Groundwater management for land subsidence in an urban context

Host : UNESCO *, UNESCO, UNESCO

Presenters

Alexandros Makarigakis(Programme Specialist, UNESCO , Division of Water Sciences, France)
Heri Andreas(Geodesy Research Division Faculty of Earth Sciences and Technology Institute of Technology Bandung Indonesia, Indonesia)
Shujun Ye(Department of Hydrosciences, School of Earth Sciences and Engineering, Nanjing University, China)
Dora Carreon-Freyre(Centro de Geociencias, Campus Juriquilla, UNAM, Mexico)

Description

Body

i. Title and a short description of the session's topic and/or sub-theme (and alignment with which congress theme)

"Groundwater management for land subsidence in an Urban context"

Land subsidence occurs gradually with sever impacts on humans and their settlements, as it can destroy houses and facilities, damage agriculture and drainage infrastructure, degrade the quality of the aquifer, as well as increase the risk of flooding mainly for coastal urban centers. This session will focus on the challenges of land subsidence at an urban level and demonstrate technical solutions through groundwater management perspectives. This session aligns with theme C 'Adoption smart technologies, policies and processes' and the cross – cutting theme 3 'Delivering SDG outcomes: Five years on and looking to 2030'.

ii. Name of nominating organisation (s) : UNESCO - Land Subsidence Initiative (LaSII), UNESCO-IHP, K – Water

iii. Session objectives, justifications, and projected outcomes, aligned with the specified programme theme

This session will introduce to IWRA delegates to cutting-edge research in the area of sustainable groundwater management to prevent land subsidence and related ground ruptures. Diverse representatives from various institutions will present their findings and cases, related to the session and the conference cross-cutting themes. The presentation will be covering major topics related to:

- Aquifer-system compaction and subsidence caused by groundwater abstraction
- Land subsidence in coastal urban areas
- Ground ruptures in semi-arid urban areas
- Integrated approaches to managing groundwater and climate change
- Land surface displacement, measuring and monitoring
- Social, cultural and economic influence of land subsidence
- Water management strategies for urban settlements

Justifications

Land subsidence is a "silent" disaster. It takes long time to develop, much longer than other natural

hazards such as flooding, or landslides, and it remains unnoticed until the effects become irrecoverable. The loss of land elevation cannot be recovered anymore. Although the physical process has been understood since the 1950s, land subsidence is threatening more urban areas and million people now than in the previous decades. And most of these cities are located in developing countries where the economical availability to implement mitigation strategies is low. Therefore, this session is aimed at increasing the awareness on this process at the world scale. Land subsidence can be avoided with an appropriate management of the available water resources.

Projected outcomes

The short-term outcome is to make the management and technical authorities of developing countries aware of the land subsidence process and the possible consequences. The mid- to long-term outcome is to make conscious that strategic plans of optimal water management must be developed in parallel with the growth of urban areas. The singularity of Jakarta, which is subsiding at 20 cm per year although it received a yearly precipitation of 2000 mm, must remain alone

Alignment with Congress

Land subsidence is an irrecoverable disaster fully caused by of an unproper water management. Therefore, the session matches perfectly several of the congress themes: theme A (specifically A1 and A3), theme C (specifically C1), theme D (specifically D3), theme E (specifically E3), and the crosscutting topic 3 (specifically 3.1 and 3.2).

iv. How the session will be organised and by whom

After an introduction keynote address (10 minutes) there will be 4 presentations (10 minutes each). Presentations will include a brief overview of the land subsidence at urban level.
The final 30-40 minutes will be devoted to an interactive Panel Discussion including presenters, audience and Q & A.

v. Presenters who are proposed to speak/present in the session

1. Pietro Teatini (LaSII)
2. Alexandros Makarigakis (UNESCO)
3. Heri Andreas, Indonesia: he will clearly explain the situation in Jakarta and the possible ways proposed to authorities to mitigate land subsidence. Jakarta can be viewed as the exemplification of the situation of coastal mega-cities in developing countries. Several cities in Asia are experiencing the same process and related problem; but also in Africa, this is started to becoming an issue, e.g., in Lagos, Nigeria;
4. Dora Carreon, Mexico: she will explain how ground ruptures associated to groundwater over-exploitation can severely threatened inland cities in semi-arid environments. Mexico City and other large cities in central Mexico are largely affected by this subsidence-related phenomenon;
5. Shujun Ye, China: she will explain how land subsidence due to groundwater pumping in Shanghai has been efficiently controlled and reduced over the last decade.

vi. Description of financial and other resources that could be committed to realising the session

The session is going to be virtual.