20. Capacity Estimation of Minor Irrigation Tanks using Drone Survey

Aim

- To assess the feasibility of using UAVs to generate digital surface and terrain models of small irrigation tanks.
- To develop the methodology for estimating the live storage capacity of the tank using this terrain model.

Study Area

TeegalanarayanaCheruvu, a small tank near Godumakunta village of Keesara Mandal in the outskirts of Hyderabad city, Telangana(Figure 1), located at 17° 29' 15.0" N latitude and 78° 38' 32.8" E longitude.

Scope

This UAV application for the generation of surface models of tank beds is limited to dry tanks. Since the onboard sensor is an optical RGB sensor, the characteristics of underwater topography cannot be captured using these types of sensors.

Status

Completed

### Current constraints / Challenges:

The information on water level and water-spread area is essential to monitoring the volume of water stored in a tank. This water level/spread area is compared with Elevation-Area-Capacity (EAC) curves available in the tank memoirs to assess the storage volume. For most of the irrigation tanks in the country, either memoirs are unavailable or EAC curves need to be updated. To generate EAC curves, the bathymetric survey needs to be carried out. Considering the cost factor, the time required, and the physical location of minor irrigation tanks, it is not feasible to carry out a field survey for all the tanks in the country. Generation of terrain information of tank storage area using remote sensing technology is one of the options available today. Non-availability of capacity information for most of the tanks in the country is a limitation in assessing the water availability in these tanks. Satellite stereo images do not provide the required terrain details for these shallow water bodies. Technologies like UAVs help acquire high-resolution images of the tanks during the dry period, which can be further used for generating terrain models and thus helpful in developing Elevation-Area-Capacity (EAC) curve for these tanks.
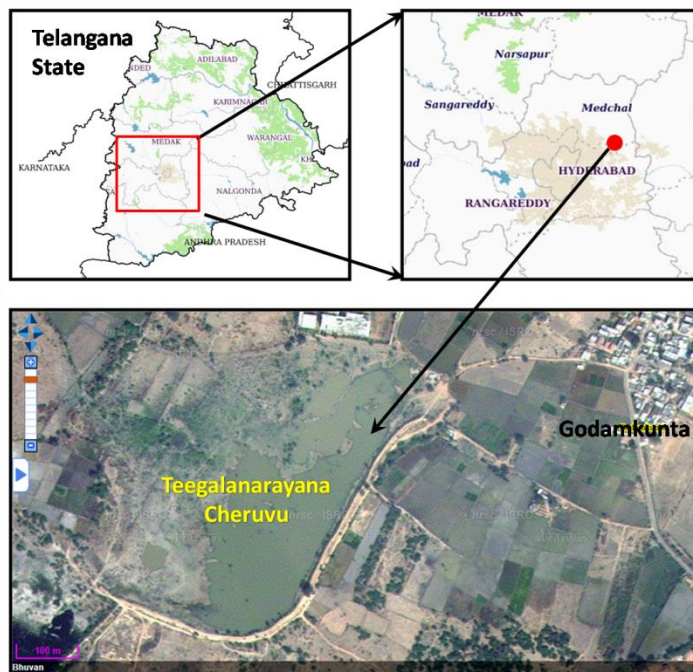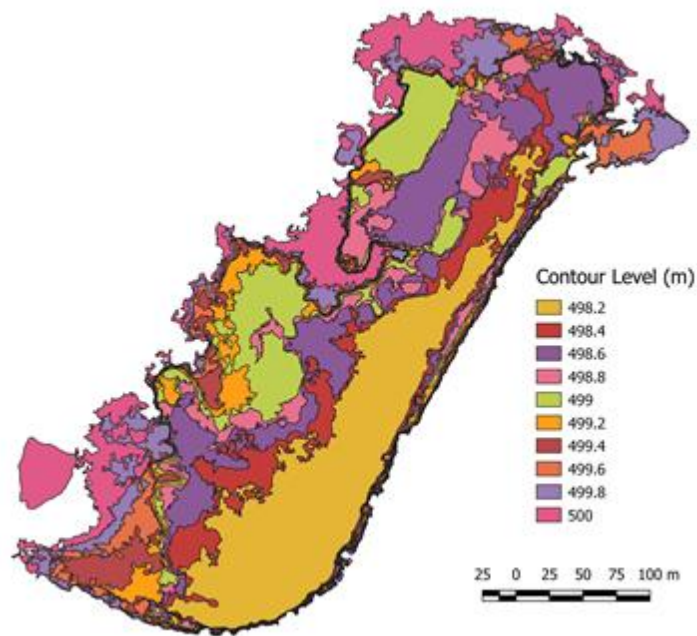
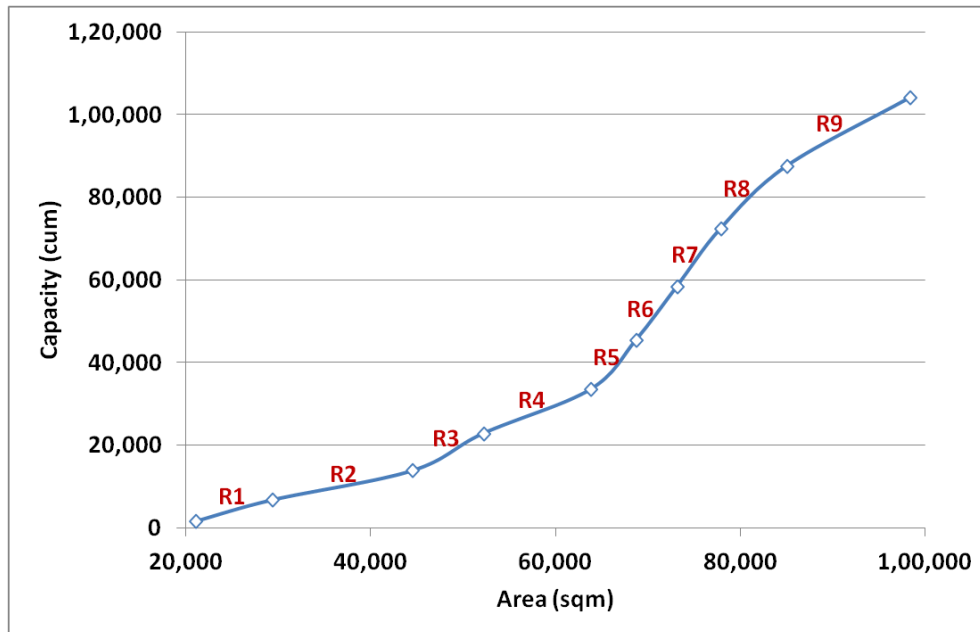Location map showing the study area, TeegalanarayanaCheruvu

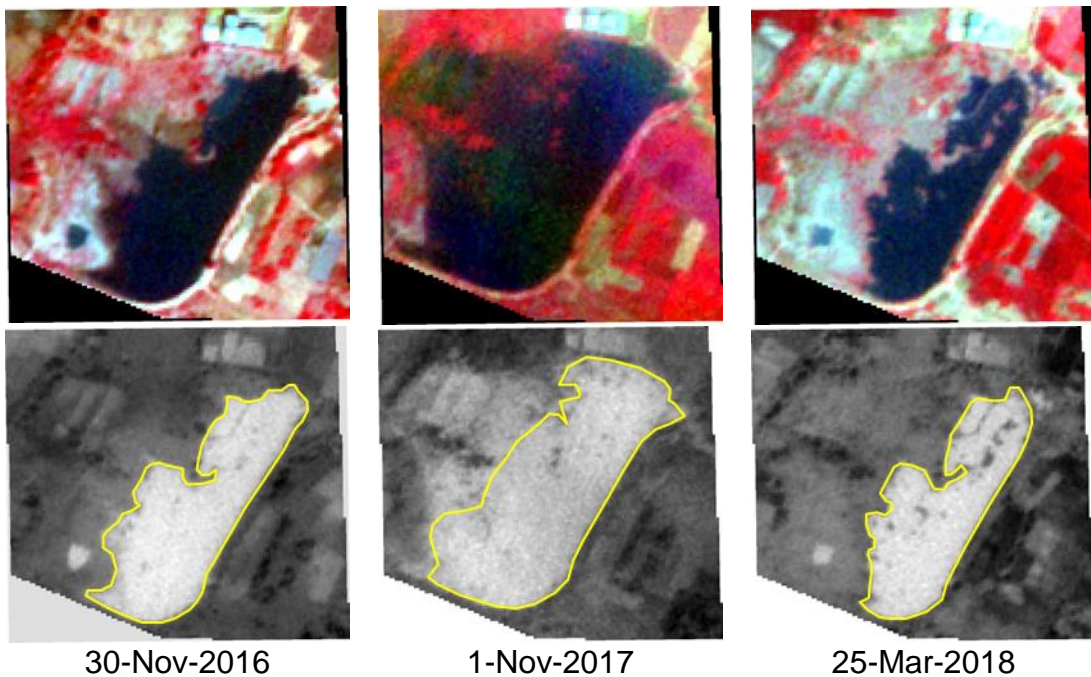True ortho-image generated for the study area
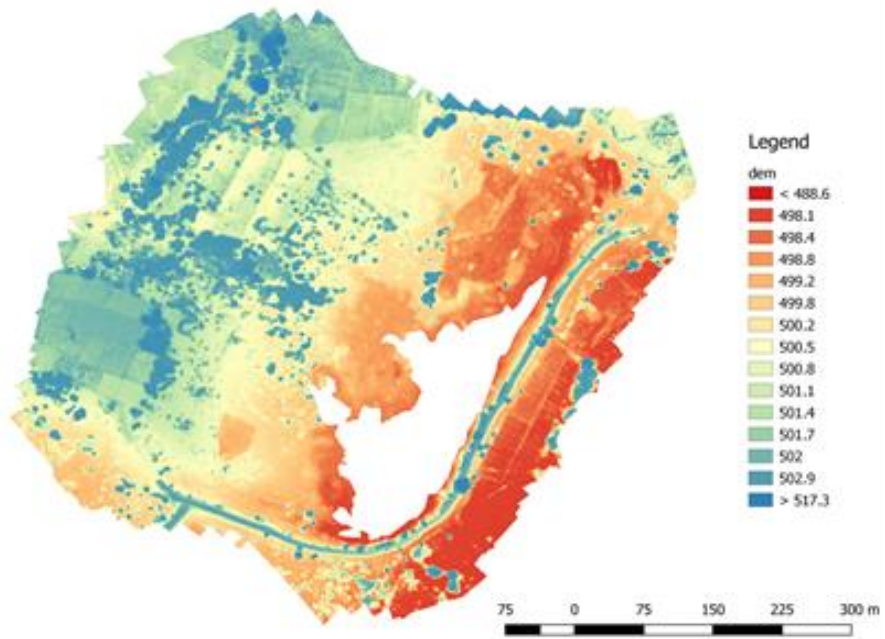
The digital surface model generated.

Contours generated from the terrain model

Area-Capacity curve for the selected tank

30-Nov-2016   1-Nov-2017   25-Mar-2018

LISS IV images and corresponding NDWI images of the selected tank

Publication

Bharath Kumar Reddy Kadapala,K. Abdul Hakeem, K. Raghavendra, Shivi Patel & K. Pramod Kumar, "Capacity Estimation of Irrigation TanksThrough Remote Sensing From UAVPlatform," J Indian Soc Remote Sens (2020), 48:1403-1411, DOI 10.1007/s12524-020-01164-x