GEOSPATIAL WORLD FORUM
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GLOBE GEOSOLUTION

NDVI is not The Last Parameter to Judge Your Crops' Health

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Organizational Background

- ✓ We, Globe Geosolution Private Limited, represents as one of the widely accepted technical consultancy firm in the sector of Geospatial, Geoscience, IT, Energy, Urban & Infrastructure Design, Artificial Intelligence and Capacity Building.
- ✓ One of our principle services in Geo-Agri sector is now extensively agreed and accepted by different National and International Agriculture Reinsurer like ICICI Lombard, Bajaj Finserv, Agriwatch, Swiss Re, Ministry of Agriculture & Livestock of Afghanistan, Department of Agriculture of Bangladesh and so on.
- ✓ Our worldwide presence to provide customized services to our clients and partners
- ✓ Each and every solution provided by us are binded with trust, quality, on-time & on-budget
- ✓ Our main watchword is “idea is ours…choice is yours…” which really depicts our respect to your findings and requirements.
- ✓ Some of our esteemed clients and partners are UNOPS, KKCES, Telenor, NJ Property Records LLC, Swiss Re, Agriwatch, ICICI Lombard, Bajaj Finserv, DCDA, Ministry of Agriculture and Livestock- Afghanistan and so on.

Recall The NDVI

- ✓ $NDVI = \frac{NIR-RED}{NIR+RED}$
- ✓ The Normalized Difference Vegetation Index
- ✓ Is an index of plant “greenness” or photosynthetic activity, and is one of the most frequently used vegetation indices.
- ✓ NDVI is correlated with many ecosystem traits that are of interest to researchers (e.g., net primary productivity, canopy cover, bare ground cover)
- ✓ It is a ratio of two bands
- ✓ NDVI helps compensate for differences both in illumination within an image due to slope and aspect, and differences between images due things like time of day or season when the images were acquired
- ✓ NDVI values can be calculated by choosing RED and NIR (Near Infrared) band of any satellite image and through the application of above formulated way.

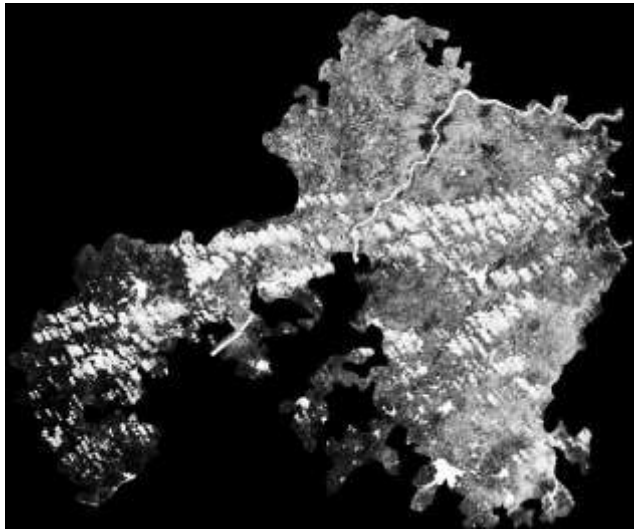
Reality of NDVI

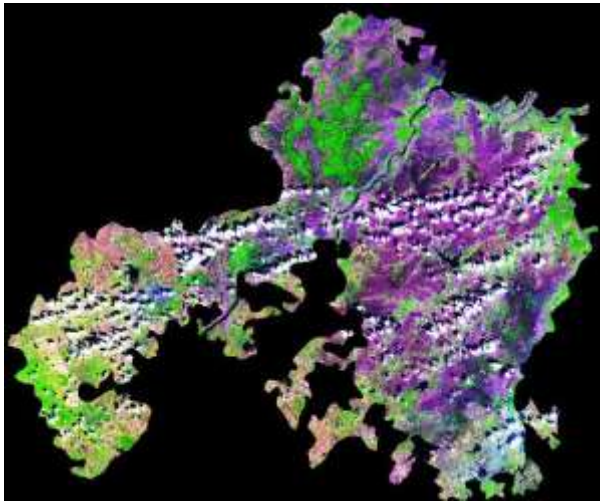
- ✓ The NDVI well known formula can be using in different way based on analysis process of greenness of plant or crop to derive the NDVI values from satellite data.
- ✓ What about those satellite data which don't have any Near Infrared Band so we cannot use NDVI formula for them?
- ✓ AND THE ANSWER IS YES !! We can…..
- ✓ Landsat OLI/TIRS, Landsat 7 ETM+, Aster Global Data which are having resolution of <= 30 meter and freely available to be acquired weekly basis
- ✓ Mainly Focused on Weekly Analysis of Crop Growth and Health
- ✓ Has to be observed by 30 meter or less than resolution satellite data to study lentils, pulses and crop like Guar Seed
- ✓ BAND combination by applying FCC and NDVI supervised classification through greenness of crops and crop position by analysing FCC data with Histogram equalization

Cases of NDVI with Landsat 8 / 7

- ✓ Landsat 8 OLI or, Landsat 7 ETM+ → Choose RED band of Landsat as RED for NDVI and BLUE band of Landsat as NIR for NDVI
- ✓ BLUE band is being more reflectance than RED band for vegetation
- ✓ RED and BLUE, both is being absorbed by crops' chlorophyll and GREEN band is being reflected fully by crops' chlorophyll

Landsat 8 OLI Data in FCC & NDVI for 2016 October Week 1 in the area of Jhansi District





Estimation of NDVI and Crop Health

Blocks	Crop	2016																		2015		2014	
		June				July				August				September				October		September	October	September	October
		Week 1	Week 2	Week 3	Week 4	Week 1	Week 2	Week 3	Week 4	Week 1	Week 2	Week 3	Week 4	Week 1	Week 2	Week 3	Week 4	Week 1	Week 2	Week 3	Week 2	Week 3	Week 2
Babina	Teel	-0.016	-0.075	-0.069	-0.064	-0.081	-0.076	-0.068	-0.054	-0.086	-0.076	-0.097	-0.030	-0.044	-0.044	-0.126	-0.113	-0.100	-0.103	-0.089	-0.073	-0.102	-0.084
Badagaon		-0.015	-0.070	-0.065	-0.060	-0.076	-0.071	-0.064	-0.051	-0.080	-0.072	-0.091	-0.028	-0.041	-0.041	-0.118	-0.106	-0.093	-0.096	-0.083	-0.068	-0.096	-0.079
Bamaur		-0.018	-0.081	-0.074	-0.069	-0.087	-0.081	-0.073	-0.058	-0.092	-0.082	-0.104	-0.032	-0.047	-0.047	-0.135	-0.121	-0.107	-0.110	-0.095	-0.078	-0.109	-0.090
Bangra		-0.019	-0.085	-0.079	-0.073	-0.092	-0.086	-0.077	-0.062	-0.097	-0.087	-0.110	-0.034	-0.050	-0.050	-0.143	-0.128	-0.113	-0.117	-0.101	-0.083	-0.116	-0.095
Chirgaon		-0.015	-0.070	-0.065	-0.060	-0.076	-0.071	-0.064	-0.051	-0.080	-0.072	-0.091	-0.028	-0.041	-0.041	-0.118	-0.106	-0.093	-0.096	-0.083	-0.068	-0.096	-0.079
Gursrai		-0.017	-0.079	-0.073	-0.067	-0.085	-0.079	-0.071	-0.057	-0.090	-0.080	-0.101	-0.031	-0.046	-0.046	-0.132	-0.119	-0.105	-0.108	-0.093	-0.077	-0.107	-0.088
Mauranipur		-0.020	-0.093	-0.086	-0.079	-0.100	-0.093	-0.084	-0.067	-0.106	-0.094	-0.119	-0.036	-0.054	-0.054	-0.155	-0.128	-0.093	-0.117	-0.109	-0.088	-0.126	-0.101
Moth		-0.023	-0.106	-0.097	-0.090	-0.115	-0.107	-0.096	-0.076	-0.121	-0.107	-0.136	-0.042	-0.062	-0.062	-0.177	-0.106	-0.133	-0.096	-0.125	-0.093	-0.143	-0.107

Blocks	Crop	Yield (Tonns / ha)			Acreage (ha)		
		2014	2015	2016	2014	2015	2016
Babina	Teel	0.251	0.465	0.220	11616.48	12313.48	7752.92
Badagaon		0.209	0.310	0.090	9680.40	8208.98	3192.38
Bamaur		0.125	0.207	0.155	5808.24	5472.66	5472.65
Bangra		0.181	0.284	0.129	8389.68	7524.90	4560.54
Chirgaon		0.237	0.362	0.168	10971.12	9577.15	5928.70
Gursrai		0.084	0.310	0.258	3872.16	8208.98	9121.08
Mauranipur		0.097	0.207	0.194	4517.52	5472.66	6840.81
Moth		0.209	0.439	0.078	9680.40	11629.39	2736.32

Estimation of Crop Growth

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WEEK WISE TEEL CROP GROWTH STAGES FOR DIFFERENT BLOCKS									
Time Span		Blocks of Jhansi District							
		Babina	Badagaon	Bamaur	Bangra	Chirgaon	Gursrai	Mauranipur	Moth
June	Week 1	Emerging	Emerging	Seedling	Emerging	Emerging	Seedling	Seedling	Seedling
	Week 2	Emerging	Seedling	Seedling	Emerging	Seedling	Seedling	Seedling	Seedling
	Week 3	Seedling	Seedling	Rosette	Seedling	Seedling	Rosette	Rosette	Rosette
	Week 4	Seedling	Rosette	Rosette	Seedling	Rosette	Rosette	Rosette	Rosette
July	Week 1	Rosette	Rosette	Rosette	Rosette	Rosette	Rosette	Rosette	Rosette
	Week 2	Rosette	Rosette	Bud	Rosette	Rosette	Bud	Bud	Bud
	Week 3	Rosette	Bud	Bud	Rosette	Bud	Bud	Bud	Bud
	Week 4	Bud	Bud	Bud	Bud	Bud	Bud	Bud	Bud
August	Week 1	Bud	Bud	Flowering	Bud	Bud	Flowering	Flowering	Flowering
	Week 2	Bud	Flowering	Flowering	Bud	Flowering	Flowering	Flowering	Flowering
	Week 3	Flowering	Flowering	Almost Flowers covered	Flowering	Flowering	Flowering	Almost Flowers covered	Almost Flowers covered
	Week 4	Flowering	Almost Flowers covered	Full of Flowers	Flowering	Almost Flowers covered	Almost Flowers covered	Full of Flowers	Full of Flowers
September	Week 1	Almost Flowers covered	Full of Flowers	Ripening	Almost Flowers covered	Full of Flowers	Full of Flowers	Ripening	Ripening
	Week 2	Full of Flowers	Ripening	Ripening	Full of Flowers	Ripening	Ripening	Ripening	Ripening
	Week 3	Ripening	Ripening	Ripening	Ripening	Ripening	Ripening	Ripening	Ripening
	Week 4	Ripening	Harvesting	Harvesting	Ripening	Harvesting	Harvesting	Harvesting	Harvesting
October	Week 1	Harvesting	Harvested	Harvested	Harvesting	Harvested	Harvested	Harvested	Harvested
	Week 2	Harvested	NA	NA	Harvested	NA	NA	NA	NA
	Week 3	NA	NA	NA	NA	NA	NA	NA	NA
	Week 4	NA	NA	NA	NA	NA	NA	NA	NA

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Conclusion

- ✓ NDVI value is a number which mainly derive from satellite image based on the greenness of the crops
- ✓ This value is not in a fixed range of positive values or negative values. It is totally a wrong concept to have that NDVI can have a particular range of positive or negative values
- ✓ Based on the analysis process, analyser and further interpreter should understand the crop situation based on NDVI values upto a certain level. This value is just a coefficient which mainly helps us to determine the estimation of yield and pixels under same crops
- ✓ It generally observes that values tend to -0.17 represents good vegetation strength while beyond -0.17 represents malfunctions which needs some details study and same as values tends to -0.07 represents weak vegetation strength while beyond -0.07 represents some natural calamity in weather
- ✓ Seeding and harvesting stage is mostly having less NDVI and middle of cultivation is having more NDVI generally than seeding and harvesting stage but this can vary based on different parameters effect on crops

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Thanks a lot for your attention !!

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