

## Review on the Height Datum Unification in Sri Lanka

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Single or multiple Tide Gauges (TGs) observations are typically used to observe the sea level changes and those observations are used to define either the vertical datums/Local Vertical Datums (LVDs) island-wide or continental-wide. The national geodetic datum is the most significant framework for any surveying work in a country in areas like construction, engineering, mapping, or hydrography. This network usually consists of both horizontal (latitude and longitude) and vertical (height) components with a higher order of accuracy to fulfil the survey and mapping needs within the country. Vertical datums are based on the geopotential whereas horizontal datums are geometric. Vertical datums are mostly based on the equipotential surface like the geoid, an equipotential surface that coincides with the Mean Sea Level (MSL) of the oceans. Currently, there are numbers of LVDs existing in the world and usually, they are used to define using spirit levelling, gravimetric observations, and TGs observations, and it was continuously described within the geodetic literature over the past decades. Sometimes within that, it can be identified Global Vertical Datums (GVDs) which were based on the low-resolution geoids. According to the International Association of Geodesy (IAG), one of its main tasks is to create unification of the existing LVDs around the world through the Global Geodetic Observing System (GGOS). The main objective of this study is to identify a suitable vertical datum unification method that can be applied for the vertical datum in Sri Lanka which was formed in the early 1930s and it is essential to re-observe it in order to fix the potential datum bias due to various geodynamic effects. The concept of the Unification of height/vertical datum is increasingly interesting nowadays, and it makes the comparison of various datums in different regions possible. Our study revealed that the Geodetic Boundary Value Problem (GBVP) approach is the most appropriate process that can be used for the unification process of the vertical datum in Sri Lanka.

**Keywords:** *geodetic boundary value problem, mean sea level, unification, vertical datum, tide gauge*