IAF EARTH OBSERVATION SYMPOSIUM (B1)
Assessing and Mitigating the Global Freshwater Crisis (6)

Author: Ms. Beverley Chelsea Saungweme
Russian Federation, bevsauchelsy70@gmail.com

Mr. Gift Saungweme
Zimbabwe, gsaungweme70@gmail.com
Mr. Darlington Madaka
Moscow Aviation Institute (National Research University, MAI), Russian Federation,
madakadarlington@gmail.com
Mrs. Funmilola Adebisi Oluwafemi
National Space Research and Development Agency (NASRDA), Abuja, Nigeria,
oluwafemifunmilola@gmail.com
Ms. Valeria Evgenievna Kuznetsova
Siberian Federal University, Russian Federation, makagyanlera2003@gmail.com

DIMINISHING TERRESTRIAL AND SUB-TERRESTRIAL RESOURCES IN ZIMBABWE. A CASE STUDY OF ZIMBABWEAN FRESHWATER BODIES,PRESENT AND FUTURE.

Abstract

Gravity Recovery and Climate Experiment (GRACE) was a joint Satellite Mission of NASA and German Aerospace Center (DLR) launched from Russia on 17 March 2002 and was decommissioned in June 2017. The mission officially ended on 27 October 2017.GRACE was the first remote sensing mission to provide temporal variations of Terrestrial Water Storage (TWS),which is the sum of water masses that were contained in the soil column namely in snow ,surface water ,soil moisture and underground storage at spatial resolution of a few hundred kilometres.Within this mission GRACE-1 and GRACE-2 flew at perigee altitude of 483 kilometers and apogee altitude of 508 kilometers above the ground. This satellite constellation was categorically Low Earth Orbiting capable of taking high-resolution satellite images over a small area, (https://en.wikipedia.org/wiki/GRACE$_a nd_G RACE - FO$).

GRACE-based groundwater changes revealed significant aquifer depletion over larger regions such as Middle East, India and Darling Basin in Australia. It was used to estimate ground related parameters such as specific yield of ground level storage, indices of depletion and stress, (ibid).

This paper seeks to provide insights on the state of terrestrial and sub-terrestrial freshwater storages in Zimbabwe. To achieve this, satellite technologies must be employed to monitor, map and assess fluctuations and depletions of freshwater from the soil column of Zimbabwe. Three basic ways are available to provide essential data on availability of freshwater which include:

Point measurement – which uses classical instruments such as the famous German Fresh Result-2 underground water detector.

Satellite constellations data which use Low Earth Orbiting satellites to provide high resolution images over a small area. Typical example are de-commissioned, jointly commissioned GRACE-1 and GRACE-2. Apparently, extensive use of satellite data ensures cost-effective and real-time assessment of groundwater storage variations.

Numerical Modelling - which is an extremely useful tool to evaluate and project groundwater resources in the future. It is a point-based detection method of the Fresh Result 2 machine type. It provides baseline information for researchers and it can be used in conjunction with satellites.

My presentation further aims to assess the unregulated pumping, fluctuations and depletion of terrestrial and sub-terrestrial water bodies in Zimbabwe. Key drivers of dwindling water resources are rapid and unplanned urbanization.

Accelerated urbanization led to wanton drilling of boreholes which cause water tables to sink. Invariably, the use of satellite technologies and related devices such as computer receivers and GIS will help Zimbabwe develop resilience against critical water shortages in the future.