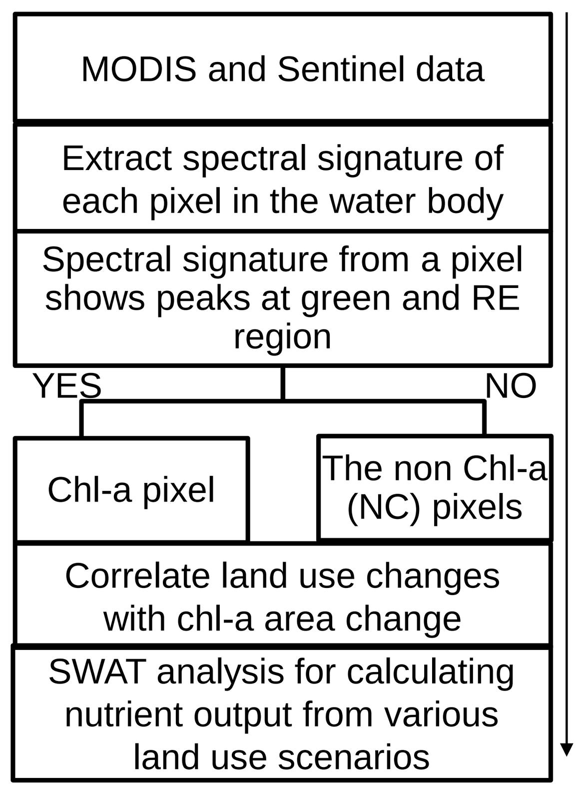
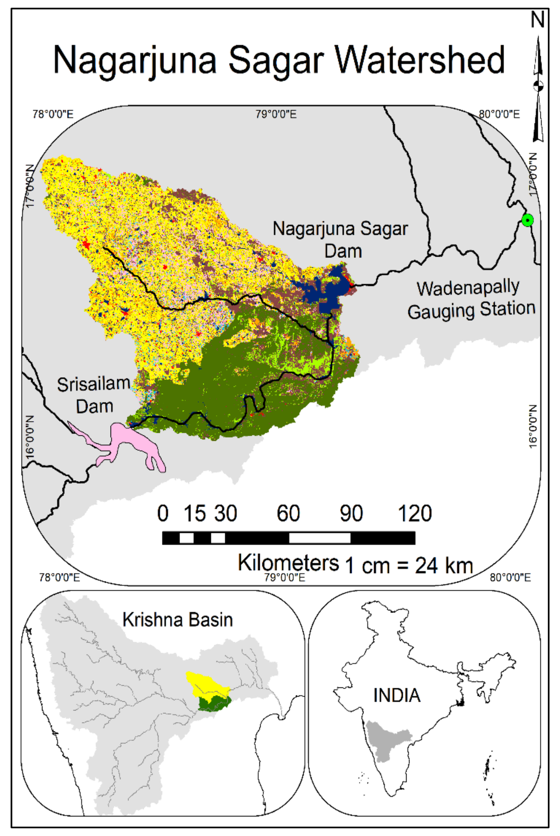
Factors Effecting The Nutrient Content in the Inland Water bodies

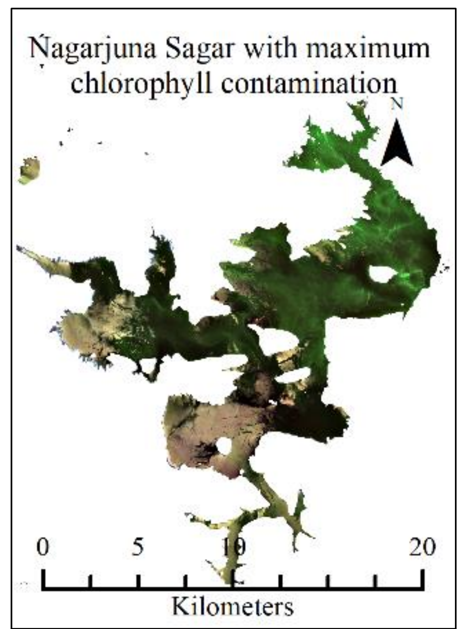
ABSTRACTS

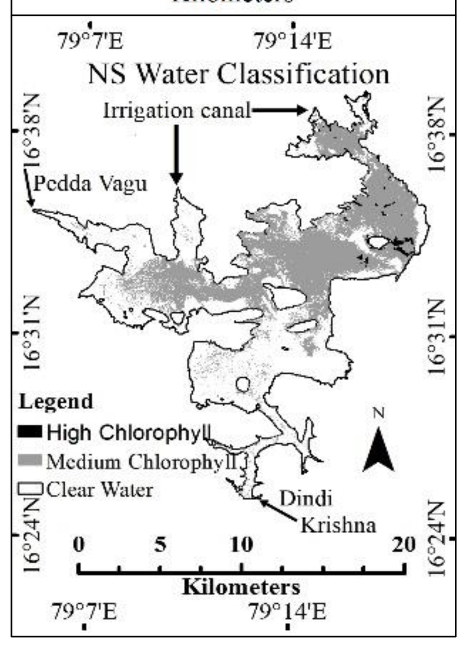
Nutrient contamination is one of the major threats to inland water quality. Understanding the behaviour of the contamination in the water body along with the components that contribute to excessive nutrient content in the water body could help in better management of the water resources. As a case study the nutrient contamination in the Nagarjuna Sagar reservoir using chlorophyll-a as a proxy was studied using MODIS and Sentinel 2 (2A and 2B) data from the year 2005 to 2018. Along with this, the changes occurring in the land use pattern and the nutrient output from these land covers in the contributing watershed were analysed using land use maps from NRSC and SWAT model for the same years. Collating the information form these assessments reveals that the nutrient contamination in the Nagarjuna Sagar is steadily increasing and the increasing agricultural and urban land use in the contributing watershed had a direct impact to the water body contamination. Further, the SWAT model analysis on the nutrient output from these land use patterns showed that the these two parameter and closely linked. The SWAT analysis also showed that the precipitation amount in the region along with the fertilizer amount used in the agricultural land use are decisive factors that control the movement of the nutrient contamination from the land use to the water body. So, land use pattern and its intensity along with the precipitations controls the external conditions that transport the nutrients into the water body. Since precipitation is a natural phenomenon, controlling the land use intensity and improving the efficiency could help in reducing the nutrient contamination in the inland water bodies such as Nagarjuna Sagar (NS).

METHOD

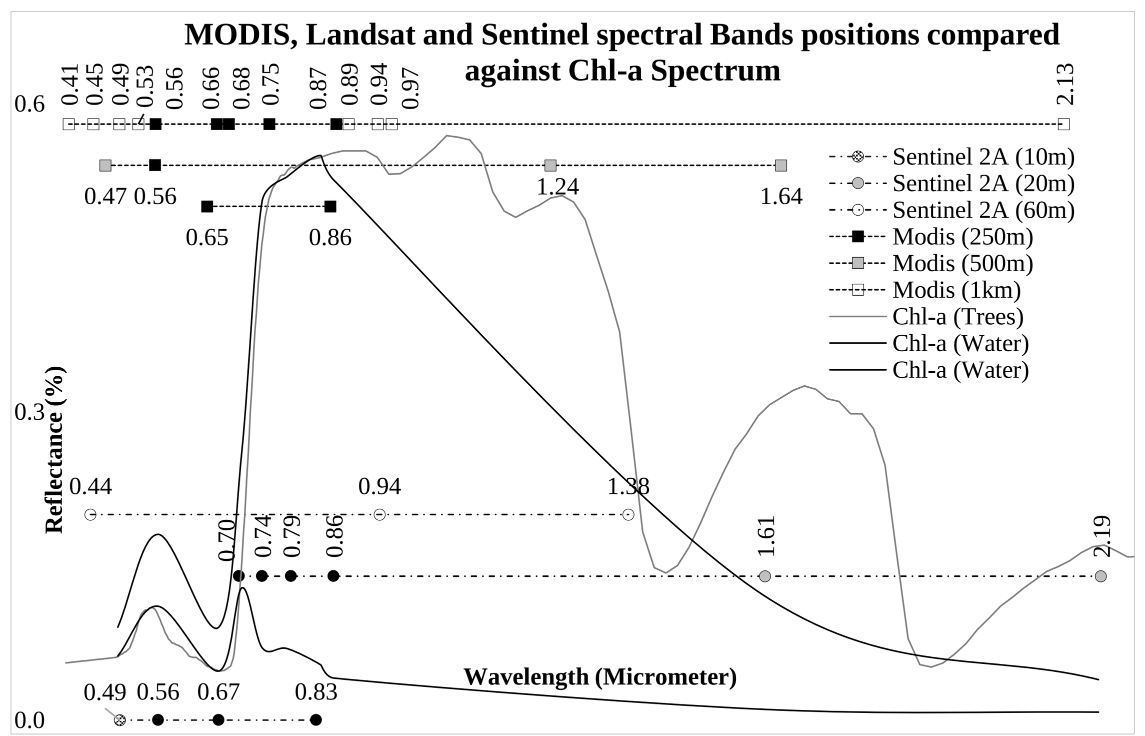






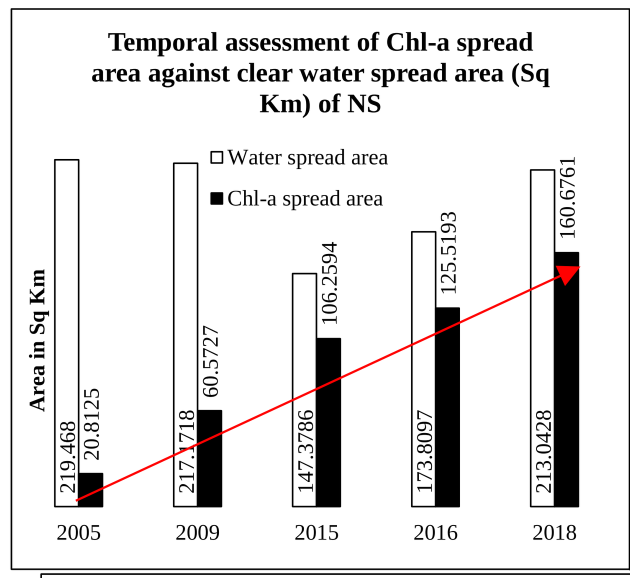


SWAT calibration parameters					
Parameter Name	Fitted Value	Min value	Max Value	T-Stat	P-Stat
1:A__GWQMN.gw	11	-100	100	0.3	0.75
2:V__ESCO.bsn	0.815	0	1	-0.24	0.8
3:R__CN2.mgt	-0.07125	-0.15	0.1	0.24	0.8
4:R__CN2.mgt	-0.10375	-0.15	0.1	0.26	0.79
5:R__CN2.mgt	-0.06625	-0.15	0.1	1.43	0.15
6:R__CN2.mgt	-0.00625	-0.15	0.1	-1.27	0.2
7:R__CN2.mgt	0.07375	-0.15	0.1	1.32	0.19
8:R__SOL_AWC(..).sol	0.03235	0.03	0.5	0.21	0.82
9:A__REVAPMN.gw	29.180004	-61	47	-0.19	0.84
10:V__GW_REVAP.gw	0.0407	0.02	0.2	-0.49	0.62
11:V__EPCO.bsn	0.075	0	1	-0.43	0.66
12:V__RCHRG_DP.gw	0.09075	0.01	0.2	0.93	0.35
13:R__SOL_K(..).sol	0.255	-0.3	0.3	0.85	0.39
14:V__CH_K2.rte	0.61525	-0.01	25	2.04	0.044
15:V__CH_N2.rte	0.0424	0.01	0.09	-0.56	0.57
16:V__RCHRG_DP.gw	0.09955	0.01	0.1	-0.19	0.84
17:R__SURLAG.hru	0.8075	0.5	1	1.44	0.15
18:R__HRU_SLP.hru	0.1955	0.1	0.2	-0.73	0.46
19:R__OV_N.hru	-0.101	-0.2	0	-0.84	0.39
20:R__SLSUBBSN.hru	0.199	0	0.2	0.89	0.37
21:R__NDTARGR.res	9.950001	-10	20	9.23	0
22:R__WURCH(..).wus	11.750001	-10	20	-0.06	0.95



Results

1



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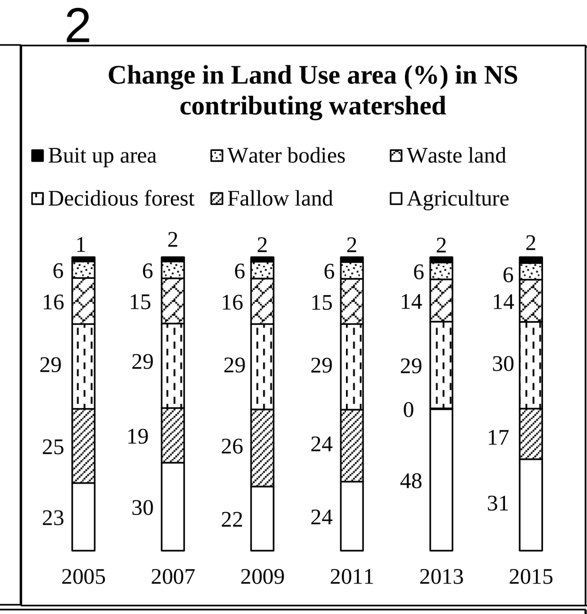

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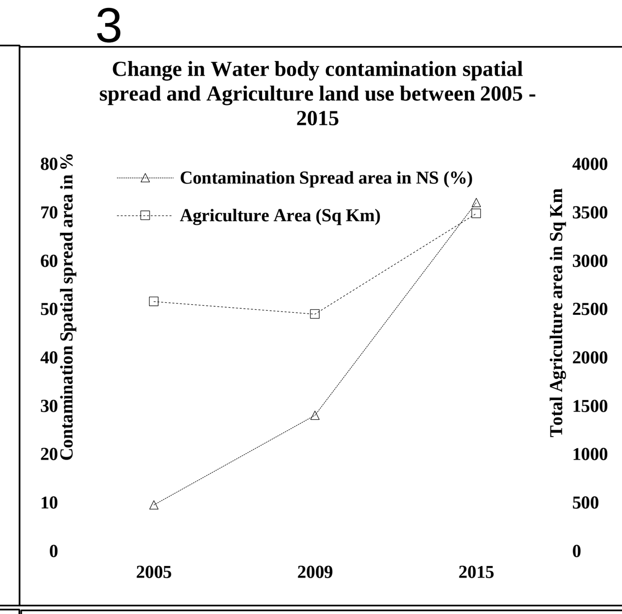

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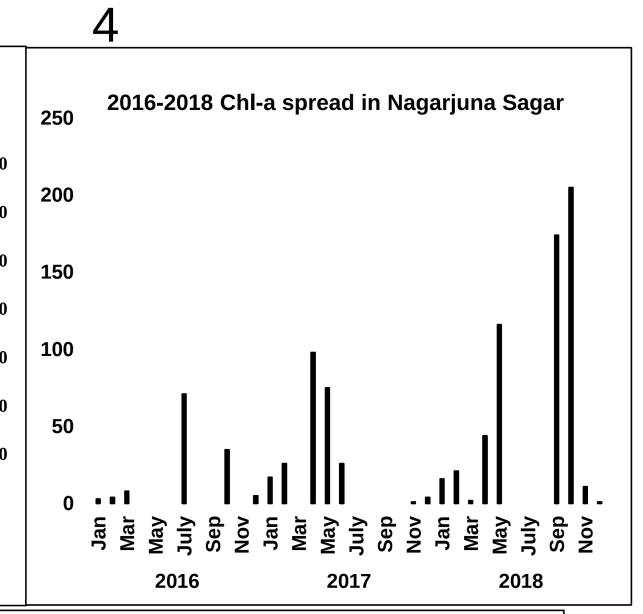

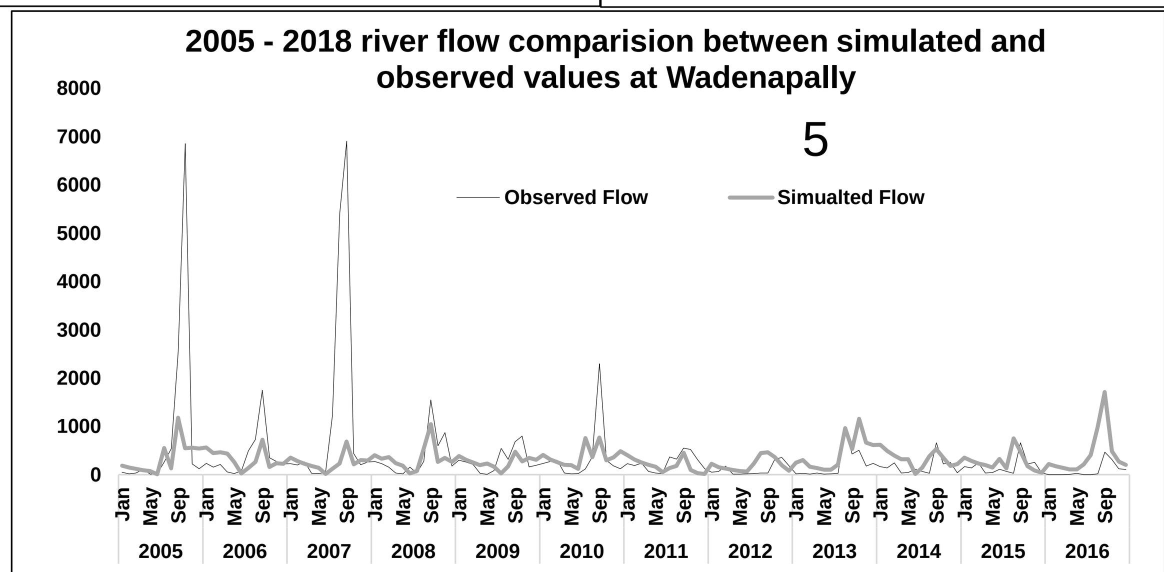

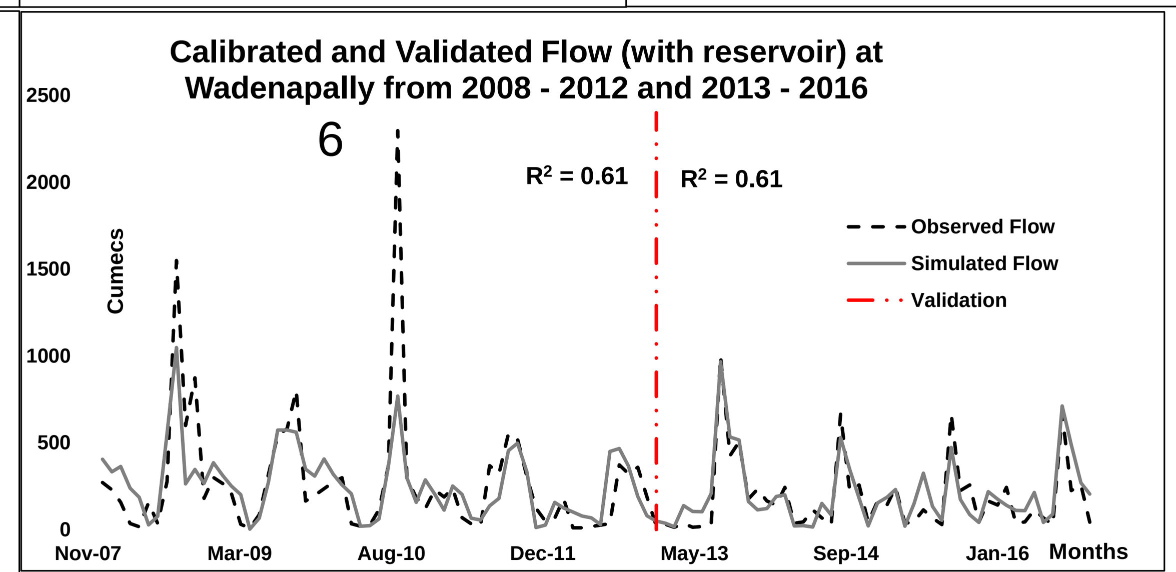

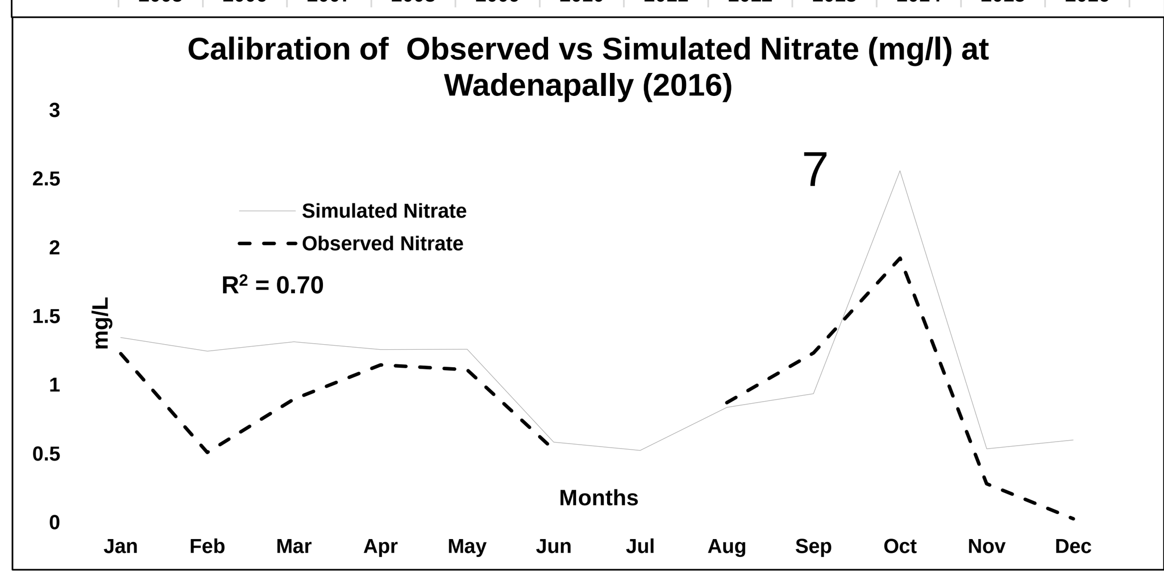

Figures and their description.

1. Shows the increasing Chl-a spread area (Sq Km) in the water bodies.

2. Graphs showing the area under each land use. From the graph it can be seen that area under agriculture is steadily increasing.

3. Shows the relationship between increasing agricultural land use and Chl-a spread area.

4. Shows the monthly Chl-a spread area (Sq Km). From the graph it can be seen that Chl-a spread area is steadily increasing.

5. Shows the Observed vs Simulated flow using SWAT model from 2005 to 2018 at wadenapally gauge site. The large peaks indicate heavy flood and these conditions were ignored as they randomly occur with less frequency.

6. Shows the calibrated and validated flow results using SWAT model from 2008 to 2016 at wadenapally gauge site.

7. Shows the Calibrated Nitrate (mg/L) using SWAT model at wadenapally for the year 2016.

Conclusion

1. Land use, Precipitation, Fertilizer usage are major driving forces behind nutrient contamination in inland water bodies.

2. As Water quality of Inland water bodies are changing, mainly deteriorating, it is important to study the factors affecting these water bodies.

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