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on Large Dams

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Central Water Commission

## Assessment of hydro-cover in three revenue zones of Maharashtra by remote sensing method

Main Theme – Global Best Practices in Dam Safety  
Management (Technical Session 1)

Sub Theme – Technological needs

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10-12 October 2022 at Jaipur, Rajasthan (India)



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Dam Rehabilitation & Improvement Project



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## INTRODUCTION

- Hydro cover is one of the most important parameter play crucial role in hydrological cycle.
- With global climate change and growing influence of human activities, river changes, uneven rainfall, rising temperature, glacier melting, flooding etc causing changes in surface water resources.
- Accurate information of hydro-cover is important for flood prediction, monitoring and relief etc.
- This paper describes the 3 hydro-cover assessment studies using satellite remote sensing data carried out by Resources Engineering Center, Maharashtra Engineering Research Institute of Water Resources Department, GoM.
- Focuses on identification of water bodies using supervised classification technique.

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## OBJECTIVES

- To study revenue region-wise hydro-cover statistics of Nashik, Aurangabad and Pune for pre-monsoon and post-monsoon season.
- To study the impact of climate change on hydro-cover.
- To provide fundamental information to state government as well as local authorities for the protection and restoration of hydro-covers and conservation of natural ecosystem in Nashik, Aurangabad and Pune revenue region.

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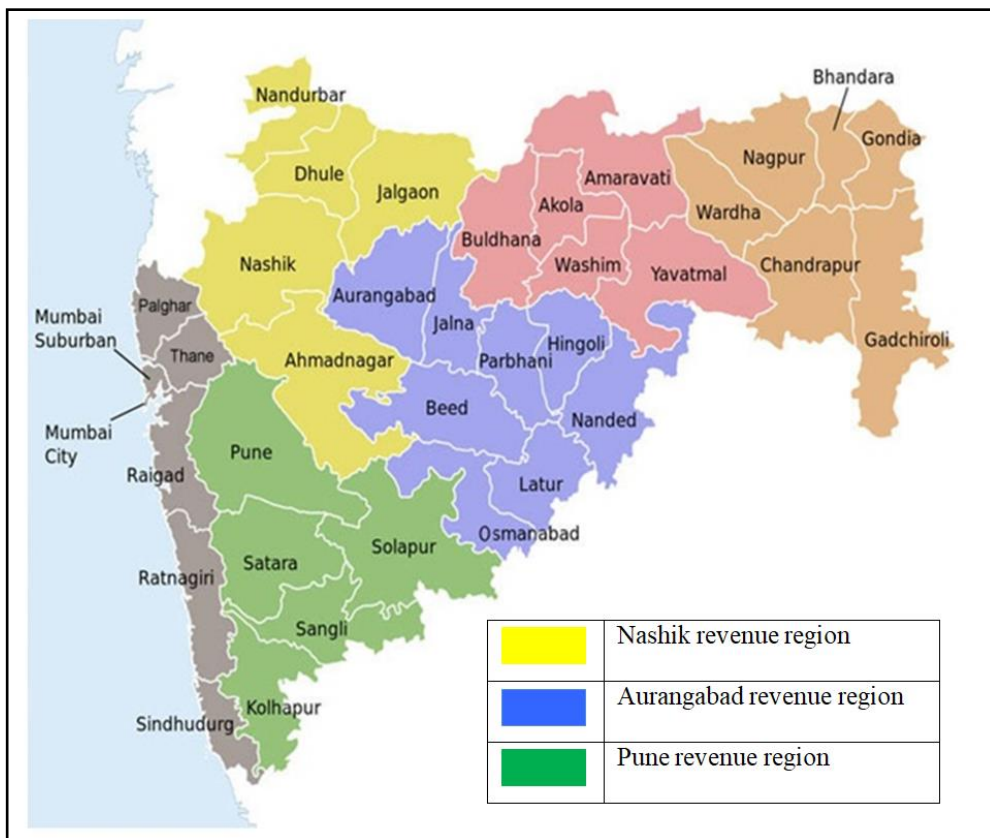
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## STUDY AREA

- Nashik revenue region covers 5 districts and 54 talukas of 5657300 Ha geographical area,
- Aurangabad revenue region covers 8 districts and 46 talukas of 6454897 Ha geographical area
- Pune revenue region covers 5 districts and 58 talukas of 5723569 Ha geographical area of Maharashtra state.



Source: GoM official website.

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## DATA USED

Sr.No	Region	Nashik	Aurangabad	Pune
1	Pre-monsoon satellite	Resourcesat-2 Resourcesat-2A	Sentinel-2	Sentinel-2
2	Post-monsoon satellite	Sentinel-2	Sentinel-2	Sentinel-2
3	No. of images	Pre-monsoon –11 Post-monsoon-20	Pre-monsoon –20 Post-monsoon-20	Pre-monsoon –20 Post-monsoon-20
4	Satellite pass	Pre-monsoon - April 2020 Post-monsoon - November 2020	Pre-monsoon - April 2021 Post-monsoon - December 2021	Pre-monsoon - April 2021 Post-monsoon - December 2021

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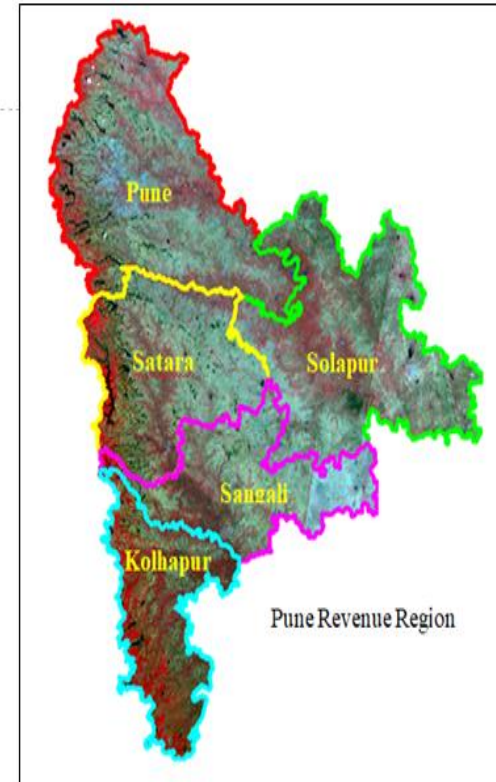
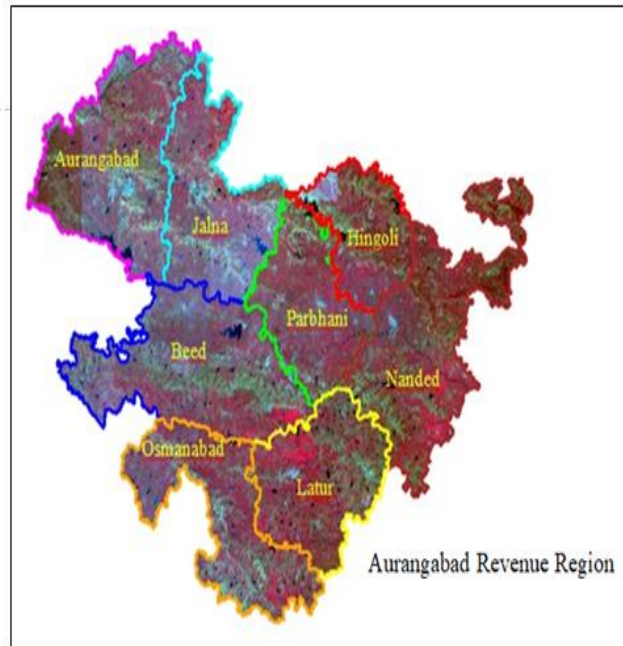
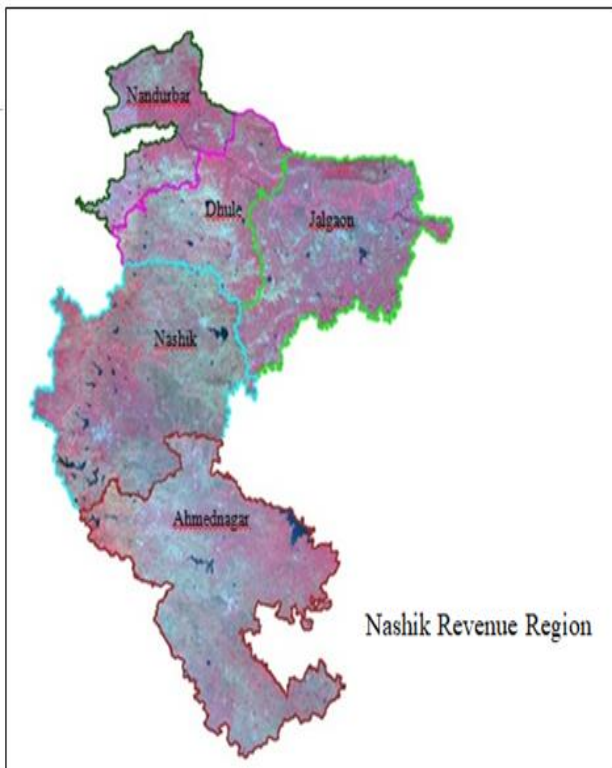
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## SATELLITE IMAGES AND OVELAY OF DISTRICT BOUNDARY



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## METHODOLOGY

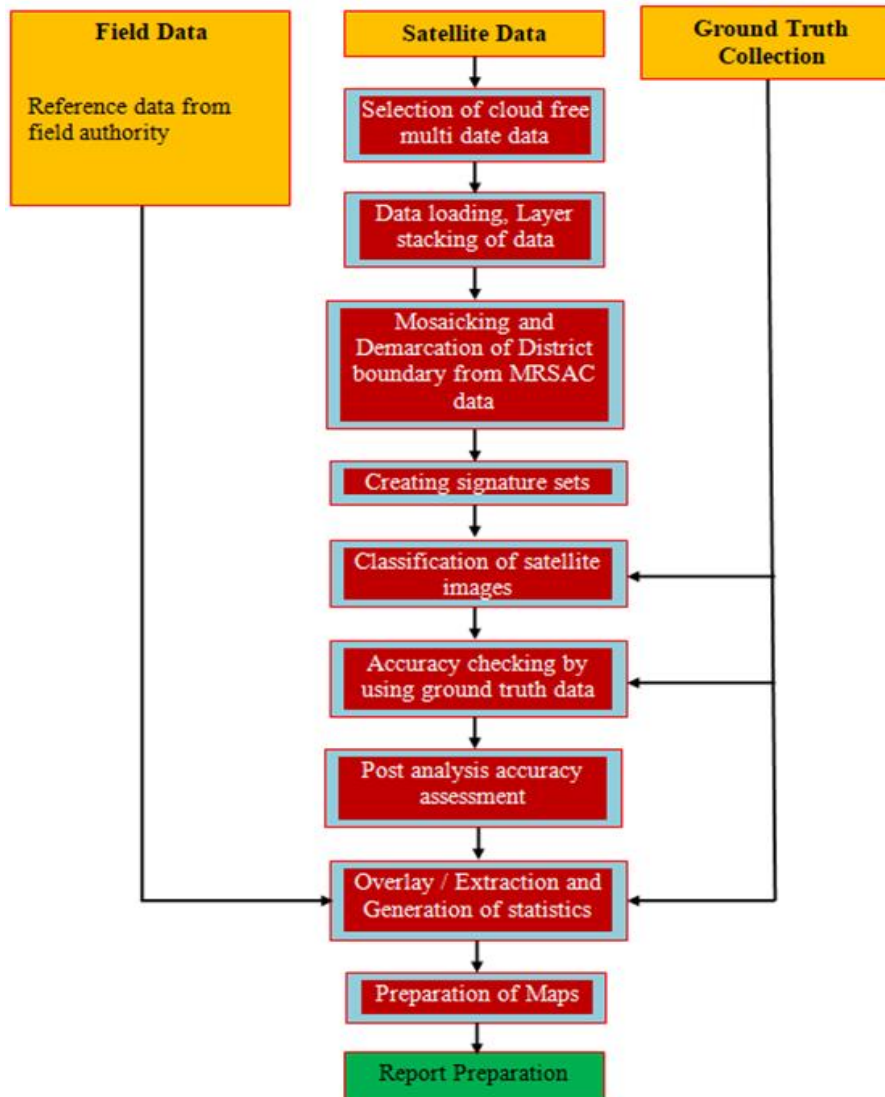
- Remote sensing technique is utilized to assess the water spread area for Pre monsoon and Post monsoon season.
- In the present study hydro cover assessment has been done by supervised classification technique.
- The extensive ground truthing was done for classifying the pre monsoon and post monsoon images.
- For Nashik revenue region the ground collections of 1568 features, Aurangabad revenue region 146 and for Pune revenue region 365 have been used for supervised classification and validation purpose.

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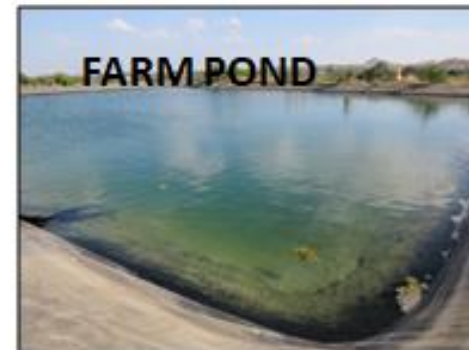
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## FIELD VISIT AND GROUND TRUTH

- Remote sensing techniques require certain amount of field observation called “ground truth” in order to convert pixel data into meaningful information. Such work involves visiting number of sites. The data dictionary was created for recording the field information. The location of the features is recorded using the Hand held GPS. The standard proforma was used to record the field data. Field photographs are also taken during the field visit.



- From Nashik revenue region total 1568 ground features, Aurangabad revenue region 146 ground features and from Pune revenue region 365 ground features have been collected and used during supervised classification technique. Following figure shows the overlay of ground truth collection on satellite images.

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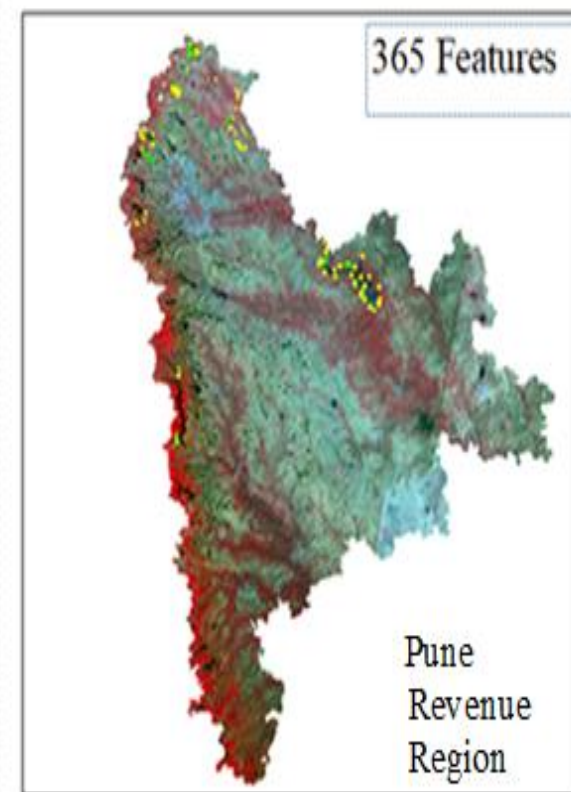
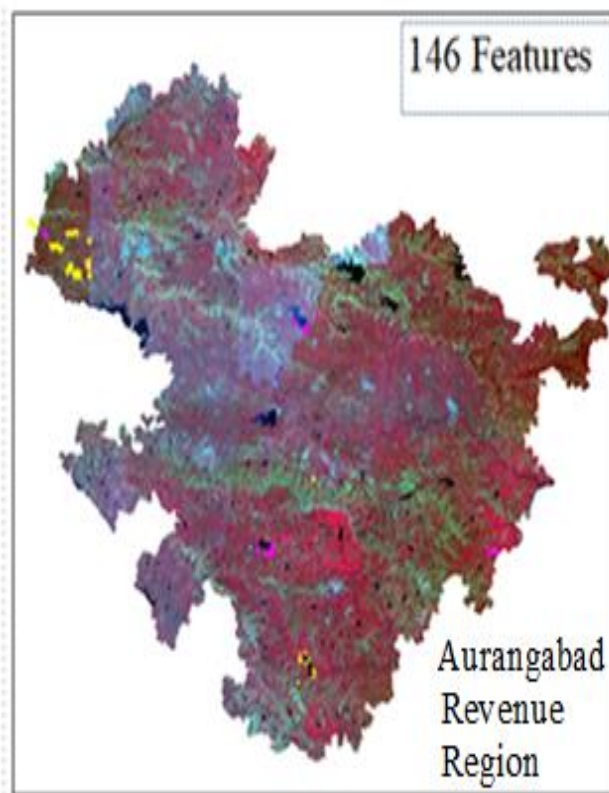
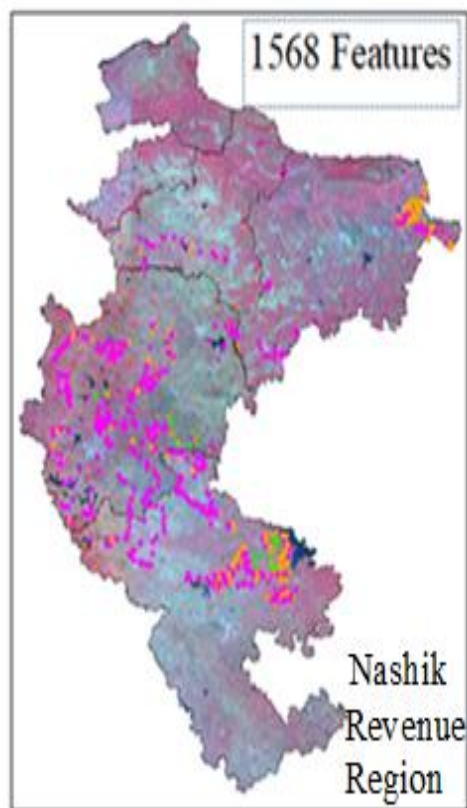
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## OVERLAY OF GROUND TRUTH COLLECTION ON SATELLITE IMAGES FOR VERIFICATION AND ACCURACY ASSESSMENT



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## RESULT

Region	District	Geographical Area (Ha)	Pre-monsoon Hydro-cover area (Ha)	Post-monsoon Hydro-cover area (Ha)	% area Pre-monsoon	% area Post-monsoon
Nashik	Ahmednagar	1704800	27715.10	55696.70	1.63	3.27
	Dhule	719500	7823.75	13214.70	1.09	1.84
	Jalgaon	1176500	13491.90	22578.20	1.15	1.92
	Nandurbar	503500	9372.44	12020.20	1.86	2.39
	Nashik	1553000	21695.00	42898.00	1.40	2.76
<b>Total</b>		<b>5657300</b>	<b>80098.19</b>	<b>146407.80</b>	<b>1.42</b>	<b>2.58</b>
Aurangabad	Aurangabad	1013800	22904.4	36779.5	2.26	3.63
	Jalna	768739	11821.9	21180.0	1.54	2.76
	Beed	1069300	16544.7	26462.8	1.55	2.47
	Parbhani	625058	9946.7	12994.9	1.59	2.08
	Hingoli	452600	12825.7	16183.8	2.83	3.58
	Latur	715700	9685.2	18178.6	1.35	2.54
	Osmanabad	756900	14410.3	22582.1	1.90	3.03
	Nanded	1052800	10256.0	16539.5	1.01	1.57
<b>Total</b>		<b>6454897</b>	<b>108812.6</b>	<b>170901.2</b>	<b>1.69</b>	<b>2.65</b>
Pune	Pune	1564300	50423.80	59050.00	3.22	3.77
	Solapur	1485569	30568.00	36620.00	2.06	2.47
	Satara	1048000	22032.50	30141.00	2.10	2.88
	Sangli	857200	9303.11	14891.80	1.09	1.74
	Kolhapur	768500	11746.40	16690.10	1.53	2.17
<b>Total</b>		<b>5723569</b>	<b>124073.81</b>	<b>157392.90</b>	<b>2.17</b>	<b>2.75</b>

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## CONCLUSIONS

- Nashik revenue region in the year 2020 the hydro-cover area varies from 1.42% in pre-monsoon study to 2.58% in post-monsoon study as per geographical area. Aurangabad revenue region in the year 2021 the hydro-cover area varies from 1.69% in pre-monsoon study to 2.65% in post-monsoon study as per geographical area. For Pune revenue region in the year 2021 hydro-cover area for varies from 2.17% in pre-monsoon study to 2.75% in post-monsoon study as per geographical area.
- The results provide useful and up-to-date information to planners, resource managers and policy makers for sustainable use of water.
- The effect of climate change is observed in pre-monsoon and post-monsoon statistics, hence continuous monitoring is required for sustainable development.

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# Thank You

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