SEALNET-IV/20/Report

Report of the Fourth meeting of the Asian Soil Laboratory Network (SEALNET)

Virtual meeting, 30 June – 2 July 2020

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FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

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Introduction

The fourth meeting of the Asian Soil Laboratory Network (SEALNET) was held online, from 30 June to 2 July 2020. The meeting was attended by about two hundred and fifty-five laboratory staff members from eighteen Asian countries (Afghanistan, Bangladesh, Bhutan, Cambodia, China, India, Indonesia, Japan, Lao PDR, Mongolia, Myanmar, Nepal, Pakistan, Philippines, Sri Lanka, Taiwan, Thailand and Vietnam). The list of participants is available in Annex I.

The meeting was opened by Ms. Gina Nilo as SEALNET Chair that recalled the objectives of the meeting: (i) to inform Asian laboratories on GLOSOLAN progresses and way forward, (ii) to train soil laboratories on health and safety, (iii) to train laboratories on internal and external quality control, and (iv) to define the position of SEALNET in GLOSOLAN by agreeing on the activities to implement in the region in 2020 as per the work plan of GLOSOLAN and collect regional inputs on GLOSOLAN work.

Highlights and conclusions

Due to Covid-19 outbreak, the meeting was organized virtually using Zoom Video Communications© platform and lasted three days, with a four-hours meeting every day (see the agenda in Annex II). The meeting consisted of three sessions: (i) session one focused on updating participants on the implementation of GLOSOLAN activities and on introducing new laboratories in SEALNET. Still, a regional overview on the status of laboratories, their needs and expectation on GLOSOLAN was provided. (ii) The main session of the meeting consisted on training on internal and external quality control, health and safety. Trainings were made more interactive by laboratories presenting thematic case studies. (iii) The last session of the meeting on defining the position of SEALNET in GLOSOLAN.

Status of participating laboratories

Representatives from Afghanistan and Hong Kong/China were given the opportunity to present about the status of their laboratories because these countries were new to the network. All other laboratories were kindly asked to complete an online survey at the purpose of retrieving information on the status of laboratories in the region. The online survey enquired on (1) he amount of tests performed every year by individual labs per each type of analysis (chemical, physical and biological), (2) quality control procedures in place, (3) the registration of the lab to national and/or international Proficiency Testing programs, (4) laboratory weaknesses and (5) expectations on GLOSOLAN and SEALNET. Survey results are herewith discussed.

Laboratory facilities

Laboratories showed to be consistently different in equal number in terms of surface area. Indeed, almost the same number of laboratories reported to have an area of less than 150 m^2, between 150 m^2 and 600 m^2, and larger than 600 m^2. Concerning the number of rooms within the laboratory structure, the majority of laboratories (thirteen) reported to have less than five rooms, while eleven laboratories were made up by more than ten rooms. Finally, six laboratories stated to have their working space organized between five to ten rooms.

Laboratory staff

Around 40 percent of laboratories rely on a number of working staff ranging between 5 and 10 people, while the 25 percent of them has personnel made up by less than five people. Sixteen percent of laboratories reported to have an amount of personnel ranging between 10 and 20 people and another 16 percent seemed to have more than 20 staff members. In more than 60 percent of the cases staff members are trained on a regular basis, while laboratories training personnel occasionally or not at all represented almost 40 percent of the respondents. The staff qualification was also investigated. Results showed that the majority of working staff obtained a Bachelor's degree. Still, 28 percent of the lab staff has a Master of Science and only the 21 percent hold a Ph.D.

Amount of samples analyzed every year

A significant difference was noted regarding the type of analysis performed by the laboratories. While all of them perform chemical analysis (and more than the half of them can handle more than two thousand samples per year), physical and biological analysis are performed by the 80 and the 30 percent of them, respectively.

Quality Control process

Only the 60 percent of respondents implemented Quality Control (QC) procedures in their activities. Out of those, almost the 80 percent run a reference sample every batch of analysis, while the 14 percent relies their QC on Proficiency Testing (PT) organized more than one time per year. Ultimately, the 7 percent of them joined PT only once every year or less.

Areas for improvement:

- The implementation of QC procedures within the routine laboratory work represented the main need expressed by respondents;
- Staff training. Developing training programs on a regular basis is one of the main issues in the region. Areas of interest regards the use of new equipment and the adoption of standard methods of analysis;
- Implementation of harmonized Standard Operating Procedures (SOPs);
- Training on cutting-edge technologies for soil analysis, with special regard to spectroscopy;
- Health and safety measures;
- Need for consumables and equipment, including a better technical assistance from the manufacturers;
- Improve the management of laboratory waste material.

The expectations related to the implementation of SEALNET reflect the needs expressed in the above-listed areas for improvements, and are in line with the main activities planned by GLOSOLAN. These are hereby summarized:

- To improve laboratory capacity by providing technical assistance and organizing training programs;
- To harmonize methods and SOPs;
- To share knowledge among network members, both at regional and global levels;
- To be involved in the organization of PTs exercises;
- To be involved in the awareness raising process, in order to increase funding opportunities and persuade national government and institutions operating at the local level to invest in laboratories.
- To be provided with the necessary instrumentation.

Additional information on laboratories staff and facilities are provided in table 1.

Table 1. Statistics on staff and laboratories characteristics

	Laboratory information
Number of staff	➢ <5 people: **8 labs** ➢ From 5 to 10 people: **12 labs** ➢ From 10 to 20 people: **5 labs** ➢ >20 people: **5 labs**
Level of education of staff members (taking into account only the personnel with a degree)	➢ B.Sc.: **51 %** ➢ M.Sc.: **28%** ➢ Ph.D.: **21%**
Regularity of training	➢ Regularly: **63%** ➢ Not Regularly: **37%**
Laboratory space (in m^2)	➢ <150 m^2: **8 labs** ➢ From 150 to 600 m^2: **11 labs** ➢ >600 m^2: **11 labs**
Laboratory space (number of rooms)	➢ From 1 to 5 rooms: **13 labs** ➢ From 5 to 10 rooms: **6 labs** ➢ >10 room: **11 labs**

Training

One of the main focus of the meeting regarded training laboratories in internal and external quality control (trainers: Mr. Rob De Hayr, Department of Environment and Sciences, Queensland, Australia and Mr. Christian Hartmann, IRD France), and health and safety (trainer: Ms. Hanane Aroui, IRD France). Main training considerations:

- Preparation of QC samples and their use within laboratory activities (especially in analytical batches). Interpretation of the internal QC tests was explained via the adoption of QC charts and by estimating the uncertainty related to the measurement. The importance of performing internal QC procedures was highlighted also in terms of improvement of analytical performance quality of the laboratory. Some laboratories reported the problem to find accreditation bodies in their own countries, which would make the QC process easier. Many times this is possible, but the budget limitations represent an important issue to access such services. This is why many laboratories hoped for a larger awareness raising process (in order to have the chance to obtain more financial resources). In this regard, some laboratories proposed that those having issues with the access to certification bodies can received assistance from other laboratories or countries within SEALNET or even at global level from GLOSOLAN members.

- The importance of **downscaling proficiency testing** was supported by the presentation of laboratories already organizing national PTs. Following the announcement that the GLOSOLAN PT 2020 will not take place due to Covid-19, countries were encouraged to organize national and regional PTs. Some participants raised the issue that PT samples providers are often difficult to find. It was also pointed out the importance of selecting the right soil type when organizing a PT, which should take into account the kind of analysis to be performed. In this regard, the possibility to develop strategies aimed to establish sub-networks specialized on the analysis of certain soil types (volcanic soils, salt-affected soils, black soils, etc.) was stressed. Finally, it was pointed out that solving problems related to i.e. PT and QC is often not a matter of budget but a matter of improving laboratory accuracy (management issue).
- **Health and safety** features in the laboratory were addressed using participating tools in addition to the trainers' presentations.

Position of SEALNET in GLOSOLAN

Ms. Lucrezia Caon (GLOSOLAN Coordinator, GSP Secretariat) introduced participants to the agenda of the Fourth GLOSOLAN meeting and asked for their opinion on:

- The Standard Operating Procedures (SOPs) GLOSOLAN should work on harmonizing in 2020-2021, which was followed by the identification of regional leaders.
  In addition to the SOPs already in the 2020-2021 agenda of GLOSOLAN, SEALNET proposed the network to work also on the following SOPs:
    - Texture and coarse fraction (pipette method and hydrometer). Regional leaders: Renuka, Sri Lanka
    - Moisture content. Reginal leaders: Jamyang, Bhutan
    - Available micronutrients (Fe Zn Cu Mn Mo) – extraction using DTPA. Reginal leaders: Sanjay, India
    - Boron by hot water extraction, by Dilute HCl and by CaCl2. Reginal leaders: Ansar Farooq, Pakistan
    - Exchangeable acidity (Al and H). Reginal leaders: Somsak Maneepong, Thailand
    - Exchangeable bases (calcium, magnesium, sodium and potassium) by AAS/flamephotometer. Reginal leaders: Choudhari, India
    - Microbial biomass. Reginal leaders: Sanjay/ Ashok, India

- Opinion on the FAO Soils Bulletin 74 – "Guidelines for Quality Management in Soil and Plant Laboratories". The large majority of participants expressed the need to update the guidelines.

In conclusion, Ms. Caon reminded participants that whoever is interested and has the capacity to prepare large amounts of homogeneous soil samples could become a PT samples provider to GLOSOLAN. Still, participants were asked to complete the survey related to the global assessment 2020. It was agreed that before publishing the global assessment 2020 report, all countries will have the opportunity to review and confirm their country profile. Participants were also informed that GLOSOLAN will start investing in the establishment of the National Soil Laboratory Networks. As a start, a webpage will be created per each

country. Laboratories were kindly invited to provide the information to include in the webpage on their country. Still, laboratories doing fertilizers analysis were invited to register to the International Network on Fertilizers Analysis.

Venue and time of the next meeting

Due to the world pandemic, the 4th SEALNET meeting was organized virtually. This allowed all participants to be more confident with the powerful tool of video meeting. Both advantages and disadvantages have been reported by the participants. While many stated the asset of having a much larger audience since the hindrance represented by travel costs is not present, some participants reported the issues related to the absence of in person chats and meetings, since during the moments of social interactions more ideas can come out. Problems related to bad conditions of network and technical problems, which may become a serious impediment for the success of the meeting, have been pointed out as well. After discussing this item, the majority of the participants (70 percent) proposed to continue organizing SEALNET meeting online every year, in order to allocate resources for trainings and other areas of improvement (such as instrumentation, equipment and safety measures).

Annex I. List of participants

Ms. Lucrezia Caon, Global Soil Partnership Secretariat, FAO HQ

Mr. Filippo Benedetti, Global Soil Partnership Secretariat, FAO HQ

Ms. Nopmanee Suvannang, GLOSOLAN Chair

Mr. Rob de Hayr, GLOSOLAN Vice-Chair

Mr. Christian Hartmann, IRD France

Ms. Hanane Aroui, IRD France

Participant	Laboratory Official Name	Country
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Said Azmar	Soil Laboratory of Nangarhar PAIL	Afghanistan
Ahmad Wali Wali	Soil Laboratory of Nangarhar PAIL	Afghanistan
Asadullah Hamdard	Soil Laboratory of ANASTU	Afghanistan
Allah Dad Noori	Soil Laboratory of ANASTU	Afghanistan
Qudratullah Rahmati	Soil Laboratory of Herat University	Afghanistan
Frough Mujadedi	Soil Laboratory of Parwan PAIL	Afghanistan
Mohammad Rafi Salihzada	Soil Laboratory of Parwan PAIL	Afghanistan
M. Shohidullah Miah	Agricultural Laboratory, IUBAT	Bangladesh
Muhammad Rehan Dastagir	Agricultural Laboratory, IUBAT	Bangladesh
Shaila Sharmin	Agricultural Laboratory, IUBAT	Bangladesh
M. Rehan Dastagir	Soil Science Lab of College of Agricultural Sciences of IUBAT	Bangladesh
Begom Samia Sultana	Central Laboratory, Soil Resource Development Institute	Bangladesh
Mohiuddin Ahmed	Central Laboratory, Soil Resource Development Institute	Bangladesh
Md. Taiabur Rahman	National focal point	Bangladesh
Tsheten Dorji	National Soil Services Centre	Bhutan

Dawa tashi	National Soil Services Centre	Bhutan
Jigme kundrel	National Soil Services Centre	Bhutan
Damber singh Alay	National Soil Services Centre	Bhutan
Jigme Dorji	National Soil Services Centre	Bhutan
R.B.Subha	National Soil Services Centre	Bhutan
Wangchuk Dema	National Soil Services Centre	Bhutan
Karma Choden	National Soil Services Centre	Bhutan
Tashi Uden	National Soil Services Centre	Bhutan
Tshering Pem	National Soil Services Centre	Bhutan
Karma Lekpel Jamtsho	National Soil Services Centre	Bhutan
Tashi wangchuk	National Soil Services Centre	Bhutan
Norbu Rinchen	National Soil Services Centre	Bhutan
Nima Tshering	National Soil Services Centre	Bhutan
Jamyang	National Soil Services Centre	Bhutan
Jigme Tshering	Land Management Unit, NSSC	Bhutan
Kuenzang Nima	Land Management Unit, NSSC	Bhutan
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Vannak Ann	Soil laboratory (ITC)	Cambodia
Pinnara Ket	Soil laboratory (ITC)	Cambodia
Boreborey Ty	Soil laboratory (ITC)	Cambodia
Lyda Hok	Soil laboratory (RUA)	Cambodia
Xueli Chen	SFI, HAAS	China
Chunyan Gong	SFI, HAAS	China
Shuming Wan	SFI, HAAS	China
Derrick Lai	The Chinese University of Hong Kong	China
Thomas Lui	The Chinese University of Hong Kong	China
Wang Hong	Institute of Agricultural Resources and Regional Planning, Chinese Academy of Agricultural Sciences	China
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Sanjay Srivastava	Indian Institute of Soil Science	India
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Dovchin Zandraagombo	Head of Soil-Agrochemistry laboratory of IPAS	Mongolia
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Kanthana Klaigaew	System Research of Soil and Water Quality Laboratory, Agricultural Chemistry group, DOA	Thailand
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Tana Sombuttun	Land Development Regional Office 7, LDD	Thailand
Phichit Ratchabaen	Land Development Regional Office 9, LDD	Thailand
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Khanok-on Amprayn	Soil, Fertilizer and Plant Analysis Laboratory	Thailand
Napassawan sunthorn	Soil, Fertilizer and Plant Analysis Laboratory	Thailand
Phanuphong Khongchiu	Soil, Fertilizer and Plant Analysis Laboratory	Thailand
Nattapong Chanchula	Soil, Fertilizer and Plant Analysis Laboratory	Thailand
Praweena Tangbovornthamma	Soil, Fertilizer and Plant Analysis Laboratory	Thailand
Somsak Maneepong	Walailak University	Thailand
Sukunya Yampracha	Laboratory of Soil Science, Department of Plant Production Technology, Faculty of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang (Soil Science, KMITL)	Thailand
Pattrarat Teamkao	Laboratory of Soil Science, Department of Plant Production Technology, Faculty of Agricultural	Thailand

	Technology, King Mongkut's Institute of Technology Ladkrabang (Soil Science, KMITL)	
Nanchaphorn Udomsri	Laboratory of Soil Science, Faculty of Agriculture, Chiang Mai University	Thailand
Kawiporn Chinachanta	Laboratory of Soil Science, Faculty of Agriculture, Chiang Mai University	Thailand
Fapailin Chaiwan	Division of Soil Science, Department of Plant and Soil Science, Faculty of Agriculture, Chiang Mai University	Thailand
Audthasit Wongmaneeroj	Soil Science Department	Thailand
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Ratchaneegorn Kaewpa	Soil Science, Faculty of Agriculture, Chiang Mai University (CMU)	Thailand
Tasanee Pripanakul	Soil Science, Faculty of Agriculture, Chiang Mai University (CMU)	Thailand
Sirinrat Thongbopit	Soil Science, Faculty of Agriculture, Chiang Mai University (CMU)	Thailand
Nattanicha Pompukdee	Soil Science, Faculty of Agriculture, Chiang Mai University (CMU)	Thailand
Aunthicha Phommuangkhuk	Laboratory of Soil and Plant Analysis	Thailand
Sirisuda Butchpetch	Laboratory of Soil and Plant Analysis	Thailand
Yanisa Namsawat	Laboratory of Soil and Plant Analysis	Thailand
Do Duy Phai	Central Analytical Laboratory – Soils and Fertilizers Research Institute	Vietnam
Doan Thu Thuy	Microbiology Department - Soils and Fertilizers Research Institute	Vietnam
Cao Hoang	Soil and Agricultural product quality analysis lab – Northern Mountainous Agriculture and Forestry Science Institute	Vietnam
Nguyen Luong Thien	Center for Agricultural analysis and services – Institute of Agricultural Science for Southern Vietnam	Vietnam

Annex II: Agenda

Tuesday, 30 June 2020

7:00 – 7:15	**Opening of the meeting and approval of the agenda** Gina Nilo, SEALNET Chair Lucrezia Caon, GSP Secretariat
7:15 - 7:50	**Item 1: Individual laboratory presentations** • Afghanistan, Soil Laboratory of Soil Research Directorate, Hameedullah Ahmadzai • China, The Chinese University of Hong Kong, Derrick Lai and Thomas Lui **Item 2: Status of soil laboratories: overview** Filippo Benedetti, GSP Secretariat
7:50 – 8:00	**Item 3: Global Soil Laboratory Network updates** Nopmanee Suvannang, GLOSOLAN Chair Lucrezia Caon, GSP Secretariat
8:00 – 8:20	**Item 4: Global assessment 2020: presentation of regional findings | Discussion on regional priorities in soil laboratories – formulation of requests and proposals** Moderator: Lucrezia Caon, GSP Secretariat & Gina Nilo, SEALNET Chair
8:20 – 9:00	**Item 5: Presentation and discussion of the results of the GLOSOLAN PT 2019** Christian Hartmann, IRD France
9:00 – 11:00	**Item 6: Training on external quality control (PT)** • The case of Bhutan - Jamyang, Soil & Plant Analytical Laboratory, Bhutan • The case of Indonesia - Laili Purnamasari, Laboratorium Pengujian Balai Penelitian Tanah - Indonesian Soil Research Institute, Indonesia • The case of India - Sanjay Srivastava, ICAR-Indian Institute of Soil Science • The case of Japan - Yuji Maejima and Takashi Kanda, Soil Inventory Unit, National Institute for Agro-Environmental Sciences, NARO • The case of Mongolia - Enkhtuya Bazarradnaa, Soil-Argochemistry Laboratory, IPAS, Mongolia

- The case of Myanmar - Su Su Win, Soil and Plant Analysis Laboratory, Myanmar
- The case of the Philippines - Gina P. Nilo, Laboratory Services Division – Bureau of Soils and Water Management, Philippines
- The case of Sri Lanka - Renuka Silva, Central Soil and Fertilizer Testing Laboratory, Sri Lanka
- The case of Thailand - Chanida Charanworapan, Office of Science for Land Development (OSLD)
- The case of Viet Nam - Do Duy Phai, Central Analytical Laboratory – Soils and Fertilizers Research Institute, Viet Nam

Discussion on the case studies

- The case of the Pacific Soil Laboratory Network (ASPAC), Rob De Hayr, GLOSOLAN Vice-Chair

Moderator: Christian Hartmann/IRD France, Gina Nilo/SEALNET Chair, and Lucrezia Caon/GSP Secretariat

11:00 **Wrap up and closure of the day**

Wednesday, 1 July 2020

7:00 – 8:30 **Item 7: Downscaling GLOSOLAN and SEALNET PTs**

The organization of national PTs in China - Wang Hong, Institute of Agricultural Resources and Regional Planning (IARRP) of Chinese Academy of Agricultural Sciences (CAAS)

- The organization of national PTs in Indonesia - Laili Purnamasari, Laboratorium Pengujian Balai Penelitian Tanah, Indonesian Soil Research Institute, Indonesia
- The organization of national PTs in Thailand - Chanida Charanworapan, Office of Science for Land Development (OSLD)
- The organization of a national PTs in India - Dr. Ashok K Patra, Director, ICAR-IISS
- The organization of national PTs in the Philippines - Gina P. Nilo, Laboratory Services Division, Bureau of Soils and Water Management, Philippines

Moderator: Christian Hartmann/IRD France, Gina Nilo/SEALNET Chair, and Lucrezia Caon/GSP Secretariat

Reference document: Basic guidelines on how to produce a soil sample for proficiency testing. Available at http://www.fao.org/3/ca7522en/ca7522en.pdf

Discussion on downscaling

8:30 – 11:00 **Item 8: Training on internal quality control**

Rob De Hayr, GLOSOLAN Vice-Chair

- Overview of internal quality control measures
- How to prepare and use internal quality control soil samples
- How to introduce internal QC samples in analytical batches
- QC charts - how to interpret the results of internal QC: QC charts and development of estimates of Measurement of Uncertainty using a top down approach
- How to take action in case of bad results
- Presentation from the labs that already have QC procedures in place

Reference document available at:

- Basic Guidelines for Preparing a Sample for Internal Quality Control. Available at http://www.fao.org/3/ca9320en/ca9320en.pdf
- Guidelines for Quality Management in Soil and Plant Laboratories. (FAO Soils Bulletin - 74). Available at http://www.fao.org/3/W7295E/W7295E00.htm
- [For those that have access to it] ISO Guide 80:2014(E) Guidance for the in-house preparation of quality control material (QCMs)

11:00 **Wrap up and closure of the day**

Thursday, 2 July 2020

7:00 – 9:00 **Item 9: Training on Health and Safety**
Hanane Aroui, IRD France

9:00 – 10:00 **Item 10: SEALNET position in GLOSOLAN**

- Decision on the SOPs to harmonize in 2021 and identification of regional leaders
- Opinion on the need to update the FAO Soils Bulletin 74 – "Guidelines for Quality Management in Soil and Plant Laboratories" – (http://www.fao.org/3/W7295E/W7295E00.htm)

Moderators: Nopmanee Suvannang, GLOSOLAN Chair and Lucrezia Caon, GSP Secretariat

11:00 **Closure of the meeting**