

# Land use/Land cover Changes (LULCC) in Semi-arid Regions of Maharashtra

POLICY BRIEF: January 2020

## Context:

- Land use and Land cover (LULC) is an important predictor of the availability of ecosystem services in a region. LULC changes (LULCC) combined with the climate change, is likely to have major implications for the adaptive capacity of communities, both rural and urban, that depend on their respective ecosystem services.
- The use of advanced satellite imagery and data from Maharashtra's semi-arid Mula Pravara and Purna River basins has enabled the identification of major areas of LULCC over the last three decades, and the driving forces, particularly agriculture and urbanization, behind these changes.

## Key Recommendation:

Integrated land use planning based on the existing/ projected climate risks, resource availability and land transitions is imperative. Promotion of adaptive sustainable agriculture practices such as judicious use of water, soil health management, crop weather advisories and market linkages makes agriculture sustainable while ensuring income returns.

## Introduction:

The arid and semi-arid areas are most vulnerable to climate change, where resources are limited and the adaptive capacity is low. Rapid LULCC in these regions can exacerbate the effect of climate change and contributes to resource overuse, land degradation, drought and flood hazards, and loss of livelihoods.

## Objectives:

To assess the LULCC over the last 25 years in the Mula-Pravara and Purna River basins located in the Godavari River in semi-arid Maharashtra and investigate the driving forces that cause change.

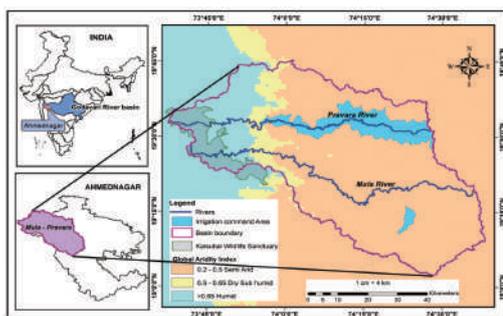
## Approach:

- The study examined the LULCC in the Mula-Pravara and Purna Basins over the periods of 1991-2001, 2001-11 and 2011-16, using geospatial techniques and methods.
- Multi-temporal Landsat series of satellite imagery was used to produce finer scale land use maps and to explain the changes.
- The results acquired from remote sensing analysis were studied in the context of government policies, schemes introduced and outcomes measured by other studies, to identify the various factors driving LULC changes.

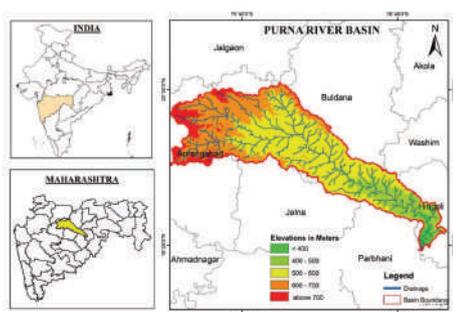
## Research Findings:

### Mula-Pravara River basin

- Over the last 25 years (1991-2016), agricultural land area has increased by approximately 98% by conversion of uncultivable and fallow lands to agriculture land, because of access to irrigation sources (groundwater and irrigation schemes).
- There is a shift from food crops to commercial orchards (pomegranate), observed as a steep increase in land under plantations, by 1601% from year 2001 to 2016.

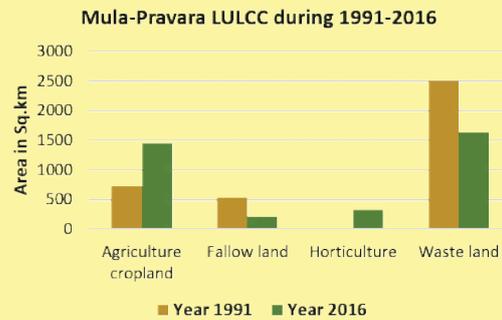
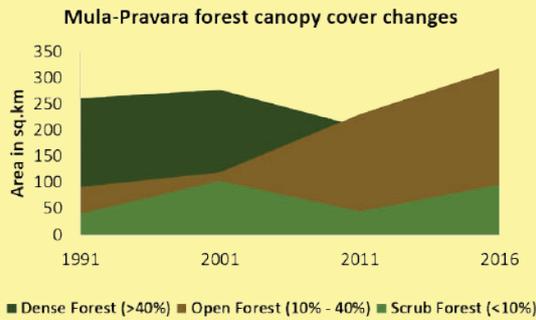


Study area of Mula Pravara



Study area of Purna

The detrimental effects of unplanned and ad hoc LULCC can be reduced through suitable land management strategies, which require information on the present and future scenarios of LULCC.



- A reduction in the forest canopy is observed in many locations with transition to agriculture; degradation along the road network of the Bhandardara reservoir is observed.

### Purna River basin

- Total cultivated area is increased by 43% from year 1991 to 2015. Area under cultivation and fallows are affected by rainfall and water availability.
- During the years 2011-2015, precipitation changes (drought and drought-like conditions) have greatly affected agriculture which sees a decline by 20.7%.
- Access to water resources -surface and groundwater- has helped farmers cultivate crops in lean periods. Regardless of the almost continuous droughts between 2012 and 2015 in this region, Aurangabad and Jalna show considerable area of double crop cultivation (mainly cotton).
- In the Buldhana district construction of the Khadakpurna irrigation dam contributes 26,000 hectares to the additional area under irrigation.

Government schemes, watershed development programs improved access to water resources were the major drivers of change in hotspots, especially in the context of agriculture. Technological (access to groundwater) and economic factors were the other supporting elements that contributed to the change.

### Policy Recommendations:

- Groundwater plays a major role in the agricultural growth in the region but the local geology i.e. hard rock basalt severely limits groundwater recharge potential. Over-dependence on groundwater may have serious implications for sustained agriculture.
- Access to markets and government incentives have encouraged farmers to cultivate high-input and high-profit commercial crops, which also increases farmers' exposure to both market and climate risks.
- Upgrading agro-advisory systems and information technology infrastructure, to make market, climate, and crop management information accessible to farmers, will play an important role in mitigating risks.
- Soil health is in jeopardy due to the current mono-cultivation (cotton, pomegranate) and intensive agriculture. Promotion of Adaptive Sustainable Agriculture (ASA) practices is important and includes the judicious use of water through micro-irrigation and water conserving techniques, crop rotation, organic and improved farming techniques (package of practices), soil health management as well as market linkages which will make agriculture sustainable and ensure income returns.
- Integrated land use planning based on the existing/ projected climate risks, resource availability and land transitions is imperative.

**References:** 1) Duraisamy, V., Bendapudi, R. and Jadhav, A. (2018). Identifying hotspots in land use land cover change and its drivers in a semi-arid region of India. Environmental Monitoring and Assessment. <https://rdcu.be/b0yYR>

2) Boominathan, S., Duraisamy V. and Jadhav, A. (2020). Monitoring the Land Use Land Cover changes Using Remote Sensing and GIS Techniques: A spatio-temporal study on Purna River Basin, Maharashtra, India (Article under preparation)

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