysis was supplemented by interviews with experts from selected countries. Moreover, the potential contribution of additional SOC storage was evaluated using the scientific literature. The results of the study were discussed during a side event in June 2019 at the Bonn Climate Change Conference (SB50) and presented in a webinar carried out in April 2020 (NDCs webinar).

An Info Note was written by L. D. Wiese, V. Alcantara-Shivapatham and L. Wollenberg with the title "Enhancing Nationally Determined Contribution (NDC) ambition for soil organic protection and sequestration" (Infonote on the NDCs) Wiese LD, Alcántara-Shivapatham V, Wollenberg E. 2019. Enhancing Nationally Determined Contribution (NDC) ambition for soil organic carbon protection and sequestration. CCAFS Info Note. Wageningen, Netherlands: CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS). (https://ccafs.cgiar.org/resources/publications/enhancing-nationally-determined-contribution-ndc-ambition-soil-organic). Main conclusions are: (1) countries do not consider SOC in NDCs or indirectly via practices and not explicitly, (2) countries need help, (3) what about the additionality in projects that aim SOC sequestration if the SOC is in the NDC?

A paper was also published on this issue: Wiese L, Wollenberg E, Alcántara-Shivapatham V, Richards M, Shelton S, Hönle SE, Heidecke C, Madari BE and Chenu C (2021) Countries' commitments to soil organic carbon in Nationally Determined Contributions, Climate Policy, 21:8, 1005-1019, DOI: 10.1080/14693062.2021.1969883. (https://doi.org/10.1080/14693062.2021.1969883)

Submissions to the process of the Koronivia Joint Work on Agriculture:

The 23rd Conference of the Parties (COP23) to the UNFCCC concluded with a landmark decision recognizing the role of agriculture in tackling climate change.

Decision 4/CP.23 on the Koronivia Joint Work on Agriculture (KJWA) requests the two Subsidiary Bodies under the Convention, namely the Subsidiary Body for Scientific and Technological Advice (SBSTA) and the Subsidiary Body for Implementation (SBI), to jointly address issues related to agriculture, taking into consideration the vulnerabilities of agriculture to climate change and approaches to addressing food security.

The "4 per 1000" Initiative, together with the Intergovernmental Technical Panel on Soils and the Global Soil Partnership, the Secretariat and the Science-Policy Interface of the United Nations Convention to combat Desertification, Drynet, the World Agroforestry Centre (ICRAF) and the CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS) East Africa have submitted their science-based views for the workshops taking place at SBSTA/SBI 5&6 in June 2019 on topic 2 (c) "Improved soil carbon, soil health and soil fertility under grassland and cropland as well as integrated systems, including water management".

In addition, together with a group of research and higher education institutions and programs the "4 per 1000" Initiative has submitted its science-based views for the workshops taking place at SBSTA/SBI 5&6 in November 2019 on topic 2(d) "Improved nutrient use and manure management towards sustainable and resilient agricultural".

The STC also adhered to the proposals to the KJWA process submitted by CIRAD and other research organizations to the topics e) and f) during 2020.

G - Relationships with other related initiatives

GSP activities

The STC has contributed to writing and reviewing several GSP documents such as the Technical Manual on SOC Management, the "Protocol for Measurement, Reporting, Verification and Monitoring to assess soil organic carbon sequestration and greenhouse emissions in agricultural landscapes (GSOC-MRW), the Carbon Sequestration potential map and the GSOCseq Technical report.

H - Strategy

Vision, Mission, Objectives, Implementation Plan of the Initiative

On June 15th 2020, the “4 per 1000” Strategic Plan for the next 30 years was endorsed by the Consortium. The STC contributed to the development since the start of the process. For developing a plan of actions to implement the strategic Plan the STC members contribute to different objectives and task forces.

I - Workshops and events

The STC has contributed to and co-organized several workshops and events around the world:

- First "4 per 1000" Initiative North America Regional Meeting, 11 to 15 May 2020, online.
- the “4 per 1000” Initiative Latin America and the Caribbean Regional Introductory Webinar took place on December 16, 2020, to introduce the mission and objectives of the 4 per 1000 Initiative and strengthen its interaction with stakeholders.
- the workshop about “Enhancing investment in soil health and carbon storage: Frontiers for linking finance and carbon accounting” organizes by CCAFS, “4 per 1000” Executive Secretariat, The Nature Conservancy and The World Bank that took place on 10 September 2020 online.
- a scientific regional meeting in South-East Asia (Hanoi, Vietnam) in collaboration with CIRCASA in September 2019.
- an international conference on the “4 per 1000” debate in June 2019 in Poitiers. The conference provided an exchange forum for scientists, decision makers, funding organizations (agencies), businesses and geopolitical entities to discuss critical issues and realistic opportunities and challenges for the implementation of the initiative. It aimed to build partnerships for soil sustainability and resilience, promote innovation and knowledge, and exchange and ensure that appropriate solutions are put into practices under the framework of the “4 per 1000” Initiative.
- at the XXI World Congress of Soil Science in Rio de Janeiro (Brazil), 12-17 August 2018, two sessions were organized by STC members: 1. convened by Claire Chenu: C4.1.5 - Carbon sequestration potential of soils. Part of Division 4: The Role of Soils in Sustaining Society and the Environment https://www.21wcss.org/docs/program/division4/C4.1.5.pdf 2. Convened by Beata Madari: 4.4 - Soil organic matter to secure food and water and the “4 per 1000” Initiative Interdivisional meeting part of Division 4: The Role of Soils in Sustaining Society and the Environment https://www.21wcss.org/?secao=conteudo&id=74.
- at 5th International Rice Congress. Singapore, Marina Bay Sands, 14-17 October 2018. http://ricecongress.irri.org/ a session was organized by an STC member: convened by J.K. Ladha.
- International Conference on Agricultural Emissions and Food Security: Connecting Research to Policy and Practice. Berlin, 10-13 September 2018. FACCE-JPI and GRA.
- NARO-FFTC-MARCO Symposium 2018: Climate Smart Agriculture for the Small-Scale Farmers in the Asian and Pacific Region. Tsukuba (Japan), 26 to 30 September 2018.
- INRA/IRD/CIRAD in November 2018, STC member participated in the organization of a French national Symposium to identify research priorities in Sète (France).