Superconducting gravimeters (SGs) may provide precise (at nanoGal level) point gravity measurements, while GRACE delivers a global coverage of the Earth's gravity field at certain spatial resolutions, depending on the data processing method. In this study, both ground and space gravity measurements are used to investigate hydrological gravity signals at Hsinchu SG station in Taiwan. The raw SG gravity records are corrected for the effects of Earth tides, ocean tidal and non-tidal loading, atmospheric loading and polar motion to obtain gravity residuals, which are then compared with the gravity values from local hydrological model, GLDAS global hydrological model predictions and GRACE observations. In the local hydrology model, in situ rainfall, soil moisture and groundwater level data are used to estimate water content and gravity variations. The standard deviation of gravity residuals are 5.13 and 3.30 microGal before and after removing the local hydrological effect, representing a 35.6 percent reduction in the SG gravity variability. RMS difference between SG gravity residuals and local hydrology model is 4.20 microGal. A combination of local hydrological model and the global part of GRACE-derived gravity yields total hydrological effects at Hsinchu. RMS difference between SG gravity residuals and total hydrological effects is 4.18 microGal, which is reduced to 4.05 microGal when GRACE observations are replaced by GLDAS predictions. It is concluded that (1) infiltration, based on in situ soil moisture data, dominates the local hydrological gravity effect, and (2) GLDAS outperforms GRACE in estimating global hydrological gravity effect at Hsinchu.