# IUSS Bulletin 134

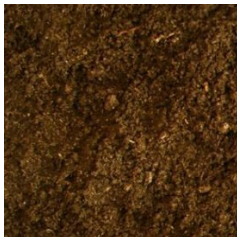

**International Union of Soil Sciences (IUSS)**

Bulletin 134

June 2019





## International Union of Soil Sciences (IUSS)

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ISSN 0374-0447




International Decade of Soils 2015-2024


Graphic Design: Daniël Loos, *www.bureaucontrapunt.nl*

***The IUSS Bulletin is the official Newsletter of the International Union of Soil Sciences. It is freely distributed through the IUSS website.***


# Contents

# IUSS Reports



# Memories of 21WCSS

The Brazilian pedology team led by Professor Carlos Schaefer, from UFV, prepared a beautiful video with highlights of the unforgettable post-congress Excursion 9, which was part of the program of the 21st World Congress of Soil Science (21WCSS). The excursion covered about 1,450 km, beginning with the tectonic depression of Rio de Janeiro, passing through the mountainous highlands of Itatiaia (2700 meters), reaching the largest area of iron mining worldwide, the so-called Ironstone Quadrangle (*Quadrilátero ferrífero*). After intense observations and discussions on benchmark soils, the field trip ended in EMBRAPA Research Station of Maize and Sorghum, in Sete Lagoas, where the participants had the opportunity to see how deep weathered Latosols are now cultivated using high technology, allowing high productivity. The last part was a visit to the gorgeous limestone cave 'Rei do Mato", which shows remarkable Karst features. During the trip, Latosols developed from deep saprolites of shales, gneisses, limestones and itabirite were studied, across the dissected Brazilian highlands and the Brazilian Plateau, in the States of Rio de Janeiro and Minas Gerais.

We thank all participants from 21 different countries, and the excellent work by Professor Schaefer and his team to enable that fantastic journey along the rolling highlands of Brazil.



Watch the video: *https://www.youtube.com/watch?v=QejEGFGRJ_s&feature=youtu.be*

# Minutes of IUSS Council meetings 2018

***Monday 13 to Thursday 16 August 2018***
***Rio de Janeiro, Brazil***

IUSS Meeting location: **Windsor Convention & Expo Center**
R. Martinho de Mesquita, 129, Bloco 2 – Barra da Tijuca, Rio de Janeiro – RJ, Brazil, CEP: 22620-220, Phone: +55 21 2195-9950

## Monday 13 August, 12:45-14:45
## Council Meeting

### 1. Introduction
Short introduction by President Rattan Lal

### 2. Minutes Council Meeting during Inter-Congress Meeting in Rio 2016
No discussion
Change of text under item 28: Bid from Italy was accepted in Jeju.
Motion: minutes unanimously approved

### 3. Minutes Executive Committee Meeting during Inter-Congress Meeting in 2016
No discussion
Motion: minutes unanimously approved

### 4. Report President
IUSS nominated for Nobel Peace Prize
Presidents shall look for own funds for travelling.
Distinguished Service Awards given each year to politicians.

### 5. Report Vice President Congress
About 1000 participants did not pay ahead, almost 4,000 participants in total at WCSS in Rio.

### 6. Report Secretariat and Treasurer
Report given according to progress reports in the annotated agenda.

*Report of the Secretary:*

1. The Secretariat has circulated Annual Reports (from November 2016) about the activities of the Secretary and Treasurer.
2. Key points were the elections of the Officers for Divisions and Commissions.
3. Active in promoting the International Decade of Soils
4. Organised the Soil Icon contest.
5. Helped to prepare and disseminate books from the IUSS Book Series
6. The first term of the activity is coming to an end in December 2018. It is anticipated that the funding will continue for a further four years. The Meeting endorsed the continuation of the contract to 2022.

*Financial report by Andreas*
IUSS has three types of accounts:

a. Raiffeisen Account in Austria – the income is mainly from membership fees, books and miscellaneous. Expenditure is principally to support the Secretariat, Division Chairs, Books and other expenses.
b. We have established a PayPal account (saves bank charges, we will change from USD to EUR).
c. IUSS established an Investment Account with Morgan Stanley in USA. The investments are made conservatively. The increase in the Portfolio was $51,121.

A question was asked about the ethical nature of the investments in the investment accounts. But if there is to be a drive to more 'ethical' investments this is a matter requiring considerable effort and guidance will be required.
The Treasurer indicated he would send the report of the investments to all Council Members.
With regard to the allocation of investment funds, proposals by Full members are welcome.
Motion to accept the Report of the Secretary and the Treasurer; accepted unanimously.
Don Sparks suggested that we should develop a programme of how to further the support for future developments in Soil Science within the framework of the Stimulus Fund.



ISC membership: chance to look for new partners and funding organisations
Motion: Shall IUSS continue the contract with Austria Bioscience for support of the Secretariat (50% Austria Bioscience, 50% IUSS).
There was discussion about this during which it was noted that the original contract was foreseen for 8 years with an Austrian funding review after 4 years. It will be necessary to seek new tenders in 2022.
The motion was approved without any dissenting votes.

### 7. Report Division 1 – Soils in Space and Time
Report by Erika Micheli (Chair of Division 1)
Summary table about performance, only Commission 1.3 did not provide a report.
One of the recent innovations of the Division is the International Soil Judging Contests, which have been very successful and have provided considerable encouragement for younger soil scientists to be involved in IUSS activity.
No questions were raised.

### 8. Report Division 2 – Soil properties and processes
Report by Kazuyuki Inubushi (Chair of Division 2) covering all Commissions and WG activities; The Working Groups (Soil Modelling Consortium and Critical Zone Systems) have been active. The Chairman has represented the Division at a number of Conferences during the last two years.
Outline of meeting participations by Div chair
Outlook towards ISMOM meeting
Introduction of new Div chair Hatano

### 9. Report Division 3 – Soil Use and Management
Bal Ram Singh noted that he had taken over as Chair of the Division after the election of Tokashi Kosaki as President Elect. The Chair spoke about the report, which had been circulated.
Book Nexus of Soils was produced.
WG Land degradation has been very active with EGU.
35 sessions were proposed for 21WCSS.

### 10. Report Division 4 – The Role of Soils in Sustaining Society and the Environment
Report by Christian Feller (Division Chair)
Division newsletter Soil Connect
Coordination by monthly web-conferences
Produced 3 IUSS fact sheets and was actively involved in the production of three books.
Overview table about Comm and WG: 12+5 symposia
WG Cultural understanding of soil has about 50 members, very active
Basis for new organisation of Division 4: See soil not only as science, but as a monetary body and a cultural body
Proposal to put more money to Div, Comm and WGs
Lal asked for new, innovative ideas, new research topics, and to think differently.

### 11. Proposal for new Commissions
*Proposal for new Commission 2.6*
Don Sparks supports the idea that Critical Zone Science is an international topic, but considers that this proposal is currently included by work across the existing Divisions and Commissions; there are two Working Groups in Division 2 and one Working Group in Division 4, which cover many of the areas covered by the proposal. Furthermore, the new structure was thought to minimize the number of Commissions and WGs in order to stimulate cross-interdisciplinary research.

Comment: we shall review the work of new WGs for longer before we make a decision.
The President encouraged a discussion about future areas of activity for IUSS.
Request how we did in addressing global issues, triggering new science, brainstorming on new concepts, review current science:
Not very effective what we are bringing out to the general public, need to communicate more, new methods of communicating, promote what we have done
We know our soils now, but there is no knowledge on how soils will change under impacts like climate change
Interventions of governments and politicians impact on soil, good soils disappear, we need more actions.
How to convince the society and politicians about the relation between soils and environmental challenges such as climate change
Bring soil science results into the socio-economic context, bring up what-if consequences, scenarios related to hydrology etc.
Open science, open access, more explicit way to use accessible data for soil research, e.g. CODATA works on this issue, encourage soil scientists in a most efficient way
Bring up something that is of value for externals, focus on other issues than soil.

### 12. Elected Division and Commission officers

The (re)elected Division and Commission officers were congratulated and start their duty after the WCSS (names see list in annotated agenda)

## Tuesday 14 August, 12:30-14:30 Council Meeting

### 13. Report Committee on Awards and Prizes

Report by Mary Beth according to the Annotated Agenda
Chair is stepping down this year

### 14. Report Committee on Budget and Finances

Report by Stephen Nortcliff according to the Annotated Agenda
Proposes not to increase the fees by member
Usually we make a deficit in Congress and Inter-Congress years, a surplus in the other two years.
IUSS books usually make a deficit, be careful to whom we sell the books.
Not all countries can transfer money, but are not excluded, and pay in cash.
Transactions of dues shall be done in Euro in future; invoices are currently made out in EUR and USD.
Chair will step down in 2019, John Kim interested to take over.
Motion: not to increase the membership fees of due classes of Full members, unanimously adopted
Motion: Issue invoices predominantly in Euro, unanimously adopted
Motion: accept the budget as presented, unanimously adopted
Discussion: request to amend the figure of national members in relation to population, we have to rely on the membership numbers provided by the national societies

### 15. Report Committee on Statutes and Structure

Report by Don Sparks according to Annotated Agenda
Proposed changes to Statutes and Bye-Laws mainly in relation to election procedure for Division and Commission chairs and vice-chairs
One vote per national member, but weight according to due classes
Motion: One vote for each national member (as for the Presidential Election), 2 opposed, motion adopted
Discussion: Small countries are in favour of motion, accreditation is needed.
Minimum size: no minimum size of national members, 1 opposed, motion adopted
Chair is outgoing, successors were proposed.

### 16. Report Committee on Presidential elections

Voting procedure was explained by Roger Swift
Motion: Candidates shall be announced today, seconded, one opposed, 6 abstain, motion adopted.
Roger: candidates are Laura Bertsch and Alex McBratney
Chair will step down, Rainer Horn is willing to take over.

### 17. Proposal for the Standing Committee chairs

Motion: Committee Prizes and Awards successors and Committee on Statutes and Structures successors to be voted secretly; adopted unanimously
Voting: Tom Sauer (Committee on Prizes and Awards) and Alfred Hartemink (Committee on Statutes and Structures) respectively received the most votes and will be the Standing Committee chairs from 2019 onwards.
No voting for the other two Committees as only one candidate was nominated in each case and no secret voting was requested.

### 18. Elected Honorary members

Honorary members were read out and congratulated.

### 19. Proposed Comm and WG forum

Presentation by Jae Yang
Many functions of the Forum shown on slides.
Future plans:
Chair will provide guidance/interactive digital discussion tool (on IUSS website?) to Forum.
First Meeting shall be organized during Inter-Congress-meeting.
Second Meeting at 22WCSS in 2020
Evaluation shall follow afterwards.

Discussion: Request to include Vice-chairs of Comms and WGs into Forum
Need for virtual meetings before 2020, to be able to exchange scientific views more intensively; Commissions and WGs shall be the powerhouse of our Union, avoid overlaps and find synergies, opportunities for mentoring, giving guidance, proposal to use GoToMeeting for this.



*IUSS Stimulus Fund*
Stephen reports about Stimulus Fund, not enough proposals received to spend 15,000 USD per year, we can increase the money for individual proposals, call to apply for it, encourage your members, the EC helps to support applications.

### 20. International Decade of Soils

Report by Sigbert as provided in the Annotated agenda, invitation to provide tools to TROP-ICSU, bring soil science to the issue of climate change
Rattan reported about Al Gore's farm as model farm for sustainable farmers.
Bringing knowledge into action is key.
New activities needed in order to reach the public.
Idea: Small video clips to explain the fact sheets to put on IUSS video channel in this decade, students involved in educational projects could be used as IUSS education initiative.
Undergraduate students produce interesting videos to be shared by IUSS.
Questions were made about major breakthroughs of soil science since 2000 that made an impact, e.g. from Divisions, what has changed life.
Soil is the new black (fashion) like SOM is very important, is a breakthrough in understanding.

21WCSS Technical tours: no vacancy due to organizational reasons, 5 months' time was given for registration in order to get knowledge about food, busses and security.

## Thursday 16 August, 12:30-14:30 Council Meeting

Discussion about Presidential election
EC will not invite any candidate for the Presidential election to the meeting as requested from Council, regulation is online.
Motion: To get a video of both candidates, seconded, adopted.
Motion: Presidential candidate shall have the opportunity to address the Council members, seconded, can only refer to this meeting, YES 34, NO 13, 1 abstain, adopted.
Amendment that it shall take place today, seconded, was not accepted.

### 21. IUSS International Affairs

IUSS Books produced
ISC General Assembly: IUSS Presidents were present
Nomination to Nobel Peace Prize: Is it possible to see the documentation? No, as it is confidential
Distinguished Service Awards will be given to politicians every year.
Presidents participated in a lot of conferences.
Cooperation with FAO like ITPS
Presence at EGU General Assembly
IUSS is presented well as international science organisation.

### 22. IUSS Internal Affairs – services for its members

Alerts, Bulletin, IUSS books –> ebooks, video clips of fact sheets, support for election tools
IUSS books requested to be available online as eBooks for members, publisher will be asked.
What is the added scientific value of participating in the union, paying membership fees, participation of members in the activities, meetings of Div and Comm, what is the impact of the science IUSS is doing, we need to look for new approaches and outlooks.
What cannot be done by national societies alone (being not IUSS member): e.g. global soil map, addressing climate change from soil science point of view.
Aim: Facilitate the communication between national scientists around the world, improve the communication, lost Alert subscribers due to new personal data protection regulations, promote World congress, cooperate with international new organizations and issues.
Only two African countries out of 54 are represented, we need to improve that, cancelled the minimum number of national members, liberal view on new members' payments.

### 23. WCSS 2022

Currently formalizing the WCSS2022 working group, see further details on slides such as PCO in place
Excursion programme: UK and Scotland, great variety
Support to get Visa for e.g. African countries
Request that Vice-Chairs of Division shall work closely together with IUSS Division chairs.

**24. WCSS 2026 bidding and beyond**

Request to receive full-bid of both candidates to Council members before the election

Motion: We shall have the presentations but postpone the voting, seconded (Belgium), Yes 24, No 36, 2 wrong, 2 abstain, motion failed.

Canadian presentation with video included:

China presentation: Video and presentation

Voting: China 35, Canada 25, 2 abstain

Comment on date: Council decided on the full package provided by China including proposed dates in June.

**25. Preparation of the Centennial 2024**

*Report by Roger*

Italian soil science society is supported in the preparation of the event by Italian research organization to take place on May 19, 2024 in Rome, then conference in Florence, the original book with report about ISSS founding meeting was founded.

Collection of personal histories: national societies were asked to make interviews of well-known soil scientists, response awful so far, interviews to be uploaded on IUSS YouTube channel.

IUSS books are usually published on WSD: 10 books in 10 years.

Distinguished Service Award given each year, this year to Minister of Agriculture from Morocco, request to propose politicians to be awarded.

Pictures on soil science history collected earlier shall be further used for preparation of IUSS History book.

**26. Any other business**

Max. 5 min. presentation of each candidate for the Presidential election,

Alex McBratney and Laura Reyes, were given orally.

Thanks to Flavio as a wonderful host who mentioned to be proud to have been working for 10 years with the Council.



# IUSS celebrates its 95th Anniversary

International Union of Soil Sciences

On May 19th, 95 years ago, was the official establishment of the International Society of Soil Science in Rome. A lot has happened in soil science and the International Union of Soil Sciences since then. We invite all members to celebrate this anniversary by promoting soil science around the world and by awareness raising among citizens to preserve this precious resource, which is the basis of life on earth.

A picture from the history of IUSS: Fourth International Soil Conference in Rome, 2nd Commission, May 1924.
*www.iuss.org/about-the-iuss/iuss-history/historical-gallery/*

# Report from the IUSS Secretariat

## IUSS Website

The main tasks of the webmaster during the last six months were adding new information to the website (e.g. new events, news), inputting Alert news into the content management system and sending the Alert out to our readers, creating new content, e.g. for the International Decade of Soils and programming it backend, and finally, keeping contact information of IUSS members updated. Patching up the content management system, implementing necessary updates and system back-ups round off the webmaster's tasks.
In May 2019 the website was migrated from the University of Life Sciences (Boku) to the Austrian Agency for Health and Food Safety (AGES) due to data ownership rules applied at Boku. The change needed some work of our webmaster, but with this change the IUSS website is independent from external organizations and the storage size is not limited anymore.

## TWITTER ALERT:

Now, the International Union of Soil Sciences have an Official Twitter Account. We invite you to follow us at the address **@IUSS_ORG**, to promote all our official activities and remain in touch with Soil Science Scientists community worldwide.


From our Twitter account, you can also directly access the IUSS Website by touching on the symbol

iuss.org

## IUSS Stimulus Fund

The IUSS Stimulus Fund was created to support suitable activities within the Commissions and Working Groups. Where appropriate, the Fund will also support other activities to assist the development of Soil Science in general, but particularly in regions of the world where lack of resources limit opportunities.
Some funds have been and will continue to be allocated to undertake specific projects identified by the Executive Committee, particularly projects which contribute to fulfilling the objectives of the International Decade of Soils.
IUSS has set aside a sum of $15,000 annually to help fund a number of activities, but this funding may be increased, if the quality of applications is particularly high. The normal maximum award will be $2,500, but larger awards may be considered. For more information about the stimulus fund, please go to *https://www.iuss.org/about-the-iuss/iuss-stimulus-fund/?search_highlighter=stimulus+fund*
Please note that research projects, travel costs of individual people, and applications from countries with outstanding membership fees as well as applications lacking detailed budgets cannot be taken into consideration for funding.
As in the preceding years, in 2019 again $15,000 are available, with two submission dates for applications: 15 March and 15 September. Applications are always welcome and should be sent in due time to iuss@umweltbundesamt.at.
From the first round of submissions in 2019, in which ten applications were received, the IUSS decided to support the preparation of the MOOC (Massive Open Online Course) on Tropical soil science of KU Leuven, May to July 2019; Pedometrics 2019, University of Guelph in Guelph, Ontario, Canada, 2-6 June 2019; a Soil Judging Contest in Mexico, 23-26 October 2019, and the IUSS Soilutions Poster Contest, Submission deadline June 15, 2019. Details on the latter can be found in section International Decade of Soils (2015-2024), Recent Achievements.
A short (500-1000 words) report of the activity for which the funds were received, must be presented for inclusion in the IUSS Bulletin within 2 months of completion.

## IUSS at EGU General Assembly 2019

At EGU 2019, which took place in Vienna from 7 to 12 April 2017 and attracted 16,273 scientists from 113 countries of which 53% were under the age of 35 years, IUSS shared a booth with ESAFS (East and Southeast Asia Federation of Soil Science Societies), ECSSS (European Confederation of Soil Science Societies), BGS (Soil Science Society of Switzerland) and DBG (German Soil Science Society). IUSS presented its Divisions and their most recent activities as well as the IUSS book series under the umbrella of the International Decade of Soils 2015-2024.

The latest book in the IUSS soil book series *Global Soil Proverbs – Cultural Language of the Soil* was presented by IUSS Secretary Sigbert Huber on 11 April, 15:45-16:15. IUSS President Elect Laura Bertha Reyes Sánchez, co-author of the chapter on proverbs in Mexico, talked about her insights. President Takashi Kosaki provided an outlook on the next IUSS soil book. The book can be ordered already from *iuss@umweltbundesamt.at*; reduced price for IUSS members: EUR 30.00 (plus shipping costs).
Read more: *https://iuss.org/index.php?article_id=704*

The book presentation was followed by a meet and greet session with IUSS President 2019-2020 Takashi Kosaki from Japan and IUSS President Elect 2019-2020 Laura Bertha Reyes Sánchez from Mexico.
Read more: *https://www.egu2019.eu/*
Download latest IUSS flyer: *https://www.iuss.org/media/iuss_flyer_v5_2019.pdf*

## International Poster Contest 'Soilutions' to solve soil degradation problems

The Secretariat helped launch this contest with the following entry in the March Alert:
IUSS considers stopping soil degradation as one of its most important tasks, and invites you to propose in a poster your 'Soilutions' to address soil problems in order to preserve this unique resource and life. The ideas and proposals should represent the role of the soil as an essential natural resource to preserve the environment**. IUSS will award 1,000 USD from the Stimulus Fund for the best 'Soilutions' poster and 500 USD each for the second and third best poster. The posters shall be submitted until May 31, 2019.** The best 12 posters will be displayed on the IUSS website and a calendar shall be made using these posters.
Read more: *https://iuss.org/index.php?article_id=26&goback=619*

# Awards

## Glinka World Soil Prize: the winner is...

Professor Rattan Lal won the Glinka Prize for his work on Sustainable Soil Management. He has been listed among the world's most influential scientific minds (2012) and among the top 1 percent of all researchers in agriculture. Prof. Lal's focus has been on soil organic carbon restoration and improvement of soil structure. His efforts have led to the eco-intensification of agricultural systems, following a soil-centric approach, which ensures long-term sustainability. His work has played a major role in converting science into policy and decision making.
Read more: *http://www.fao.org/global-soil-partnership/pillars-action/2-awareness-raising/glinka-world-soil-prize/en/*

## 2019 Japan Prize Winner is Pioneer in No-Till Agriculture and Soil Carbon Sequestration

The Japan Prize is awarded annually to scientists and engineers from around the world who have made significant contributions to the advancement of science and technology, thereby furthering the cause of peace and prosperity of mankind.
Rattan Lal, IUSS Past President and Distinguished University Professor of Soil Science at The Ohio State University in Columbus, Ohio, U.S.A. is being honoured for his work in identifying technological options adapted to various ecosystems through his intensive basic and applied research on processes and factors of soil degradation caused by inappropriate biological production, as well as in evaluating recommended agricultural practices which reduce risks of soil degradation and of anthropogenic climate change while improving the environmental quality and addressing the critical issues of feeding the earth's population, which is expected to reach 9.8 billion by 2050.
The Japan Prize recognizes original and outstanding achievements in science and technology and the winners receive cash award of 50 million Japanese yen (approximately $450,000 USD), a medal and certificate to recognize their achievements.
The prestigeous 35th Japan Prize in the category Biological Production, Ecology was presented to Rattan Lal, IUSS Past President 2019-2020on April 8 in the presence of the Emperor and the Empress of Japan.
The Japan Prize is awarded annually to scientists and engineers from around the world, who have made significant contributions to the advancement of science and technology, thereby furthering the cause of peace and prosperity of mankind. Each year two fields of scientific endeavor are honored. The Japan Prize laureates receive a certificate of merit and a prize medal. A cash prize of 50 million yen is also awarded for each prize field.
A video of the Presentation Ceremony and Banquet is available here:
*https://www.youtube.com/watch?v=yXjQQkq4TNI&feature=youtu.be*
Photos of the Presentation Ceremony at the National Theatre of Japan and the Banquet in Tokyo as well as following celebration events at the Japan Academy, the Ito International Research Center, the University of Tokyo, the U.S. Embassy and the Foundation Office of the Japan Prize can be looked at here:
*https://www.japanprize.jp/en/press_photo_2019.html*
Information about the Laureates of the Japan Prize can be found here:
*https://www.japanprize.jp/en/laureates_by_year.html*
Read more about the Japan Prize Foundation here:
*https://www.japanprize.jp/en/index.html*

Fellows from the Ohio State University and the Japanese Society of Soil Science and Plant Nutrition as well as IUSS officials, i.e. Rattan Lal, Kazuyuki Inubushi, Junata Yanai and Takashi Kosaki, Past President, past Chair of Division 2, current Vice-Chair of Commission 3.5 and President, respectively. © The Japan Prize Foundation

## Dick Arnold received Guy Smith Medal

Since Dick Arnold could not attend the World Congress of Soil Science in Rio, Curtis Monger and John Galbraith (current and past chairs of Commission 1.4 Soil Classification) and Erika Michéli, chair of Division 1, organised a celebration event in his home town West Lafayette, Indiana, on 18 May 2019, and presented the award to Dick Arnold, Honorary Member of the IUSS. Dick Arnold was granted this prestigious IUSS award in honour of his outstanding contributions to soil science in research, teaching and outreach.
The IUSS Guy Smith Medal is the award of Commission 1.4 Soil Classification, and is awarded in every 2 years to distinguished soil scientists in the field of soil classification and/or mapping.

# Other IUSS News

## Slovene translation of WRB now available

The Slovenian version of the WRB in *Mednarodni klasifikacijski sistem za poimenovanje tal 2014 Mednarodni klasifikacijski sistem za poimenovanje tal in izdelavo legend na zemljevidih tal, Posodobitev 2015* is now available.


Download the pdf:
*http://www.fao.org/3/I3794SL/i3794sl.pdf*



# Report of Division 1: Soils in Space and Time

Division 1 deals with the 'body' of soil in a landscape context. It quantifies pedogenic processes responsible for spatial diversity in soil cover with landscape, geomorphic and geographic patterns. It includes the scaling of soil morphology from micro to macro levels of generalization, calibration of morphology to pedogenic processes, and integration of this pedosphere knowledge with that of the biosphere, atmosphere, lithosphere, and hydrosphere. Only through the knowledge of morphogenesis is it possible to develop rational multiple working hypotheses of soil formation, soil chronology, soil morphology, and geographic distribution patterns. Without this linkage there is little opportunity to extrapolate our knowledge base on soil attributes beyond immediate locations where it was derived. Using morphogenic knowledge, it is possible to catalogue and classify the population of soil attributes and generate multiple-use interpretations with spatial or tabular representations using GIS, and other state-of-the-science technologies.
The Division coordinates and harmonizes research activities on observation, genesis, classification and mapping of the soils and landscapes, as well as communicating results to the soil science community, soil users and to the public.

Structure and officers:
Chair: Erika Michéli, Hungary
1st Vice-chairperson: Matt Aitkenhead, United Kingdom
2nd Vice-chairperson: Jacqueline Hannam, United Kingdom

The vice-chairs are responsible mostly for the organization of the World Congress. The Chair is responsible for communication with the commissions, the working groups and vice chairs.
Since the IUSS World Congress, the Division, its Commissions and Working Groups continued organizing their events, published books and newsletters. They also participate in the discussions of the newly formed IUSS Forum, which provides a platform for interactions between commissions and working groups.

IUSS Division 1 Soils in Space and Time consists of six Commissions and several working groups:
- Commission 1.1 – Soil Morphology and Micromorphology
- Commission 1.2 – Soil Geography
- Commission 1.3 – Soil Genesis
- Commission 1.4 – Soil Classification
- Commission 1.5 – Pedometrics
- Commission 1.6 – Paleopedology

Working Groups: Cryosols, Digital Soil Mapping, Digital Soil Morphometrics, Global Soil Map, Proximal Soil Sensing, Soil Information Standards, Soil Monitoring, Universal Soil Classification, World Reference Base for Soil Resources.
The intensity of activities among the commissions and working groups varies as reflected in the details of the reports presented below.

## Commission 1.1: Soil Morphology and Micromorphology

Chair: Fabio Terribile, Itally
Vice-chair: Richard J. Heck, Canada

The commission is dealing with soil as a continuous natural body that has spatial and temporal dimensions (soil cover or pedosphere) and studies the organization of its organic and inorganic constituents on different scales from micro to macro. They closely cooperate with IUSS units dealing with paleopedology and soil genesis.
The Commission has two awards, the Kubiëna Medal and Young Micromorphologist Publication Awards.
The commission has a long tradition of circulating regular Newsletters and organizing training courses. In the intercongress period the commission organized sessions in the European Geosciences Union General Assembly (EGU) in 2018 and 2019 and prepares its biggest event together with the Polish Soil Science Society:
The 6th International Conference on Soil Micromorphology, which will be held in Krakow, Poland, from August 30 to September 3, 2020. Further information is available: *http://www.icosm2020.sggw.pl/* and *https://www.facebook.com/16icosm/*

## Commission 1.2: Soil Geography

Chair: Thomas Scholten, Germany
Vice-chair: Sergey V Goryachkin, Russia

Commission 1.2 Soil Geography deal with the soil cover and its many morphogenetic attributes as a function of climate, geology, relief, vegetation, human activities, and history (natural and anthropogenic). The Commission participated and supported the organization of several events such as European Geosciences Union General Assembly (EGU) 2018 and 2019 and also the events organized by the European Society for Soil Conservation (ESSC).
The Commission is also closely cooperating with Global Soil Map Working Group as well as with the Cryosols Working Group. The chair is actively participating in the IUSS Forum and the organization of the Eurosoil 2020 meeting as well.

## Commission 1.3: Soil Genesis

Chair: Endre Dobos, Hungary
Vice-chair: Megan Balks, New Zealand

This Commission quantifies the fundamental physical, chemical, biological, and mineralogical processes (pedogenic) of gains, losses, translocations, and transformations occurring in soils from micro to macro scales to explain and understand profile formation.
The Commission is developing and an important platform for soil scientists. Since the number of traditional soil scientists with a strong soil genetics background are decreasing, even proper soil profile descriptions are becoming a problem. The new initiate is an integrated soil profile description database and application. Local experts record their detailed profile description which will be uploaded together with the data base. The locations will be available to search on Google Earth. The product, to which any soil scientist can contribute, will be launched soon and advertised via IUSS.
The Working group Cryosols is closely related to this Commission.

## Commission 1.4: Soil Classification

Chair: Curtis Monger, USA
Vice-chair Bipin B Mishra, India

Within the Division 1 Soil classification is the Commission which categorizes the infinite number of morphogenetic attributes of the pedoshpere so that the attributes used to classify soils permit the greatest number, most precise, and most significant statements about soil behaviour and genesis. Commission 1.4. has a home page: *https://sites.google.com/a/vt.edu/iuss1-4_soil_ classification/*
Several activities are jointly organized by the WG WRB and the WG Universal Soil Classification and may overlap in the reports. The Commission has an award, the Guy Smith Award (granted every 4 years). The 2018 awardee was Dick Arnold (USA), who could not attend the WCSS in Brazil. Division 1. and Commission 1.4. jointly organized an celebration symposium in May 2019 where the IUSS activity of Dr. Arnold was acknowledged and the award was handed to him.

The Commission regularly is at inter congress meetings. The 6th International Congress of Soil Classification will be organized **16-24 April 2020, in Mexico**, Campus UNAM, followed by a field workshop. Detailed information is available at: *iscc2020.org*
There are two active Working Groups related to Commission 1.4, as follows:

### Working Group WRB

Chair: Peter Schad, Germany
Vice-chair: Stephan Mantel, the Netherlands

The working group is continuously developing, testing and maintaining the World Reference Base for Soil Resource. The major activities include training courses and field excursions, such as the upcoming ones:
*WRB Summer, Torun, Poland*, June 30 - July 5, 2019, the workshop WRB Summer is organized under the auspices of IUSS Working Group WRB by experts who have been organizing soil classification trainings for nearly 10 years. The aim of the event is to help beginners using WRB or to enhance skills in soil classification during a 1-day indoor training and 3-days intensive field activities.
Please find further information at: *https://sites.google.com/site/summerwrb/home*

*WRB Field tour Mongolia, July 28 - August 10, 2019:*
The purpose of the excursion is to test whether the current edition of the WRB is adequate to classify these soils.
The Working Group is involved in the organization of the 1.4 Commission Conference as well.

### Working Group Universal Soil Classification

Chair: Budiman Minasny, Australia
Vice-chair: Philip R. Owens, USA

The WG organized several skype workshops on the development of the principles of future harmonized soil description and classification systems. Since the Word Congress mostly small group discussions occurred. Hopefully the Commission 1.4 Congress will allow the planning of WG level activities.

## Commission 1.5: Pedometrics

Chair: Vera Leatitia Mulder, the Netherlands
Vice-chair: Nicolas Saby, France

The Commission deals with the application of mathematical and statistical methods for the study of the distribution and genesis of soils. The goal of pedometrics (and the WG) is to achieve a better understanding of the soil as a phenomenon that varies over different scales in space and time. The commission has a very active communication. They are circulating regular Newsletters called Pedometron, which are providing very valuable details of the short summary of the great activities of the Commission. The Newsletters can be downloaded from the Commission's web site: *http://pedometrics.org*
The Commission is organizing a biennial conference (Pedometrics Conference) which showcases innovative research on the mathematical spatial and temporal modelling of soil.
The upcoming one will be organizes in Guelph, Ontario, Canada, 2-4 June, 2019.
Further information: *http://www.pedometrics2019.com*
The commission has three awards:
The Best Paper in Pedometrics (yearly), the Richard Webster medal (every 4 years), and the Margaret Oliver Award for Early-Career Pedometricians (every 2 years).
There are several working Groups under or closely related to Commission 1.5, such as Digital Soil Mapping, Global Soil Map, Proximal Sensing, Soil Monitoring, Digital Soil Morphometrics and Soil Information Standards.

The communication and activities of these working groups often overlap. Below only those working groups that reported specific events are listed separately. Other working groups mostly contributed to other larger events.

### Working Group Digital Soil Mapping, and Global Soil Map

Chair: Laura Poggio, the Netherlands
Vice-chair: Alessandro Samuel-Rosa, Brazil
Chair (GSM): Dominique Arrouays, France
Theses Working Groups are closely working with the Commission in terms of activities and event organizations. The WG contributed with session to the EGU and participates in the planning of the Eurosoil 2020.
The largest event during the intercongress period co-organized with the Global Soil Map Working group was the 2019 Joint workshop for Digital Soil Mapping and GlobalSoilMap, 12-16 March 2019, Santiago, Chile. *https://sites.google.com/view/mapsoil2019/home*
The University of Sydney organized the 3rd Global Soil Security conference with the title 'Soil Security and Planetary Health Conference", 4-6 December 2018 with the participation of several IUSS officers and members of the listed Working Groups under Commission 1.5 Pedometrics.

## Commission 1.6: Palaeopedology

Chair: Maria Bronnikova, Russia
Vice-chair: Elizabeth Solleiro-Rebolledo, Mexico

The mission of the Palaeopedology Commission is to promote cooperative research by Soil and Environmental Scientists and Quaternary Geologists to increase our knowledge of past environments derived from paleosols. The issues covered by Paleopedology encompass the understanding of soil forming processes, deep weathering and regolith formation, soil mapping, soil conservation, Quaternary geology, geological mapping, neotectonics, and pedoarcheology. The motto of the Commission is ***rerum cognoscere causas*** (to know the cause of things).
The Commission has been active in organizing inter congress conferences and training courses and traditionally contributes to the organization of the EGU (European Geosciences Union General Assembly).
The Commission introduced a new award: Dan Yaalon Young Scientist Medal, which is awarded to outstanding scientists every four years at the World Congress.

# Report of Division 2: Soil Properties and Processes

*By Ryusuke Hatano, Chair. Paul Hallett, Vice-Chair and Leo Condron, Vice-Chair*

Division 2 integrates physics, chemistry, biology, mineralogy and pedo-genesis to understand fundamental soil properties and processes that underpin soil behavior. These phenomena are studied at multiple scales ranging from global to atomic.
Division 2 is organized in five commissions and two working groups:

- Commission 2.1 – Soil physics
- Commission 2.2 – Soil chemistry
- Commission 2.3 – Soil biology
- Commission 2.4 – Soil mineralogy
- Commission 2.5 – Soil interfacial reactions
- Working groups – Critical Zone System; Soil Modeling Consortium

## Officers

New officers of Division 2 were elected in 2017, taking up their positions after WCSS in Rio (12-18 August 2018). We thank the former officers (Chair Kazuyuki Inubushi, 1st vice-chair Dalvan Josè Reinert, 2nd vice chair Valdomiro Severino de Souza Junior) for their contributions to and leadership of Division 2 in 2014-2018. The new Division 2 officers are:

- Chair: Ryusuke Hatano / Japan
- 1st Vice-chairperson: Paul Hallett / United Kingdom
- 2nd Vice-chairperson: Leo Condron / New Zealand

## Divisional activities in 2018

In WCSS 2018, Division 2 organized 13 symposia and 17 poster sessions. A total of 130 and 460 papers were presented, respectively. *https://www.21wcss.org/?secao=conteudo&id=75*
The Division Chair contributed to several international and national meetings and symposia, such as the Annual meeting of the Japanese Society of Soil Science and Plant Nutrition, at Fujisawa, Japan, on 29-31 August 2018; the International Symposium on C and N Dynamics by Land Use and Management Changes in East and Southeast Asian Countries, at Tsuruoka, Japan, on 10-12 September 2018; the 12th International Conference on Agrophysics, at Lublin, Poland, on 17-19 September 2018, NARO-MARCO and the International Symposium on Nitrogen Cycling and Its Environmental Impacts in East Asia, at Tsukuba, Japan, 19-22 November 2018. The Division Chair acts as Vice Editor in Chief of Soil Science and Plant Nutrition, including as guest editor of a Special Issue 'C and N Cycling and Greenhouse Gases Emission in Agroecosystem' in Atmosphere that published 8 papers in a Special Issue.

Division 2 officers at the WCSS 2018 in Rio, with Prof. Inubushi, former Division Chair (©Kazuyuki Inubushi)

Recipients of travel fund in WCSS 2018 from Division 2, with Prof. Inubushi, former Division Chair (©Kazuyuki Inubushi)

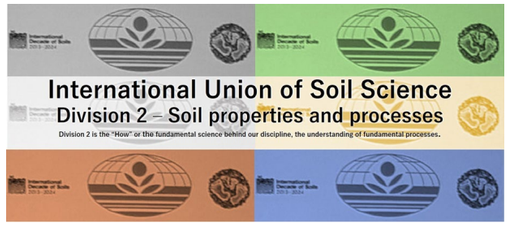
## Travel fund in WCSS 2018

Division 2 supported travel funds to following four scientists:

1. Ana Fernández Scavino (Universidad de la Republica, Uruguay) C2.3.1 speaker of 'Methane emission and dynamics of microbial communities in rice crop rotation systems".
2. Siu Mui Tsai (University of São Paulo, Center of Nuclear Energy in Agriculture) C2.3.1 keynote speaker of 'New approaches for measuring microbial ecosystem services in modern and sustainable agricultural cropping systems", and co-authors of posters in C2.3.2 and C2.3.3.
3. Deborah Pinheiro Dick (Federal University of Rio Grande do Sul) C2.5.1 keynote speaker of 'Role of surface interactions on the organic matter composition and content in tropical and subtropical soils' and co-author of posters in C2.1.1 and C2.2.1.
4. Débora Milori (Embrapa, Brazil) C2.5.2 key note speaker of 'Laser-induced Breakdown Spectroscopy-LIBS: novel methods for soil analysis".

## Facebook Group of IUSS Division 2

The Division Chair established the FB Group 'IUSS Division 2' on 18 August 2018 to share the schedule and activities of the symposia, workshops and conferences, and information of books, papers and some other issues related to Division 2. So far, more than 450 colleagues have joined the FB Group. Welcome all who would like to join!
Address of the FB Group: *https://www.facebook.com/groups/213698576164024/*.



Cover of the Facebook Group of IUSS Division 2. The five colors of the cover relate to plant and dominant soils in Japan. Green means plants. Bluish gley soils are dominant in the alluvial plain, and red soils are seen in the southern warm area. White sand dune soils and pumiceous volcanic regosols are seen in western Japan, and black andosols are dominant in the northern cool area.

# Report of Commission 2.1: Soil physics

*By Stephan Peth, Commission Chair and Brigitta Toth, Commission Vice-Chair*

## Soil physics contributions to the 21st World Congress of Soil Science: Beyond food and fuel

During the 21st World Soil Science Congress in Rio de Janeiro from 12 to 17 August the Soil Physics Commission was very well represented at the conference with three symposia. Two Divisional Symposia were offered: 1) *Soil Structure Dynamics* with 20 lectures in two lecture blocks (*Assessment and Evolution and Modeling and Fluxes*) and a total of about 90 submitted papers and 2) *The role of soil physics in water conservation and food security* with a total of about 50 submitted papers and one lecture block. The high number of papers submitted demonstrates that soil structure is still a central topic in the soil physics community. On the other hand, soil physics can also make a contribution to improving the use of our increasingly scarce resources (especially water) and to mastering the challenges of a further increase in food demand. In a comprehensive interdivisional symposium, three keynote lectures on the *Interactions between physical, biological and chemical processes in soils* were held. The session started with a presentation by Prof. Dr. Rainer Horn (University of Kiel, Germany) on the *Extrapolation of chemical, physical and biological properties and functions from micro- to the macro-scale* followed by Prof. Ellen Kandeler (University of Hohenheim, Germany) presenting very interesting views on *The power of the soil on microbiome function and interaction*. Finally, Dr. Eiko Kuramae (Netherlands Institute of Ecology) gave us a very comprehensive insight into the *Spatial distribution of soil microorganisms within their habitat*. The symposium was very well visited and the lively discussion reflected the need for such interdisciplinary views on the soil micro-environment. A more intensive exchange, especially between soil (micro)biology and soil physics, is certainly very desirable in the future in order to better understand the manifold processes and interactions in soil habitats and their significance for soil functions.


Impressions from the Interdivisional Symposium at the 21st WCSS 2018 with Rainer Horn, Ellen Kandeler und Eiko Kuramae presenting their views on the soil micro-environment (©Valéria Vieira, *www.valeriaviera.com.br*)

## Upcoming Events:

During the next General assembly of the European Geoscience Union (EGU 2019) a section on *Building Inter- and Transdisciplinary Bridges in Soil Science: Honoring Lily Pereg 1964–2019* will be organized by Taru Sandén, Brigitta Toth, Karen Vancampenhout, Eric C. Brevik and Bahar S. Razavi (SSS6.1/BG2.29/HS8.3.17); the aim of the section is to facilitate discussion and feed soil information between the biology, chemistry and physics disciplines.

## Call for collaboration:

In an initiative of Mehdi Rahmati, Rainer Horn, Harry Vereecken, Lutz Weihermüller they ask anyone who is interested to contribute data to a unique Collection of Soil Hydraulic Data. The aim is to build a comprehensive database of soil hydraulic properties and their metadata with special focus on taxonomic structural information, pore size data, aggregates stability, geometric mean or mean weight diameter of aggregates, fractal dimension, mechanical resistance. For further information please contact Mehdi Rahmati: *mehdirmti@gmail.com*

## Commission officer election:

During the 2017 election of division and commission chairs Dr. Brigitta Tóth (Institute for Soil Sciences and Agricultural Chemistry, Hungarian Academy of Sciences) and Prof. Dr. Stephan Peth (Department of Soil Science, University of Kassel, Germany) have been appointed vice-chair and chair of the soil physics commission. Thanks for your trust and we are looking forward to serve the commission during the period 2018-2022.

# Report of Commission 2.2: Soil Chemistry

By *Boris Jansen, Commission Chair* and *Karen Vancampenhout, Commission Vice-Chair*

In the period of January through December 2018 Commission 2.2 once more actively tried to promote soil chemistry, in particular amongst young scientists. To this end, the following activities were organized.
The Chair and Vice-Chair of the Soil Chemistry Commission organized a well-attended session titled 'Soil organic matter turnover: from molecules to ecosystems and back again' at the European Geosciences Union General Assembly in Vienna, Austria 8-13 April 2018. This session was explicitly endorsed by the Soil Chemistry Commission. Related to this, the Vice-Chair of the Soil Chemistry Commission contributed to the organization of a short course on land functions, where again soil chemistry was actively promoted, particularly among young scientists. More information can be found on this website: *https://www.egu2018.eu/*
However, the highlight of 2018 for the Soil Chemistry Commission was the 21th Word Conference of Soil Science in Rio de Janeiro, Brazil. At this conference the Commission organized three very well attended sessions:

C2.2.1 - *Soil organic matter dynamics from molecules to landscapes*
C2.2.2 - *Life on the interphase: interactions between soil geochemical and biological traits*
C2.2.3 – Soil and water pollution: dynamics and evaluation

More information can be found on this website: *https://www.21wcss.org/*


Some photo impressions, courtesy of Valeriavieira Fotografia

# Report of Commission 2.3: Soil biology

*By **Ellen Kandeler, Commission Chair and Magdalena Frac, Commission Vice-Chair***

The main focus of commission 2.3 during the last year was our contribution to the IUSS conference which was held in Rio from the 12th to the 18th of August 2018. Many exciting topics were presented. The following themes were discussed in detail: (1) Soil microbiological processes and nutrient cycling under crop rotation, (2) Molecular techniques as a useful tool to reveal soil biodiversity and biotechnological potential of microbial genomes and (3) Rhizosphere mineral dynamics: soil-plant-microorganism. Diana Wall (CSU/USA) gave an exciting oral presentation about Soils and biodiversity: providing global scale benefits. Commission 2.3 collaborated closely with other commission (e.g. soil chemistry and soil physics). We want to mention specifically the session held by S. Peth (Kassel-Witzenhausen, Germany) which focused on the Interactions between physical, biological and chemical processes in soil.
An important aim for the future is also to strength the interaction between IUSS with other international societies. The chair of commission 2.3 Soil Biology, Ellen Kandeler, is a member of the subdivision committee 'Soil Biology, Microbiology and Biodiversity' of the EGU (European Geosciences Union). Magdalena Frac is also vice-president of ISEB (International Society for Environmental Biogeochemistry), and she contributes to the planning of the 24th International Symposium on Environmental Biogeochemistry (ISEB24) which will be held in September (27-29) 2019 in Postdam (Germany). Consequently, a close collaboration between IUSS, EGU and ISEB will support the future development of our discipline and will stimulate further inter- and intra-disciplinary exchanges. Our commission 2.3 will also contribute to the planning of the next EUROSOIL 2020 which will be held in Genova (Switzerland) from the 24th to the 28th of August 2020. Eurosoil 2020 and ECSSS 20th birthday will be an important milestone for European soil science.

# Report of Commission 2.4: Soil Mineralogy

*By Stephan Hillier, Commission Chair, Sofia N. Lessovaia, Vice-Chair and Balwant Singh, former Chair*

Following the 21st World Congress of Soil Science in Rio de Janeiro, Brazil the position of Chair of Commission 2.4 was taken up by Professor Stephen Hillier of The James Hutton Institute, Aberdeen, Scotland and Department of Soil and Environment, Swedish University of Agricultural Sciences, Uppsala, Sweden and the position of vice-chair was taken up by Professor Sofia N. Lessovaia of Saint Petersburg State University, Russia. Professor Balwant Singh, from University of Sydney, Australia was the outgoing Chair and we thank him for his contributions to and leadership of Commission 2.4 during the previous four years.

## Events

In 2018 the primary activities of Commission 2.4 were the organisation of two symposia at the 21st World Congress. The symposia (i) Dynamic minerals: shifts in soil mineral composition as a result of soil use and management over the human time scale (organised by Dr Aaron Thompson, from the University of Georgia, USA and Professor Balwant Singh from the University of Sydney, Australia) and (ii) New techniques for advanced mineral studies (Professor Balwant Singh from the University of Sydney, Australia and Dr Sheila Furquin from UNIFESP, São Paulo, Brazil). A number of interesting and novel presentations were made at the two symposia, which were highly popular and well attended.
Subsequently, the newly appointed Chair and Vice-chair met at the 9th Mid-European Clay Conference (MECC), in Zagreb 17-21 September (*http://www.mecc2018.com/*) where the Chair delivered the 19th George Brown lecture titled 'Quantitative analysis of clay minerals and poorly ordered phases by prior determined X-ray diffraction full pattern fitting: procedures and prospects". At MECC possible activities to promote the study of soil mineralogy in the framework of soil genesis / soil forming processes / soil features via soil mineralogy (fate of clays, iron oxides, primary minerals in the soil environments) were discussed. In this context, plans are being made to suggest a session on soil mineralogy linked to sustainable development goals at the forthcoming Eurosoil 2020 conference 24-28th August 2020, Geneva, Switzerland, *www.eurosoil2020.com/*

## Publications:

Some books on soil mineralogy and related topics that appeared in 2018 include:

- Benny K.G. Theng (2018) Clay mineral catalysis of organic reactions. CRC Press Book. 1st Edition. Hardback.
- Schroeder, P. (2018). Clays in the Critical Zone. In Clays in the Critical Zone (pp. I-Ii). Cambridge: Cambridge University Press.
- R. Schoonheydt, C.T. Johnston, F. Bergaya (2018) Surface and Interface Chemistry of Clay Minerals, Developments in Clay Science, Volume 9, Pages 1-410, Elsevier.

# Report of Commission 2.5: Soil Interfacial Relations

By *Siobhan Staunton, Commission Chair*

The main activity of Commission 2.5 in 2018 has been the organization of two symposia at the WCSS in Rio.
2.5.1 Soil interfacial reactions and their control of biogeochemical cycles
2.5.2 Advances in techniques to investigate soil interfaces to understand interfacial reactions
These symposia were chaired by Jeferson Dieckow and Ladislau Martin-Neto, along with Siobhan Staunton as Chair of the Commission. In total these symposia attracted nearly 120 abstracts and the oral sessions were well attended with lively question sessions at each. Keynote talks were given at both symposia:
Deborah Dick – Role of surface interactions on the organic matter composition and content in tropical and subtropical soils
Débora Milori – Laser-induced Breakdown Spectroscopy-LIBS: novel methods for soil analysis
Both keynote speakers received travel grants from Division 2 of the IUSS. A special issue of European Journal of Soil Science will be published and papers are currently under review.
The other important activity of the Commission is the organization of the next ISMOM (International Symposium of Interactions of Soil Minerals with Organic Components and Microorganisms). The 8th ISMOM, which is also the 5th InterCongress meeting, will be held in Seville, Spain, June 23rd-28th 2019 and is entitled Understanding Soil Interfacial Reactions for Sustainable Soil Management and Climatic Change Mitigation. The Chairs are Heike Knicker and Francisco González Vila. The call for abstracts is open until February 28th. More information and registration are available on the web site (*https://www.ismom2019.org*). The scientific sessions will be

- ***Soil as a C and N sink*** – Who is the major player, soil minerals, soil organic matter quality, microbial activity or their interplay?
- ***New physical, chemical and biological analytical approaches*** – How can they lead us to a better understanding of soil interfaces?
- ***Ecological disturbances*** – How do mismanagement of soils (overgrazing, erosion etc.) or natural disasters (fire, flooding etc.) affect the interplay between soil minerals, SOM and microorganisms?
- ***Dynamics of pollutants at soil interfaces*** – What is new and how can environmental biotechnology be beneficial for soil restoration and bioremediation?
- ***Soil amendments*** (biochar, composts and digestates) – How do they affect interactions at soil interfaces?
- ***Nutrient availability in soils*** – Can our knowledge on soil interfaces improve biotechnological approaches or soil management to decrease the need for artificial fertilizers?

Subsidies are available for students and scientists from low-income countries. The P.M. Huang prize will be awarded to a young or mid-career scientist for a significant contribution to advancing the understanding of the interactions between soil minerals, soil organic matter, and soil organisms.
It was suggested at the Division 2 meeting held in Rio de Janeiro during the WCSS that the ISMOM venue could serve as a meeting for the Division 2 and all Division and Commission Chairs are on the mailing list of the conference.
The mailing list of the Commission contains nearly 3700 addresses and any interested person can request to be added to the list by sending a message to *Siobhan.staunton@inra.fr*.

## Report of Working Group: International Soil Modeling Consortium (ISMC)

By *Harry Vereecken, Chair* and *Michael H. Young, Vice-Chair*

The IUSS Working Group International Soil Modeling Consortium (WG ISMC) was established in 2016 with the aim to integrate and advance soil systems modeling, data collection, and observational capabilities. The underlying principles and scientific basis were

outlined in a recent white paper on 'Modeling soil processes: review, challenges and new perspectives' published in the Vadose Zone Journal in 2016. Its activities are organized into three science panels: data and observation model linking, soil modeling development and intercomparison, and cross cutting and outreach activities. WG ISMC has an executive board and a scientific advisory board that guides WG ISMC in pursuing its objectives. WG ISMC is a community effort based on voluntary contributions. Membership is free (https://soil-modeling.org/). Here, we briefly state the recent activities organized or co-organized, if not stated otherwise, by WG ISMC during the year 2018:

- 13-15 Feb. 2018 Joint ISMC, NEON, CZO, and LTER workshop: Using Observation Networks to Advance Earth System Understanding: State of the Art, Data-Model Integration, and Frontiers at NEON Headquarters, Boulder, CO, USA
- 7 Apr. 2018 1-day OLAM-SOIL modeling workshop at European Geosciences Union annual meeting, Vienna, Austria
- 17 May 2018 1-day Workshop on benchmarking models of root system architecture at Jülich, Germany
- 12-17 Aug. 2018. 21st World Congress Soil Science 2018, one session hosted by ISMC with 28 abstracts, Rio de Janeiro, Brazil
- 5-7 Nov. 2018 Second biennial ISMC Conference: 'New Perspectives on Soil Models', 140 abstracts and participants from 22 countries at Wageningen University, The Netherlands
- 7 Nov. 2018: The Rien van Genuchten Award was presented to Nicholas Jarvis (Swedish University of Agricultural Sciences) during the Second ISMC Conference for his outstanding contribution and advanced modeling of flow and transport processes in soils
- 7 Nov. 2018 The ISMC Early Career Award was given to Giuseppe Brunetti (BOKU Vienna) during the Second ISMC Conference to recognize his outstanding scientific achievements in the field of soil science and vadose zone hydrology
- 26-30 Nov. 2018 Pan-African Soil Challenge (PASCAL) workshop focused on secure and sustainable food production for the African continent as one of the most stringent global challenge in the face of degraded soil, Accra, Ghana
- 8 Dec. 2018 Workshops on soil – climate interaction at American Geosciences Union, Washington, DC, USA
- 2019 Special Section on New Perspectives on Soil Models in Vadoze Zone Journal was initiated.



# Report of Division 3: Soil Use and Management

Division 3 'Soil Use and Management' focuses on how we use the soil and how it links to the knowledge base of Divisions 1 and 2 in order to ensure that soils are used and managed in a sustainable manner. The Division is concerned with both soil use and management in terms of agricultural production, forestry, grazing lands, and the broader environmental context. Activities to remediate degraded soil, arising from the agricultural misuse of soil or contaminations resulting from non-agricultural activities are part of the scientific area of this Division. The aim of this Division is to ensure that through our knowledge and understanding of soil properties and processes and the Distribution of soils within the landscape soils and soil quality are maintained and improved Division 3 consists of 6 commissions and 4 working groups (WG) in 2018. The two working groups i.e. Land degradation and Modelling of Soil and Landscape Evolution were terminated in 2018. They are briefly presented below along with chair and vice chair responsible for commission or working group's activities.

- Commission 3.1 – Soil evaluation and land use planning
- Commission 3.2 – Soil and water conservation
- Commission 3.3 – Soil fertility and plant Nutrition
- Commission 3.4 – Soil engineering and Technology
- Commission 3.5 – Soil degradation control, remediation and reclamation
- Commission 3.6 – Salt-affected Soils

**Chair and Vice-chair of Division 3: Soil use and management**

- Chair: Bal Ram Singh / Norway
- 1st Vice-chair: Bob REES, United Kingdom
  2nd Vice-chair: Tom ASPRAY, United Kingdom

**Commission Chair and Vice-chair**

3.1 Soil Evaluation and Land Use Planning
- Chair: Ivan Vasenev, Russia
- Vice-chair: Jagdish Prasad

3.2 Soil and Water Conservation
- Chair: Lillian ØYGARDEN, Norway
- Vice-chair: Nobuo TORIDE, Japan

3.3 Soil Fertility and Plant Nutrition
- Chair: Bruno GLASER, Germany
- Vice-chair: Toru Fujiwara, Japan

3.4 Soil Engineering and Technology
- Chair: Jiabao ZHANG, China
- Vice-chair: Laura E. PAULETT, Romania

3.5 Soil Degradation, Control, Remediation and Reclamation
- Chair: Stefan NORRA, Germany
- Vice-chair: Junta Yanai, Japan

3.6 Salt Affected Soils
- Chair: Tibor Tóth, Hungary
- Vice-chair: Ki-In Kim, South Korea

**Working Groups (WG) Chair and Vice-chair**

Acid Sulphate Soils
- Chair: Anton Boman, Abo University, Finland
- Vice-chair: Vanessa Wong, Southern Cross University, Australia

Forest Soils
- Chair: Zhi hong Xu, Griffith University, Australia
- Vice-chair: Chris Johnson, Syracuse University, USA

Paddy Soils
- Chair: Mizuhiko Nishida,NARO Tohoku Agricultural Research Center, Japan
- Vice-chair: Bentio Heru Purwanto, Gadjah Mada University, Indonesia

Soils of Urban, Industrial, Traffic, Mining and Military Areas (SUITMA)

- Chair: Kye-Hoon John Kim, The University of Seoul, Korea
- Vice-chair: Przemyslaw Charzynski, Nicolaus Copernicus University, Torun, Poland

## Activities of the Division and its Commissions

### Report from Division 3

Division chair Prof. Bal Ram Singh was actively involved in co-editing a book 'Agriculture and Ecosystem Resilience in Sub Saharan Africa' published by Springer publishers and based on the outcome of the International Conference on Ecosystem Resilience and Agricultural Productivity – Livelihood Pathways under Changing Climate held in Kampala, Uganda in November 2017. The book with 33 chapters was completed and sent to the publisher in 2018 and will come out in 2019.

Chair Prof. Bal Ram Singh got involved in another international conference held
in Lilongwe, Malawi in October 2018. The topic of the conference was 'Sustainable Agriculture and Natural Resource Management under Changing Climate". He also delivered a lecture on 'Soil carbon sequestration in crop-livestock/aquaculture systems in Sub-Saharan Africa".
The presentations at the conference will be published in a book called 'Climate Impacts on Agricultural and Natural Resource Sustainability in Africa' by Springer publishers. Bal Ram Singh is chief editor of this book, which will come out towards the end of 2019.

The division chair also participated in the 21st IUSS World Congress at Rio De Janeiro, Brazil in August 2018. He organized and chaired the symposium on «Restoring degraded lands through soil carbon management» with 8 oral presentations.
At the Norwegian University of Life sciences (NMBU) Bal Ram Singh, as a president of the Norwegian Society of Soil Science, organized several seminars on topics such as 'Soil Pollution with heavy metals and hazardous organic chemicals' and 'multipurpose use of peat soils".
Several active members of the division prepared symposium topics in cooperation with division 2 and 4. In total, 7 such symposia were presented at the 21st WCSS congress in Rio, Brazil in August 2018, in addition to nearly 20 other symposia by commissions and working groups.

## Commission 3.1 'Soil evaluation and land-use planning'

### Activities during 2018

May 26-27 Commission 3.1 'Soil evaluation and land-use planning' (SELUP) organized the field excursion 'Soils and landscapes of south taiga subzone' (Moscow – Central Forest Reserve (Tver region) – Moscow) for participants of the 3MUGIS Summer school 'Monitoring, modeling and managing urban soils and green infrastructure' from 7 countries.
July 9-15 Commission 3.1 'Soil evaluation and land-use planning' (SELUP) organized IX Moscow international summer environmental school (MOSES-2018) 'Smart environmental monitoring technologies for sustainable development of agro- and urban ecosystems' held in the Russian State Agrarian University-Moscow Timiryazev Agricultural Academy, Moscow, Russia, with participation lectors and students from 5 countries and 6 regions of Russia.
August 16 Commission 3.1 'Soil evaluation and land-use planning' (SELUP) organized a divisional symposium 'Multi-scale and multi-domain approaches to develop smart farming' during the 21st World Congress of Soil Science (21st WCSS) held in Rio de Janeiro, Brazil, with 7 oral presentations followed by fruitful general discussions.

### Planned activities during 2019

March 5 Commission 3.1 'Soil evaluation and land-use planning' (SELUP) and Wetlands International organized the round table 'Climate responsible solutions in Agriculture on Wetlands' held in the Russian State Agrarian University-Moscow Timiryazev Agricultural Academy, Moscow, Russia, with participation of FAO profile departments and land-use experts from 6 countries and 7 regions of Russia. 21 oral presentations were discussed with practical recommendations for development.
July 30-August 1 Commission 3.1 'Soil evaluation and land-use planning' (SELUP) will organize the field excursion 'Natural and man-changed soils and landscapes of south taiga subzone' (Moscow – Central Forest Reserve (Tver region) – Moscow) for participants of the 3MUGIS Summer school 'Anthropogenic and natural soil landscapes in European Russia: from sea to sea' from 8 countries.

September 15 Commission 3.1 'Soil evaluation and land-use planning (SELUP) will organize a symposium Soil evaluation and smart land-use planning in the International Conference, 'Soils and Noosphere' held in Vladivostok, Russia, 14-17 November, 2019.

The photos show the conference poster (left) and conservation farming at a farmer's field in Malawi (right), both ©Bal Ram Singh.


Field excursion 'Soils and landscapes of south taiga subzone' (Moscow – Central Forest Reserve (Tver region) – Moscow) for participants of the 3MUGIS Summer school 'Monitoring, modeling and managing urban soils and green infrastructure", ©IUSS Division 3


Practical classes and certification at the IX Moscow international summer environmental school (MOSES-2018) 'Smart environmental monitoring technologies for sustainable development of agro - and urban ecosystems", ©IUSS Division 3

## Commission 3.2: Soil and Water Conservation

**Report for 2018**

Chair Prof. Bernd Lennartz delivered a keynote lecture at the 1st World Conference on Soil and Water Conservation under Global Change (CONSOWA) in Spain in June 2017. The commission was responsible for two symposia at the 21st WCSS in Rio, Brazil:
Artificial Drainage Systems: Maintaining soil functions and protecting water resources. (Bernd Lennartz and Mohamed A. Youssef).
Nutrient and contaminant transport in drained and rewetted peat soils. (Bernd Lennartz and Fereidoun Rezanezhad).
The commission arranged a joint symposium with the Paddy Rice working group at the 21st WCSS in Rio, Brazil.

**Planned activities for 2019**

The commission (Bernd Lennartz) is planning to organize **'WETSCAPES – Understanding the ecology of restored fen peatlands for protection and sustainable use'** in Rostock, Germany in September 2019.

The Commission will start preparing proposals for the Inter congress meeting in Scotland 2020.
Together with the chair of Division 3 Bal Ram Singh, Commission 3.2 is planning a seminar to be held in Norway around the topic Climate – soil and water conservation – related to Nordic winter conditions. The seminar can be arranged in cooperation with other organizations and contact will be made to e.g. ESSC.
IUSS Forum: Division 3 is involved (initiated in 2019) in the task Best Soil Management Practices to restore Soil Health. It is suggested that Commission 3.2 can contribute to the topic. Soil erosion and degradation caused by extreme events related to climate change. An outline of the work will be prepared during summer 2019.

## Commission 3.3: Soil Fertility and Plant Nutrition

**Activities 2018**

*Participation in the 21st World Congress of Soil Science (Rio de Janeiro Brazil)*

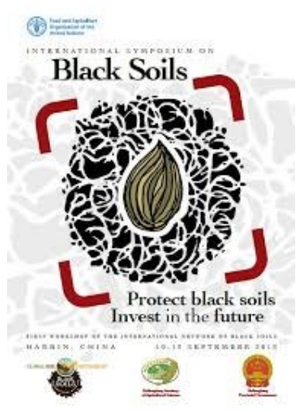
At the 21st World Congress of Soil Science, held August 12-17, 2018 in Rio de Janeiro (Brazil), several symposia

related to soil fertility and plant nutrition were co-organized by IUSS members:

- Soil fertility management and the African Green Revolution
- Biochar for soil fertility management
- Beneficial management practices for sustaining soil fertility
- Nutrient budgets in agricultural soils
- Advancement of plant nutrition studies for sustainable agriculture

*Participation at the International Symposium on Black Soils*

The International Symposium on Black Soils took place in Harbin, China on 10-12 September 2018. The international Network of Black Soils (INBS), the Food and Agriculture Organization and its Global Soil Partnership (GSP), in collaboration with the Ministry of Agriculture and Rural Affairs of China and the government of the Heilongjiang Province, organized it. The aim of the symposium was to promote the sustainable use and management of black soils and to identify relevant research gaps within countries with black soils. The delegates from 18 black soil countries/regions and members of the INBS signed the *Harbin communiqué* and agreed to advance science and technology of black soils management in the world.




Impressions from the International Symposium on Black Soils, ©IUSS Division 3

During the Symposium discussions focused on the concept note and the institutional framework of the INBS in order to consolidate the membership for future cooperation and action plans. As far as the sustainable management of black soil is concerned, soil organic carbon, soil nutrient management, soil health and soil erosion will remain in the spotlight.
The Symposium outputs will include the development of a global report on the status of black soils, the establishment of a database on good black soil management practices and their implementation on the ground. With this bold action, the organizers aim to unlock the multifaceted values of this black treasure for agriculture.
The main outcome of the Symposium will be a policy-oriented document based on scientific evidences, showing the pathways towards sustainable soil management implementation and highlighting success stories and technological innovations in regions with black soils. In addition, this document will provide specific recommendations for adopting, upscaling and supporting sustainable soil management. The Symposium served as a platform for enhancing collaboration and synergies to move sustainable soil management forward and protect/ preserve black soil regions in countries of the world.
The Symposium featured internationally recognized keynote speakers and presenters, networking opportunities, interactive sessions, and visits to long-term black soil experiment stations.

*Participation in new interdisciplinary research topic to link soil health and human health as one of our frontiers in soil science*

This activity was initiated by the chair (Lorna Dawson) and vice chair (Heide Spiegel) of Commission 4.2 (Soils, Food Security, and human health). As this topic is also related to soil fertility and plant nutrition, Commission 3.3 will participate in this interdisciplinary activity.
As further steps, we planned:

a) to provide links between soil scientists and human health experts
b) a high-ranking publication (ideally Science or Nature) as an output from our work

## Commission 3.4: Soil Engineering and Technology Commission

### Activities during 2018

The main activity IUSS Commission 3 Soil Engineering and Technology Working Group (SETWG) during 2018 was the change of state commission chairs. Professor Jiabao Zhang from the Institute of Soil Science, Chinese Academy of Sciences, China, and Professor Laura E. Paulette from the University of Agricultural Sciences and Veterinary Medicine, Romania were elected as Chair and Vice-Chair, for the period of 2018-2022 at the next World congress of soil Sciences in Glasgow, UK.

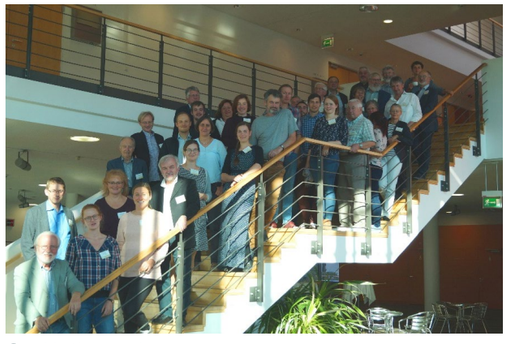
### Planned activities for 2019-2020

SETWG proposed the 'International Soil Engineering and Technology Conference (ISETC)", 6-8 June 2020, Nanjing, China. The theme will be 'Green Innovations of Soil En-

gineering and Technology". The ISETC is a new forum for the presentation of new advances and research results in the fields of engineering uses of soils both in the agriculture and non-agriculture context. The conference will bring together leading academic scientists, researchers, students and managers in this domain of interest from around the world. ISETC will be announced in June 2019.

## Commission 3.5: Soil Degradation, Control, Remediation and Reclamation

In 2018, with Stefan Norra and Junta Yanai the commission got two new commissioners, who express their gratitude to Jaume Bech, Spain, and Xudong Zhang, China, for their former long-term commitment to the successful chairing of this commission.
The protection of soils against degradation and also the remediation and reclamation of soils as well as the control of soil quality are still of highest importance to ensure soil fertility and sufficient food for the world population and to preserve the ecosystems on local, regional and global scales. Without soils no terrestrial life is possible, as we all in our community know. To contribute to this aim and to the work of commission 3.5, any member of IUSS interested in the subject of commission 3.5 is warmly invited to send her/his email to Stefan (stefan.norra@kit.edu), who is compiling an email distribution list and is establishing a network for commission 3.5. Based on that network it is planned to organize a meeting in 2020 to present and discuss on-going research and socio-economic and political developments in the field of commission 3.5, as well as to develop our network and to initiate joint actions.



©IUSS Division 3

In this context, Stefan, together with the German Soil Science Society and the Helmholtz Centre for Environmental Research, organized in a symposium on 'Perception and Evaluation of Soils in Society' in Leipzig, Germany, October 2018. During this symposium, intensive discussions i.a. on the use of glyphosate, application of heavy agricultural machinery and ecosystem services of soils took place.

In 2019, Junta Yanai is planning to set up a symposium on the 'Control, remediation and reclamation of degraded and contaminated soils' at the 14th International Conference of the East and Southeast Asia Federation of Soil Science Societies, which will be held from 3 to 8 November, 2019 in Taipei, Taiwan (China).

## Commission 3.6: Salt-affected Soils

### Report for 2018

The activities of 2018 started under the leadership of Jingson Yang and Donald Suarez as former chairman and vice-chairman. The commission was responsible for four announced symposia at 21WCSS in Rio, Brazil:

- C3.6.1 – Oasis soils: can our wisdom and experience survive in Anthropocene
  C3.6.2 – Salinity mapping and modelling salinization processes
  C3.6.3 – Salinity management and remediation of salt-affected soils
  C3.6.4 – Impact of land use change on soil and the environment in dry regions
- Due to the low number of applicants, these were merged into one symposium of two sessions, convened by the following persons: Jingsoang Yang (convener) and Tibor Tóth (co-convener)

During the Rio de Janeiro Congress the new chairs of the Commission (Chair T Tóth and Vice-chair Ki-In KIM met and discussed the tasks ahead.)

### Planned activities for 2019

As the main activity, the commission is planning to organize two conferences on soil salinization, one in Uzbekistan and another in China. There is a reserve plan to organize one meeting in Hungary if problems with these arise. This year's plan was to draw up the final plan of these meetings.

Regarding the plan of the Uzbek conference: With the help of Prof Pavel Krasilnikov, Dr Gulchekhra Khasankhanova was approached for organizing the meeting in Uzbekistan. Negotiations started in 2018 and the correspondence continued in 2019. Still there are pending issues and it is not likely that the meeting will be held this year.
Regarding the plan of the Chinese conference: Prof Zhijun Wang is interested in organizing one meeting; timing depends on the Uzbek meeting.

## Report of Working groups (WGs)

### Working Group Acid Sulfate Soils

**Activities during 2018**

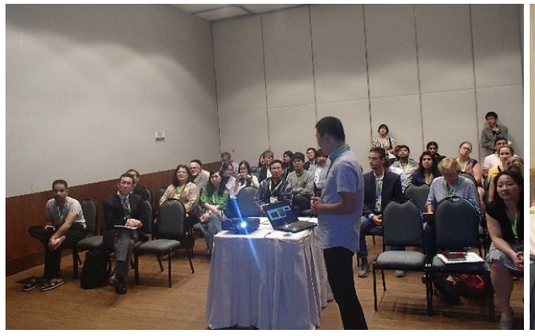
IUSS Working Group 3.1 Acid Sulfate Soils has continued to be active since the 8th International Acid Sulfate Soil Conference held in College Park, Maryland, USA, during July 17-23 2016. The main activity during 2018 was the 21st World Congress of Soil Sciences in Rio de Janeiro, Brazil (August 12-17) where Acid Sulfate Soils had a session on 13 August 2018.

Former Chair, Professor Leigh Sullivan (picture above), opening the session and Dr Anton Boman (picture below), new Chair, giving his presentation (©IUSS Division 3)

Professor Leigh Sullivan, Chair of the WG Acid Sulfate Soils, convened the Acid Sulfate Soils session. Working Group (ASSWG). The Vice-Chair, Dr Peter Österholm, was scheduled as co-Convener but he was unable to attend the congress. Nine oral presentations were scheduled for the Acid Sulfate Soils session. Two presentations were withdrawn late and the gaps were filled with open discussions. The majority of attendants during the session came from Finland followed by Australia, USA, Spain and Germany.
After the session, the Acid Sulfate Soils Working Group of the IUSS had a meeting. The main outcome of the meeting was that the longtime Chair, Professor Leigh Sullivan and Vice-Chair, Dr Peter Österholm, stepped down from their positions. Dr Anton Boman from the Geological Survey of Finland and Dr Vanessa Wong from Monash University, Australia, were elected unanimously as Chair and Vice-Chair, respectively, for the period starting from 2018 and ending in 2022 at the next World Congress of Soil Sciences in Glasgow, UK. The Working Group proposed that the 9th International Acid Sulfate Soil Conference would be held in Adelaide Australia in November 2020.
The Working Group further discussed the possibility of establishing a website for the Working Group and the possibility of the Working Group to create an international map of acid sulfate soils.
To further the international activity of the WG Acid Sulfate Soils and to enhance the awareness of acid sulfate soils in general, Vice-Chair (Dr Vanessa Wong) and Chair (Dr Anton Boman) applied successfully for a session of acid sulfate soils at the next EGU conference 7-12 April 2019 in Vienna, Austria.

**Upcoming and planned activities for 2019-2020**

- Organization of 'SSS9.3 Acid sulfate soils, sulfidic material and wetland soils' at the 2019 EGU conference 7-12 April in Vienna, Austria. Vanessa Wong is convener and Anton Boman is co-convener.
  - The Working Group will have a meeting where upcoming activities will be discussed.
  - New members will be invited to the Working Group.
  - The creation of an international acid sulfate soils map will be discussed.
- The possibilities to establish a website will be investigated during the spring of 2019.




Divisional symposium 'Managing and remediating flood plain and wetland soils. Paddy soils: Mitigating GHG emission and enhancing productivity in rice-based systems' during 21st WCSS (©IUSS Division 3)

- The Working Group will continue to improve the communication and work within the Working Group and to work on expanding the network and include more researchers into the acid sulfate soils community.
- Arrangement of the 9th International Acid Sulfate Soils Conference 15-20 November 2020, Adelaide, Australia.

## Working Group Forest Soils

**Activities during 2018**

IUSS Forest Soils Working Group co-hosted the 13th North America Forest Soils Conference / 9th International Symposium on Forest Soils with the Soil Science Society of America and International Union of Forestry Research Organizations (IUFRO), 10-16 June 2018, Quebec City, Quebec, Canada. This was the first and quite successful major forest soils conference jointly hosted by SSSA, IUSS and IUFRO, with more than 200 participants attending the Conference. Both IUSS WGFS Chairs Prof. Chris Johnson and Prof. Zhihong Xu went to the Forest Soils Conference in June 2018.

**Planned activities for 2019-2020**

IUSS FSWG will co-host the 9th International Conference on Geochemistry in the Tropics & Subtropics – GeoTrop 2019 during 28-31 July 2019, Gold Coast, Queensland, Australia, with more than 200 participants to attend the Conference expected

The 10th International Symposium on Forest Soils is expected to be held during the period 18-22 October 2020 in Lin-An, Zhejiang, China.

## Working Group Paddy Soils

**Activities during 2018**

Paddy Soils Working Group (PSWG) organized a divisional symposium 'Managing and remediating flood plain and wetland soils. Paddy soils: Mitigating GHG emission and enhancing productivity in rice-based systems' at the 21st World Congress of Soil Science (21st WCSS) held in Rio de Janeiro, Brazil, 12-17 August 2018. This symposium was a joint symposium with Soil and Water Conservation Commission (Commission 3.2), Division 3, IUSS. In the session, 10 oral presentations were delivered. Fruitful discussions were had in the session.

**Planned activities for 2019**

In 2019, PSWG will organize a symposium 'Recent advances in paddy soil science: toward the establishment of sustainable rice production, environmentally-friendly managements and food safety' in the 14th International Conference of the East and Southeast Asia Federation of Soil Science Societies (ESAFS) held in Taipei, Taiwan, China, 3-7 November, 2019.

## Working Group Soils of urban, industrial, traffic, mining and military areas (SUITMA)

**Activities during 2018**

WG SUITMA organized a working group symposium 'SUITMA (Soils of Urban, Industrial, Traffic, Mining and Military Areas) during the 21st World Congress of Soil Science held in Rio, Brazil on 12-17 August, 2018. The symposium was co-convened by Kye-Hoon John Kim and Maxine Levin. After opening remarks by the chair, 9 papers with state-of-the-art aspects of SUITMA were orally presented followed by heated discussion.


Working Group SUITMA symposium 'Soils of Urban, Industrial, Traffic, Mining and Military Areas' during the 21st WCSS, (©IUSS Division 3)

Next WG SUITMA symposium is planned to be held during the next WCSS at Glasgow, UK in 2022.

**Planned activities for 2019**

WG SUITMA will organize the 10th conference in Seoul, Korea from June 16 to June 21, 2019. The theme of the 10th SUITMA10 is SUITMA+20; envisioning the future by reflecting on 20 years of SUITMA since its birth in 1998.

# Report of Division 4: The Role of Soils in Sustaining Society and the Environment

***What we do***

This Division focuses on the transfer and outreach of good soil knowledge to society, as well as, taking responsibility for lifting the profile of soil among the general community. It takes the scientific knowledge and information developed in the other three divisions of the IUSS and shares this through education, international conventions and informing the public policy and debate. Sharing this knowledge between scientists, economists, policy makers and the broader community means this division interacts well beyond the traditional bounds of the soil science disciplines.
Chair: Damien Field, Australia
1st Vice-chair: Christine Watson, United Kingdom
2nd Vice-chair: *Vacant*

***Who we are***

***Commission 4.1. Soils and Environment***

This Commission looks at the soil as part of the ecosystem and how human activities impact on the soil and environmental interactions
Chair: Morihiro Maeda, Japan
Vice-chair: Claudio Zaccone, Italy.

***Commission 4.2. Soils, Food Security & Human Security***

This Commission looks at the challenge of maintaining agricultural lands, providing enough safe food and nutritious food, and the role of soils in a changing world affecting human health.
Chair: Lorna Dawson, United Kingdom
Vice-chair: Heide Spiegel, Austria

***Commission 4.3. Soils and Land-use Change***

In the context of global sustainability, this Commission investigates how soil functions can be managed and controlled to mitigate the impact of climate change. It also considers the impact of land-use change with increasing urbanization, and the loss of productive land.
Chair: Chengrong Chen, Australia
Vice-chair: Bellingrath-Kimura, Germany

***Commission 4.4. Soil Education & Public Awareness***

A well informed public is needed so that the importance of soil is understood. This Commission shares the developments in learning and teaching of soil science that support this aspiration, as well as, developing strategies that increase the connectedness of the public with soil.
Chair: Cristine Muggler, Brazil
Vice-chair: Hideaki Hirai, Japan

***Commission 4.5. History, Philosophy, & Sociology of Soil Science***

This Commission deals with the past; it links the study of what has happened in history and how soil can be used to help explain the past changes. This Commission investigates the relationship between human development and soil.
Chair: Eric Brevik, USA
Vice-chair: Thomas Sauer, USA

***WG Cultural Patterns of Soil Understanding***

This WG established in 2016 is very important to identify some basic human patterns in understanding soil and relating to it, as well as cultural differences. It is one of the keystone for communication between science and society.
Chair: Nikola Patzel, Germany
Vice-chair: Eric Brevik, USA

***World Congress of Soil Science (WCSS) and Division 4***

The World Congress of Soil Science (WCSS) ushered in a changing of the guard for Division 4. The Commissions of Division 4 put a significant amount of effort into organising a suite of very successful symposia representing its research and activities. As in coming

You can see Christian Feller at the head of the table leading one of the Division 4 meetings in Rio (© Hideaki Hirai).

Chair, I would like to thank Christian Feller (Division 4 Chair 2014-18) for his leadership and tireless work. Under his leadership the activities of Division 4 have significantly increased, all of which culminated in the interdivisional and symposia sessions that helped make Rio a success.

There were a number of interdivisional sessions organised with the first accepting the challenge raised by the French Minster of Agriculture, Stéphan Le Folle (2015) who launched the 4 per 1000 initiative, which is now becoming a focus globally, *https://www.4p1000.org/*.
In this session **IS4.1** *Soil organic matter to secure food and water and the 4 per 1000 initiative*, Claire Chenu provided an overview of the initiative and its impact, while Budiman Minasny presented the current activities globally. Heitor Teixeira who addressed the importance of agro-ecology in conservation and provision of ecosystem services followed this. Damien Field introduced a session on **IS4.2** *Soil Education and public Awareness*. Here he framed the scene of soil science education focused on the globally accepted TRIL education model. Soil Education in Latin America presented by Laura Berta Reyes Sanchez and work on soil and the public audience presented on behalf of Alexandra Toland. A session looking at the philosophical and cultural aspects of soil was integrated in an interdivisional session focused on **IS4.3** *Paradigm change in soil science: utopia or reality?* Here Professor Thomas Sauer, Professor Chick Rice and Nikola Patzel challenged our ways of thinking about soil. Finally, Christian Feller focused on making soil visible, Professor Sabine Grunwald focused on the soil ethics around belief, care and our values, while Milinda Banerjee considered ideas sovereignty through the sacred plough and the soil, in a session **IS4.4** *Soils, Society and Culture: people´s connections to soil*.
There were a large number of divisional symposia, which are reported in the *Activities of the Commissions* section.

## A sad Loss

At the beginning of 2019 Professor Lily Pereg died tragically in Argentina.

Lily was a microbiologist with 25 years of research experience and a Professor at the School of Science and Technology, University of New England in Armidale, Australia. She was elected to serve as the President of the EGU's Soil Science Systems Division in 2017. Graduating from Ben Gurion University in Israel with a bachelors and Master from Tel Aviv University, Lily moved to Australia to complete a PhD from The University of Sydney.

Her research concentrated on soil microbiology, nitrogen cycling and, soils and human health. She was a very active member at EGU and strong supporter of the journal SOIL. Most recently, she led a significant contribution to Soils and Human Health in the WCSS in Rio.

She will be missed. We send our deepest sympathies to her family, friends and colleagues.

# Report on Activities of Commissions

The following activities are reported from each of the Commissions.

## Commission 4.1: Soils and the Environment

Commission 4.1 organised a session on *Climate change and the adaption of Soil Functions* chaired by Masamichi Takahashi and Beata Madari, which attracted a wide range of presentations focusing on greenhouse gas emissions, new techniques for measurement, and models for assessment and adaption (C4.1.2). There was also a joint session chaired by Johan Bouma and Conçalo Farias on *Soil as Natural Capital: Economic and legal dimesons of ecosystem change* (C4.1.4). The *Potential of Soil to sequester carbon* was organised by Claire Chenu and Denis Angers (C4.1.5) addressing topics on carbon storage; on different soil types form different regions, looking at the methodologies and definitions of carbon storage. This session ended with looking at the potential to honour the 4 per mille goal proposed by the French minister of Agriculture, which has now become a global challenge. *Soil ecosystem services* was also explored in a session organised by Rachel Prado, Ana Turretta and Elaine Fidalgo (C4.1.1). *Soil in the Anthropocene* was convened by Pavel Krasilnikov and Norma Eugenia García Calderón where they looked at what it means to be a 'soil farmer', the importance of soil information, links to traditional cultures and the role of policy (C4.1.3).

### Events

1. Field tour and discussion '*Sustainable management of water and organic wastes in agricultural areas in Sri Lanka*' was co-organized by Morihiro Maeda (Commission 4.1 Chair), Bandunee Liyanage (Open University, Sri Lanka), D.A.L. Leelamanie (Ruhuna University, Sri Lanka) on 24-27 November 2018
2. BSSS 18th February 2019 – *VOCs in soil: investigation to remediation*.
3. BSSS 19th March 2019 – *Managing soil structure and organic matter*.
4. BSSS 28th March 2019 – *Engaging with All – Soils through the National Nature Reserves*.
5. BSSS 3rd April 2019 – *Welsh Soils Discussion Group Spring Meeting: Soil – the Essentials*.

### Conferences

During the General Assembly of the European Geoscience Union (EGU 2019; Vienna, 7-12 April 2019; *www.egu.eu/*) two sessions were co-organized by Claudio Zaccone (Commission 4.1 Vice-chair).

6. SSS5.9/ERE2.10 – Waste management and soil: impacts, benefits and risks of biochar, wood ash and other amendments. Conveners: José María De la Rosa, Paloma Campos Díaz de Mayorga, Agustin Merino, César Plaza, Claudio Zaccone
7. SSS5.14 – Soil minerals and the cycling of elements with special focus on carbon. Conveners: Robert Mikutta, Christian Mikutta, César Plaza, Claudio Zaccone
8. At the EGU, Vienna, Dawson and co authors Glendell et al, presented on the topic of 'testing the use of compound-specific stable isotope analysis of n-alkanes for river sediment source apportionment', which was well received and demonstrated the power of combining analytical approaches in source apportionment.

### Publications/research

- SEFARI RESAS Work Package 1.1 Soil *https://safari.scot/research/objectives/soil-and-its-ecosystem-function*.
- SEFARI Peatland Case Study *https://safari.scot/research/maximising-the-benefits-of-peatland-restoration-right-place-right-time-and-best-practice*.

Discussion at Ruhuna University with Profs. Maeda, Leelamanie, Somura and Bandunee (© Commission 4.1).


Composing from agricultural wastes (© Commission 4.1)


Water resources scared in Kala Oya Watershed (© Commission 4.1)

- SEFARI Protecting our soil and securing the way ahead. Case Study *https://safari.scot/research/protecting-our-soil-and-securing-the-way-ahead*.
- SEFARI Novel greenhouse gas reduction measures – *https://safari.scot/research/objectives/novel-greenhouse-gas-reduction-measures*.
- Assessing the impact of tree diseases on the wider environment Case Study – *https://safari.scot/research/assessing-the-impact-of-tree-diseases-on-the-wider-environment*.
- No Hitchhikers! Biosecurity on display at the Botanics Blog – *https://safari.scot/blog/2018/09/06/no-hitchhikers-biosecurity-on-display-at-the-botanics*.
- Reducing Greenhouse Gas Emissions From Cropping Systems Blog – *https://safari.scot/blog/2019/04/08/reducing-greenhouse-gas-emissions-from-cropping-systems*
- Livestock health and greenhouse gases: Ruminating on climate change Blog – *https://safari.scot/blog/2019/04/08/livestock-health-and-greenhouse-gases-ruminating-on-climate-change*.
- Discussing extreme climate change scenarios – continued... Blog – *https://safari.scot/blog/2019/02/25/discussing-extreme-climate-change-scenarios-%E2%80%93-continued%E2%80%A6*.

## Symposia

9. International symposium '2nd International Scientific Conference on Sustainable Agriculture and Environment' was co-organized by Nong Lam University-Ho Chi Minh City, Vietnam, the University of Queensland, Australia and Okayama University, Japan in Ho Chi Minh City on 13-15 December 2019. In the symposium, the session 'Agricultural and bio-system engineering' was organized by Morihiro Maeda (Commission 4.1 Chair) and Nguyen Huy Bich (Nong Lam University)

## Upcoming events

1. 'Soil as a C and N sink' at the 8th ISMOM meeting (Understanding Soil Interfacial Reactions for Sustainable Soil Management and Climatic Change Mitigation) that will be held in Seville, Spain, June 23rd-28th 2019. Commission 4.1 Vice-chair is involved as member of the Scientific Committee of the session. This symposium is part of a series of international symposia organized by Commission 2.5 (Soil chemical, physical and biological interfacial reactions) of the IUSS. More information are available on the web site (*www.ismom2019.org*).
2. 14th International Conference of the East and Southeast Asia Federation of Soil Science Societies (ESAFS) (*http://esafs2019.cssfs.org.tw/*).
3. First Joint Meeting on Soil and Plant System Sciences (SPSS) 'Natural and Human-induced Impacts on the Critical Zone and food production", organized by the Italian Society of Agricultural Chemistry (SICA), the Italian Society of Pedology (SIPe) and the Italian Society of Soil Science (SISS), in collaboration with the Mediterranean Agronomic Institute (CIHEAM, Bari) and the International Humic Substances Society (IHSS). The IUSS President, Takashi Kosaki, is one of the invited speakers (*https://spss2019.azuleon.org/*).

## Other activities

1. Commission 4.1 Vice-chair Claudio Zaccone has been elected as President of the Soil System Sciences (SSS) division of the European Geosciences Union (EGU) (*https://www.egu.eu/elections/egu-extraordinary-spring-election-2019/*).

Consequently, a closer collaboration between IUSS and EGU will support the future development of our discipline and will stimulate further inter- and intra-disciplinary exchanges.

# Commission 4.2: Soils, Food Security and Human Health

At the WCSS Eric Brevik and Lily Pereg convened a session on *Soil and Human Health I* focusing on new indexes and approaches to assessment, as well as, many examples of soils directly contributing to human health issues (C4.2.1). The role of soil in affecting the human microbiome, providing contaminants to the food chain, a pool for antibiotic resistance genes and links to frameworks on global soil health and soil security were further explored in a session on *Soil and Human Health II* (C4.2.1). Ganga Hettiarachchi and Margareth Simões convened a session on soil quality to secure human health covering topics from assessment of waste and the promotion of reusing wastewater through to connecting the biophysical and socioeconomic factors for management of soil quality (C4.2.3). Soil quality and food security in the tropics was convened by Cassio Hamilton Abreu Júnior and Marcia Thais de Melo Carvalho (C4.2.2). A closer cooperation between IUSS and EGU has been achieved through contributions and session leadership by Taru Sandén and Heide Spiegel (*https://meetingorganizer.copernicus.org/EGU2019/meetingprogramme*).

## Soil at the World Congress of soil science in Rio 2018

A meeting arranged with the Borderlands project and the RSA was held in the Scottish borders to discuss the role of natural assets in food, farming and countryside in December 2018. This is part of a series of events currently being held and will be formally reported upon in 2019. Lorna Dawson presented on the importance of understanding our many different soils in securing future food needs.

## Report/blog

Is Smart Farming a solution for Scottish agriculture? Blog – *https://sefari.scot/blog/2019/04/08/is-smart-farming-a-solution-for-scottish-agriculture*.
This report originally published by the Scottish Parliament's Information Centre (SPICe), who commissioned SEFARI to write a series of blogs to stimulate debate on this issue. SEFARI research takes a collaborative approach and looks at this complex and challenging issue from multiple perspectives, including improving animal health, changing dietary

Dorodango (Shiny Soil Balls) © Valéria Vieira


Soil Colour Collection
(©Valéria Vieira, *www.valeriaviera.com.br*)

intake, soil health and the role of cropping systems to reduce greenhouse gas emissions.
SEFARI What we eat, and meeting our climate change commitments Blog – *https://sefari.scot/blog/2019/04/08/what-we-eat-and-meeting-our-climate-change-commitments*.

Scotland's acid soils, liming to improve crop sustainability. *https://sefari.scot/research/scotland%E2%80%99s-harmful-acidic-soils-can-liming-improve-cropping-sustainability*
Results from this study provide information to re-evaluate the management of arable soils in Scotland to ensure future sustainability. In addition, this study highlights the importance of soil type and fertiliser application (specifically phosphorus) on the relationship between soil pH and crop yield. When phosphorus fertiliser inputs are reduced, the critical soil pH for crop yield increases and consequently there is a greater need for liming. Fertiliser inputs should be considered in combination with the management of lime.
Further information about SEFARI can be sourced from the web site: *https://sefari.scot/sefari-gateway*

## Commission 4.3: Soils and Land-use Change

At the WCSS a session on *Ecological soil management systems and soil, quality* was organised by Heitor Mancini Teixeira and Fernanda de Paula Medeiros looking at indicators of ecological change and quality as well as the effects of management and the valuation of ecosystem services (C4.3.1).

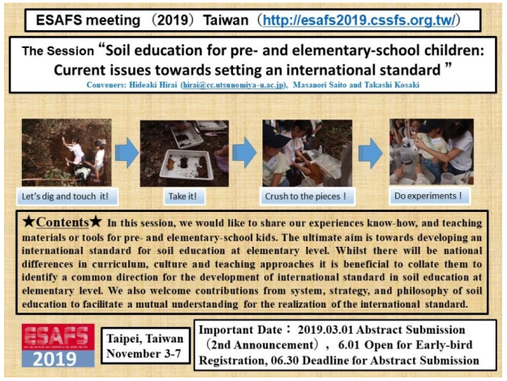
Governing Scotland's natural resources: are our policies sufficiently joined-up? A case Study *https://sefari.scot/research/governing-scotland%E2%80%99s-natural-resources-are-our-policies-sufficiently-joined-up*, funded by SEFARI, discusses how soils and other natural resources link to policy. The aim of this research is to understand if and how policy measures (often called policy instruments) designed for different purposes and implemented through different approaches currently interact; whether there are trade-offs or cross-overs, who is involved, and how policies have been designed and implemented.

## Commission 4.4: Soil Education and Public Awareness

Damien Field and David Lindbo co-convened a session at the WCSS addressing Soil Science Education in the 21st Century. This covered a wide range of topics reporting on the culture of learning in different countries, a focus on the knowledge and skills that are required for the future and the adoption and adaption of new learning techniques (C4.4.1). Soil Education and the Public Perception of Soil was organised by Cristine Muggler and Laura Bertha Reyes Sanchez. This covered many topics celebrating soil where education engages the wider community.
A session for SSS1 (SSS1.2) in EGU assembly was proposed by Hideaki Hirai, Damien Field, Jacqueline Hannam, Cristine C Muggler. The title of the session (SSS1.2) was 'Soil education for pre- and elementary-school children: Current issues towards setting an international standard.' Unfortunately, the session of SSS1.2 was withdrawn, because only two abstracts were submitted to the session, although the poster (see below) was sent to the colleagues belonging to IUSS through Takashi Kosaki. One of two abstracts was from Keiko Mori et al. and the other from Hideaki Hirai and Takashi Kosaki. So, Keiko Mori and Hideaki Hirai asked Dr. Jacqueline Hannam to include our abstracts in her session of SSS1.1, but her session was also withdrawn! Therefore, we transferred from SSS1.2 to SSS6.1 where Eric and Lily (deceased) were co-conveners. Fortunately, Keiko's presentation was oral, and Hideaki's presentation was assigned to poster presentation. The former's title was '***Suggestion to future soil education in Japan considering the current Guidelines for Primary School.***' The latter's one was ***'Setting the target of soil education based on questionnaire survey to elementary school children: A case study in Tokyo and Tochigi, Japan.'*** During the poster presentation, the questionnaire sheet on soil was shown and distributed to the colleagues concerned with the questionnaire survey.

### Upcoming events, symposia, conferences:

The Japanese society of Soil Science and Plant Nutrition will hold its annual conference from September 3-6 in Shizuoka University, Japan. A session towards an international standard for soil education has been proposed. Now, at least 8 researchers have already registered towards an international standard for soil education. From now on, they will write their abstracts and make slides for their presentation. Hideaki Hirai is a convener and he has just discussed with two other co-conveners about the contents of the session for making the program.
ESAFS 2019 – Smart Soil Management for Sustainable Agriculture – will be held in Taipei, Taiwan (China) from November 3-7, 2019. In ESAFS (East and Southeast Asia Federation of Soil Science Societies), a session 'Soil education for pre- and elementary school children: current issues towards setting an international standard' was organized. For details, please see the following poster. Now, the deadline of the abstract submission is June 30. Please see the web page of *http://esafs2019.cssfs.org.tw/*. Please see *http://www.cssfs.org.tw/ESAFS2019/Files/ESAFS-2019_2nd-Announcement.pdf* about the sessions proposed.




In a project called 'Bokli – short for Boden und Klimawandel (soil and climate change)", led by Environment Agency Austria, school children learn about the importance of protecting land ecosystems in relation to climate change. The principles of circular economy are explained on the basis of a raised bed with a compost worm box, covering the topics bio-waste treatment, composting, carbon cycle, climate change, plants and soil. For one school year plants are cultivated and harvested in the raised bed, progress documented, research results and knowledge passed on to kids of the same age via peer-teaching. In this period of time children looked after their raised beds, supervised by their teachers. Experimenting, measuring, observing, documenting and critical thinking form the didactic basics. The experts of Environment Agency Austria, the University of Natural Resources and Applied Life Sciences, the Austrian Agency for Health and Food Security and the Federal Research Center for Forests made sure that the contents and processes were of a high professional quality.
The project is funded by the Austrian Research Promotion Agency (FFG) through the 'Talente Regional' programme, project duration August 2017 - September 2019.
Franz Zehetner and Martin H. Gerzabek (BOKU, Vienna) conducted a scientific trip to the Galapagos Islands. They guided the work on a movie on 'Soils and soil use'

©M.H. Gerzabek, 2019

in a group of eleven people, mainly students. The movie will be about the soil formation and development on the differently aged islands and specifically about the conflicts of soil use and management, invasive species and the impact of tourism on soil resources.

### Events

1. SEFARI Get digging! Best Soil in Show 2019 now open for entries – *https://sefari.scot/news/get-digging-best-soil-in-show-2019-now-open-for-entries*.
2. SEFARI Learning By Doing: Understanding and Managing for Ecological Resilience Case Study *https://sefari.scot/research/learning-by-doing-understanding-and-managing-for-ecological-resilience*.
3. SEFARI Safeguarding our environment's future can have an impact on our gardens today Blog – *https://sefari.scot/blog/2018/12/11/safeguarding-our-environment%E2%80%99s-future-can-have-an-impact-on-our-gardens-today*.

Contributions to the Criminal Justice system and general awareness raising on the topic of soil have been made through working with police and lawyers in UK and overseas, in search and as trace evidence. Contribution to culture through contribution to media such as press releases, newsprint articles, crime authors and TV (e.g. Vera, Shetland and Silent Witness).

Head of Soil Forensic Science at the James Hutton Institute, Prof Lorna Dawson, CBE, FRSE, FRSA, who was awarded a CBE for services to soil science and forensic science by HRM Queen Elizabeth, was a guest on BBC Radio Scotland's 'Stark Talk', sharing her varied, interesting career, including her experiences working with high profile crime writers and on real life cases.  Further information on soil forensics can be sourced from the web site: *https://www.huttonltd.com/services/soil-forensics*

Lorna Dawson (©Lorna Dawson).

## Commission 4.5: History, philosophy and sociology of soil science

This commission organized 2 sessions with a total of 15 oral presentations (*https://iuss.boku.ac.at/files/21wcss_programacao_final.pdf*). The commission chair organized one session and presented in two others (one invited presentation) that were part of or relevant to (presentation in the Soil Science Society of America's soils and human health symposium) the Division 4 mission. Soil meets art was celebrated at a session organised by Alexandra Toland and Maxine Levin, called *Field to Palette: Artistic Perspectives on Soil Functionality*. Here we heard from the authors of chapters in a book that formed the spine of this session. This also included a session on *Foreseeable breakthroughs in soil science* from Sabine Grunwald and Marcos Bacis Ceddia (C4.5.1 & C4.5.2)

The commission chair contributed to international and national meetings and symposia in 2018-2019, including the Conference on Connections between Soil Health and Human Health in Washington DC, USA, on 16-17 October, 2018 (organized by the Soil Health Institute); Soil Science Society of America annual meeting in San Diego, California, USA 6-9 January, 2019, and the European Geosciences Union General Assembly in Vienna, Austria 8-12 April, 2019. In each case the commission chair helped organize sessions and presented materials relevant to the Division 4 mission.

'On the Deep Wealth of this Nation, Scotland' is a collaboration in ecological art, supported by SEFARI and is an example of collaboration between artist Newton Harrison, James Hutton Institute, the Barn, RGU, RBGE and SRUC. The project has involved a touring exhibition of 10 works, seminars and discussions, covering soil, water, land use, food security and climate change topics, an animated short film, and poetics. It presents an original vision for how one small country such as Scotland can mobilise as a nation to be the first industrialised country to give back more to the global environment than it consumes. Exhibitions and seminars have engaged local communities, landowners, agencies, NGOs, students, environmentalists, politicians and scientists. The works provoke consideration of the long-term consequences of climate change and describe the major changes in land use that will be needed to enable a thriving population to persist.

A session on *Building Inter- and Transdisciplinary Bridges in Soil Science: Honoring Lily Pereg 1964–2019* was organized by Taru Sandén, Brigitta Toth, Karen Vancampenhout, Eric C. Brevik and Bahar S. Razavi (SSS6.1/BG2.29/HS8.3.17) at the 2019 European Geosciences Union General Assembly. The goal of the session was to facilitate discussion regarding links between the soil biology, chemistry and physics disciplines, including investigations of soil and human health and soil education, issues. IUSS Division 4 was a cosponsor of this session (Brigitta Toth and Eric Brevik are both chairs of Division 4 commissions).

***Call for collaboration:***

Commission 4.5 is cooperating with the Cultural Patterns of Soil Understanding Working Group (Nikola Patzel, chair) in developing a book on Soil Culture as part of the IUSS book series. This book is due to be released in 2020.

### Working Group Cultural Patterns of Soil Understanding

At 21 WCSS in 2018, many members of WG Cultural Patterns of Soil Understanding, many of them with overlapping activities in commissions of Div.4, undertook a huge effort in organizing and participating in about 10 symposia and 4 interdivisional sessions. They focused on soil cultural issues in the broad sense. This contributed to a stronger perception and standing of Division 4 in the IUSS community, aiming at an ongoing development of ties between the realm of soil scientists and our science on the one side with the manifoldness of societies, societal groups and science and actor networks on the other.

In Rio, the WG Cultural Patterns of Soil Understanding held two internal meetings, partly fused with the Div.4 business meeting, where the self-image of us in our roles as scientists doing research, formation and communication, as well as structural issues of the Div. were important issues. The efforts to rename and change some bodies within Div.4 shall lead to a modification application in due time before the inter-congress meeting in Glasgow 2020.

The WG 'Cultural Patterns of Soil Understanding' together with the Eurosoil organizers plans to present the book on Cultural Understanding of Soils there (in August 2020), making book chapter contents part of symposia and other events on educational and cultural issues. The chapters are progressing well and case studies will be presented from all world regions.

# International Decade of Soils (2015-2024)

## IUSS and the World Soil Day Award 2018

FAO organised a competition on the best World Soil Day event that was carried out on WSD 2017 (December 5). IUSS was one of the members of the WSD Award 2018. The Secretariat organised the evaluation and provided the documents for the IUSS Stimulus Fund Committee which was enlarged by Prof. Winfried Blum, one of the initiators of the WSD. The Secretariat collected the evaluation results, compiled them and filled the online evaluation form provided by FAO.

## Celebrating World Soil Day in Costa Rica

*The following account was provided by Floria Bertsch, President of the Soil Science Society of Costa Rica*

Dear colleagues:
Through this note I will try to describe the 'Manos al Suelo' ('Hands on Soil') event that we had on 5 December in celebration of World Soil Day. We carried out four simultaneous activities in one of the emblematic parks of our capital San José, the La Sabana Metropolitan Park, located 2.5 km from the central axis of the capital, which constitutes an urban 'lung" of 65 ha.

First, a group of close to 400 people which included children, young people and adults, and a group of five inmates (who during that time had the opportunity to meet their families, divided into 26 groups with two guides ("teens") who analysed with the attendees the importance and functions the resource 'soil' has in their lives, and applied 13 tons of compost to 3,000 trees that had been part of a landscape recovery programme over the last 6 years. In previous times the park used to be the international airport of the city and in the 1980s eucalyptus was planted there, which for Costa Rican conditions constitutes an exotic species. Starting in 2011, a group financed by Scotiabank in conjunction with ICODER, which is in charge of keeping and maintaining the park, took on the task of replacing all eucalyptus trees with native species that were perfectly adapted to the local conditions. With the wood thus produced, furniture was built for schools, tables for the park itself and just before the event, a series of garbage bins were installed to separate waste for recycling throughout the park.
On Map 1 (Photo 1) below you can see the 26 areas in which the compost was placed (0.5 t of the compost applied in each section).

With this activity we wanted to emphasise the important role of soil in the recycling or transformation of waste as it occurs during the manufacture of

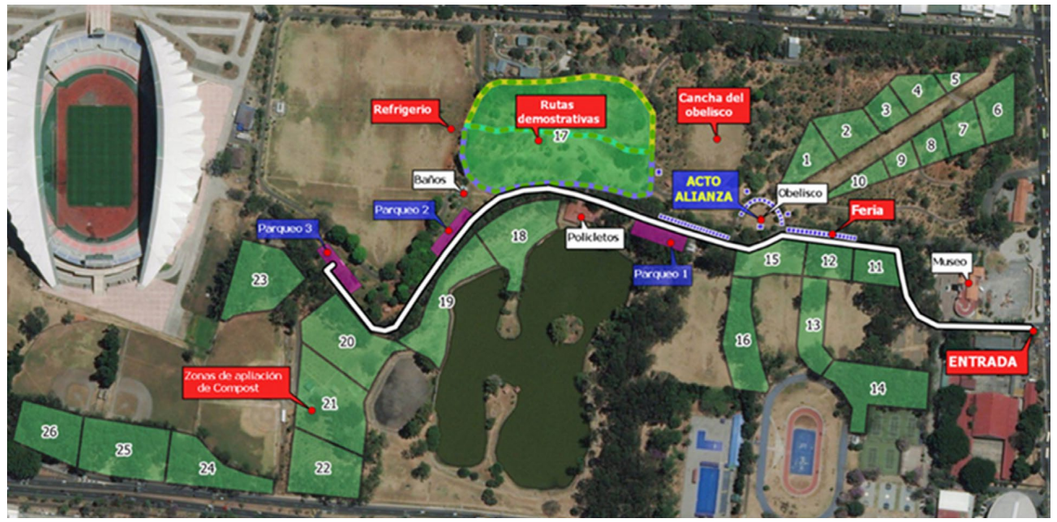


Photo 1: Areas in which compost was applied (©ACCS)

Photo 2: People applying compost (©ACCS)

Photo 3: Adults and children applying compost (©ACCS)


Photos 4 and 5: Learning how to apply compost (©ACCS)

compost, and also demonstrate how such a simple practice, available to us all, can make us part of a plan as ambitious as the country's global plan, which is the decarbonisation of our economy. This is what we said to each of our participants: "By applying organic fertiliser to the trees, we are encouraging our urban soils to capture the carbon that is in the atmosphere and conserve it, and therefore we will be contributing to the decarbonisation of our city". (Photos 2, 3, 4, 5, 6, groups applying compost). The compost that was distributed came from donations made by 17 companies (Photo 7).

The idea was also to transmit that we can all be part of the solution to pollution and encourage the soil to continue fulfilling its recycling function.

The second activity was the exhibition of 15 stations, divided into three routes and located on the only hill that exists in the park. The idea here was to show how



Photo 6: Applying soil compost (©ACCS)


Photo 7: Companies who had donated compost (©ACCS)

fragile the resource is, because in a relatively small area of the park, in which a small hill with moderate slopes is present, it is feasible to find the different types of soil degradation, such as surface erosion, pedestals that indicate deeper erosion, and even gullies. These situations were used to show the conservation practices that could be used in each case as indicated on Map 2 (Photo 8).

The third activity was what we call the Soil Fair, for which 50 entities including public and private institutions, companies and micro-enterprises installed their

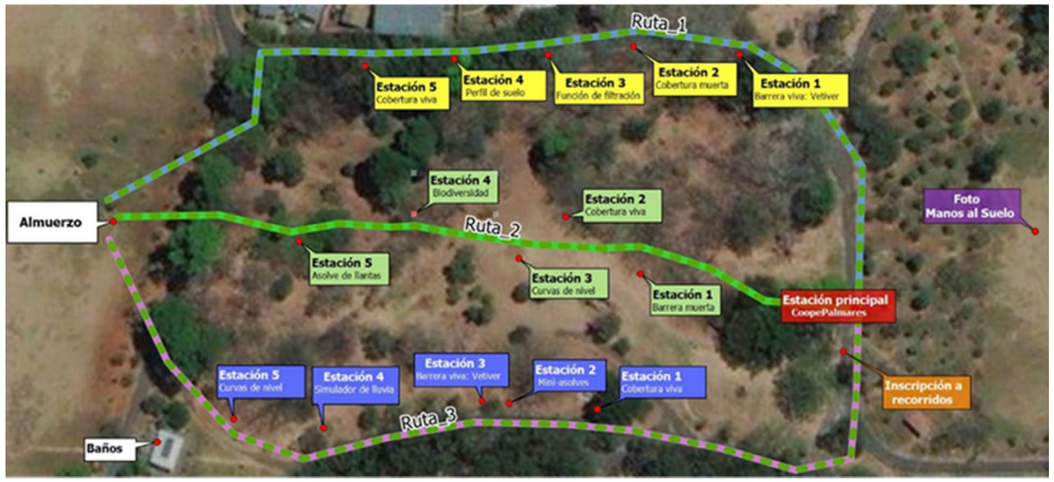



Photo 8: Map indicating the 15 stations showing the fragility of soil and different conservation practices, (©ACCS)

own stands or awnings along some of the park boulevards, as indicated on Map 1 (Photo 1), in which they showed in some way how they carried out some type of management of the resource 'soil". Among them were almost all compost-donating companies, each one showing the way in which they process their product, with or without the help of earthworms, indicating the raw materials they use (coffee beans, cane bagasse, cow dung, chicken manure, etc.); some showed the simple equipment that they use to produce compost with household waste in their own homes and its diffusion in a municipal programme, and even the way in which butterflies, upon completing their life cycle, during the pupal stage, are some processors of the natural compost was exposed. There was also another series of stands that exhibited options for home gardening, the establishment of small-scale plants, biodegradable pots and equipment for the production of useful chippings for coverage. Others referred to soil functions, such as the one showing a water filtration system, which dealt with the issue of recycling and pollution. In this regard, one organisation addressed plastic pollution on beaches and another referred to the non-use of single-use plastics. Accompanying the entire stand area were the 18 posters produced by FAO, nine about threats and nine showing different ways of contaminating soils. There was also an awning to paint with soil materials, another awning to mould with soil materials, and several with handicrafts made with materials left on the ground, even the furniture used for the main activity was an example of the reuse of wood remains for manufacturing artistic furniture. Several state, non-governmental, and academic entities presented those relevant activities for the resource 'soil' that each of them engages in. There was also a series of posters showing alternatives that farmers use to manage soil sustainably.

The objective of all these three activities was to raise awareness among the visitors; however, the activity with which we believe that substantial importance will be given to the positioning of the resource SOIL in the country was the Official Act of Constitution of the National Alliance for Soils and Lands of Costa Rica, which was carried out in the middle of the other three activities – outdoors, in the shadow of a large awning installed on the ground itself, among the representatives of more than 40 public and private entities. As a result of a previous process of contact and individualised adhesion that had been carried out by the Governance Committee (Pillar 1) of the ACCS, the day had come when a very clear determination had been reached of the need to rally entities of both sectors, the public and the private, at the national level, as a way to advance synergistically the conservation of the resource 'soil". Among the entities that were present were at least four ministries (Environment, Agriculture, Housing, Public Works and Transportation) and another series of government institutions related directly and indirectly to the resource. Non-state public entities, academic entities, international organisations besides FAO, such as UNDP, IICA and GIZ, various NGOs, and another large group that includes Professional Associations, Movements (Organic, Union of Small Agricultural Producers) also participated as well as financial institutions and the companies financing the event. Each representative signed a symbolic act using soil as a paint medium, and the intervention of the Minister of Environment and Energy, Mr. Carlos Manuel Rodríguez, closed the event with the greatest boost that the resource has received in our country in years: "There is no doubt that this day 5 December 2018 has marked a 'before and after' on the national agenda in relation to the resource SOIL.' (Photos 9, 10, 11, Constitutive Act of the Alliance).

Finally, as a reminder of this celebration of World Soil Day 2018, all participants wearing the white shirt organised themselves in the form of symbolic hands which could be seen from above using a drone, meaning 'Manos al Suelo' (Hands on Soil) in La Sabana! (Photo 12).


Photo 9 (©ACCS)

Photo 10 (©ACCS)

Photo 11 (©ACCS)

Photo 12: 'Manos al Suelo' (Hands on Soil), (©ACCS)

## Soil Book Series

We are proud to present the latest edition in the IUSS Soil book series.

### Global Soil Proverbs. Cultural Language of the Soil

Ed.: Jae E. Yang; M. B. Kirkham; Rattan Lal; Sigbert Huber. Published in the CATENA series GeoEcology essays in December 2018; 275 pages, 165 figures, 10 tables, 17×24cm, 720 g, US-ISBN: 1-59326-271-X, ISBN 978-3-510-65431-4. The book can be ordered from the IUSS Secretariat (*iuss@umweltbundesamt.at*) at the price of EUR 34.90 (plus shipping costs); reduced price for IUSS members: EUR 30.00 (plus shipping costs).
Read more: *https://www.schweizerbart.de/publications/detail/isbn/9783510654314*

### "Global Soil Proverbs": a source of inspiration and a challenge for the future!

To develop personally and professionally one needs 'roots"and 'wings". Building on and being nourished by experiences of past generations, the challenge is to move beyond the well known and fly away exploring new adventures. Reading professional books and papers is often a rather dreary and boring affair that only occasionally offers enlightenment when discovering inspiring 'nuggets". The new IUSS book on Global Soil Proverbs, Cultural Language of the Soil, edited by Jae Yang, Mary-Beth Kirkham, Rattan Lal and Sigbert Huber, offers many of such nuggets. The 600 proverbs from 29 countries on five continents, convincingly illustrate the close relationship between man and soil. This is not a book that one reads instantly from cover to cover but it offers a rich text that invites occasional shopping.
Not all 600 items qualify as proverbs, expressing the cultural language of the soil familiar to and used by a significant number of people in a given country. Some read more like statements, pronouncements and even truisms but this does not reduce their relevance nor interest.
Quite impressive is chapter 6, proverbs in China. We read:*"Different kinds of soil are good for different people or things",* dating from around 500 BC. *"Soil types determine human health and their characteristics"* from 140 BC. It took mankind 24 centuries to rediscover the occurrence of soil types!
Some 160 statements have an agronomic focus and don't mention soils or its equivalent (e.g. *"a chilly May leads to a granary year"*, (Moldova, p. 160); *"plow a lot and sow little and you will harvest more than any other",* (Spain, p. 191; *"in autumn* a *sheep pasture leaves a manure that is worth the price"* (France, p. 123) and many more. Most other statements relate to use of soil and its limitations and challenges. There is attention for tillage, fertilization, use of manure and soil conservation: *"manure makes clay soils kind"* (Iran, p. 53); *"The more you plough the land, the more you get out of it and the more you eat"* (Pakistan, p. 90); *"soil is not lost because we farm, soil is lost because of how we farm"*(US, p. 224); "*fall plowing fertilizes the earth almost for half"* (France, p. 122). and many more.
The term 'soil' is used in 145 statements. Seperate soil textures (clay, sand, dust, dirt, mud) are mentioned 57 times: *"sand over clay, money thrown away, clay over sand, money in hand"* (US, p. 214), *"Sunday Soils, too wet too sow or till until Saturday and too dry to sow on Monday"* (Australia, p. 238). Aside from soil, 'land' is mentioned 90 times, 'earth' 77 times, 'ground' 55 times and 'fields", 18 times. These differences are relevant because 'land' expresses soils in the context of landscape, hydrology, weather and vegetation and reflects an interdisciplinary focus moving beyond soil as such. Also, 'earth' has a wider scope than soil alone (*"white bread grows in black earth",* Lithuania, p.153) while 'ground' specifically refers to the soil surface: *"to have solid ground under one's foot again"* (Austria, p. 113).
Proverbs are particularly striking when social aspects of rural life are linked to soil: *"who lickes the plate, has to lick the ground"* (Italy, p. 144), *"to you the woman, to me the land that you may breed men while I grow food",* (New Zealand, p. 242, hardly reflecting emancipatory feelings); *"do not stay with your inlaws if their paddy field is plowed twice"* (Korea, p. 72); "*a farmer becomes rich if a sho (1.8 litre) of soil accumulates in his bed"* (Japan,p. 64, indicating long hours working in the field with little time for anything else).
There is much more to discover as the book is a rich source of shared rural feelings, strongly focused on working the land and on production. Some traditional views are clearly in conflict with modern insights.
Many statements mention the importance of soil tillage, which is becoming less relevant in the modern world with more emphasis on minimum and zero tillage. Traditional views in Spain favor uncovered soils in orchards: "*In January climb up the hill and if you see the land with its colour, start to sing, but if you see it of greenish colour start to cry"* (Spain, p. 188). Unfortunately, soil without vegetation can easily erode and, in contrast to traditions, a cover crop between the trees is effective to combat erosion. In contrast, the importance of manure for soil fertility is often mentioned as well and this is still highly relevant today.
Overall, the statements demonstrate the close link between mankind and the soil, forming our 'roots"as a profession. However, they largely reflect traditional views in a rural environment of the past that was primarily focused on concerns related to crop production. Currently, land users are also confronted with environmental concerns in their own right not only expressed by rules and regulations in many countries but also by vocal citizens and pressure groups. A real challenge, therefore, for modern soil science to effectively address these broader societal issues. And for those scientists still struggling with defining soil health, remember: "*soil health is like human health: it is hard to define but you sure know when you don't have it".* (US, p. 225).

*By Johan Bouma, em. Prof. in soil science, Wageningen University, the Netherlands, Honorary member of IUSS.*

## Soil Icons

The Global Soil Icon Contest was launched in December 2017, with an announcement in IUSS Alert No. 150. For details please see *https://www.iuss.org/index.%20php?article_id=678*. 22 interesting soil icons were received. In addition to awarding 2,500 USD from the Stimulus Fund to the winning icon, which will be used during the International Decade of Soils (2015-2024), the best 12 icons were presented on the IUSS website (one per month), showcasing manifold approaches to picture the importance of soil in our daily lives.
In this Bulletin, we are proud to present the last four soil icons, which were presented on the IUSS website from the months of December 2018 and January, February and March 2019.

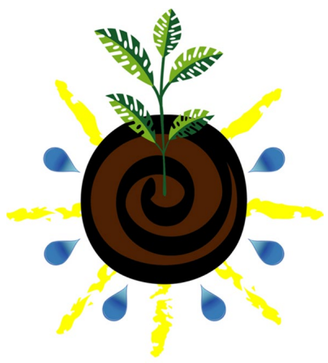
Below please find the soil icon of the month of December 2018:

Please find below some information about the icon as it was submitted by its creators Gabriel Lascu (graphic designer, University of British Columbia, Vancouver, Canada), Dr. Stephanie Grand (pedologist at the University of Lausanne, Switzerland) and Dr. Maja Krzic (soil scientist at the University of British Columbia, Vancouver, Canada):
The icon entitled *'Love, nurture, and respect our soil. Let's celebrate together!'* shows the role of soil in sustaining all terrestrial life including humanity. The person embodied in the tree is rooted in soil of all the continents and produces her food (fruits) whose colour is derived from the soil. Soil is not depicted literally but its life-support function is emphasized instead. The icon highlights the close intertwining between the primary productivity of terrestrial ecosystems and humanity's welfare and shows that soil is the foundation of our existence on this planet. The icon also has an optimistic outlook, which is much needed to revive hope and interest in protecting our natural resources. The leaves are waving in the sky in a celebratory fashion and the fruits have a full, glowing shape. Love, nurture, and respect the soil and it will feed us all and give us reassurance and reasons for celebrating a healthy and sustainable life on our planet.

In January 2019, IUSS presented the following icon on its website:


The soil icon was designed by Andre Dani Mawardhi, Soil Scientist of Riset Perkebunan Nusantara (Indonesian Plantation Research Institute), Indonesia.

*Explanation of the Soil Icon Design*
The icon design represents the earthworm, which is widely known as the most important soil fauna. It contributes to both soil physics and soil chemistry. It roles on decaying deadly matter on soil, making channel therefore air and water can intercept soil down, distributing nutrients evenly in soil, and giving responsibility on soil ecosystem. This is why the earthworm is an appropriate symbol the soil.
The colours of the lower part of earthworm body are dark and light green. Those represent the fresh deadly matter on soil. In the middle part, the colour of the earthworm becoms dark and light orange. Those represent the colour of the earthworm itself. On the upper part, the earthworm is dark and light brown, symbolizing that the fresh dead matter on lower part which was broken down by the earthworm (middle part) has been changed into organic matter, an important part of soil composition.
In the following month of February 2019, yet another icon was shown on the website:



The icon was created by Alina Svystunova, Kharkiv, Ukraine.

*Brief description*
The soil is presented in the form of a round base and a platform for the generation of life. The spiral inside represents the infinity and the cycle of this process. The rays and drops around the earth represent the symbols of water and sunlight. All together this is a system of life.

The twelfth and last icon of the Soil Icon Contest adorned the IUSS website in March 2019.

*Description:*
The provision of our Planet with everything necessary for its sustainable functioning is mainly carried out at the expense of the natural body – SOIL. This is clearly seen on the represented iconic symbol, where, by analogy, the provision of everything necessary for the lush growth of plants, soil plays a key role. For life on Earth (providing high-quality food and a place for living organisms, including people; clean water and air; everything that surrounds us (furniture, clothes, transportation and material enrichment means) – SOIL is one of the main sources of energy, which is symbolized by the plug leading from the soil to the Planet.
Soil is also a 'landscape mirror", it reflects the surrounding conditions, and it is inextricably linked with all other layers of the Earth by a general (global) circulation of matter and energy in the biosphere. On the represented iconic symbol it is shown in the form of a circle, which concludes the basis of the symbol. The circle consists of a discontinuous line, which indicates that circulation of matter and energy in biosphere is open now. This is very important for the current state of the planet's biosphere, as human activity has made adjustments to the closed circulation of matter and energy, including damaging the 'health' of the SOIL.

## **Soil**utions

### IUSS launches poster contest '**Soil**utions'to discover new ideas regarding solutions for soil problems

Soil is a limited natural resource that is under increasing pressure and thus at great risk of being degraded. IUSS has identified the key roles played by soils in guaranteeing food security, reducing greenhouse gas emissions that contribute to climate change, generating drinkable and clean water necessary for human life and for the sustenance of the terrestrial and aquatic ecosystems, practicing sustainable agriculture, and in reaching the Sustainable Development Goals (SDGs).
Since many of these SDGs directly or indirectly involve the soil resource, reaching them will only be possible if we preserve this resource as a common good of humankind. This is why IUSS decided to make a poster contest inviting all soil lovers, be they school children, students, designers, soil scientists or experts of any other profession, to submit their ideas in a poster describing their **'Soilutions'** to address soil problems in order to preserve this unique resource and life.
The call for posters was published in IUSS Alert 165 in March 2019.
IUSS considers stopping soil degradation as one of its most important tasks, and invites you to propose in a poster your 'Soilutions' to address soil problems in order to preserve this unique resource and life. The ideas and proposals should represent the role of the soil as an essential natural resource to preserve the environment. IUSS will award 1,000 USD from the Stimulus Fund for the best 'Soilutions' poster and 500 USD each for the second and third best poster. The posters shall be submitted until May 31, 2019, later postponed to June 15, 2019. The best 12 posters will be displayed on the IUSS website and a calendar shall be made using these posters.
Read more: *https://www.iuss.org/index.php?article_id=26&goback=619*

# Conference and Meeting Reports

## TBI Symposium 2019

*20 and 21 February, Älgsalen, Umeå*

**SUMMARY**

### Program:

*20 February*

9:00 Welcome and practical information

9:05-9:30
**TBI science, where are we now?**
*By the TBI team*

Joost Keuskamp, Taru Sandén, Mariet Hefting and Judith Sarneel published the standardized method in 2013. Since than we have deepened our understanding of the pro's and cons' of the method (for instance incubation duration), and we can show that some of our assumptions have been met. Many TBI initiatives across the world created a database with about 3000 locations, spread over the different biomes. Further, many citizen science initatives have been initiated such as teatime4science, teatime4schools, Tea in OTC and teatime in NETLAKE. © TBI team.

The presentation can be watched 10-20 March 2019 on *www.teatime4science.org/symposium*

9:30-9:50 Raúl Ochoa-Hueso
**Climatic and microbial controllers of litter decomposition under nutrient enrichment in global grasslands**

9:50-10:10 Hao Tang
**Plant-ecotype control on soil decomposition processes in response to sea level rise**

10:10-10:30 Marshall McDaniel
**Decomposition of Household Items (including Rooibos and Green Tea) as Low-cost Indicators of Soil Health**

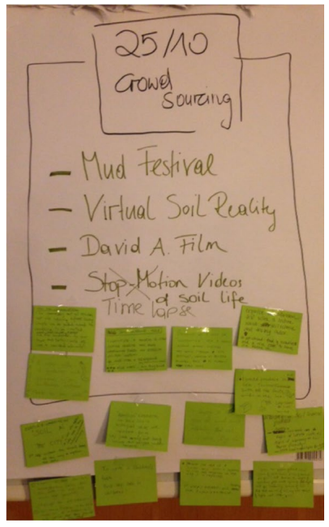
10:30-10:50 Lorenzo Brusetti
**Microbial communities in litter: a comparison between local and external substrates along a European transect**

10:50-11:00: coffee break

11:00-12:30: Discussion groups and breakup in groups preparing for the review article

12:30-13:30: Lunch

13:30-17:00: Elena Kinz
**How to communicate your soil science (using tea bags)**




The workshop included a thorough overview of the field of science communication: Definitions, Areas and Formats. Elena Kinz explained the deficit model and framing model that can help to tailor science communication. After a tea break we moved on to citizen science, with the example of teatime4schools. The workshop finished with the 25/10 crowdsourcing exercise, which resulted in cool ideas for activities. A pdf of the powerpoint presentation as well as the results of the 25/10 exercise are available by emailing Judith. © TBI Elena Kinz.

19:00
**Conference dinner at 'Hunger och Törst'**

*21 February*
9:00 Welcome

9:00-9:45: **Ellen Dorrepaal,** Sylvain Monteux, Frida Keuper, James Weedon
**Interacting controls on decomposition in thawing permafrost ecosystems**

9:45-10:05: Ada Pastor
**Plunging into Arctic waters: using the TBI to assess decomposition in Greenland streams**

10:05-10:25: Michele Carbognani
**Soil moisture and vegetation type modulate the influence of temperature on litter decomposition**

10:25-10:45: Andrea Lopez
**Drought affects the summer litter decomposition rate of six central North American Grasslands**

10:45-11:00: coffee break

11:00-11:20: Nina Filippova
**Decomposition in Mukhrino field station, Western Siberia**

11:20-11:40: Taru Sandén
**Citizen scientist perspective on TBI**

11:40-12:00: **FastForwardPresentations**
3 min talks and 2 min for questions.

1. **Guillaume Patoine** iSBio Consortium: exploring global soil biodiversity and function distribution
2. **Marina Partain** Evaluation of tea bag index (TBI) in predicting decomposition rates in Black Mangrove (*Avicennia germinans*) sediment
3. **David Watson** Measuring resource availability for ground-foraging insectivores
4. **Rafaella Canessa Mesías** New insights into litter decomposition from a reciprocal transplant and a functional diversity experiment in Chile.

12:00-13:30: Lunch / Poster presentations
**Rafaella Canessa Mesías,** van den Brink L., Saldana A., Rios S.R., Bader M.Y.: Climate or litter quality? The right question is when.
**Rafaella Canessa Mesías,** van den Brink L., Saldana A., Rios S.R., Bader M.Y.: Litter diversity effects vary between plant communities in Chile

Abiotic environment, quality of litter, and composition and functioning of the decomposer community are generally thought to control decomposition rates. Understanding their roles is crucial for predicting carbon-feedbacks to our climate and has therefore received much attention. Therefore, often one factor is varied while the other are kept constant. Yet, in ecosystems undergoing climate change, factors controlling decomposition will not operate in isolation and therefore likely interact, but such ecosystem-mediated controls remain poorly understood. We investigated how climate warming and associated changes in plant community can alter the microbial community in thawing permafrost soils, and how these interactions may affect microbial decomposition, using three experiments. In the laboratory, we observed that functional limitations of microbial communities can hamper in vitro decomposition of old Yedoma permafrost, which was relieved by inoculation with exotic microorganisms. Microbial community structure thus matters for permafrost decomposition. In a garden experiment with five typical permafrost tundra plant species grown in Sphagnum peat or newly-thawed permafrost peat, we then investigated how the soil microbial community depends on plant species. In Sphagnum peat topsoil, the plant species did not harbour different rhizosphere bacterial communities, but they did when grown in sub-surface permafrost peat. Plant species might thus differently affect functional microbial limitations in thawing permafrost soil, and climate change-induced vegetation changes might alter microbial decomposition in thawing permafrost. Finally, we showed at a field-scale in situ permafrost-thaw experiment in a palsa peatland, how 10-years of thawing and colonization by deep-growing sedge roots caused colonization of thawing permafrost soil by overlying soil microbes. In turn, bacterial community structure, but not root colonization, helped soil quality to explain variation in soil respiration, but these relations interacted with the decadal deep thaw treatment. Our results suggest that climate-plant-decomposer interactions play an important role in the functioning and feedbacks of thawing permafrost. © Sylvain Monteux.



13:30-16:30 **Working group meetings**

1. TBI in warming experiments. We discussed the current state of the experiment. Suggestions will be presented in the next draft.
2. TBI synthesis article. Three groups were formed that tried to summarize different areas of TBI. 'Microbial ecology' worked on summarizing perspectives on how TBI can be used in understanding microbial ecology. Can we come up with a standardized sampling protocol, or has the field not developed enough?

'Citizen science' worked on getting an overview of all the Citizen science initatives in which tea bags have been used and aims to draft reccommendations based on the '10 principles in cititzen science'

'Different systems' worked on summarizing practical hurdles in doing TBI in different systems
'tea material' vacancy

The TBI team will create a repository which includes

- all papers that cite the keuskamp 2013 paper.
- a excel document in which group membership and task assignment can be indicated
- a road map to a joined publication.

We aim to have a draft ready by the end of the year.

All symposium participants are invited to join this paper.

13:30-17:30 Skiing trip on Mariehemsängarna.

## Participants

We could invite 5 young researchers to participate with support of IUSS.

This is a full list of the 32 participants and their institutes:
Ada Pastor, Aarhus University
Andrea Lopez, University of New Mexico
Anna-Lena Lindskog, Teknats kansli (UMU)
Anne Honsel, Umea University
David Watson, Charles Sturt University
Elena Kinz, Open Science – Life Sciences in Dialogue
Ellen Dorrepaal, Climate Impacts Research Centre, Umeå Universitet
Guillaume Patoine, iDiv: German Centre for Integrative Biodiversity
Hao Tang, University of Hamburg
Hjalmar Laudon, SLU
Johan Asplund, Norwegian University of Life Sciences
Joost Keuskamp, Biont Research
Judith Sarneel, Umea University
Juha Alatalo, Qatar University
Kristina Viklund, Umea University
Lorenzo Menichetti, SLU (Ecology)
Lorenzo Brusetti, Free University of Bolzano
Maaike Bader, University of Marburg, Germany
Marina Partain, Texas A&M University – Corpus Christi
Mark Bonner, SLU
Marshall McDaniel, Iowa State University
Martin Bolinder, SLU
Mary Frances, Hoover
Susan G.Komen, North Texas
Michele Carbognani, University of Parma
Nina Filippova, Yugra State University
Rafaella Canessa, University of Marburg
Raúl Ochoa-Hueso, University of Cádiz
Sanghyun Kim, SLU
Sarah Dudigan, University of Reading
Shun Hasegawa, Swedish University of Agricultural Sciences
Sue Benham, Forest Research
Taru Sandén, AGES/Dept. for Soil Health and Plant Nutrition


Five young researchers participating with support of IUSS. © Ada Pastor, Guillaume Patoine, Sarah Dudigan, Hao Tang and Nina Filippova.

## Outcomes

1. Umeå University produced a short video on the symposium:
   *https://www.youtube.com/watch?v=rQm5UTsAcjw*
2. Next year we will organize an online meeting. Different timeslots and matchmaking events to discuss about your tea project with experts and other decomposition ecologists in your field of interest.
   This meeting will be facilitated by Umeå University and the KBCon – Focus Environment at KBC. More information follows soon.
3. We will write an TBI synthesis paper which includes a literature review and a summary of relevant small side experiments (leaching, tea quality) and methodological developments (assumption testing). The aim is Methods in Ecology and Evolution. Participation on invitation only.
   A repository is created by May 1st.
   Subgroups wil be formed by the end of April and contributions of subgroups need to be handed in at *TBI@decolab.org* before the end of july 2019.
4. Attention on facebook and Twitter about the symposium and the Young scientists that were supported with travel money by the IUSS.


## Acknowledgements

The TBI team acknowledges the IUSS for funding travel allowance to five young researchers, Umeå University, Umeå Kommun and ALTER-net for co-funding. This symposium was part of the teatime4science project funded by Vetenskapsrådet.


# International Congress of the Eurasian Federation of Soil Resources and Environment Conservation Society

The International Congress of the Eurasian Federation of Soil Resources and Environment Conservation Society was held in Almaty from 17 to 19 October 2018 with the participation of scientists from 27 countries from leading universities, research centres, research institutes and representatives of the FAO and Eurasian Soil Partnerships (EAPP).
The Congress was organised by the Eurasian Federation of Societies of Soil Scientists, the Kazakh Society of Soil Scientists and the U. Uspanov Kazakh Research Institute of Soil Science and Agrochemistry.

176 scientists from countries of near and far took part in the work of the Congress: Azerbaijan, Armenia, Belorus, Iran, Finland, Italy, Kazakhstan, Kenya, Kyrgyzstan, China, Lithuania, Moldova, Nigeria, Pakistan, Poland, Ukraine, Georgia, Russia, Slovakia, Serbia, Turkey, Germany, Chile, the USA, Russia, the Czech Republic and Japan. 77 of these scientists presented scientific reports. This great interest in the work of the International Soil Congress was caused by the current state of the soil cover and its ecology, since these problems are a matter of concern for the entire global community. The fertility of the soil and its ecology are the guarantors of food security for all mankind. In this regard, scientific research about finding innovative ways to solve fundamental, applied, and methodological problems in soil science and environmental protection is a priority all over the world.
The results of basic and applied research, along with methodological issues relating to soil, agrochemical and allied sciences, and the presentations of the relevant reports were discussed at the plenary and sectional meetings at the Congress.
The plenary session of the Congress was opened by Abdulla Saparov, Chairman of the organising committee, President of the Kazakh Society of Soil Scientists, and General Director of the U. Uspanov Kazakh Research Institute for Soil Science and Agrochemistry.
The following scientists addressed welcome words to all participants of the Congress:

- Takashi Kosaki – Elected President, International Union of Soil Scientists, Japan
- Ahmet Mermut – Saskatchevan University, Saskaton, Canada
- Ridvan Kizilkay – General Director of the Eurasian Soil Federation, Vice-President of the Turkish Soil Sciences Society
- Evgenij Shein – Member of the Russian Soil Sciences Society, Russia
- Tlektes Espolov – Academy Fellow of the National Academy of Sciences of the Republic of Kazakhstan, Rector of the NJSC Kazakh National Agrarian University, Kazakhstan
- Mi Gujsyun – Science and Technology Consul, Consulate General of China in Almaty
- Representatives of the media, such as the TV channels 'Kazakhstan' and 'STV' and the newspaper 'Egemen Kazakhstan' attended the opening of the Congress.

17.10.2018 'Ekologialyq aqual' *https://www.facebook.com/www.soil.kz/videos/2057408117905469/?modal=admin_todo_tour*
news complete version *https://kaztrk.kz/news/zholdau-2019/songy-200-zhylda-zherdegi-atmosfera-zharty-gradusqa-zhylygan-120049?fbclid=IwAR0xVUZenzT0SjSrQfvuWJLBWGtNNSLpTtvBjjRy2OC8RZ9HLhngxlfYu_o*
18.10.2018 Congress of Soil Scientists / *https://www.facebook.com/www.soil.kz/videos/1378917168908930/?modal=admin_todo_tour*
news complete version *https://www.youtube.com/watch?time_continue=664&v=DHF1T5srF1c*

Five reports were prepared at the plenary session (Japan, Russia, Germany, Canada, EAPP).
Leading scientists and the representatives of different countries of the world shared their opinions and new viewpoints on the current state of the soil cover, the environment and their developments in the future, on the rational use of soil and land resources and of agricultural lands, and on the preservation of soil fertility to ensure food security in the Congress participants' countries. The reports cited the development of innovative methodologies based on modern analytical methods using the latest ultra-sensitive electronic equipment. Scientists paid special attention to innovative technologies to prevent the influence of negative factors on the soil cover – anthropogenic, man-made and natural.
The leading scientists also made their speeches on the current state of our soil resources, on degradation, desertification, disturbance, pollution, salinisation, soil protection and on the environment in different thematic sections of the Congress.

14 reports were presented, together with the relevant materials and main results, in the section on 'Soil science, classification and cartography, geostatistics, remote sensing and GIS". Important questions were discussed – on the genesis and classification of soils, the ecological assessment of the current state of ecosystems, on soils as such, on ecological soil mapping using remote and computer technologies, and on geostatistics.

16 reports were presented in the 'Soil Ecology, Soil Pollution and Restoration' section. All reports were accompanied by a presentation of the main scientific results and conclusions. The active participation of the scientists and the discussion on important problems of soil ecology and its improvement were especially noteworthy. It was stated that food and environmental safety in each country primarily depend on the state of the soil cover. To improve the ecological situation and reduce the effects of degradation processes, a rational and efficient use of soil and land resources is particularly important, as well as the development of measures to improve the ecological situation of the soil cover and the recultivation of polluted and disturbed lands.

14 reports were presented in the 'Biology and Soil Biochemistry, Soil Health and Quality' section. They were accompanied by a presentation of the most important and interesting materials that had been used for the reports. This was followed by a session of active participation. There was a scientific business discussion, and different opinions of scientists were discussed.
The concept of 'soil health' in the 21st century has been introduced to the whole world. The soil as an ecosystem is a subsystem of a more complex community of biota – a terrestrial soil ecosystem. Without vegetable components – or autotrophs (producers), without fauna (consumers) and, of course, without microorganisms – or heterotrophs (decomposers), there is no natural soil. The problem of how to achieve rapid soil rehabilitation is difficult to solve, but any solution requires an integrated approach and the joint efforts of scientists.

23 reports with presentations of important scientific results and conclusions were discussed in the section 'Soil Physics and Chemistry". The main topic was soil physics (air in the soil, water content in the soil, the influence of heavy metals (copper, mercury)). Scientists actively participated in this section, asking interesting questions about the reports and entering into discussions. Scientists from Russia, Turkey, the Czech Republic presented really good reports.
In the 'Fertility and soil fertility management; Fertilisers and Plant Nutrition' section 18 reports were submitted. All reports were accompanied by a presentation. After the presentation of each report, a large number of questions were asked; then the scientists entered into discussions. The level of development of the agricultural sector has always acted as, and continues to be, a determining factor in the economic stability of the country. Plant growth requires water, light and nutrients that are in the soil, but often these nutrients are not enough and require the use of different types of mineral fertilisers. As evidenced by the data on the rapid growth of the use of fertilisers in the world over the past 50 years, the world market of mineral fertilis-

ers has increased almost five-fold and its volume now reaches more than $ 70 billion. In recent decades, farmers in many countries with intensive farming have re-evaluated the value of organic fertilisers. About 25 billion tons of organic fertiliser (calculated on the basis of standard manure), or about 15 tons per 1 ha of arable land, are applied to the soil per year on the planet as a whole. Most of the organic fertiliser is used in the Netherlands (about 70 t/ha), followed by England (25 t/ha) and the USA (14 t/ha). On average, more nutrients are supplied to the soil via organic fertiliser (rather than using minerals) in all countries of the world (with the exception of European and US states). However, in view of the characteristics of the soil and cultivated crops, it is necessary to correctly apply both mineral and organic fertilisers.

In general, the section moderators concluded the following:

- High-quality reports were presented, there was little time (15 minutes) since after each presentation there were many questions and discussions; therefore the regulations were not complied with in all the sections;
- High-level reports were presented by young scientists from Russia and Turkey. "It is necessary to support young people by reducing the registration fee for international conferences and congresses, is the young people are our future, we must build a bridge between young and adult scientists";
- Congress participants highly appreciated the new initiatives of scientists in the field of soil science, and the use of more effective research results that can contribute to the restoration of soil resources in general.

Each of the moderators thanked Professor, Dr. A.S. Saparov for the excellent organisation of the International Congress.

The results of the discussions and the general discussion of the work of the 10th International Congress on 'The Soil Resources and Environment Conservation' identified the most urgent problems that need to be solved in the near future. Therefore, the Congress participants from the different countries urged that we should take our responsibility seriously and take the necessary steps in the relevant areas through the following measures:

- Attract the attention of government agencies to the problem of protecting the soil from degradation.
- Adopt a law on soil conservation.
- The agrarian sector as a basic sector of the national economy should be intensively developed taking into account experiences from all over the world when using and preserving the main means of production - the soil.
- It is necessary to intensify ties with soil scientists from all countries in the exchange of new methods and methodologies in the theoretical and practical areas of soil science, the protection of the soil and its biodiversity.
- Caring for people is crucial to ensure the sustainable development of life on earth in harmony with nature. It is necessary to preserve the soil as the main component of biogeocoenosis, which acts as the 'governing system' of the biosphere.

The Congress participants call on the governments of the countries to give priority to the solution of the problems of soil degradation and desertification.

- To popularise the topic of soil science, ordinary people (and not only scientists and state bodies) should know about our problem; it is necessary to include environmental protection and soil science issues in the educational programme.
- When organising the next Congress, it will be necessary to cover the topics under discussion, to include urban soil; the topic of soils should be expanded to include all aspects.
- Expand cooperation of the International Society of Soil Science and the Global Soil Partnership in the field of land and water management.
- Provide the International Society of Soil Scientists with information on the results of the Congress with a view to widely discussing and making decisions in the field of soil protection and the environment, the preservation and reproduction of soil fertility, as well as increasing crop productivity and in general, ensuring food and national security in all countries.

Within the framework of the Congress, a field excursion was organised with a visit to the fields of the Kaskelen Agropark and the Ile-Alatau National Park, and soil profiles were prepared to demonstrate the nature of the soil-forming processes of chestnut foothill and mountain soils.

After the completion of the field trip, the participants of the Congress were shown the sights of Almaty.



Both pictures of training courses © Uruguayan Soil Science Society

# News from the Latin American Soil Science Society: SLCS

## 'Thus are the Soils of my Nation'

In preparation for our **VII Latin American Symposium on Educational Innovations in the Teaching and Learning of Soil Sciences** for children and young people, the Uruguayan Society of Soil Science began offering training courses for basic education teachers of Soil Sciences to prepare them for teaching the subject 'Soils' in their classrooms, for giving practical advice to students in their 'scholar orchards", and for presenting research or didactic presentations about Soils at our Latin-American Symposium, to be held on 9 October at the 'Radisson Montevideo Victoria Plaza Hotel' in Montevideo, Uruguay, as part of the **XXII Latin-American Congress of Soil Sciences (XXII CLACS)**.

The Spanish Soil Science Society has launched a call for selecting young people who will participate in our Symposium, and the Soil Science Society of Peru is also preparing children for participation.

## Costa Rican Soil Science Association: ACCS

On 24 February, the Costa Rican Soil Science Association and its newly formed 'Alianza Nacional por el Suelo y las Tierras' participated in an activity that can be considered the first concrete and very positive achievement of the World Soil Day celebrations held in La Sabana on 5 December 2018, the 'Manos al Suelo' activity.

The Government of Costa Rica launched its new National Decarbonisation Programme and to celebrate it, a large fair was held on Paseo Colón, one of the main avenues of the city of San José, which is open to the public. At this fair all kinds of options to reduce atmospheric CARBON (electric cars, bicycles, green options, solar and wind energy, residues recycling, etc) were presented and, to represent the role of SOIL in that process of DESCARBONISATION, ACCS was invited directly by the Presidential House to participate with eight exhibition stands.

ACCS explained, with eight stands and using a practical, didactic approach, how the functions of the soil


Exhibition stand at a fair, © Costa Rican Soil Science Association (ACCS)


ACCS central exhibition stand © Costa Rican Soil Science Association (ACCS)

and the way in which one of these functions, namely soil recycling, demonstrated by composting organic waste at home and using it subsequently in gardens as a means of storing CARBON in cities, can result in an excellent option for each family to personally participate in the process of DECARBONISATION.

All stands were very busy and for us the activity reached its peak when the ACCS stand received a visit from the President of the Republic, Mr. Carlos Alvarado, and the First Lady, Mrs. Claudia Dobles, who is responsible for a large part of urban development activities. They both expressed an interest in sharing our proposed activity. They ended their visit with a sign of the government's commitment to the resource SOIL: both leaders, with great spontaneity, put their 'Hands on the Soil' symbolically!


© Aurelio Baez


© Gonzalo SIgnorelli

## Latin-American Network of Soil Laboratories: LATSOLAN

Within the framework of Pillar 5 of the Global Soil Partnership, the second meeting of the Latin American Network of Soil Laboratories (LATSOLAN) was held in Mexico City from 12 to 14 March 2019, with the assistance of official representatives from the laboratories of twenty Latin-American countries that had been called upon to participate by FAO.

On this occasion, the results of the first Latin American ring test were analysed and discussed and Mexico delivered soil samples which it will use to run the first ring test that will be carried out at global level.

# IUSS Alerts

## December 2018 - May 2019

## Information for and from the global soil science community

**IUSS Alerts** were e-mailed to more than 2,100 people in over 100 countries. Please forward the IUSS Alerts to your friends and colleagues. Send information for IUSS Alerts to *iuss@umweltbundesamt.at*. Below are still relevant contributions that appeared in the IUSS Alerts between December 2018 and May 2019.

## World Soil Day, 5 December 2018

### Be the Solution to Soil Pollution

Years of our actions and habits on soil have left a legacy of pollution worldwide. Soils have a great potential to be the solution to the increasing challenge of soil pollution. They act as a sponge that filters contaminants, degrading and attenuating their negative effects. But soil buffering capacity is limited. If exceeded, contaminants can seep into the environment and enter the food chain.

Growing food on uncontaminated soils provides safe food and helps fight hunger. Ninety-five percent of our food comes from soils: conserving and sustainably managing soils is critical in successfully feeding a growing world population. Simultaneously, it can restrain the risk soil pollution poses to agricultural productivity, human health and the health of all organisms on Earth.

*http://www.fao.org/world-soil-day/en/*

Everyone has a role to play

Did you know that 1/3 of globally produced plastic ends up in our soils? Half of it is disposable, single-use plastic? That up to half of your shopping consists of packaging? Reverse the trend and take up the challenge to #StopSoilPollution! Everyone can do something great in their own small way...

Watch the video: *https://www.youtube.com/watch?v=s1O3_0GKiEg&feature=youtu.be*

World Soil Day at the United Nations

The Food and Agriculture Organization of the United Nations (FAO) has co-organized official WSD events at the UN Secretariat in New York, US, at FAO headquarters in Rome, Italy, at the Land Development Department in Bangkok, Thailand, and at a dedicated side event at COP24 in Katowice, Poland. The events in Rome and New York were broadcast live via the UN channels.

FAO country offices around the world in Bangladesh, India, Iran, Panama, Philippines, Sri Lanka etc. and also in FAO regional offices for Near East and North Africa, South America, Europe and Central-Asia organized WSD18 celebrations by calling on to raise awareness on soil resources to mobilize public support for tackling soil pollution and sustainable soil management.

### WSD18 around the globe

On our World Soil Day event interactive map, over 200 pins from 60 different countries show the enthusiasm and the involvement of the soil science community in keeping soils in the global agenda.

Take a look at the map: *http://www.fao.org/world-soil-day/worldwide-events/en/*

Your outstanding World Soil Day (WSD) 2018 event will have the chance to compete for the WSD award 2019! Your event should comply with the theme 'Be the solution to soil pollution' and be held between 20 Nov-20 Dec 2018.

The 1st World Soil Day Award bestowed upon...

Sponsored by the Kingdom of Thailand, the first World Soil Day Award has been granted to Practical Action of Bangladesh jointly with the Soil Resource Development Institute. They organized colourful rallies, a 'Soil Care Award' ceremony, seminars, 'Farmers Dialogue' fora, and field visits in Dhaka and 22 other districts. More than 5,500 participants were involved, ranging from farmers to scientists, policy makers, practitioners and general public with great media visibility.

Read more: *http://www.fao.org/world-soil-day/world-soil-day-award/en/*

### Outcomes from CBD-COP14

The Global Soil Biodiversity Initiative (GSBI) wants to share some exciting outcomes from the recent Convention on Biological Diversity COP14 meeting in Egypt: Countries confirmed the need for, and the COP14 endorsed two important items: to consider the preparation of a report on the state of knowledge on global soil biodiversity and make it available for consideration before COP15 (2020), and planning an international symposium in 2020 on global soil biodiversity.

Read the full draft decision (most relevant articles can be found on page 4ff): *http://files.constantcontact.com/a3128908401/492416f3-6227-4d2c-acd6-914bb8c99d8a.pdf*

New GSBI-Website: *https://www.globalsoilbiodiversity.org/*

## News from the International Science Council

The ISC Governing Board (GB) released a communiqué with the outcome of the GB meeting (8-10 October 2018) and about the initiation of intensive work by the GB after the meeting. The GB agreed to communicate with ISC Members regularly. The intention is to keep the Members such as IUSS informed about the work of GB and the ISC Secretariat and to share strategic ideas and actions for the future development of the Council. The GB welcomes questions, insights and ideas that Members may have in response to the information provided.

The ISC GB is developing a program of action to implement the mission of the Council, which is to be 'the global voice for science.' As agreed in the ISC's high-level strategy, adopted by ISC Members in Taipei in October 2017, the Council will use its voice to: (i) speak for the value of science and of evidence-informed understanding and decision-making; (ii) stimulate and support international scientific research and scholarship on major issues of global concern; (iii) articulate scientific knowledge on such issues in the public domain; (iv) promote scientific rigor, creativity and relevance in all parts of the world; and (v) defend the free and responsible practice of science.

The ISC GB issued a draft document where four strategic challenge domains are discussed. These domains are those in which the global voice for science is most needed and could be most effective. It is important to note that there are major synergies between the four following domains, which will contribute to the Council's need for rapid development of awareness, brand and reputation whilst favouring the efficient use of resources:

Domain 1: The 2030 Agenda for Sustainable Development. Better understanding the globally coupled natural, physical and social systems of our planet and finding pathways for more sustainable and equitable evolution is a major and urgent task. The 2030 Agenda for Sustainable Development including its 17 Sustainable Development Goals (SDGs) adopted by in 2015 by Member States of the United Nations provides an integrated framework for this task. The contribution of science to the development and implementation of the goals at national, regional and global levels is vital.

Domain 2: The digital revolution. Global society is in the throes of a disruptive, digital revolution in the means by which information and knowledge, which have always been powerful drivers of human material and social progress, are acquired, stored, communicated and used. There are few areas of individual, commercial, social or political action to which this is not relevant. It poses powerful opportunities and radical challenges both to science and to society.

Domain 3: Science in policy and public discourse. As exemplified by challenge domains 1 and 2, society unarguably needs science more than ever, but it is arguably less inclined than in the past to listen to its voice. It is therefore essential to the ISC vision of 'advancing science as a global public good' to ensure understanding and strengthening of the ways in which science contributes effectively both to policy processes and to the increasingly contentious public discourse about global priorities.

Domain 4: The evolution of science and science systems. The scientific enterprise has always needed to adapt to the changing environment within which it operates. New awareness of inherent structural inequalities, new socio-political demands and norms, new technologies, new funding practices and new scientific opportunities and challenges are creating mounting pressures for a renewed period of adaptation, which affects all scientists and science systems in all parts of the world.

By Alik Ismail-Zadeh, ISC Secretary (shortened)

[From IUGG Electronic Journal Volume 18 Number 12 (1 December 2018)]

## Carbon budget in the EU agricultural soils

Soil plays a significant environmental role in balancing the climate as it may act as a carbon sink or source of $CO_2$ to the atmosphere. Using a new biogeochemistry-erosion model to quantify the impact of future climate on the carbon cycle, JRC tracks the possible transformations of the organic carbon across the landscape. Accelerated soil erosion in EU agricultural land due to more intense precipitation will lead to a 35% increase in eroded carbon in the period 2016-2100. This is likely to exacerbate carbon losses from agricultural land to the atmosphere (up to 23% of the predicted losses under the RCP4.5 scenario), thus increasing the effect of climate change.

Read more: *http://advances.sciencemag.org/content/4/11/eaau3523*

Data available at: *https://esdac.jrc.ec.europa.eu/content/carbon-budget-eu-agricultural-soils*

[From the European Soil Data Centre Newsletter No.114 (October-November 2018)]



## Biodiversity factor in soil erosion

The relationship between soil erosion and biodiversity is extremely multifaceted. According to the current (limited) knowledge, earthworms can play a key role in reducing soil erosion, mainly due to their burrowing activity that increase soil porosity. In addition, the ecological impact of soil erosion on soil-living communities is a challenge. The soil erosion – biodiversity interactions are presented in the paper published in Global Ecology and Biogeography. Based on available pan-European (11 countries) maps of earthworm richness and abundance, we developed an 'Earthworm factor' (Et-factor) to be integrated into soil erodibility (K-factor) calculation.

Read more: *https://onlinelibrary.wiley.com/doi/full/10.1111/geb.12782*

Data available at: *https://esdac.jrc.ec.europa.eu/content/biodiversity-factor-soil-erosion*

[From the European Soil Data Centre Newsletter No.114 (October-November 2018)]

## Land and Soil Management Award (by European Landowners' Organisation)

The prize rewards land use and soil management practices mitigating soil threats i.e. soil degradation, erosion, reduction of organic matter content, diffuse contamination, and compaction as well as the reduction of soil biodiversity, salinization, sealing, flooding and landslides. In doing so, the award sheds light on outstanding achievements, encouraging new concepts of land and soil protection and their implementation in land management, as well as enhancing awareness about the importance of land and soil functions.

Deadline: December 31, 2018

[From the European Soil Data Centre Newsletter No.114 (October-November 2018)]

## Scientists call for eight steps to increase soil carbon for climate action and food security

Leading scientists call for action to increase global soil carbon, in advance of the annual climate summit of the United Nations Framework Convention on Climate Change (UNFCCC) in Katowice, Poland (COP24) and World Soil Day (5 Dec).The amount of carbon in soil is over twice the amount of carbon found in trees and other biomass. But one-third of the world's soils are already degraded, limiting agricultural production and adding almost 500 gigatons of carbon dioxide to the atmosphere, an amount equivalent to the carbon sequestered by 216 billion hectares of U.S. forest.

Modalities for climate action in agriculture were addressed on 3rd December at the first workshop of the Koronivia Joint Work on Agriculture, a breakthrough initiative of the 2017 UNFCCC climate negotiations.

Read more: *https://scienmag.com/scientists-call-for-eight-steps-to-increase-soil-carbon-for-climate-action-and-food-security/?fbclid=IwAR0N_Pu43B68IeWz0YO2cPQ0oldLBRoi7_7qth0j5fy9CkfRjY769SDahnI*

## Climate change: Can 12 billion tonnes of carbon be sucked from the air?

Is it remotely feasible to remove 12 billion tonnes of carbon dioxide from the air? Every year. For decades to come. That's the challenge posed by the latest conclusions of the UN's climate science panel.

It says that only by pulling this heat-trapping gas out of the atmosphere can we avoid dangerous climate change.

But according to one leading researcher, there's a bit of a hitch: "We haven't a clue how to do it".

Read more: *https://www.bbc.com/news/amp/science-environment-46345280?__twitter_impression=true&fbclid=IwAR1XFhLyG2K6tp5hpUqpCcGQ4ASuEdQKKt8aIRkVUV-KI_vVgtWqm-SQ98CE*

## Climate change is making soils saltier, forcing many farmers to find new livelihoods

Salt is essential for cooking, but too much salt in soil can ruin crops and render fields useless. As sea levels rise, low-lying coastal areas are increasingly being inundated with saltwater, gradually contaminating the soil. These salts can be dissipated by rainfall, but climate change is also increasing the frequency and severity of extreme weather events, including droughts and heat waves. This leads to more intensive use of groundwater for drinking and irrigation, which further depletes the water table and allows even more salt to leach into soil.

Read more: *https://theconversation.com/climate-change-is-making-soils-saltier-forcing-many-farmers-to-find-new-livelihoods-106048*

## In 100 years' time, maybe our food won't be grown in soil

It takes a lot to make a room of soil scientists gasp. Last month, I presented at the National Soils Conference in Canberra, and asked 400 colleagues a simple question: do you think soil will play as significant a role in food production in 100 years as it does today? A sea of hands went up: the consensus was clearly 'yes". I demurred,

saying I'm not so sure. Gasps rippled across the room. Why say that? You're a soil scientist! Are you crazy? A century is a long time. Most of our scientific horizons seem no more than a decade or two away. But how we manage food and our environments need very long-term, inspired thinking. Within my concern about whether the future of food production is on *terra firma*, there is also a hope.
Read more: *https://theconversation.com/in-100-years-time-maybe-our-food-wont-be-grown-in-soil-108049*

## How soil bacteria are primed to consume greenhouse gas

New research has revealed that some soil bacteria are primed ready to consume the potent greenhouse gas nitrous oxide when they experience life without oxygen in the environment.
*https://www.sciencedaily.com/releases/2018/10/181029165528.htm?fbclid=IwAR3Pwh_ZzOsuYcilAwuO5PKmWOYDASsfTL28a35G08P8J-ugnxqisLbb088*

## Solving the sandy soil puzzle

Congolese scientist Lydie-Stella Koutika wins the TWAS-Al-Kharafi Prize for work investigating how to enrich nutrient-poor soil in the face of growing poverty and climate change.
Read more: *https://twas.org/article/solving-sandy-soil-puzzle*

## Can we grow more food on less land? We'll have to, a new study finds

If the world hopes to make meaningful progress on climate change, it won't be enough for cars and factories to get cleaner. Our cows and wheat fields will have to become radically more efficient, too.
Read more: *https://www.nytimes.com/2018/12/05/climate/agriculture-food-global-warming.html?rref=collection%2Ftimestopic%2FAgriculture%20and%20Farming&mc_cid=3129943aa0&mc_eid=5dd98208d4*
[From ASA-CSSA-SSSA Science Policy Report, 12 December 2018]

## Increased soil contamination puts food safety and food security at risk

Urgent action is needed to address soil pollution and contain the multiple threats it poses to global food safety and food security, said FAO today marking World Soil Day. Thousands of chemicals, which are commercially produced on a large scale, plastic and electronic waste, non-treated wastewater can all become a source of soil pollution, paving the way for the pollutants to enter the food chain with serious consequences for the health and wellbeing of people and planet.
Read more: *http://www.fao.org/news/story/en/item/1173588/icode/*
[From ASA-CSSA-SSSA Science Policy Report, 12 December 2018]

## The most neglected threat to public health in China is toxic soil

Soil contamination occurs in most countries with a lot of farmland, heavy industry and mining. In Ukraine, for example, which has all three, about 8% of the land is contaminated. A chemical dump in upstate New York called Love Canal resulted in the poisoning of many residents and the creation of the 'superfund", a federal programme to clean up contaminated soil. But the biggest problems occur in China, the world's largest producer of food and of heavy industrial commodities such as steel and cement.
Read more: *https://www.economist.com/briefing/2017/06/08/the-most-neglected-threat-to-public-health-in-china-is-toxic-soil?fsrc=scn/fb/te/bl/ed/themostneglectedthreattopublichealthinchinaistoxicsoil&fbclid=IwAR21zJXcfrj7BTQ-3XG6v4heZkbAKcrmoZfRGp5Rbjc9pwi3cYanbjZtZA4*

## World Soil Day 2018

Over 300 pins on the World Soil Day interactive map. This year, the campaign called for increased action across sectors and continents to achieve #StopSoilPollution. Along with the official celebrations in Rome, New York, Katowice and Bangkok, the call for action spread from Santiago de Chile to Saint Petersburg with more than 300 breathtaking events in 90 countries. A significant increase in outreach, also thanks to FAO offices and partners worldwide, and a substantial escalation of a pro-bono advertising effect across the world, contributed to the success of the day.
Read more: *http://www.fao.org/world-soil-day/worldwide-events/en/*

## COP24 | Katowice, Poland

Black Soils for Food Security and Climate Change Adaptation and Mitigation (2-14 Dec. 2018). On World Soil Day 2018 during the Conference of the Parties to the United Nations Framework Convention on Climate Change (COP24) a side event on Black soils was organized by FAO/GSP together with the *Ministry of Agriculture and Rural Development of Poland* and the *Institute of Soil Science and Plant Cultivation* (IUNG). It succeeded in raising awareness on the importance of black soils for food security and climate change adaptation and mitigation
Read more: *http://www.fao.org/global-soil-partnership/resources/highlights/detail/en/c/1173759/*

## Latest updates on the International Network of Black Soils

Black soils are the most productive soils, but also the most endangered soil resources of the world and their degradation has a serious impact on global food security, climate change, and biodiversity. In September 2018, 26 countries decided to join efforts against their degradation through the International Network of Black Soil (INBS). The INBS has made great progress since its establishment: starting from its launch in March 2017, the International Symposium on Black Soils that was held in Harbin (China) in Sept. 2018 and the upcoming meeting in Moldova in Oct. 2019.
Read more: *http://www.fao.org/global-soil-partnership/resources/highlights/detail/en/c/1153703/*

## Contribution to the Healthy Soils Facility

The European Commission, the Republic of Germany, the Swiss Confederation, the Russian Federation, The Netherlands and PhosAgro donate financial resources to promote sustainable soil management. During December 2018, resource partners committed to the implementation of the Global Soil Partnership activities through the provision of financial resources. This constitutes the major financial contribution to the GSP activities since the establishment of the Healthy Soils Facility. The supported activities vary from normative work, including the global assessments of soil pollution, soil biodiversity; implementation of the VGSSM; global soil erosion, soil salinity and soil organic carbon sequestration maps and GLOSIS; international networks with a focus on GLOSOLAN; global symposiums on soil erosion and soil biodiversity; the Global Soil Doctor Programme; strengthening of soil laboratories including fertilizer quality sections; soil management for nutrition-sensitive agriculture, and support to Regional Soil Partnerships.
Read more: *http://www.fao.org/global-soil-partnership/resources/highlights/detail/en/c/1173809/*

## Launch of the Centre of Excellence for Soil Research in Asia on WSD18

On WSD18, the Kingdom of Thailand launched the Centre of Excellence for Soil Research in Asia (CESRA), in Nakhton Ratchasima's Pak Chong district, Thailand. In compliance with the implementation plan of the Asian Soil Partnership, CESRA will foster targeted research on regional priorities as well as technical and scientific cooperation between Asia and the rest of the world. CESRA's results will provide guidance for decision-making and the center itself will constitute the hub for capacity development on sustainable soil management in the Asian region.
Read more: *http://www.fao.org/global-soil-partnership/resources/highlights/detail/en/c/1174871/*

## Sub-regional workshop on sustainable land and soil management

13-15 Nov 2018, Tunis, Tunisia. A workshop on the implementation of sustainable soil and land management (SSM/SLM) in the Maghreb region was organized by FAO Tunisia on 13-15 November 2018. The Global Soil Doctors Programme, the Global Soil Laboratory Network (GLOSOLAN), GSP tools for soil organic carbon management, mapping, monitoring and sequestration potential as well as the Global Soil Information System (GLOSIS) and its related National Soil Information Systems were presented. Ultimately, a regional plan of action for promoting the use of these and other tools in the framework of implementing the Voluntary Guidelines for Sustainable Soil Management was developed by participating countries.
Read more: *http://www.fao.org/global-soil-partnership/resources/events/detail/en/c/1170492/*
[All articles above from Global Soil Partnership Newsletter #22, 21 December 2018]

## Microbial aromas might save crops from drought

If you've ever walked in a forest following the first rainfall after a dry spell, you would recall a sweet, fresh and powerfully evocative smell. This earthy-smelling substance is geosmin, a chemical released into the air by soil-dwelling bacteria called actinomycetes. You may also recall the tangy scent of the sea, evoking memories of crashing waves, sandy beaches and the cry of seagulls. This smell is thanks to dimethyl sulfide, a rather stinky sulfurous compound produced by bloom-forming algae.

But microbial scents can also protect plants. Agricultural crops can wither and die under drought conditions. Microbes – thanks to the scents they release – can help plants better tolerate these stressful conditions, an important service in a warming climate. As a microbial ecologist, my work focuses on understanding how microbes and plants work together, and which microbial scents help crops.
Read more: *https://www.bizcommunity.com/Article/1/742/185922.html?fbclid=IwAR39eBSVJOqEP7uPnA8F2zCP4vPs4ZdPHwd_ERrRPKA54LrOG_vT--Af-aA*

## News from the Latin American Soil Science Society: SLCS

***'Thus are the Soils of my Nation' at the XXII Latin-American Congress of Soil Sciences (XXII CLACS)***

'Thus are Soils of my Nation' – an educational project of the Latin-American Soil Science Society and the Latin-American network for soil science teaching & learning – in the framework of the FAO Global Soil Partnership and the International Decade of Soils, would like to invite children and teachers, the global soil community and the general public to participate in our VII Latin-American Symposium of Educative innovations on Teaching and Learning Soil Sciences, to be held on October 9th at the 'Radisson Montevideo Victoria Plaza Hotel' in Montevideo, Uruguay.
Read more: *http://slcs.org.mx/index.php/es/calendario/55-vii-simposio-de-innovaciones-educativas-en-la-ensenanza-de-la-ciencia-del-suelo* and *http://slcs.org.mx/images/CONVOCATORIA_2019.pdf*

***'Thus are the Soils of my Nation' at the XLVI Mexican Congress of Soil Sciences***

'Thus are Soils of my Nation' – an educational project of the Latin-American Soil Science Society and the Latin-American network for soil science teaching & learning – in the framework of the FAO Global Soil Partnership and the International Decade of Soils, would like to invite children and teachers, the global soil community and the general public to participate in our XIV Mexican Symposium of Educative innovations on Teaching and Learning Soil Sciences, to be held on October 29th at 'Pedro de Alba Auditorium' of the National and Autonomous University of Aguascalientes, Mexico.
Read more: *http://slcs.org.mx/index.php/es/calendario/66-xiv-simposio-de-innovaciones-educativas-en-la-ensenanza-de-la-ciencia-del-suelo* and *http://slcs.org.mx/images/CONVOCATORIA_INNOVACIONES_EDUCATIVAS_2019.pdf*

## Crops leave large amounts of soil nitrogen

Nitrogen cycling and distribution in soils are of great economic importance because each hectare of crops needs hundreds of kilograms of nitrogen to grow. Environmentally, nitrogen lost from soils can degrade water quality. Cash crops cease taking up nitrogen a month or more before harvest maturity, and residual nitrogen (as nitrate) commonly leaches downward >1 m between fall and spring in the humid mid-Atlantic region. Few studies have investigated residual soil nitrogen deeper than 30 cm, so we don't know how much nitrogen remains, and at what soil depth. In a paper recently published in Agricultural & Environmental Letters, researchers found that a significant amount of nitrogen remained in the 0-210 cm profile following summer crops, over half of which is likely to be out of reach to next year's summer crop.
Read more: *https://dl.sciencesocieties.org/content/Crops-Leave-Large-Amounts-of-Soil-Nitrogen*
[From: ASA-CSSA-SSSA Science Policy Report, 20 February 2019]

## Macropore flow in frozen soils

Snowmelt is the major source of freshwater in many cold regions. The ground is usually frozen when snowmelt begins, and consequently, the permeability of frozen ground has a significant influence on a watershed's response to snowmelt. In a paper recently published in Vadose Zone Journal, researchers review the hydrologic importance of preferential flow in frozen soils during snowmelt infiltration. They emphasize that frozen ground is not impermeable, but rather that networks of unsaturated macropores (fractures, plant root holes, and animal burrows) can allow water to preferentially 'short circuit' the frost zone during snowmelt, reducing runoff and enhancing soil drainage and groundwater recharge.
Read more: *https://dl.sciencesocieties.org/content/Macropore-Flow-in-Frozen-Soils*
[From: ASA-CSSA-SSSA Science Policy Report, 6 February 2019]

## Comparison between geostatistical and machine learning models as predictors of topsoil organic carbon with a focus on local uncertainty estimation

The main objective of this work is to compare geostatistical techniques, ML methods and hybrid methods, e.g., regression kriging, in terms of not only their overall accuracy but also their precision in providing useful confidence intervals at unsampled locations. We aim to provide clear application guidelines for future mapping exercises.
For this experiment, we used a legacy soil dataset (n = 414) of topsoil observations from the semi-arid Mediterranean region of Sicily.
Read more: *https://www.sciencedirect.com/science/article/pii/S1470160X19301359?dgcid=author*

## CRC Press welcomes book ideas

CRC Press welcomes new book ideas and hearing from individuals who want to edit or write a book. If you are interested please contact Ms. Randy Brehm, Senior Editor for Agriculture and Nutrition at CRC Press/Taylor and Francis Group at *Randy.Brehm@taylorandfrancis.com*.

## Healing Power of Clay? Not as Off-the-Wall as You Might Think

An ancient folk remedy, blue-green iron-rich clay, kills antibiotic-resistant bacteria using a one-two punch, a new study shows. People have studied how clay heals wounds for a long time, "but they don't understand why" clay is antibacterial.
Read more: *https://eos.org/articles/healing-power-of-clay-not-as-off-the-wall-as-you-might-think?fbclid=IwAR3uUp3WAev95P7140r9hcdXJvlTWQYk9UXQenFy8CoqoEhSUfmH-zII6Z8Q#.XBzR1MIwAZQ.twitter*

## 'We're black sheep': the people who are fascinated by soil in cities

A recent gathering of scientists on the upper west side of Manhattan enthused about a crucial element in the formation of the surrounding city. The substance talked about in revered tones? Soil.

In a fairer world, soil would be receiving reverence from people well beyond the fourth annual NYC Urban Soils Symposium, given that the slender outer layer of the planet supports the life that treads, grows and flies above it. As it is, though, it is up to soil aficionados to extol the urban importance of this crumbly manna.
*https://www.theguardian.com/cities/2019/jan/16/dirty-secret-can-urban-soil-help-solve-our-environmental-problems?CMP=Share_iOSApp_Other&fbclid=IwAR3O-8sNjxfBPuajTPc79WtFPCpcVrxQC6Pw-Pt939Q-VaO7f9feNSO9rKfU*

## EJSS Pedometrics 2017 special issue

Pedometrics 2017 special issue published in EJSS: Volume 70, Issue 1, Special Issue: Including Landmark Papers No. 8. Pedometrics Special Issue. Pages: i-iv, 1-213, January 2019. It will be open access for the entire year.
Read more: *https://onlinelibrary.wiley.com/toc/13652389/2019/70/1*

## Video contest on soil erosion: Share your story and win

GSP is calling for your contribution to the video contest on soil erosion. This contest is addressed to anyone who has witnessed the damaging consequences of soil erosion – farmers, extension agents, students, researchers, policy makers, businesses and NGOs! Submit your video & the registration form by 31 March 2019.
Read more: *http://www.fao.org/about/meetings/soil-erosion-symposium/video-contest/en/*

## Global Soil Erosion dataset

This Global Soil Erosion map 2012 (GeoTIFF format) at 25 km resolution (re-sampled) is available for free download. It is based on the Version 1.1 of the JRC/University of Basel 'RUSLE-based Global Soil Erosion Modelling platform (GloSEM)". The original resolution is approx. 250 m and an example for those data (location: Amazon rainforest) is provided. The data package includes also the soil erosion estimate in 2001, the input factors (K, LS, C, R) and ArcMap project files.
Read more: *https://esdac.jrc.ec.europa.eu/content/global-soil-erosion*

## Plastic, plastic everywhere: Microplastics in the food system

Plastics are part of our everyday lives and have been for decades. Lack of recycling has led to 'microplastics' – tiny particles of plastic – permeating our environment. Marine life has been heavily impacted, but there is reason to believe that microplastics are in our soil as well. What is certain is that humans are consuming microplastics in their food. The impact this will have on human health is unknown.
Read more: *https://foodtank.com/news/2019/02/plastic-plastic-everywhere-microplastics-in-the-food-system/*
[From: ASA-CSSA-SSSA Science Policy Report, 6 March 2019]

## Soil health, human health research priorities identified

The Soil Health Institute (SHI) released the Conference on Connections Between Soil Health and Human Health report, which includes recommendations for better understanding soil health - human health relationships. The conference was designed to bring the soil health and human health communities together, establish the current state of collective knowledge, identify gaps and associated priorities, and scope a collaborative path forward.

Read more: *https://www.prnewswire.com/news-releases/soil-health-human-health-research-priorities-identified-300812481.html?tc=eml_cleartime*

[From: ASA-CSSA-SSSA Science Policy Report, 20 March 2019]

## Soil loss due to crop harvesting in the European Union: A first estimation of an underrated geomorphic process

Over the last two decades or so, there has been a lot of research carried out to understand the mechanics and spatial distribution of soil loss by water erosion and to a lesser extent of wind, piping and tillage erosion. The acquired knowledge helped the development of prediction tools useful to support decision-makers in both ex-ante and ex-post policy evaluation. In Europe, recent studies have modelled water, wind and tillage erosion at continental scale and shed new light on their geography. However, to acquire a comprehensive picture of soil erosion threats more processes need to be addressed and made visible to decision-makers. Since 1986, a small number of studies have pointed to an additional significant soil degradation process occurring when harvesting root and tuber crops. Field observations and measurements have shown that considerable amounts of soil can be removed from the field due to soil sticking to the harvested roots and the export of soil clods during the crop harvest. This study aims to scale up the findings of past studies, carried out at plot, regional, and national level, in order to obtain some preliminary insights into the magnitude of soil loss from cropland due to sugar beets and potatoes harvesting in Europe. We address this issue at European Union (EU) scale taking into account long-term (1975–2016) crop statistics of sugar beet and potato aggregated at regional and country levels.

Read more: *https://www.sciencedirect.com/science/article/pii/S0048969719304887?fbclid=IwAR1HOSUSUzrdQMzvnPzVdbTLfZ4fWhVw49o2dMDuenif3cH9U4mie6jyyJo*

## Continuing drought will further burden the already depleting groundwater resources of the country, according to associate professor Vimal Mishra

Nearly 50% of the country is currently facing drought with at least 16% falling in the 'exceptional' or 'extreme' category, according to IIT Gandhinagar scientists managing India's real time drought prediction system. This ongoing drought will pose a lot of challenges in water availability this summer, Vimal Mishra, associate professor at the Indian Institute of Technology (IIT) in Gandhinagar, told PTI.

Read more: *https://www.thehindu.com/sci-tech/energy-and-environment/nearly-50-per-cent-of-india-currently-facing-drought-say-iit-gandhinagar-scientists/article26396033.ece?fbclid=IwAR1KEWt6UNWxfY6KYdvQBWezYe2m0-TmJEGK5sUxdbKH_LCULhKoQ7ozLq0*

## We should discuss soil as much as we talk about coal

Most discussions about fighting climate change focus on electricity and the need for renewable energy. Decarbonizing the way we generate electricity would be a huge step, but it won't be enough if we don't reach zero net emissions from every sector of the economy within 50 years (and make a serious dent in the next ten). That includes the agriculture, forestry, and land use sector, which is responsible for 24 percent of all greenhouse gas emissions – just one percentage point less than electricity. I wish agricultural innovation got as much attention as the impact on climate change from electricity, because its success is just as critical to stopping climate change. Future changes in income and population may come close to doubling the current environmental impacts of the food system. I believe creative, scalable solutions to this challenge are out there, and now is the time to invest in their R&D.

Read more: *https://www.gatesnotes.com/Energy/We-should-discuss-soil-as-much-as-coal*

[From: ASA-CSSA-SSSA Science Policy Report, 2 April 2019]

## Dung beetles and soil bacteria reduce risk of human pathogens

Food safety regulations increasingly pressure growers to remove hedgerows, ponds, and other natural habitats from farms to keep out pathogen-carrying wildlife and livestock. Yet, this could come at the cost of biodiversity, making the farmland less hospitable to pollinators and other beneficial insects or birds. New research published in the Journal of Applied Ecology encourages the presence of dung beetles and soil bacteria at farms as they naturally suppress E. coli and other harmful pathogens before spreading to humans.

Read more: *https://www.sciencedaily.com/releases/2019/03/190319083915.htm*

[From: ASA-CSSA-SSSA Science Policy Report, 2 April 2019]

## The multi-faced role of soil in the Near East and North Africa – New policy brief out now!

The policy brief, launched on 31 March 2019 at the Near East and North Africa Land and Water Days, aims to raise awareness and trigger policy action on the added value of soil resources in the Near East and North Africa (NENA) region.

Read more: *http://www.fao.org/global-soil-partnership/resources/highlights/detail/en/c/1187691/?fbclid=IwAR0Udo860xzVlYriOwqY6Gb9Op-5qfsBOp-W9YNvAhD31X54MOMjdBLOaKiY*

## Soil suitability for ground penetrating radar

This map shows the suitability of soils to be imaged using ground penetrating radar. The map was made by evaluating properties derived from soil mapping by the National Cooperative Soil Survey. This suitability rating is a 'soil survey interpretation.' Interpretations predict soil behavior for specified soil uses and under specified soil management practices.

Read more: *https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcseprd1451423.pdf?fbclid=IwAR0UfaPKArlLn4zoPqdGtURxM5yOdKtOH66HbIlWUrMDokSlzlmAsQstNqw*

## Assessment of the global status and regional trends of soil pollution

Do you have info about #*soilpollution* in your country or region?

Participate in the Global Soil Partnership questionnaire on the global status & regional trends of soil pollution *http://bit.ly/2VWtlN3*

## Apply to receive the 2019 IPBES Global Assessment of Biodiversity and Ecosystem Services

Accreditation is available to attend IPBES 7 (Paris, 29 April - 4 May) and / or to receive advance online access to the 2019 IPBES Global Assessment of Biodiversity and Ecosystem Services, launching Monday May 6.

The report from the Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES.net) has been prepared over three years by 150 leading experts from 50 countries.

To apply for online or site accreditation go to: *http://bit.ly/IPBES7Media*

Read more: *https://www.ipbes.net/*

## Soil loss due to crop harvesting (SLCH) in the European Union

This study aims to scale up the findings of past studies, carried out at regional and national level, to obtain preliminary insights into the magnitude of soil loss from cropland due to sugar beets and potatoes harvesting in EU. The 4.2 million ha of root crops in the EU contribute to 14.7 million tons of SLCH. Sugar beet cultivation has decreased significantly during the last 16 years resulting in a SLCH decline of 37% compared to the period 1987-99. According to this *article*, the SLCH is less intense compared to the water, wind, tillage and gully erosion. Data are available in ESDAC.

Read more: *https://esdac.jrc.ec.europa.eu/content/soil-loss-due-crop-harvesting-european-union*

[From: European Soil Data Centre Newsletter No.117 (Apr- May 2019)]

## Rainfall Erosivity Database at European Scale (REDES)

The Rainfall Erosivity Database on the European Scale (REDES) includes Annual R-factor values for 1,675 precipitation stations within the European Union (EU) and Switzerland. The R-factor in REDES has been calculated using high temporal resolution (5-min, 15-min, 30-min, hourly) rainfall data. REDES has been used to develop the European R-factor map, monthly R-factor assessments and projections of future erosivity. The R-factor raw data per station are made available in ESDAC (monthly or individual storm events can be distributed upon request).

Read more: *https://esdac.jrc.ec.europa.eu/content/rainfall-erosivity-european-union-and-switzerland*

[From: European Soil Data Centre Newsletter No.117 (Apr- May 2019)]

## Join the very first MOOC on Tropical Soil Science

Soils are the foundation of sustainable developments and access to soil knowledge is more important than ever before. Therefore, a global community of partners

designed the very first Massive Online Open Course on tropical soils and how they affect the world above ground. Enrollment is now open on the EdX platform and FREE for this run. MOOC starts on May 13, 2019. Watch the trailer and subscribe here: *https://www.edx.org/course/as-above-so-below-soils-ecosystems-and-livelihoods-in-the-tropics"*

## Call for manuscripts

'Safe Use of Composts in Urban Gardening' Special Issue in the International Journal of Environmental Research and Public Health *https://www.mdpi.com/journal/ijerph*
We aim at producing a special issue on the various environmental aspects of the use of compost in the urban environment. Papers dealing with the presence and behavior of contaminants in urban soils amended with compost or in green roofs constructed with compost, as well as studies on the transference of different pollutants to waters, plants and the food chain are welcome. We also encourage the submission of reports of practical experiences on the integration of organic waste management strategies into urban agriculture systems and urban soil protection schemes. Papers reporting results from different countries are particularly welcome, in order to obtain a worldwide perspective of this subject.
Manuscript submission until October 31st, 2019
Read more: *https://www.mdpi.com/journal/ijerph/special_issues/Composts_Gardening*

### Call for Papers for the Virtual Special Issue 'New Research on Soil Degradation and Restoration"

Soil degradation is a main issue all over the world. Physical, chemical and biological degradation of soil environments need detailed research, also going deeper in some new aspects poorly covered up to now. Similarly, new quality research on restoration of degraded soils, dumping sites, different areas affected by mining activities, and so on, would be clearly useful in order to prevent and/or solve critical environmental hazards.
In view of that, the editors of this Special Issue encourage authors to submit new quality manuscripts on the matter, focusing on soil degradation, soil restoration, and/or on soil degradation + restoration simultaneously.
Read more: *https://www.journals.elsevier.com/journal-of-environmental-management/call-for-papers/call-for-papers-for-the-virtual-special-issue-new-research*

### Soil Health Mission Board

The European Commission has identified five main missions that will serve as the main pillars of Horizon Europe, one of which targets Soil Health and Food. The missions are designed to make a real difference in the lives of citizens and society as a whole by boosting the impact of EU-funded research and innovation.
The Commission has just launched a call for experts to join 'Mission Boards', which will advise the Commission for the identification and implementation of each mission. Members of the 'Mission Boards' will be high-level independent experts, who will help shape their respective objectives, indicators and timelines.
Further information on Missions can be found here: *https://ec.europa.eu/info/news/commission-invites-top-experts-shape-new-research-and-innovation-missions-2019-may-13_en*
Application forms for Mission Boards: *http://ec.europa.eu/transparency/regexpert/index.cfm?do=calls.calls_for_app*

### 1 million species face extinction – soil could be a solution

An intergovernmental science-policy group of the United Nations found – and the United States agreed – that 1 million species are threatened with extinction, and that one factor in that decline was the decline of carbon in soil. Specifically, 5.6 gigatons of annual $CO_2$ emissions are sequestered in marine and terrestrial ecosystems. That's equivalent to 60 percent of global fossil fuel emission. The finding released in a report May 6 also found that it is not too late to stop this decline, but action is needed immediately at the local, country, and global level.
Read more: *https://thehill.com/policy/energy-environment/442239-un-1-million-species-threatened-with-extinction-by-humans*
[From: ASA-CSSA-SSSA Science Policy Report, 15 May 2019]

### This global map of manure could help save farming as we know it

To grow the world's wheat, corn, and beans, farmers need phosphorus – an essential nutrient that comes from bird and bat droppings and rock deposits. But the global supply of easily mineable phosphorus is dwindling; to stave off the coming drought, scientists are exploring an alternative: recycling animal manure for its phosphorus content. Now, they've come up with the world's first map of this underappreciated resource, which shows that most manure is exactly where farmers need it – in their own backyards.
Read more: *https://www.sciencemag.org/news/2019/05/global-map-manure-could-help-save-agriculture-we-know-it?utm_campaign=news_daily_2019-05-07&et_rid=49165632&et_cid=2804893*
[From: ASA-CSSA-SSSA Science Policy Report, 15 May 2019]

### 7th GSP Plenary Assembly

The *7th GSP Plenary Assembly* was held at FAO headquarters from 5-7 June 2019. The Plenary is the main decision body of the GSP. Representatives from FAO member countries and GSP partners will review the progress made and discuss the work plan for the next year.
Read more: *http://www.fao.org/global-soil-partnership/about/plenary-assembly/en/*

### Global assessment: SOC Sequestration Potential Map

Carbon sequestration is a growing topic that addresses one important aspect of an overall strategy for carbon management to help mitigate the increasing emissions of $CO_2$. Soil is recognized as an important component of the carbon cycle due to its great potential to sequester carbon. The GSP is currently finalizing the technical aspects for the Global Soil Organic Carbon Sequestration potential map (GSOCseq map) together with its technical networks and world-renowned SOC experts. A coordinated and country-driven approach will ensure tangible results and impact at a national and global scale.
Read more: *http://www.fao.org/global-soil-partnership/intergovernmental-technical-panel-soils/gsoc17-implementation/en/*

### The multi-faced role of soil in the Near East and North Africa

The policy brief, launched on 31 March 2019 at the Near East and North Africa Land and Water Days, aims to raise awareness and trigger policy action on the added value of soil resources in the Near East and North Africa (NENA) region. English | French | Arabic
*http://www.fao.org/global-soil-partnership/resources/highlights/detail/en/c/1187691/*
English: *http://www.fao.org/documents/card/en/c/CA3803EN*
[The four items above are from the Global Soil Partnership #23 – Newsletter, 3 May 2019]

### Baboons' gut makeup is determined mostly by soil, not genetics

You are what you eat. And when you eat a lot of dirt, the makeup of your gut will change – at least, if you're a baboon. A new study shows local soils, not genetics, may be the primary determinant of baboons' gut microbiota, the vast ecosystem of microorganisms that live in the gut, digesting food, fighting infections, and breaking down toxins.
Read more: *https://www.sciencemag.org/news/2019/04/baboons-gut-makeup-determined-mostly-soil-not-genetics*
[From: ASA-CSSA-SSSA Science Policy Report, 1 May 2019]

### Laser diffraction evaluation for soil particle size determination

Soil particle size distribution is a fundamental soil characteristic that highly affects soil water retention, soil fertility and microbial activity, and requires accurate determination. The laser diffraction method is increasingly being applied to measure soil particle size owing to its merits of rapid processing, high reproducibility and detailed analysis for a wide range of size fractions; yet some ambiguities exist regarding the comparability of its results with those obtained by other classical methods.
Read more: *https://dl.sciencesocieties.org/content/Laser-Diffraction-Evaluation-for-Soil-Particle-Size-Determination*
[From: ASA-CSSA-SSSA Science Policy Report, 1 May 2019]

### A Cascade Extraction Method for risking phosphorus leaching

Soil phosphorus leaching has aroused a wide concern in recent years. There is much information about the evaluation of P leaching in topsoil. However, little information is available on the evaluation of P leaching from soil profiles in agroforestry areas. In an article recently published in the Journal of Environmental Quality, researchers proposed a cascade extraction method to determine the leachable P in the underlying soil extracted using extraction solution of the adjacent upper layer of soil (ESAUS), and in the topsoil, it was still extracted by 0.01M CaCl2. This method was defined as the Cascade Extraction Method. Then the change-point can be estimated according to a split-line model between soil leachable extracted by ESAUS and soil Olsen-P.
Read more: *https://dl.sciencesocieties.org/content/Cascade-Extraction-Method-for-Risking-Phosphorus-Leaching*
[From: ASA-CSSA-SSSA Science Policy Report, 1 May 2019]

### Mud and guts: Europe's forgotten environmental crisis

The dirt scientists know their work isn't glamorous. But alarmed soil experts at the Netherlands Institute of Ecology, where scientists conduct crop studies lasting decades, say human activity above ground has wreaked havoc below. Chemical spills, industrialized farming, urban sprawl and erosion are gnawing away on one of the world's most relied-upon natural resources. It's a problem that some soil scientists liken to climate change: glacial, inexorable, potentially disastrous if it's left unaddressed. The European Commission estimates Europe loses 9 million metric tons of soil annually – equivalent to 275 soccer pitches each day. Regaining just one cubic centimeter of topsoil can take centuries

Read more: *https://www.politico.eu/article/europe-forgotten-environmental-crisis-soil/*

[From: ASA-CSSA-SSSA Science Policy Report, 1 May 2019]

### Concerns over glyphosate pass from human health to the soil

When François Peaucellier talks about soil, he sounds like a sommelier. Peaucellier, who grows cereals and vegetables on a 200-hectare farm in the Hauts-de-France region north of Paris, is part of small but growing movement of farmers who are cutting back on pesticides not so much out of concerns for human health – but because they worry about what it does to the soil. Public attention on the risk of pesticides has focused on what chemicals like glyphosate do to human health. A U.S. federal jury last week ordered Germany's Bayer to pay more than $80 million to a man who claimed his cancer was caused by exposure to the weedkiller. But farmers like Peaucellier say the weedkiller's impact on soil health has been overlooked, and represents a serious threat to Europe's long-term food security.

Read more: *https://www.politico.eu/article/glyphosate-concerns-pass-from-human-health-to-soil/*

[From: ASA-CSSA-SSSA Science Policy Report, 1 May 2019]

### When losing your soil means losing your livelihood (commentary)

In Niger, where agriculture is the main source of income, the message is simple: Losing your soil means losing your livelihood. The ability to grow food is inextricably linked to the productive capacity of the soil. In the case of Niger's soil, the picture is bleak: The soils hold poor structural stability, low nutrient holding capacity, low water retention capacity… the list goes on.

Read more: *https://news.mongabay.com/2019/05/when-losing-your-soil-means-losing-your-livelihood-commentary/?fbclid=IwAR1VLYXrkZzK5ZUECXIqt8FahVGXduRL1v95NjH_LjAznYcjXmdTU1hvLDg*

### Soil Biodiversity Observation Network Established

The Group on Earth Observations Biodiversity Observation Network (GEO BON) and the Global Soil Biodiversity Initiative, together with the German Center for Integrative Biodiversity Research (iDiv), have established the global Soil Biodiversity Observation Network (Soil BON). This operational network will be specified and deployed in the near future with other partners

Read *https://geobon.org/bons/thematic-bon/soil-bon/*

[From: GSBI Newsletter – May 2019]

### #WorldWormWeek

The basics of a good farmland earthworm population includes two key parameters – spatial abundance (widespread earthworm activity over the field) and earthworm diversity (all three ecological types of earthworms) – with surface-dwelling earthworms supporting efficient crop residue breakdown facilitating crop seedling emergence, topsoil earthworms mixing and mobilising nutrients for plant uptake, and deep burrowing 'drainage' worms forming permanent vertical burrows helping to reduce waterlogging of crop roots. This framework was the basis of developing an earthworm survey method that would be useful and used by farmers.

Read more: *https://www.globalsoilbiodiversity.org/blog-beneath-our-feet/2019/3/22/4ewwexsdm77v9qxyrp1hswhzvg605h*

[From: GSBI Newsletter – May 2019]

### New insights in belowground drivers of plant performance

Plants interact with a myriad of soil organisms ranging from microscopic bacteria, protists and fungi to animals such as nematodes, micro-arthropods and earthworms. When it comes to plant performance, these soil communities contain both many good and many bad guys. Plants affect the composition of this belowground biodiversity, and in turn soil organisms affect plant performance. This multi-directional process is called 'plant-soil feedback', and acts on a plant species-specific level.

Read more: *https://www.globalsoilbiodiversity.org/blog-beneath-our-feet/2019/4/4/new-insights-in-belowground-drivers-of-plant-performance*

[From: GSBI Newsletter – May 2019]

### Contribute to the Special Issue on 'Elucidating the Role of Soil Arthropods in Soil Health'

The Journal of Insects is requesting submissions to a special issue about the soil arthropods impacts on soil health. The deadline for manuscript submission is 31 August 2019

Read more: *https://www.mdpi.com/journal/insects/special_issues/soil_arthropods*

[From: GSBI Newsletter – May 2019]

## Upcoming Conferences and Meetings

## 2019

### World Soils 2019 user consultation meeting

2-3 July 2019, ESA ESRIN, Frascati, Italy. Space-based EO systems provide a means to support the monitoring of some soil chemical and physical properties, directly or indirectly, through the interaction of radiance fields with the (mainly upper) soil layer as shown by many research projects. With the advent of operational EO systems such as the European Union Copernicus Program (including the high priority Copernicus expansion missions), the free and open EO data policies as well as cloud-based access and processing capabilities (e.g. DIAS) an EO based Soil Monitoring System appears feasible today. Therefore, a user consultation workshop on space-based EO tools for mapping and monitoring soils will take place at ESA ESRIN with the aim to bring together stakeholders from the policy and user domain with remote sensing experts to discuss the necessary steps to develop such a system.

Deadline for abstract submission: May 31, 2019

Read more: *http://worldsoils2019.esa.int/index.php*

### 43rd Annual Conference of the Soil Science Society of Nigeria 'Food Basket 2019"

Understanding Nigerian Soils: A Panacea for Sustainable Food and Nutrition Security, Preservation of Safe and Healthy Environment and Mitigation of Land Crisis

14-18 July 2019, Makurdi, Nigeria. On behalf of the organizing committee, it is our great pleasure to invite you to the 43rd Annual Conference of the Soil Science Society of Nigeria in conjunction with LOC Makurdi.

The theme of the conference is 'Understanding Nigerian Soils: A Panacea for Sustainable Food and Nutrition Security, Preservation of Safe and Healthy Environment and Mitigation of Land Crisis", with a number of sub-themes including Soil Vegetation/Climate Relationships, Soil Survey and Land Use Planning as a Tool for Mitigating the Land Use Crisis, Soil Fertility, Plant Nutrition and use Planning Agrochemicals for Sustainable Agricultural Productivity in Safe and Healthy Environment, Soil and Water Management for Sustainable Agricultural Productivity, Managing Land and Environmental Degradation for Sustainable Food and Nutrition Security and Management of Soil Organisms and Indiscriminate Agrochemical Use for Sustainable Food and Nutrition Security; understanding the properties, functioning, impacts and long-term evolution of Nigerian soils in order to achieve food security.

Abstract submission deadline extended to April 15, 2019

Read more: *https://iuss.boku.ac.at/files/photo-2018-11-01-22-15-35.jpg*

### 3rd International summer school 'Monitoring, modeling and management of urban green infrastructure and soils"

Topic: Anthropogenic landscapes and soils of European Russia: from Sea to Sea

July 21 - August 11, 2019, Russia. The 3MUGIS summer school is an annual event, which addresses relevant contemporary environmental consequences and opportunities of urbanization with special emphasis on soil functions. The summer school aims to provide a solid background practical skills training in addressing impacts of urbanization through the monitoring and assessment of urban soils, design and maintenance of urban green infrastructure, and projects of sustainable urban development.

More information: *https://iuss.boku.ac.at/files/3mugis-2019.pdf*

Invitation letter: *https://iuss.boku.ac.at/files/3mugis-2019_invitation_letter.doc*

Read more: *http://3mugis.org/*

## International Soil Conference of Indonesian Soil Science Society (ISCO-ISS)

August 5-7, 2019, Trans Luxury Hotel Bandung, West Java, Indonesia. The following topics will be covered: Soil Health and Fertility, Biodiversity and Bioresources; Soil Physics, Water Conservation and Agroforestry; Land Use Planning and Policy, Socio-cultural and Economical Aspect of Land Management; Soil Mineralogy, Genesis and Classification; Mining Reclamation and Environment Disaster Management; GIS And Remote Sensing on Agriculture, Integrated Farming System, Precision Agriculture and Green Technology.
Abstract submission deadline: May 15, 2019
Read more: *http://isco-iss.faperta.unpad.ac.id/index.php/isco/2019*

## Summerschool 'Certificate in Archaeological Soil Micromorphology and Phytolith Analysis"

5-10 August 2019, Université Libre de Bruxelles, Belgium. This summer, the Université Libre de Bruxelles organises for the first time a Summerschool 'Certificate in Archaeological Soil Micromorphology and Phytolith Analysis". It is a one-week training programme in English focusing on the basics of archaeological soil micro morphology and phytolith analysis, including intensive microscopy sessions and an on-site visit in the Brussels area.
Application: *https://bit.ly/2UU4YPx*
More information: *summerschool@ulb.ac.be*

## Wageningen Soil Conference 2019 (WSC2019)

August 27-30th, 2019, Wageningen, The Netherlands. Wageningen University & Research is delighted to invite you to join us at the 4th edition of the Wageningen Soil Conference. As in previous editions, the aim is to discuss the importance of soils. In the 2019 edition, the focus will be on 'Understanding soil functions: from ped to planet". To do this we will adopt a new style of conference, with traditional conference talks in the mornings, followed by a range of scientific and interactive topic masterclasses in the afternoons. Masterclasses will include a range of topics linking to four themes: 1) Soil functions for society; 2) Innovative methods for measuring soil functions; 3) Modelling & mapping of soil functions across scales; 4) Can we understand synergies and trade-offs between soil functions. We also invite you to offer to lead a course as part of this week. Finally, if you would like to plan a side event or meeting in the afternoon, we can provide you with the venue. Get together with colleagues and discuss future project proposal ideas or have a project meeting, as part of the conference.
First Circular and more info are available at *www.wur.eu/wageningensoilconference2019*.
Abstract submission deadline: April 15, 2019
Download 2nd Circular: *https://iuss.boku.ac.at/files/wsc2019_second_circular.pdf*
Read more: *https://www.iuss.org/index.php?article_id=21*

## International Workshop on Archaeological Soil Micromorphology

2-4 September 2019, Basel, Switzerland. Due to the restricted number of microscopes during this Workshop of the Working Group on Archaeological Soil Micromorphology (WASM), we have to limit the number of participants to 35. The rules are simple: first come, first served.
2nd circular: *https://iuss.boku.ac.at/files/wasm_basel_2019_2nd-circular.pdf*
Registration until May 31, 2019: *https://iuss.boku.ac.at/files/registration_form_wasm_2019_basel.pdf*
In case of questions, please contact: *geoarchaeology@unibas.ch*

## TERRAenVISION 2019

3-7 September 2019, University of Barcelona. Join the second edition of the TERRAenVISION conference. This year the conference will be on working towards the Sustainable Development Goals (SDGs). TERRAenVISION proposes more than 20 sessions in which different aspects of Science for Society will be addressed. Among them, Land degradation and Restoration, Environmental & anthropogenic drivers for soil pollution, Ecosystem services, Fire in Earth system, Nature-based solutions, Science policy interface.
Read more: *https://terraenvision.eu/*

## Saline Futures Conference

Addressing Climate Change and Food Security. Building a community of science and practice on saline agriculture.
September 10-13, 2019, Leeuwarden, the Netherlands. The aim of this conference is to showcase the global potential of saline agriculture. All stakeholders are invited, including political decision-makers, business operators, land managers, civic society, researchers and research planners. With your participation, we aim to create a platform for researchers and research-users to enhance food production on saline lands.
Research underway in the North Sea countries and elsewhere in the world illustrates the vast and as yet underrated potential of growing food on soils generally qualified as saline.
Deadline for abstracts and sessions: March 1, 2019
Read more: *https://www.waddenacademie.nl/nl/salinefutures/*

## BSSS 2019 Annual Conference 'Managing Soil Resources to Secure Our Future"

September 4- 5, 2019, Sheffield, United Kingdom. The multi-functionality of soils puts ever greater pressure on how and what expert advice is provided to manage our soils and the time that remains until we have to reduce Greenhouse gas emission gets ever shorter. Innovative research and research applications from all areas in soil science will be required to tackle these challenges. We invite you to present your latest research at this meeting and contribute to having soil science make a difference.
Abstract submission deadline: July 4, 2019
Read more: *https://www.soils.org.uk/event/1674*

## CODATA 2019 – Towards next-generation data-driven science: policies, practices and platforms

19-20 September 2019, Beijing, China. Science globally is being transformed by new digital technologies. At the same time, addressing the major global challenges of the age requires the analysis of vast quantities of heterogeneous data from multiple sources. In response, many countries, regions and scientific domains have developed Research Infrastructures to assist with the management, stewardship and analysis. These developments have been stimulated by Open Science policies and practices, both those developed by funders and those that have emerged from communities. The FAIR principles and supporting practices seek to accelerate this process and unlock the potential of analysis at scale with machines.
This conference provides a significant opportunity to survey and examine these developments from a global perspective. The convening organizations are now inviting session proposals by 15 April 2019: all proposals related to open science and open data, FAIR data, research data management and stewardship, research infrastructures and platforms are welcome.
Deadline for session proposals: April 15, 2019
Read more: *http://worldsoils2019.esa.int/index.php*

## 9th ESSC International Congress

September 26-28, 2019, Tirana, Albania. The European Society for Soil Conservation & the Agricultural University of Tirana are delighted to invite you to the 9th ESSC International Congress.
In this 9th edition of the congress, the focus will be on 'Soil's Contribution to People: from Food to Life Supporting Services".
Deadline of abstract submission: May 31, 2019
3rd Circular available at *http://9essc.ubt.edu.al/wp-content/uploads/2019/05/3rd-circular-ESSC-2019-Int.-Congress13_05_2019-1.pdf*
Read more: *www.9ESSC.UBT.EDU.AL*

## 25th World Congress of the IUFRO (International Union of Forest Research Organizations)

September 29 to October 5, 2019; Curitiba, Paraná, Brazil. The Congress will be a great opportunity to exchange experiences and knowledge on technological innovations, as well as to stay up to date on the latest research findings and trends for the future of forestry and forest research in all areas of the world.
Deadline for Abstracts: 10 January, 2019
Read more: *http://iufro2019.com/*

## 3rd Intensive Training Course on Soil Micromorphology

30 September - 11 October 2019, Tremp (Lleida), Spain. This course will comprise lectures, exercises with thin sections provided by the lecturers and also with material brought by the participants and visits to a thin section lab. Both analogic and digital polarising microscopes will be available, with a maximum of 2 participants per microscope, as well as facilities to work with them during extra time and to discuss the participants own thin sections with lecturers and colleagues. A certificate issued by the University of Lleida, under the auspices of the International Soil Science Society and the Institut Cartogràfic i Geològic de Catalunya will be handled to the participants who attend a minimum hours of lectures.
Read more: *http://www.cfc.udl.cat/fc/curso/2322*
Contact: *rosa.poch@macs.udl.cat*

## XII Latinoamerican Soil Science Congress 'Diversidad Productiva: pilar del manejo sostenible de los suelos'

October 7 to 11, 2019, Montevideo, Uruguay. The Uruguayan Soil Science Society (SUCS, *www.sucs.org.uy*) is

a IUSS member. SUCS, the Latinoamerican Soil Science Society and other Institutions are organizers of the XII Latinoamerican Soil Science Congress.
Abstract submission until February 28, 2019
Website: *www.clacs.org*

### 14th International Conference of the East and Southeast Asia Federation of Soil Science Societies (ESAFS) 2019

November 3-7, 2019, Taipei, Taiwan, China. ESAFS 2019 will be held at GIS Convention Center of National Taiwan University including 2 days (Nov 4-5) for scientific sessions and 2 days (Nov 6-7) for excursion program in Taiwan. The ESAFS 2019 will focus on Smart Soil Management for Sustainable Agriculture.
The ESAFS is dedicated to the exchange of recent advances in soil science in the East and Southeast Asian regions. The conference provides a platform for interaction among scientists, consultants, and policy makers, who are responsible for the research and technology transfer of soil science, fertilizer management, and plant nutrition in order to cope with the rapid industrial development.
Deadline for Abstract Submission: June 30, 2019
Read more: *http://esafs2019.cssfs.org.tw/*

### 2019 ASA, CSSA, SSSA International Annual Meeting

The American Society of Agronomy, the Crop Science Society of America, and the Soil Science Society of America will host approximately 4,000 scientists, professionals, educators, and students at the 2019 International Annual Meeting, 'Embracing the Digital Environment,' on November 10-13, 2019, in San Antonio, Texas.
This premier scientific meeting provides unlimited networking opportunities, scientific abstracts, oral and poster sessions, a robust exhibit hall, technical workshops, and professional and destination tours. Plus, there's a career center, graduate and undergraduate programs, distinguished lecturers, awards, continuing education units, prizes, and more!
We invite you to attend and help create solutions to advance science.
Final abstract deadline: June 11, 4:00 PM CDT
Read more: *https://www.acsmeetings.org/*

### LOTEX2019 – 2nd Conference on Long-term Field Experiments

20-21 November, 2019, Nyíregyháza, Hungary.
The University of Debrecen, IAREF, Research Institute of Nyíregyháza and the Hungarian Soil Society are pleased to invite you to take part on the 2nd Conference on Long-term Field Experiments (LOTEX2019). The aims of this conference are to draw attention to the long-term experiments, to gather the soil and plant scientists and the representatives of the decision-making organisations to know each other, to share their knowledge and to disseminate the results of different topics.
Abstract submission deadline: June 10, 2019
Read more: *http://konferencia.unideb.hu/en/node/295*
Contact: *lotex2019@gmail.com*

### World Science Forum on Science, Ethics and Responsibility

20-23 November 2019, Budapest, Hungary. Celebrating the 20th anniversary of the 1999 World Conference of Science, WSF will return to Budapest to be hosted once again by the Hungarian Academy of Sciences under the main theme 'Science, Ethics and Responsibility". In the 21st century, ways of separating the scientific method from values, beliefs and opinions are no longer self-evident, and the complex realities of science call for a greater consensus in the ethical principles of scientific research. High expectations for direct economic and social returns also bring new responsibilities regarding the evaluation of scientific performance and the value of scientific research.
In this new era, finding new channels to the minds and the hearts of the general public might prove to be the greatest challenge for science communicators.
Speakers of WSF will discuss the opportunities and risks of the new technological revolution in biological engineering, artificial intelligence, and other highly debated fields of scientific research that have the potential to radically transform human life.
Deadline for session proposals: April 10, 2019
Read more: *https://worldscienceforum.org/*

## 2020

### Global Symposium on Soil Biodiversity (GSOBI20)

10 – 12 March 2020, at Global Soil Biodiversity Initiative (GSBI) Headquarters in Rome, Italy.
This Symposium will be jointly organized by the Global Soil Partnership (GSP), the Intergovernmental Technical Panel on Soils (ITPS), the Global Soil Biodiversity Initiative (GSBI) and the UN Convention on Biological Diversity (CBD). The Global Symposium on Soil Biodiversity will bring together international experts with the aim of reviewing the status of knowledge on soil biodiversity and ecosystem services, the sustainable use and conservation of soil biodiversity, and the contributions of soil organisms to the Sustainable Development Goals (SDGs).
Read more: *http://www.fao.org/global-soil-partnership/resources/highlights/detail/en/c/1183872/*

### VI International Soil Classification Congress in 2020 in Mexico – ISCC2020

16-24 April, 2020, Querétaro, Mexico
This congress is part of the events organized by Commission 1.4 of the International Union of Soil Sciences (IUSS) and is composed of a five-day field workshop beginning in Cuatro Ciénegas and ending with a three-day conference in Querétaro.
Our main objective is to provide a forum to continue the works and discussions from previous meetings about soil classification systems as a medium to communicate soil functions and management. The particular aim is to present options for conserving and improving soils in areas with subhumid, semiarid, and arid climates. For that reasons we invite leading soil scientists, students and professionals interested in analyzing in depth the indicators, indexes, and models that will improve soil classification as a tool for soil conservation, global change mitigation, and communication to stakeholders at multiple cartography scales.
Congress activities include:

### Field Workshop from Cuatro Ciénegas, Coahuila, to Juriquilla, Querétaro, April 16 to 21

(Arrival: April 16, 2020; Tour: April 17 to 21, 2020)
Important dates:
- Registration is open
- Early bird fees deadline: July 31, 2019
- Registration deadline: November 30, 2019

For the Field Workshop the number of participants is limited to 40 persons.
Congress website: *http://iscc2020.org/*

### Conference of the IUSS Commission Soil Classification 2020 in Campus UNAM, Juriquilla, Querétaro, April 22 to 24

It is a pleasure to invite leading soil scientists, students and professionals interested in analyzing in depth the indicators, indexes, and models that will improve soil classification as a tool for understanding soil, soil conservation, global change mitigation, and communication to stakeholders at multiple cartography scales.
- Registration is open
- Abstract submission deadline: December 15, 2019
- Notification of accepted abstracts: January 15, 2020
- Early bird fees deadline: January 31, 2020
- Registration deadline (to be included in the program): February 29, 2020

Read more: *www.iscc2020.org*

### 16th International Conference on Soil Micromorphology

August 30 - September 3, 2020, Krakow, Poland
The registration will start in September 2019.
Download the first circular: *https://iuss.org/index.php?article_id=311*
Conference website: *http://www.icosm2020.sggw.pl/*

### 9th International Acid Sulfate Soils Conference

Acid Sulfate Soils: Progress, Policy and Prospects
November 15-20, 2020, Adelaide, Australia
Abstract Submission and Conference Registration opens: 1st November, 2019
Abstract Submission and Early Registration closes 1st February, 2020
Read more: *https://biological.adelaide.edu.au/acid-sulfate-soil/iassc/*

## 2021

### The Third Global Soil Biodiversity Conference

1-3 November, 2021, Dublin, Ireland.

# New Publications

## Editor's Choice – free access to Geoderma Regional papers

*Geoderma Regional* was founded in 2014 in the realization that global issues require soil studies and solutions on national and regional levels. The journal is supported by an active group of authors, dedicated editorial board, and thrives with the help of excellent reviewers. *Geoderma Regional* has embraced every aspect of soil science, and since 2014, nearly 200 papers have been published from all corners of the globe. A special issue on 'Digital Soil Mapping across the Globe' illustrated studies from Scotland, Chile, Madagascar, France, India, and Belgium. Here we present a fine selection of papers from all over the world, and hope that you enjoy reading them, and that it may inspire you to submit your next research or review paper to the journal.
Read more: *https://www.journals.elsevier.com/geoderma-regional/editors-choice/geoderma-regional-the-editors-selection*

## Earthworm species diversity: 71 new species described in a Zootaxa Special Issue

Global diversity of earthworms and enchytraeids (Clitellata): papers in honor of András Zicsi (1928–2015) (ed. Rüdiger M. Schmelz). Zootaxa 4496, 575 pp.; 30 cm. Magnolia Press, Auckland, New Zealand. ISBN 978-1-77670-496-5 (paperback). ISBN 978-1-77670-497-2 (Online edition). Orders: magnolia@mapress.com.
The contribution of earthworms to soil health and sustainable agriculture is very well known. Less well known is the diversity of species that exist in soils of the world. Some 7000 species of earthworms and enchytraeids are currently known – the latter are small, whitish, and also soil-dwelling relatives of the earthworms. Now a Special Issue of the journal *Zootaxa* uncovers 71 more species of earthworms and enchytraeids new to science, in a volume of 575 pages and 40 articles with more than 100 authors. The species were found in 15 different countries of South America, Africa, and Eurasia. This volume was published to commemorate András Zicsi (1928-2015), the eminent German-Hungarian earthworm taxonomist. It provides a good overview on the current state-of-the-art of earthworm taxonomy, with respect to methods, styles and standards of description, geographical and thematic focus. DNA-sequences are increasingly used to corroborate or even to establish new species, even though detailed morphological descriptions remain the backbone of earthworm taxonomy.
Earthworm taxonomy is not an ivory tower discipline. Many species are discovered in areas where people live, work, and sustain their livelihood. Because of their body size they are often known by the locals before science gets hold of them. Farmers are interested in the species that live on their lands. Sustainable agriculture is unthinkable without earthworms. The amount of endemic species with a narrow distribution range – and therefore with risk of extinction due to soil degradation or land use change – is tremendous. So earthworm taxonomy really matters. This volume increases the number of known species by 1 %, a small but notable proportion.
Read more: *http://www.mapress.com/j/zt/article/view/zootaxa.4496.1.3/16177*

## Soil and nutrients loss in Malawi: an economic assessment

By Solomon Asfaw, Carlo Orecchia, Giacomo Pallante and Alessandro Palma. Published by the Food and Agriculture Organization of the United Nations, the UNDP-UNEP Poverty-Environment Initiative and the Ministry of Agriculture, Irrigation and Water Development, Malawi. ISBN 978-92-5-131141-7 (FAO).
Soil and nutrient loss are among the major impediments to a stable and sustainable agricultural development in Malawi. This report analyses the economic impact of both soil and nutrient loss in Malawi with new data collected through field surveys, merged with detailed climatic data and socio-economic information.
Read more: *http://www.fao.org/3/CA2663EN/ca2663en.pdf*

## Soil Sequences Atlas III and IV

Edited by M. Świtoniak & P. Charzyński, Toruń: 2018, 218 pages (volume three), and 262 pages (volume four).
These are the third and fourth books in the series of Soil Sequence Atlases. The first volume was published in 2014, the second in May 2018. Main pedogeographic features are presented in the form of sequences to give a comprehensive picture of soils – their genesis and correlations with the environment in typical landscapes of Central Europe from Russia furthest North, through Estonia, Latvia, Lithuania, Belarus, Ukraine, Poland, Germany, Czech Republic, Slovakia and Hungary to the southernmost Slovenia and Georgia. Soils of various landscapes are presented. A total of 136 soil profiles of 20 WRB Reference Soil Groups are included. The main objective of those books is to present the diversity of relations between soil and landscape, climate, hydrology and humans, and to present interpretations reflecting the World Reference Base for Soil Resources (2015) classification with comments on the choice of qualifiers.

PDFs can be freely downloaded on Research Gate and in Nicolaus Copernicus University repository.
Read more (volume 3): *https://repozytorium.umk.pl/handle/item/5510*
Read more (volume 4): *https://repozytorium.umk.pl/handle/item/5511*

## Global Soil Proverbs – Cultural Language of the Soil

Ed.: Jae E. Yang; M. B. Kirkham; Rattan Lal; Sigbert Huber. Published in the CATENA series GeoEcology essays in December 2018; 275 pages, 165 figures, 10 tables, 17x24cm, 720 g, US-ISBN: 1-59326-271-X, ISBN 978-3-510-65431-4, price paperback EUR 34.90 (plus shipping costs); reduced price for IUSS members: EUR 30.00 (plus shipping costs). The book can be ordered from the IUSS Secretariat: *iuss@umweltbundesamt.at*.
Proverbs are truths that link one generation to another. They have been passed down through millennia to provide advice about how to live life. Every country has a vast archive of proverbs that have been handed down orally from generation to generation. The very name 'proverb' indicates that they originated 'before' (Latin, pro) the written 'word' (Latin, verbum). Ever since our ancestors settled down and started to farm the soil, proverbs have been used to communicate knowledge. Many proverbs about soils are available globally, but no effort has been made within the soil science community to compile and integrate them into a comprehensive book.
Therefore, the International Union of Soil Sciences has published this book on soil proverbs worldwide. The objective of the book is to compile such soil proverbs and, through them, share insights about philosophy, culture, and life in each country, as they relate to soils. The book features 32 chapters from 29 different countries in Africa, Asia, Europe, North America, and Oceania.
The authors of the individual chapters provide soil proverbs in both English and their native language. Chapters are illustrated with pictures related to the respective proverbs. Some themes are common, such as the need to sustain the soil to sustain humanity, while other themes are particular to a country due to its geography and climate, such as 'The peas may be sown when the first swallows come' (Russia) or 'If you want to store wheat, plow lowland areas' (Tunisia).
The book addresses both soil scientists and the general public. Readers will see the diversity of proverbs from the different countries, but each one is written in its own beautiful language, and that humankind is united by its dependence on soils, the veritable foundation of their existence.
Read more: *https://www.schweizerbart.de/publications/detail/isbn/9783510654314*

## Global Symposium of Soil pollution: from assessment to remediation – Updates from the working groups

Based on the GSOP18 Outcome Document recommendations, two new Working Groups were created. The first one is developing contextualized guidelines for measuring, mapping, monitoring and reporting on soil pollution, while the second focuses on the creation of a database on the best available techniques for the management and remediation of polluted soils. In addition, to better understand the problem of soil pollution globally, an assessment of the global status and regional trends of soil pollution is under preparation following a data collection process led by member countries.
Read more: *http://www.fao.org/3/ca0362en/CA0362EN.pdf*

## On soil scientists and where to find them in Africa: Assessment of Human Capital: Assessment of Human Capital

By Andrei Rozanov and Liesl Wiese, published in 2018 by the Eurasian Center for Food Security, Moscow, Russia, IBSN 978-5-6040425-1-9.
This report was first presented in St. Petersburg on the 5th of December 2018 – the World Soil Day. The Eurasian Center for Food Security (ECFS) has brought to the attention of the World Bank the seemingly diminishing capacity in soil expertise and stagnant or shrinking job market for soil experts within the countries of Africa. This study aims to understand the role that soil science plays in the continent's changing landscape of agriculture, land development, and conservation from the perspective of individuals working as or with soil scientists on the continent. It also analyses the soil expertise available in the countries concerned, as well as the perceived sufficiency of human capital to support decisions at farm, provincial, national, and regional levels as well as industrywide.
Read more: *http://ecfs.msu.ru/sites/default/files/node/publication/18/11/africa_report_web.pdf*

## Special report n°33/2018: Combating desertification in the EU: a growing threat in need of more action

The European Commission does not have a clear picture of the challenges presented by the growing threats of desertification and land degradation in the EU, according to a new report by the European Court of Auditors. The steps taken so far by the Commission and Member States to combat desertification have limited coherence, say the auditors, and the Commission has not assessed progress towards its goal of achieving land degradation neutrality by 2030.
Desertification describes human- and climate-related processes leading to problems affecting dry areas, such as diminished food production, soil infertility, decreases in the land's natural resilience, and reduced water quality. Projections of climate change in Europe show that the risk of desertification is increasing. Hot semi-deserts already exist in southern Europe and the phenomenon is extending northwards. Desertification is a consequence, but also a cause of climate change: soil degradation emits greenhouse gases, and degraded soils have a lower capacity to retain carbon.
Read more: *https://www.eca.europa.eu/en/Pages/DocItem.aspx?did=48393*

## Environmental Pollution of Paddy Soils

By Hashmi, Muhammad Zaffar, Varma, Ajit (Eds.), 1st ed. 2018, Springer, Series Soil Biology, 271 p., 40 illus., 30 illus. in color. ISBN 978-3-319-93671-0, Price (hardcover) 149,99 Euro.
This book provides an overview of our current understanding of paddy soil pollution, addressing topics such as the major types of pollutants in contaminated paddy soil ecosystems; factors affecting the fate of pollutants in paddy soil; biomonitoring approaches to assess the contaminated paddy soil; the impact of chemicals on soil microbial diversity; and climate change. It also covers arsenic and heavy metal pollution of paddy soils and their impact on rice quality. Further, new emerging contaminants such as antibiotics and antibiotics resistance genes (ARGs) in paddy soil and their impact on environmental health are also discussed. The last chapters focus on the bioremediation approaches for the management of paddy soils.
Read more: *https://www.springer.com/de/book/9783319936703#aboutBook*

## Fire Effects on Soil Properties

By Paulo Pereira, Jorge Mataix-Solera, Xavier Úbeda, Guillermo Rein, Artemi Cerdà, Guillermo Rein, 1st Edition on January 15, 2019, CRC Press, 400 pages. ISBN 9780367186555, Price (hardback) £ 103.99.
Fire Effects on Soil Properties brings together current research on the effects of fire on the physical, biological and chemical properties of soil. Written by over 60 international experts in the field, it includes examples from fire-prone areas across the world, dealing with ash, meso and macrofauna, smouldering fires, recurrent fires and management of fire-affected soils. It also describes current best practice methodologies for research and monitoring of fire effects and new methodologies for future research. This is the first time information on this topic has been presented in a single volume and the book will be an important reference for students, practitioners, managers and academics interested in the effects of fire on ecosystems, including soil scientists, geologists, forestry researchers and environmentalists.

## Applied Soil Hydrology

By Novák, Viliam, Hlaváčiková, Hana, 1st ed. 2019, Springer, 342 p. 130 illus. ISBN 978-3-030-01806-1, Price (hardcover) 109,99 Euro.
This state-of-the-art book clearly explains the basic principles of soil hydrology and the current knowledge in this field. It particularly highlights the estimation and application of measurements and evaluation of soil-hydrophysical characteristics using simulation models, with a focus on elucidating the basic hydrophysical characteristics of soil, such as soil water potential and hydraulic conductivity, as well as the methods of measurement. It also addresses topics such as stony soil, water repellent soils, and water movement modeling in those media.
The book presents soil hydrology in a simple way, while quantitatively expressing the soil water state and movement. It clearly and precisely describes basic terms of soil hydrology with a minimum of mathematics. It also includes the latest research findings in the field as well as the basics of the mathematical modeling of water movement in the soil-plant-atmosphere system (SPAS), using original research results to illustrate these issues. This book is of interest to all scientists and professionals in soil hydrology, including beginners, as well as those interested and working in hydrology in general and soil hydrology in particular. In addition, it can also be used by specialists and students in related fields like agronomy, forestry, meteorology, hydrology, environmental engineering, environmental protection, and geography.
*https://www.springer.com/de/book/9783030018054#aboutBook*

## Bioremediation of Agricultural Soils

Edited by Juan C. Sanchez-Hernandez, 1st Edition published by CRC Press on 15 February 2019, 295 pages, 4 colour illustrations, 39 B/W illustrations, ISBN 9781138651913, price hardback £144.50.

The quality of agricultural soils are always under threat from chemical contaminants, which ultimately affect the productivity and safety of crops. Besides agrochemicals, a new generation of substances invades the soil through irrigation with reclaimed wastewater and pollutants of organic origin such as sewage sludge or cattle manure. Emerging pollutants such as pharmaceuticals, nanomaterials and microplastics, are now present in agricultural soils, but the understanding of their impact on soil quality is still limited. With focus on *in situ* bioremediation, this book provides an exhaustive analysis of the current biological methodologies for recovering polluted agricultural soils as well as monitoring the effectiveness of bioremediation.

Read more: *https://www.routledge.com/Bioremediation-of-Agricultural-Soils/Sanchez-Hernandez/p/book/9781138651913*

## Measuring and modelling soil carbon stocks and stock changes in livestock production systems – Guidelines for assessment. Version 1 – Advanced copy

Published by FAO in 2019. 155 pages.

These guidelines are a product of the Livestock Environmental Assessment and Performance (LEAP) Partnership, a multi-stakeholder initiative whose goal is to improve the environmental sustainability of the livestock supply chains through better methods, metrics and data. These guidelines provide a harmonized, international approach for estimating soil organic carbon (SOC) stock and stock changes in livestock production systems. The intended uses of this document are all those having an interest in quantifying soil carbon stocks or stock changes. Wide is the range of objectives and scales for SOC stock change studies, for example: Global or regional accounting for GHG emissions and removals from the land sector as a component of climate change accounting; Monitoring, reporting and verification obligations for the United Nations Framework Convention on Climate Change; Analysis of the climate change impact of livestock products; Evaluation of the environmental impacts of grazing land management for animal agriculture; Assessment of the mitigation potential of agricultural practices at an industry, region or farm scale; Implementing mitigation options in an emissions trading or other market mechanism where payments for SOC sequestration depend on accurate and verifiable quantification; Research into soil and biological processes affecting SOC stocks and dynamics. A set of methods and approaches are recommended for use by individual farmers or land managers, by those undertaking life cycle assessment of livestock products, policy makers, or regulators at local, regional or national scales.

Read more: *http://www.fao.org/publications/card/en/c/CA2934EN*

## Measuring and modelling soil carbon stocks and stock changes in livestock production systems – A scoping analysis for the LEAP work stream on soil carbon stock changes

Published by FAO in 2019. 85 pages. ISBN: 978-92-5-131235-3.

In order to build consensus on methods to measure and model soil carbon stocks and stock changes, the Steering Committee of the Livestock Environmental Assessment and Performance (LEAP) Partnership mandated a task force to develop this scoping analysis and pave the way towards the formation of the LEAP Technical Advisory Group on soil carbon stock changes. Soil carbon sequestration and storage in grasslands offers a significant potential to compensate for GHG emissions from livestock, but the lack of consensus on the appropriate methodologies to account for soil carbon stock changes hinders robust and standardized assessments. In this report, we reviewed several published soil organic carbon (SOC) models, and evaluated their aptitude to combine them with life cycle assessments (LCAs). Among contentious issues, the most relevant are: a) the lack of universal models, b) the uneven data availability, comparability and quality between countries and regions, and c) the difficulty to match measurable SOC fractions with those determined by the models. Taking this into account, a tiered approach is proposed, according to the availability of original data to run the models. The use of IPCC carbon (C) accounting system appears to be the simplest approach suitable to countries with scarcity of original C data. Conversely, more complex models such as Century (Parton 1987, 1988) or Roth C (Smith 1998) are likely to perform better and give less uncertainty when original input data are easily available.

Read more: *http://www.fao.org/publications/card/en/c/CA2933EN*



## Soil-based Wastewater Treatment

Published in 2018 by the American Society of Agronomy, Crop Science Society of America, Soil Science Society of America. The book addresses the needs of practitioners, engineers, scientists, regulators, resource managers, planners, and others with a need to know about septic systems. It arose after discussions about the need for a text that integrated current understanding of the hydrologic, physical, chemical, and biological processes involved in the treatment of wastewater using soil. In our experience, people working with septic systems – ourselves included – have a fragmented understanding of what these systems are, how they function, how wastewater moves through soil, how and which pollutants are removed, and how these systems impact the environment and public health. The relevant information is scattered across disciplines, information sources and audiences. This book is an attempt to collect and integrate this information in one place, and provide a scientific framework for understanding soil-based wastewater treatment.

Read more: *https://dl.sciencesocieties.org/publications/books/tocs/acsesspublicati/sbwtreatment*

## Properties and Management of Soils in the Tropics

By Pedro A. Sanchez, University of Florida. 2nd Edition published in January 2019 by Cambridge University Press, 690 pages, 85 b/w illustrations, 12 maps, 226 tables, ISBN 9781107176058, price hardback: £ 79.99.

The long-awaited second edition of this classic textbook expands on the first edition to include advances made in the last four decades, bringing the topic completely up to date. The book addresses critical issues such as whether humanity can feed itself, and whether it can do so in environmentally sound and sustainable ways. Written from agronomic, environmental, and ecological standpoints, the textbook employs a multidisciplinary approach, including policymaking and plant genetic improvements, as well as ecosystem services, climate change, biodiversity, sustainability and resilience. New chapters in this second edition focus on organic carbon in soil, soil biology, soils in relation to livestock production and forestry, and agroforestry. The new edition will again be the go-to textbook for courses on tropical soils, and a reference textbook for soil and agricultural scientists and development professionals working in the tropics.

Read more: *https://www.cambridge.org/at/academic/subjects/earth-and-environmental-science/soil-science/properties-and-management-soils-tropics-2nd-edition?format=HB*

## Microbiology for Sustainable Agriculture, Soil Health, and Environmental Protection

Edited by Deepak Kumar Verma, 1st Edition published 19 March 2019, by Apple Academic Press, 408 pages, 16 Colour illustrations, 39 B/W illustrations, ISBN: 9781771886697.

With contributions from a broad range of experts in the field, this volume focuses on important areas of microbiology related to soil and environmental microbiology associated with agricultural importance. The information and research on soil and environmental microbiology presented here seeks to act as a gateway to sustaining and improving agriculture and environmental security. Part I focuses on soil microbiology, dealing extensively with studies on the isolation, culture, and use of Rhizobium spp. and mycorrhizae to improve soil fertility, plant growth, and yield. This includes research progress on biogeochemical cycles, plant growth promoting rhizobacteria (PGPR), microbial interactions in soil and other soil activities, microbial diversity in soil, biological control and bioremediation, and improvement of beneficial microorganisms (N2 fixers, phosphate solubilizers, etc.). Part 2 goes on to focus on microbiology for crop disease management and pathogenic control in sustainable environment, with chapters on disease management of agricultural and horticultural crop plants through microbial control and how microbial control may a be a potential solution for a sustainability in agriculture. Part 3, Microbiology for Soil Health and Crop Productivity Improvement, features a chapter on the activity and mechanism of nitrogenase enzyme in soil, which is very important for soil health and crop production and productivity. Part 4 presents two chapters entirely devoted to the environmental pollution and its control, looking at the interaction of microbes in aqueous environments and eco-friendly approaches.

Read more: *https://www.routledge.com/Microbiology-for-Sustainable-Agriculture-Soil-Health-and-Environmental/Verma/p/book/9781771886697*

## Predictive Soil Mapping with R – an Open Access book in Rmarkdown

Hengl, T., MacMillan, R.A., (2019). OpenGeoHub foundation, Wageningen, the Netherlands, 370 pages, ISBN: 978-0-359-30635-0.

Book cover artwork: *https://github.com/Envirometrix/PredictiveSoilMapping/blob/master/figures/PSMwR_cover.pdf*

Tom Hengl and Robert MacMillan have recently published an Open Access book on Predictive Soil Mapping with R (PSMwR). PSMwR is based on applying statistical

and/or machine learning techniques to fit models for the purpose of producing spatial and/or spatiotemporal predictions of soil variables, i.e. maps of soil properties and classes at different resolutions. PSMwR is about understanding the main concepts behind soil mapping, mastering R packages that can be used to produce high quality soil maps, and about optimizing all processes involved so that production costs can also be reduced. Authors are experienced soil mappers and have spent over 6 years collecting materials, running courses in R (see e.g. *http://youtube.com/c/ISRICorg* and *https://www.youtube.com/c/OpenGeoHubFoundation*) and promoting Open Soil Data standards.
Read more: URL: *http://soilmapper.org*

## LandGIS: Open Land Data service

In 2018 the OpenGeoHub foundation released a web mapping system called 'LandGIS' and which is envisaged as 'an OpenStreetMap-type system' for land-related environmental data. LandGIS provides access to new datasets including global maps of soil types (https://doi.org/10.5281/zenodo.1476844), soil texture fractions (https://doi.org/10.5281/zenodo.1476854), soil organic carbon (https://doi.org/10.5281/zenodo.1475457), relief (https://doi.org/10.5281/zenodo.1447209), geology, land cover/use/degradmicroplatation (https://doi.org/10.5281/zenodo.1475449), climate (https://doi.org/10.5281/zenodo.1420114), current and potential vegetation (https://doi.org/10.5281/zenodo.1450336, https://peerj.com/articles/5457/). It also comes with a basic API (https://landgisapi.opengeohub.org) which allows users to overlay points and get values within seconds. With LandGIS we combine the power of distributed data and Machine Learning based on the Open Source software to produce global seamless maps of environmental dynamics and ecosystem services.
Read more: *https://opengeohub.org/about-landgis/*
Notice both items above are available under Open Data or Open Access / Open Source licenses and are meant to stimulate collaboration and sharing of data and code.

## The International Yearbook of Soil Law and Policy 2018

By Dr. Harald Ginzky, Dr. Elizabeth Dooley, Dr. Irene L. Heuser, Dr. Emmanuel Kasimbazi, Dr. Till Markus, Dr. Tianbao Qin, Springer International Publishing, Print ISBN: 978-3-030-00757-7, electronic ISBN: 978-3-030-00758-4, DOIhttps://doi.org/10.1007/978-3-030-00758-4.

This book presents an important discussion on urbanization and sustainable soil management from a range of perspectives, addressing key topics such as sustainable cities, soil sealing, rehabilitation of contaminated soils, property rights and liability issues, as well as trading systems with regard to land take.
This third volume of the International Yearbook of Soil Law and Policy is divided into four parts, the first of which explores several aspects of the topic 'urbanization and sustainable management of soils.' The second part then covers recent international developments, while the third part presents regional and national reports, and the fourth discusses cross-cutting issues. Given the range of key topics covered, the book offers an indispensable tool for all academics, legislators and policymakers working in this field. The 'International Yearbook of Soil Law and Policy' series discusses central questions in law and politics with regard to the protection and sustainable management of soil and land – at the international, national and regional level.
Read more: *https://www.springerprofessional.de/international-yearbook-of-soil-law-and-policy-2018/16510178*

## Soil Fauna Assemblages

Global to Local Scales. By Uffe N. Nielsen. Published as Part of *Ecology, Biodiversity and Conservation* in March 2019 by Cambridge University Press, 378 pages, 52 b/w illustrations, 2 tables, ISBN: 9781316642108, price paperback £ 34.99.
This volume provides a modern introduction to the soil fauna and their contributions to ecosystem function, the mechanisms that structure soil fauna assemblages from local to global scales, and the potential impacts of global change on soil fauna assemblages and through this ecosystem function. Wanting to be an accessible primer, this book is a high level overview of current knowledge rather than a detailed tome of all existing information, with emphasis being placed on key findings and general patterns. It focuses on the soil fauna but contextualizes these assemblages in relation to the microbial assemblages belowground and the vegetation aboveground. It is clear that our knowledge of soil fauna assemblages is ever increasing, but there is still a lot to discover. Key areas of research are highlighted, with particular reference to the future of soil fauna assemblages.
Read more: *https://www.cambridge.org/at/academic/subjects/life-sciences/ecology-and-conservation/soil-fauna-assemblages-global-local-scales?format=PB*



## Modern Soil Microbiology, Third Edition

By Jan Dirk van Elsas, Jack T. Trevors, Alexandre Soares Rosad and Paolo Nannipieri; 3rd Edition published by CRC Press, April 24, 2019, 472 pages, 25 Colour & 73 b/w Illustrations, ISBN: 9781498763530; price hardback £61.60; eBook: £69.30; eBook Rental from £38.50.
The living soil is crucial to photosynthesis, biogeochemical cycles, global food production, climate change, biodiversity, and plant and animal health. In the past decade, scientists have made significant advances in soil microbiology research. While the basic principles are now better understood, knowledge has been forthcoming on the best available technologies and methods applied to researching soil microorganisms, their diversity, interactions, biochemistry, survival, gene expression, and their roles in global climate change, plant disease suppression and growth stimulation, and biogeochemical cycles. This knowledge can be applied to better predict the transformation of pollutants in soil and the activities of microbes in the rhizosphere. It will also assist us in fostering crop production in an era with an increasing human population and intensification of agriculture.
Following the tradition of its predecessors, Modern Soil Microbiology, Third Edition, is an indispensable source that supports graduate/undergraduate teaching for soil and environmental microbiologists in academia, as well as in government and industrial laboratories. It is a comprehensive collection of chapters on various aspects of soil microbiology, useful for all professionals working with soils. Compiled by internationally renowned educators and research scholars, this textbook contains key tables, figures, and photographs, supported by thousands of references to illustrate the depth of knowledge in soil microbiology.
Read more: *https://www.crcpress.com/Modern-Soil-Microbiology-Third-Edition/Elsas-Trevors-Rosado-Nannipieri/p/book/9781498763530*

## Ecosystem Consequences of Soil Warming: Microbes, Vegetation, Fauna and Soil Biogeochemistry

Edited by Jacqueline Mohan, 1st Edition published by Academic Press 13 April 2019, 592 pages, eBook ISBN: 9780128134948, Paperback ISBN: 9780128134931, price paperback: € 132.68; price ebook: € 147.56.
*Ecosystem Consequences of Soil Warming: Microbes, Vegetation, Fauna and Soil Biogeochemistry* focuses on biotic and biogeochemical responses to warmer soils including plant and microbial evolution. It covers various field settings, such as arctic tundra; alpine meadows; temperate, tropical and subalpine forests; drylands; and grassland ecosystems. Information integrates multiple natural science disciplines, providing a holistic, integrative approach that will help readers understand and forecast future planetwide responses to soil warming. Students and educators will find this book informative for understanding biotic and biogeochemical responses to changing climatic conditions. Scientists from a wide range of disciplines, including soil scientists, ecologists, geneticists, as well as molecular, evolutionary and conservation biologists, will find this book a valuable resource in understanding and planning for warmer climate conditions.
Read more: *https://www.elsevier.com/books/ecosystem-consequences-of-soil-warming/mohan/978-0-12-813493-1*

## Plant-Soil Slope Interaction

By Charles Wang Wai Ng, Anthony Leung, Junjun Ni. 1st Edition published by CRC Press, May 2019, 182 Pages, 188 B/W Illustrations, ISBN 9781138197558, price hardback £109.95.
This inter-disciplinary book provides the latest advanced knowledge of plant effects on vegetated soil properties such as water retention capability, water permeability function, shear strength, slope hydrology, movements and failure mechanisms, and applies this knowledge to the solution of slope stability problems. It is the first book to cover in detail not only the mechanical effects of root reinforcement but more importantly the hydrological effects of plant transpiration on soil suction, soil shear strength, and water permeability. The book also offers a fundamental understanding of soil-plant-water interaction. Analytical equations are provided for predicting the combined hydrological and mechanical effects of plant roots on slope stability.
This book is essential reading for senior undergraduate and postgraduate students as well as researchers in civil engineering, geo-environmental engineering, plant ecology, agricultural science, hydrology and water resources. It also provides advanced knowledge for civil engineers seeking 'green' engineering solutions to combat the negative impact of climate change on the long-term engineering sustainability of infrastructure slopes. Professionals other than civil engineers, such as ecologists, agriculturists, botanists, environmentalists, and hydrologists, would also find the book relevant and useful.
Read more: *https://www.crcpress.com/Plant-Soil-Slope-Interaction/Ng-Leung-Ni/p/book/9781138197558*

## Natural and Enhanced Attenuation of Contaminants in Soils

By Raymond N. Yong, Catherine N. Mulligan. Second Edition published by CRC Press, April 23, 2019, 308 pages, 131 B/W Illustrations, ISBN 9781138066373, price £115.00, eBook Vital Source £103.50.

Natural attenuation has become an effective and low-cost alternative to more expensive engineered remediation. This new edition updates the principles and fundamentals of natural attenuation of contaminants with a broader view of the field. It includes new methods for evaluating natural attenuation mechanisms and microbial activity at the lab and field scales. Case studies, actual treatments and protocols, theoretical processes, case studies, numerical models, and legal aspects in the natural attenuation of organic and inorganic contaminants are examined. Challenges and future directions for the implementation of natural attenuation and enhanced remediation techniques are also considered.

Read more: *https://www.crcpress.com/Natural-and-Enhanced-Attenuation-of-Contaminants-in-Soils-Second-Edition/Yong-Mulligan/p/book/9781138066373*

## Urbanization: Challenge and Opportunity for Soil Functions and Ecosystem Services

Proceedings of the 9th SUITMA Congress. Edited by Viacheslav Vasenev, Elvira Dovletyarova, Zhongqi Cheng, Tatiana V. Prokof'eva, Jean Louis Morel, and Nadezhda D. Ananyeva. Published in the Springer Geographybook series, 2019, ISBN 978-3-319-89602-1 price e-Book EUR 142.79.

This proceedings volume focuses on different aspects of environmental assessment, monitoring, and management of urban and technogenic soils. Soils of Urban, Industrial, Traffic, Mining and Military Areas (SUITMAs) differ substantially from their natural zonal counterparts in their physical, chemical and biological features, their performed functions, and supported services. This book discusses the monitoring, analysis and assessment of the effects of urbanization on soil functions and services. Further, it helps to find solutions to the environmental consequences of urbanization and discusses best management practices such as management and design of urban green infrastructure, waste management, water purification, and reclamation and remediation of contaminated soils in the context of sustainable urban development.

This proceedings book appeals to scientists and students as well as practitioners in soil and environmental science, urban planning, geography and related disciplines, and provides useful information for policy makers and other stakeholders working in urban management and greenery.

Read more: *https://link.springer.com/book/10.1007/978-3-319-89602-1#about*

## Modern Soil Microbiology, Third Edition

By Jan Dirk van Elsas, Jack T. Trevors, Alexandre Soares Rosad and Paolo Nannipieri; 3rd Edition published by CRC Press, April 24, 2019, 472 pages, 25 Colour & 73 b/w Illustrations, ISBN: 9781498763530; price hardback £61.60; eBook: £69.30; eBook Rental from £38.50.

The living soil is crucial to photosynthesis, biogeochemical cycles, global food production, climate change, biodiversity, and plant and animal health. In the past decade, scientists have made significant advances in soil microbiology research. While the basic principles are now better understood, knowledge has been forthcoming on the best available technologies and methods applied to researching soil microorganisms, their diversity, interactions, biochemistry, survival, gene expression, and their roles in global climate change, plant disease suppression and growth stimulation, and biogeochemical cycles. This knowledge can be applied to better predict the transformation of pollutants in soil and the activities of microbes in the rhizosphere. It will also assist us in fostering crop production in an era with an increasing human population and intensification of agriculture.

Following the tradition of its predecessors, Modern Soil Microbiology, Third Edition, is an indispensable source that supports graduate/undergraduate teaching for soil and environmental microbiologists in academia, as well as in government and industrial laboratories. It is a comprehensive collection of chapters on various aspects of soil microbiology, useful for all professionals working with soils. Compiled by internationally renowned educators and research scholars, this textbook contains key tables, figures, and photographs, supported by thousands of references to illustrate the depth of knowledge in soil microbiology.

Read more: *https://www.crcpress.com/Modern-Soil-Microbiology-Third-Edition/Elsas-Trevors-Rosado-Nannipieri/p/book/9781498763530*

## IPBES Global Assessment Report on Biodiversity and Ecosystem Services

The first intergovernmental report of its kind and the most comprehensive analysis of nature since the landmark Millennium Ecosystem Assessment of 2005. Compiled by 145 expert authors from 50 countries over the past three years, with inputs from another 310 contributing authors, the Report assesses changes over the past five decades, providing a comprehensive picture of the relationship between economic development pathways and their impacts on nature. It also offers a range of possible scenarios for the coming decades.

The Report finds that around 1 million animal and plant species are now threatened with extinction, many within decades, more than ever before in human history. To increase the policy-relevance of the Report, the assessment's authors have ranked, for the first time at this scale and based on a thorough analysis of the available evidence, the five direct drivers of change in nature with the largest relative global impacts so far. These culprits are, in descending order: (1) changes in land and sea use; (2) direct exploitation of organisms; (3) climate change; (4) pollution and (5) invasive alien species.

Read more: *https://www.ipbes.net/news/Media-Release-Global-Assessment*

The full six-chapter Report (including all data) is expected exceed 1,500 pages and will be published later this year.

## Soil erosion: the greatest challenge for sustainable soil management

By Pennock, D.; Published by FAO, Rome, Italy, 2019, 100 pages, ISBN: 978-92-5-131426-5

Despite almost a century of research and extension efforts, soil erosion by water, wind and tillage continues to be the greatest threat to soil health and soil ecosystem services in many regions of the world. Our understanding of the physical processes of erosion and the controls on those processes has been firmly established. Nevertheless, some elements remain controversial. It is often these controversial questions that hamper efforts to implement sound erosion control measures in many areas of the world. This book, released in the framework of the Global Symposium on Soil Erosion (15-17 May 2019) reviews the state-of-the-art information related to all topics related to soil erosion.

## Soil nutrient loss assessment in Malawi. Technical Report

By Christian Thine Omuto and Ronald Vargas. Published by the Food and Agriculture Organization of the United Nations and the UNDP-UNEP Poverty-Environment Initiative and the Ministry of Agriculture, Irrigation and Water Development, Malawi. 64 pages, ISBN 978-92-5-131142-4 (FAO).

Soil degradation and the consequent decline in plant available nutrients negatively affect agricultural productivity of the soil. In Malawi, soil degradation has been variously reported in the literature as an enemy of economic growth because Malawi is a largely agrarian economy. Soil degradation results in a decline in soil nutrient content and to the eventual deterioration of national food production and agricultural productivity. The government of Malawi and its development partners have called for an evaluation of the cost of soil loss in the country and its associated economic impacts. The aim of the present soil nutrient assessment study in Malawi was to quantify soil nutrient losses throughout the country for an economic assessment of overall national soil loss.

Read more: *http://www.fao.org/3/CA2666EN/ca2666en.pdf*

## Soil and nutrients loss in Malawi: an economic assessment

By Solomon Asfaw, Carlo Orecchia, Giacomo Pallante and Alessandro Palma; published by the Food and Agriculture Organization of the United Nations and the UNDP-UNEP Poverty-Environment Initiative and the Ministry of Agriculture, Irrigation and Water Development, Malawi. ISBN 978-92-5-131141-7 (FAO).

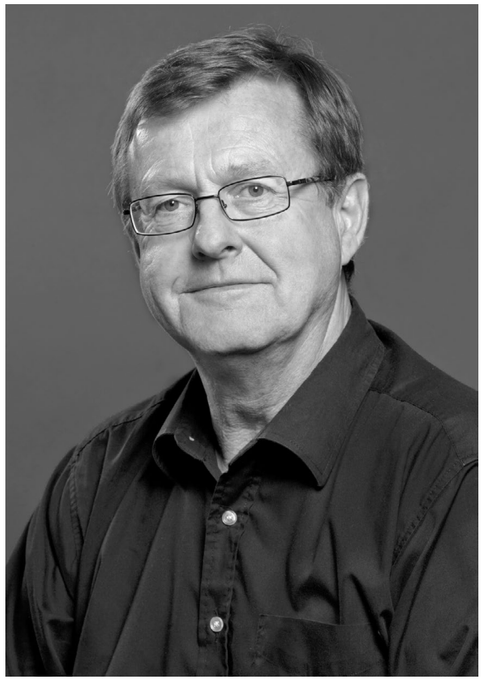
Soil and nutrients loss are among the major impediments to a stable and sustained agricultural development in Malawi. They have historically affected the country but the high population growth, rapid deforestation, overgrazing and ploughing, combined with the impacts of climate change, such as temperature increases and changing precipitation patterns, are increasing the impact of these events that harm agricultural growth. This report analyses the economic impact of both soil and nutrient loss in Malawi with new country representative data on soil and nutrients loss indicators collected through field surveys, merged with detailed climatic data and socio-economic information. It translates soil loss/nutrient loss into yield loss and estimates the economic impact of loss on agricultural production as a result of soil degradation, followed by the identification of best practices to mitigate the soil and nutrient loss events.

Read more: *http://www.fao.org/global-soil-partnership/resources/highlights/detail/en/c/1185031/?fbclid=IwAR1pyi9UUbH70rp0CDDSgXqV0TCkyajXv995gtYzldhQzC5lUDrvk4njAbc*

# In Memoriam

## Henrik Breuning-Madsen

(1949-2018)



Henrik Breuning-Madsen (©Huset Mydtskov)

Professor Henrik Breuning-Madsen DSc PhD, the long-standing Secretary of the Danish Soil Science Society, died aged 69 years on 24 November 2018 in a tragic car accident.

Henrik Breuning-Madsen was awarded a Master of Science degree in Geography by the University of Copenhagen (UC) in 1975, and a PhD degree three years later, based on a thesis on soil surveying. In 1983 he defended his DSc thesis on the detailed classification and mapping of soils in Western Denmark (Jutland). From 1981 to 1983 he was with the Ministry of Agriculture as project leader for the mapping of potential ochre areas and for managing the need for the drainage of farmland. When appointed associate professor at the University of Copenhagen in 1983, Henrik headed the section for mapping marginal Danish lands and coordinated the construction of the European soil analysis database. From 1991 until his death, Henrik was Professor of Soil Geography at the University of Copenhagen.
During his time as professor, Henrik participated in many soil geographic projects inside and outside Denmark. He initiated and conducted detailed studies on the formation of iron pans in Bronze Age barrows and clarified the formation of sandy hills in Jutland. He studied soil formation at Bellona, Solomon Islands and, in cooperation with local researchers, Henrik contributed significantly to soil science in Ghana over many years.
Henrik was a curious man with a broad interest in many scientific fields. He was an extremely interesting and fascinating man who over the years cooperated with many researchers from inside and outside Denmark such as pedologists, soil chemists and physicists, archeologists and geologists. Despite, however, his broad research

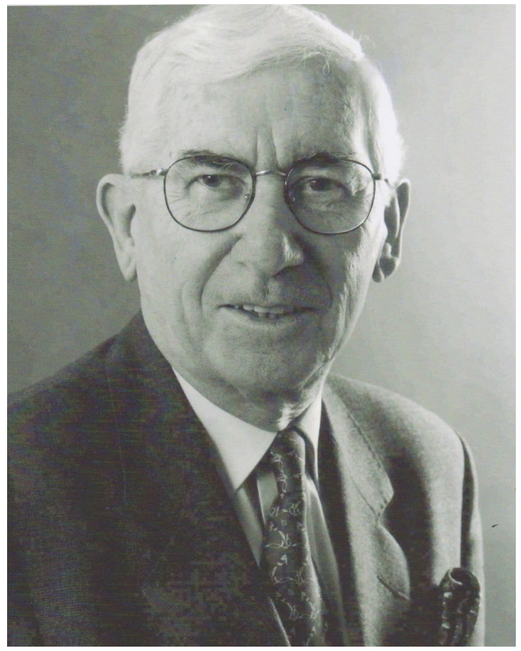
interests, soil science always played an important role in all his research and teaching.
Because of his great knowledge and broad interests, Henrik held several positions of trust. Apart from serving as the Secretary of the Danish Soil Science Society for many years, he was the leader of the Geographic Institute. Henrik was the Secretary-General and finally the Vice-President of the Royal Danish Geographic Society. He was the editor, or editorial board member, of several scientific journals.
With Henrik's death we have lost a very special and enterprising researcher; the students have lost a committed teacher; the Danish Soil Science Society has lost an inspiring and open-minded board member; and we have lost a dear friend and valued colleague.

*By Ingeborg Callesen, Gry Lyngsie, Bjarne W. Strobel & Ole K. Borggaard*



# Georges Pédro

(1929-2018)



Georges Pédro (© Madam Pedro)

## French Soil Science has lost one of its most prestigious members

Georges Pédro died on January 31st 2019. He was born on June 26th 1929. He had just published his last scientific study *Surface Cover of the Earth's Continental Areas* (ed. AFES, 2018).

Georges Pédro is internationally renowned for his work on clay minerology and geochemical weathering processes. He was a Research Director at the INRA (France's national institute for agronomic research) and played a vital role in France in the field of Pedology. Amongst others, he was president of the Orstom-IRD's 'Commission scientifique d'Hydrologie et Pédologie' (1984) (Scientific Commission for Hydrology and Pedology) and supervised and co-supervised numerous Orstom PhDs. It was his own exceptional thesis on experimental pedology that made him famous throughout the world: he experimentally modelled the principal global processes of soil weathering in the laboratory. Above and beyond the Orstom and the INRA, Georges Pédro played a major role in the leadership and/or presidency of a large number of scientific structures:

- 1971-1975. Groupes Français des Argiles (GFA) (French Clay Groups),
- 1982-1986. Association Française pour l'Etude du Sol (AFES) (French Association for Soil Study),
- 1989-1993. Comité scientifique du Centre de Pédologie Biologique (CPB-CNRS) (Scientific Committee of the Centre of Biological Pedology),
- 1983-1987. Groupe Sciences-Nature de l'Association Française pour l'Avancement des Sciences (AFAS) (Natural Science Group of the French Association for the Advancement of Science),

- 1987-1991. Conseil scientifique du Programme Interdisciplinaire des Recherches géodynamiques Tropicale péri-atlantique (PIRAT de l'INSU/CNRS-ORSTOM) (Scientific Council of the Interdisciplinary Programme of Geodynamic Tropical Peri-Atlantic Research).

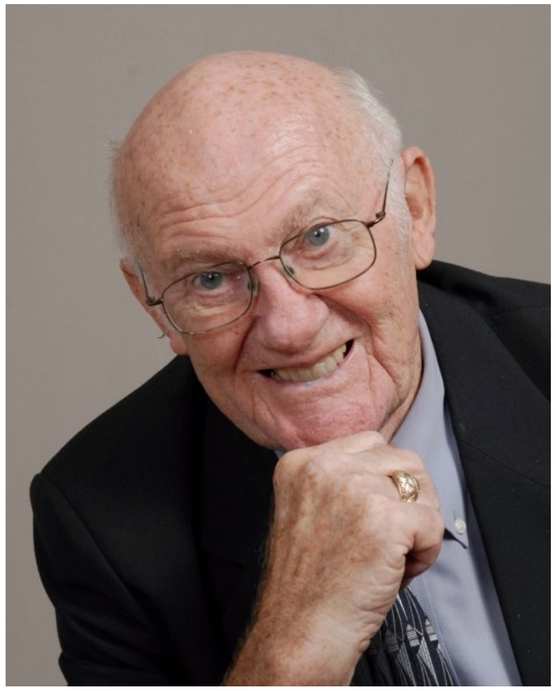
In 1998, he presided over the Scientific Council of the International Soil Science Congress (Montpellier).
He was a remarkable teacher (1965-1995) and numerous soil scientists attended his DEA lessons in Pedology and continued on to PhD with him. With the Orstom he was part of the grand African, Brazilian, New Caledonian etc. field tours from the 1970s to 1990s.
Georges Pédro was a member of both the Academy of Science and the Academy of Agriculture. For the latter he had also been president in 1993 and then became permanent vice-secretary in 1997 and finally permanent secretary from 1998 to 2004. He was a founder member of the Academy of Technology (2000). He received the CNRS (France's National Research Centre) silver medal in 1980 and was Officer of the French Legion of Honour.
He was not only an exceptional scientist but also a great humanist, historian and a highly cultured and sensitive man. He took time for people. Many of us, his colleagues, feel that we have lost a great friend.

*By Christian Feller and Michel Brossard*
*(Past-president and current president AFES)*



# Larry Wilding

(1934-2019)



Larry Wilding, © *https://www.hillierfuneralhome.com/tributes/Lawrence-Wilding*

An inspiration to family, friends and colleagues throughout the world, Lawrence 'Larry' Paul Wilding passed away on January 12, 2019 after an unexpected brain aneurysm while surrounded by the family he loved, served, and led.

Larry was born in Winner, Tripp County, South Dakota on October 1,1934, the son of William Kasper Wilding, Jr and Ruth Inez Wilding. He was the last of four children with sister Betty Jane and brothers Billy and Kenny. He grew up in Winner, SD as a farm boy milking cows and making money for the family by taking the milk and cream to town to be sold. As a young boy Larry learned his well- known humble attitude and servant qualities from his father William, as well as how to fix things and 'think outside the box". He enjoyed performing science experiments, caring for animals and riding his horse, Smokey. Larry went to a country school and was taught by his sister in seventh grade. After graduating from Winner High school, he attended South Dakota State University, majoring in Soils and Crops.

It was during his time at South Dakota State that Larry met the love of his life, Gladys Dora Milne. They were married after graduation in 1956 and started their life together as Larry worked on his M.S. degree in Soils at South Dakota State, graduating in 1959. Their first child, Linda, was born during this time and Larry served faithfully in the National Guard. From there, he moved his little family to Urbana, IL, where he received a Ph.D. from the University of Illinois in 1962. His daughter Doris and son Charles were born during this period. From there,

Larry joined The Ohio State University Agronomy faculty in 1962 and worked on soil genesis and classification and clay mineralogy for fourteen years. His fourth child, David, was born in Columbus Ohio. Larry and Gladys were blessed with sixty-two years of marriage. Their enduring love was evident in all they did and was especially meaningful the last few years as Larry served beyond compare in his role of caregiver to Gladys.

In 1976, the family made their final move to Texas A&M University to join a vibrant Soil and Crop Science department until his retirement in 2003, after which he was bestowed the title of Professor Emeritus. While with Texas A&M Larry spent time around the world serving for several summers in Africa, traveling and speaking in China, and serving and leading national and international soil science societies. More specifically, he served as president of SSSA, member of several NRC/NAS Committees, and as co-chair of the 18th World Congress of Soil Science during which amazing friendships developed. Larry was extremely active in IUSS. He was a member of the committee that developed the structure for IUSS and was an Honorary Member. He received numerous other honors and awards. His career focused on pedology with over forty years of teaching and research experience in near-surface Earth processes. Larry was the major professor for forty-seven students who received their doctorate and masters degrees. His expertise was evident in the fact that many of his former students hold influential positions throughout the world. His rich career included innumerable awards and writings in journals and books. He was known as a leader in the field of Pedology. In the last few years, the Wildings established a scholarship to demonstrate the importance of international experiences by providing international travel scholarships to full-time students pursuing a degree in the Department of Soil and Crop Sciences.

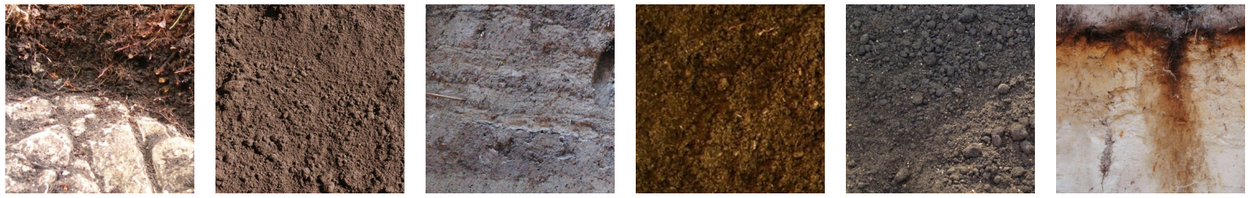
As a father and grandfather, Larry led by example. He was kind, wise, gentle, nurturing, and had an incredible work ethic. He modeled how to love others deeply by giving of himself to meet other's needs. His children and grandchildren learned the importance of tithing by him passing out dollars for them to drop in the offering plate. Giving to and praying for the less fortunate taught them the importance of caring for all. Larry and Gladys enjoyed many years being involved and serving faithfully at First Presbyterian Church in Bryan.

Larry and Gladys enjoyed seeing the world and visited a significant number of countries, oftentimes with work related events, invitations, and speaking engagements. Frequent trips were made to South Dakota and Scotland to visit family and friends. Trips to New Hampshire, a second home, were especially enjoyable with the fall foliage and apples. These places and people were especially dear to them.

In his free time, Larry enjoyed woodworking and fixing things, where he taught his children and grandchildren to 'Measure twice; cut once,' and 'Spend five minutes thinking; save an hour of work.' He spent time gardening and at social clubs enjoying bridge and gourmet foods. He collected rocks, antiques, coins, and clocks and loved attending Aggie football and basketball games.

Larry is survived by his wife Gladys Wilding and his four children (Linda Kirschenman and spouse Terry, Doris Hermann and spouse Karl, Charles Wilding and spouse Laura, and David Wilding and spouse Michelle). He is also survived by his ten grandchildren (Mark, Stewart and spouse Lauren, Christine, Katie and spouse Luke, Susan, Scott and spouse Emily, Heather, Victoria, Grace, and Hope) who he loved richly, as well as numerous cousins, nieces, and nephews. Additionally, he is survived by his Spanish foreign exchange student, Ignacio Fernandez-Montez, who was like a son to him.
In the last few years, the Wildings established a scholarship to demonstrate the importance of international experiences by providing international travel scholarships to full-time students pursuing a degree in the Department of Soil and Crop Sciences. Donations to the Larry and Gladys Wilding International Student Travel Scholarship (#35065) can be made at: *https://www.txamfoundation.com/give.aspx*
Larry was a well renowned soil scientist, loving family man, serving husband, and great teacher to all. He walked this earth with incredible generosity and love for others. He will be deeply missed.

*[From the obituary on https://www.hillierfuneralhome.com/tributes/Lawrence-Wilding amended by Donald Sparks, Professor of Plant and Soil Sciences, Chemistry and Biochemistry, Civil and Environmental Engineering, and Marine Science and Policy Director, Delaware Environmental Institute]*



# IUSS Honorary Members and Award Winners

## IUSS Honorary Members

| Year | Member | Country |
|---|---|---|
| 1924 | L. Cayeux † | France |
| | K. Glinka † | USSR |
| | Jos. Kopecky † | Czechoslovakia |
| | G. Murgoci † | Romania |
| | E. Ramann † | Germany |
| | Sir John Russell † | UK |
| | S. Winogradski † | USSR |
| 1927 | P. Treitz † | Hungary |
| 1935 | E.A. Mitscherlich † | Germany |
| | A. d'Sigmond † | Hungary |
| | J. Stoklasa † | Czechoslovakia |
| | G. Wiegner † | Switzerland |
| 1950 | A. Demolon † | France |
| | D.J. Hissink † | Netherlands |
| | W.P. Kelley † | USA |
| 1954 | S. Mattson † | Sweden |
| | E. Truog † | USA |
| 1956 | G. Bertrand † | France |
| | E.C.J. Mohr † | Netherlands |
| 1960 | F.A. Bear † | USA |
| 1964 | J.A. Prescott † | Australia |
| 1968 | F. Hardy † | UK |
| | W.L. Kubiena † | Germany |
| | L.A. Richards † | USA |
| | A.A. Rode † | USSR |
| 1974 | R. Bradfield † | USA |
| | G.V. Jacks † | UK |
| | Ch.E. Kellogg † | USA |
| | M.K. Kononova † | USSR |
| | A. Oudin † | France |
| | F. Scheffer † | Germany |

| Year | Member | Country |
|---|---|---|
| 1978 | G. Barbier † | France |
| | V. Ignatieff † | Canada |
| | Y. Ishizuka † | Japan |
| | L. Krolikowski † | Poland |
| | L. Vettori † | Brazil |
| 1982 | Ph. Duchaufour † | France |
| | W. Flaig † | Germany |
| | V. Kovda † | USSR |
| | E. Mueckenhausen † | Germany |
| | E.W. Russell † | UK |
| 1986 | H. Jenny † | USA |
| | D. Kirkham † | USA |
| | S.K. Mukherjee † | India |
| | R. Tavernier † | Belgium |
| 1990 | G. Aubert † | France |
| | E.G. Hallsworth † | Australia |
| | J.S. Kanwar | India |
| | P. Schachtschabel † | Germany |
| | R.W. Simonson † | USA |
| | I. Szabolcs † | Hungary |
| 1998 | G.H. Bolt † | Netherlands |
| | R. Dudal † | Belgium |
| | K.H. Hartge † | Germany |
| | M. Kutilek † | Czech Rep. |
| | J. Quirk | Australia |
| | W.G. Sombroek † | Netherlands |
| | K. Wada | Japan |
| | D.H. Yaalon † | Israel |
| | S.V. Zonn † | Russia |

| Year | Member | Country |
|---|---|---|
| 2002 | Richard W. Arnold | USA |
| | Gleb V. Dobrovolsky † | Russia |
| | Wilford Gardner † | USA |
| | Hassan M. Hamdi † | Egypt |
| | Luis A.L. Sarmiento | Colombia |
| | Fiorenzo Mancini † | Italy |
| | Boris S. Nosko | Ukraine |
| | Ramon Rosell † | Argentina |
| | Alain Ruellan † | France |
| | Akira Tanaka † | Japan |
| | Bernard H. Tinker | UK |
| 2004 | Winfried E.H. Blum | Austria |
| | Hans-Peter Blume | Germany |
| | Johan Bouma | Netherlands |
| | Seong-Jin Cho † | S Korea |
| | Jan Glinski | Poland |
| | Marcel G.H. Jamagne † | France |
| | Donald R. Nielsen | USA |
| | Hans V. van Baren † | Netherlands |
| | Larry P. Wilding † | USA |
| 2008 | Christian Feller | France |
| | Kikuo Kumazawa | Japan |
| | Kazutake Kyuma | Japan |
| | John Ryan | Syria |
| | Bob A. Stewart | USA |
| | Victor Targulian | Russia |
| | György Varallyay † | Hungary |
| | Jai Singh Pal Yadav † | India |
| 2012 | Jai-Joung Kim | Korea |
| | John M. Kimble | USA |
| | Ahmet Ruhi Mermut | Canada |
| | Nicola Senesi | Italy |
| | Donald L. Sparks | USA |
| | Robert E. White | Australia |

| Year | Member | Country |
|---|---|---|
| 2016 | I. P. Abrol | India |
| | Jaume Bech | Spain |
| | Maria Gerasimova | Russia |
| | Martin H. Gerzabek | Austria |
| | Mary Beth Kirkham | USA |
| | Josef Kozak | Czech Republic |
| | Stephen Nortcliff | United Kingdom |
| | Marcello Pagliai | Italy |
| | Piotr Sklodowski | Poland |
| | Karl Stahr | Germany |
| | Roger Swift | Australia |
| | Tengiz F. Urushadze | Georgia |
| | Jae Yang | Korea |



# IUSS Award Winners

| Dokuchaev Award | | |
|---|---|---|
| Year | Member | Country |
| 2006 | Victor Targulian | Russia |
| 2010 | Dan Yaalon | Israel |
| 2014 | Alex McBratney | Australia |
| 2018 | Johan Bouma | Netherlands |

| Von Liebig Award | | |
|---|---|---|
| Year | Member | Country |
| 2006 | Rattan Lal | USA |
| 2010 | Don Sparks | USA |
| 2014 | Magdi Selim | USA |
| 2018 | John Ryan | Ireland |

| Jeju Award | | |
|---|---|---|
| Year | Member | Country |
| 2018 | John Bennett | Australia |