Inherent Vulnerability (Based on disturbance + resilience)

About 25% of the total forested area in Meghalaya has high or very high inherent vulnerability

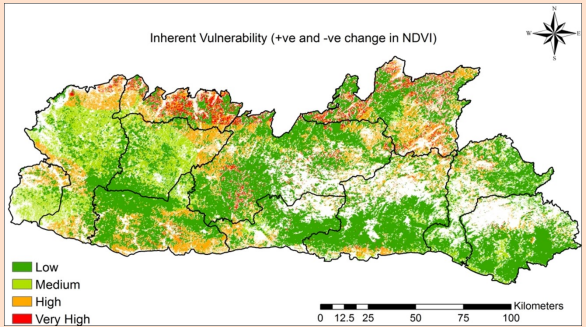
About 64% of the forested area in the state is estimated to have low inherent vulnerability, indicating higher resilience in these areas

- **Most Vulnerable Forests**

Forests in North Garo Hills & Ri-Bhoi

- **Most Resilient Forests**

Forests in East Jaintia Hills & East Khasi Hills

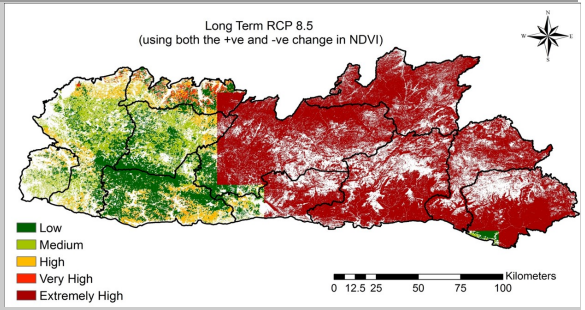


Climate Change Vulnerability (Projections)

In high emission scenario (RCP 8.5) in 2080s about 70% forested grids will become extremely vulnerable

Districts of West Khasi Hills, South-West Khasi Hills, East Khasi Hills, East Jaintia Hills, West Jaintia Hills and Ri-Bhoi are assessed to be the most vulnerable

Forests in the district of South West Garo Hills and West Garo Hills are assessed to be the most resilient



Projected climate stress is likely to manifest in the form of:

- Shift in vegetation boundaries due to climate change
- High evapotranspiration rate and water stress due to increase in temperature causes forest dieback
- Most of the forests in the State are moderate (42.7%) and open (32%) forest type which are more vulnerable to degradation due to climate change.
- Unchecked shifting cultivation (jhum) may lead to increase in forest blanks and scrubs in the State. This may further cause land degradation and soil erosion.
- The fragmented and isolated forests in low biodiversity areas are especially vulnerable to the impacts of climate change which, in turn, could hamper the dispersal and migration of species.
- Habitat loss coupled with forest/habitat fragmentation increases the risk of biodiversity loss of the State. Meghalaya is projected to experience rise in temperature which may cause a gradual loss of biological diversity.
- Declined Net Primary Productivity of the forest in the last 15 years indicate the impact of climate change and the trend is likely to continue with projected rise in temperature in the future.
- Due to a significant increase in air temperature, events of forest fires may be more frequent especially in pine and bamboo forests

सत्यमेव जयते

Assessment of the Impacts of Climate Change on Forests and Biodiversity of Meghalaya

MEGHALAYA
CLIMATE CHANGE CENTRE

IBDLP MEGHALAYA

Department of Science & Technology
Ministry of Science & Technology
Government of India

NMSHE NATIONAL MISSION FOR SUSTAINING THE HIMALAYAN ECOSYSTEM

Objectives of the Study

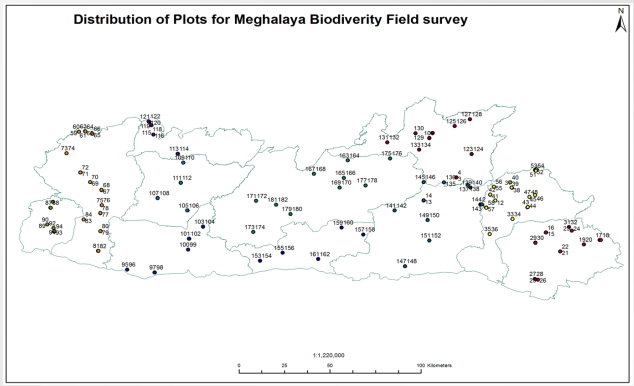
- To assess the state of the forests and floral diversity
- To assess the change in forests in the last decade
- To assess the current/inherent vulnerability of the forests
- To assess the impact of projected climate change on the forests and biodiversity
- To identify critical and vulnerable forest areas

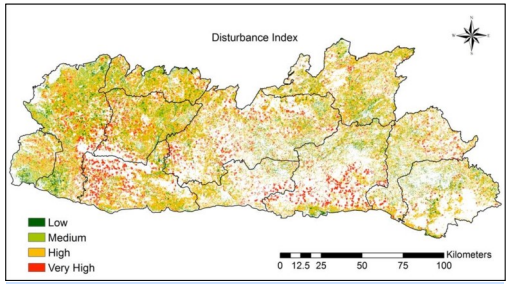
Methodologies Used

- **Present state of forests :** Satellite Data (MODIS) – 2000-2016

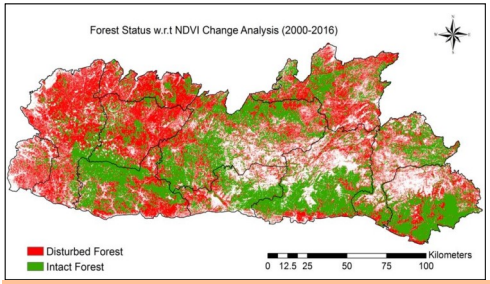
Satellite based Normalized Differential Vegetation Index (NDVI) AND Net Primary Productivity (NPP) metrics

- **Present state of Biodiversity &Biomass** –182 plots,84 locations
- **Projections :** Dynamic Global Vegetation Models - LPJ model

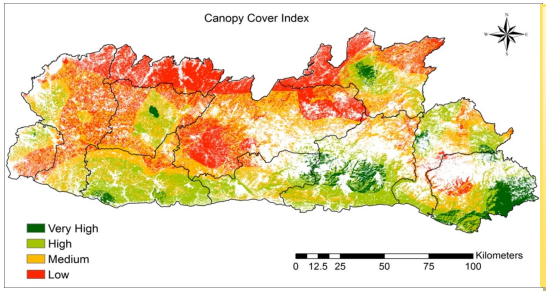




Summation of the anthropogenic disturbances such as roads, settlements and shifting cultivation and natural disturbances



Satellite data (MODIS) based analysis suggests that about 50% of the forest have experienced increased disturbance in the last 16 years

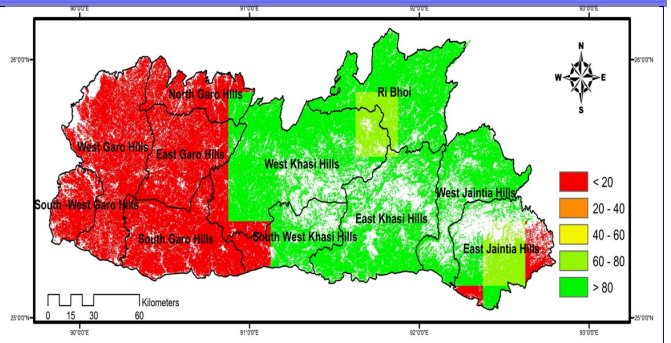


Canopy and biomass related indicators such as biomass stock, tree density, basal area indicates the health of the forest

The index combines tree density, basal area, forest biomass, C- stock and canopy cover

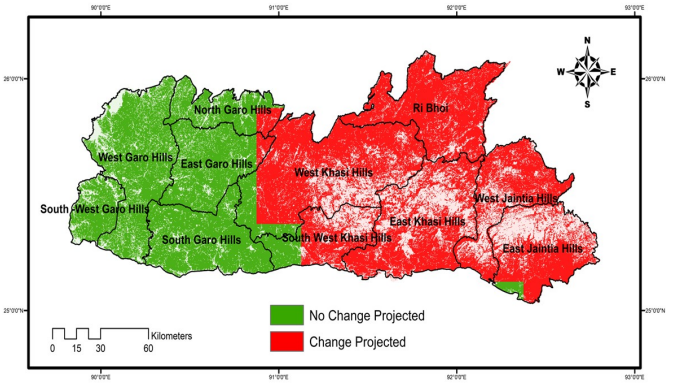
Impact on Net Primary Productivity (RCP 8.5, 2030s)

- Increase in NPP is projected in short & long term compared to baseline 1975-2005
- Highest increase in NPP: parts of the Khasi and Jaintia hills
- Least increase in NPP: the parts of Garo hills

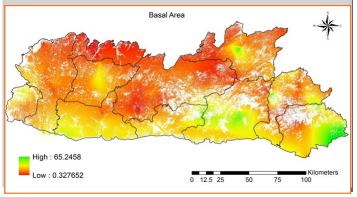


Impact on vegetation distribution: vegetation grid shift (RCP 8.5, 2080s)

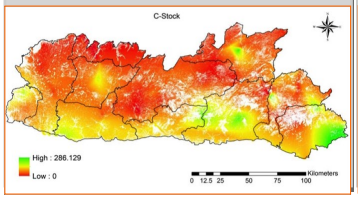
- Districts of Jaintia hills, Khasi Hills and Ri-Bhoi are projected to experience vegetation change
- These projected forest grid changes could lead to vulnerability, especially in the case of fragmented and disturbed forests. In fragmented forest patches, seed dispersal may not be efficient in the view of loss or reduction in number of dispersal agents due to human habitation pressures and climate change. It should also be noted that vegetation change projections are associated with uncertainty, largely coming from the uncertainty inherent in the climate change projections and especially the uncertainty related to rainfall projections.



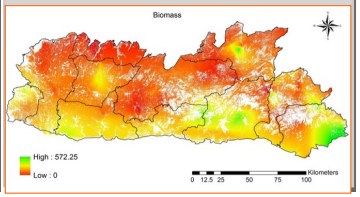
Average basal area for Meghalaya to be 14.8m2/ha



Average carbon density of about 55 tC/ha



Biomass density of about 110 tonnes/ ha in the State



Analysis based on field surveys from about 180 plots across Meghalaya, suggests an average carbon density of about 55 tC/ha in the State, which is much higher than the estimates published by Forest Survey of India for the State (17 tC/ha)