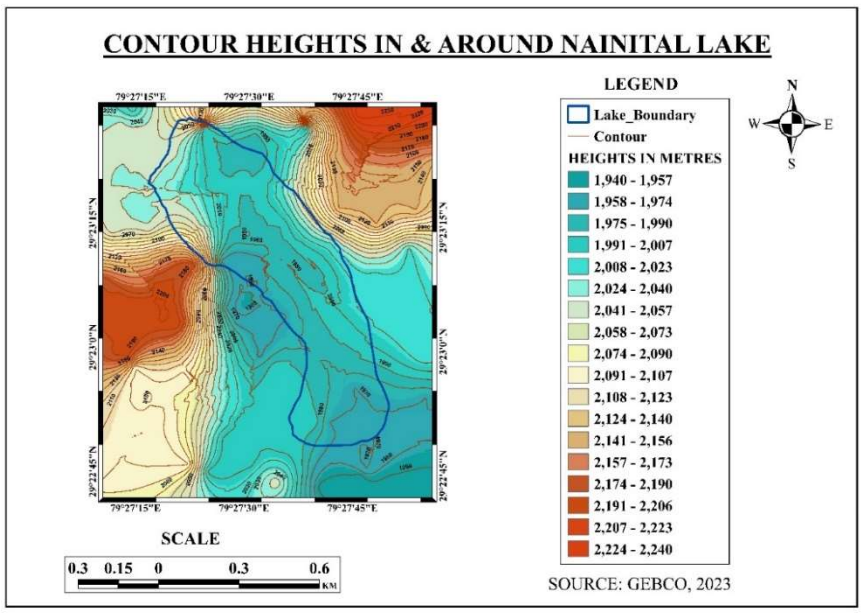
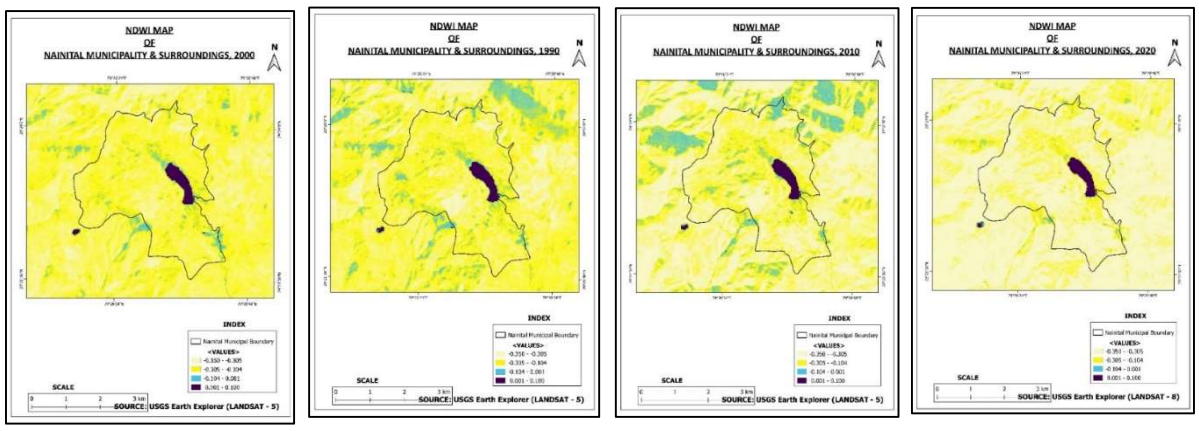
ENVIRONMENTAL STATUS OF NAINITAL LAKE & CITY

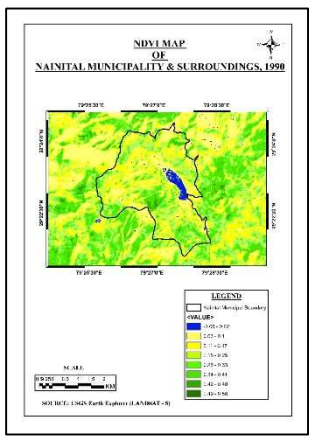
Nainital is a region of Kumaon Himalayas. The region develops round a lake namely Naini Tal. A portion of map no. 53 0/7 shows Nainital and its surrounding. The latitude of Nainital is 29.22'18" North and 29.23'18 North and longitude is 79.26'40" East and 79.27'51"East. The elevation of the lake above sea level is 1935.48 metres. Nainital city is situated on the hilly land around the lake. It is surrounded by the mountains. Naina peak is the highest peak of town, 2611 mts

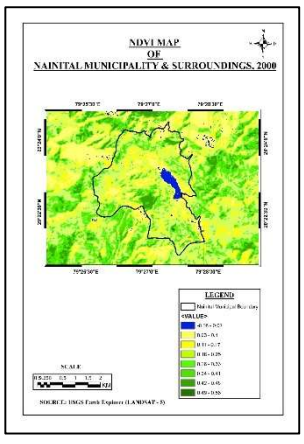


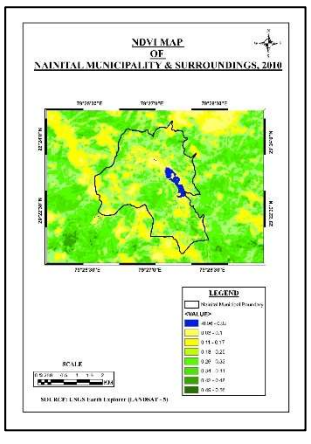
The Nainital district, widely known as India's lake district, and located amid Uttarakhand's picturesque landscapes, is home to six beautiful lakes namely Naini Lake, Bhimtal Lake, Sattal Lake, Sariyatal Lake, Khurpatal Lake, and Naukuchiatal Lake. However, these lakes have been inflicted by encroachments, illegal development in the catchment areas surrounding the lakes, population growth, increased tourism, eutrophication, and contamination due to pollution because of the quick expansion of homes and hotels.

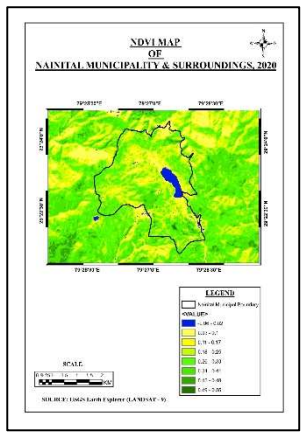


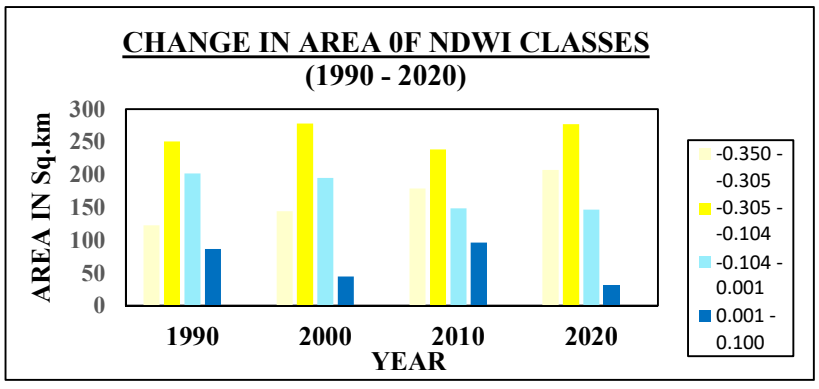
The NDWI values revealed changes in water areas, with Lake Sariyatal exhibiting the highest value and the largest percentage increase. Nainital, Khurpatal, Naukuchiatal, and Bhimtal also displayed notable changes in water areas.

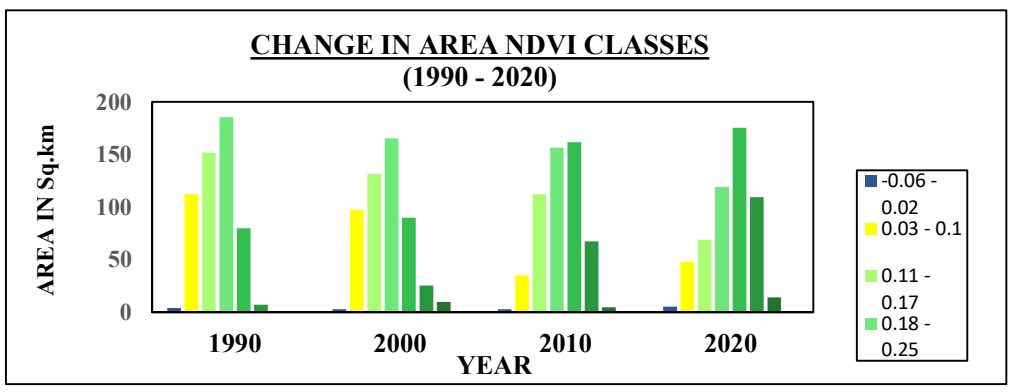




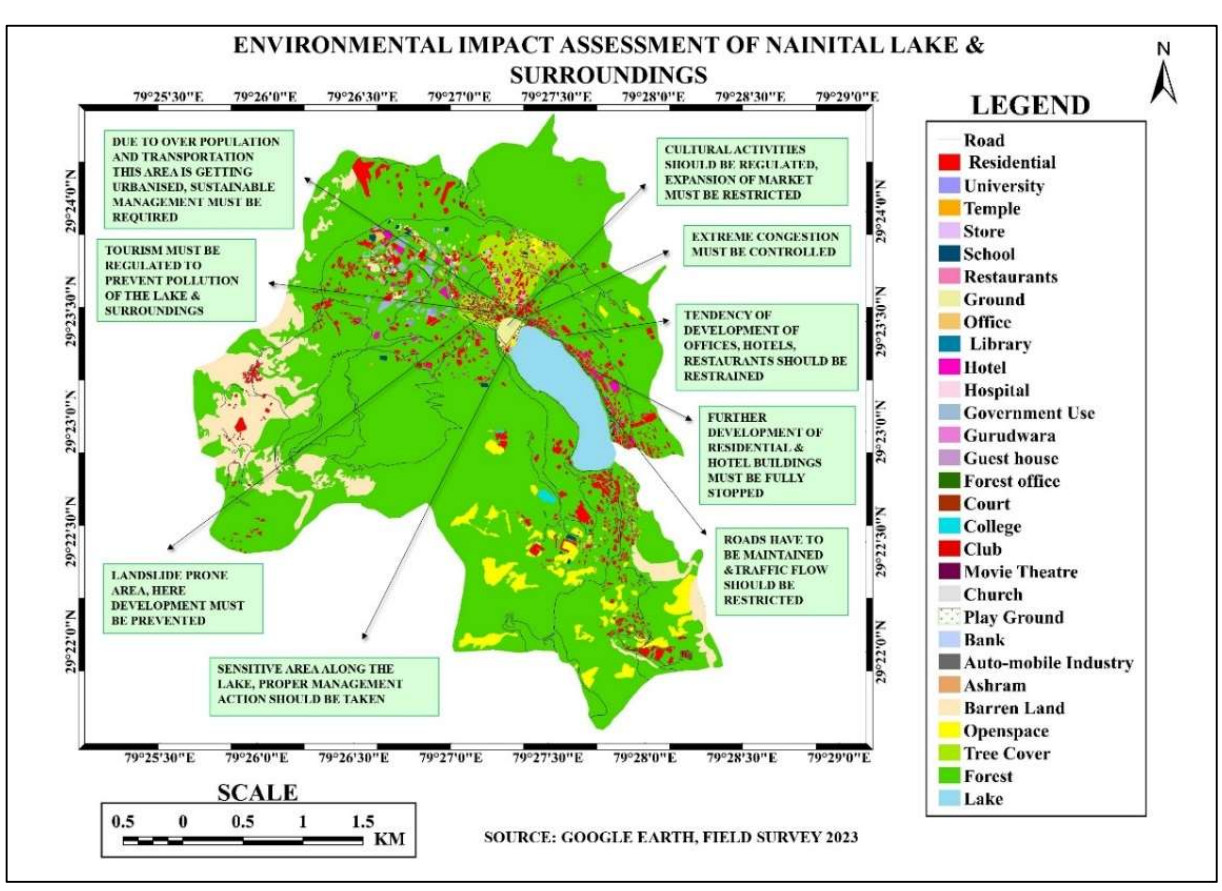








The analysis revealed an overall positive trend in NDVI values for Lake Nainital, indicating increases in the area covered by shrubs and grass, sparse vegetation, and dense vegetation. This suggests a generally healthier and denser vegetation cover in the lake.

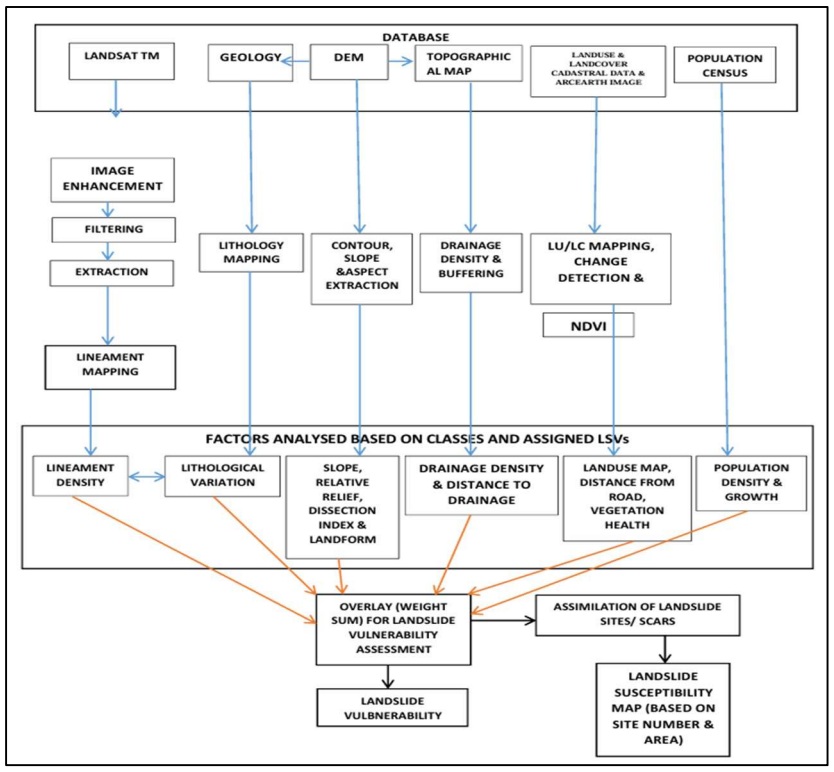


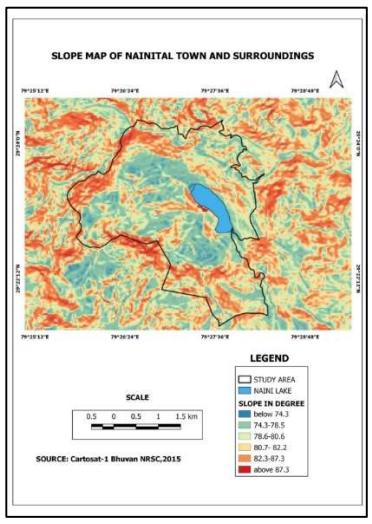
Nainital Lake, a picturesque and vital water body in India, is grappling with severe pollution issues primarily due to domestic sewage, tourism pressure, agricultural runoff, and urbanization. Untreated sewage from surrounding residential areas significantly increases the nutrient load in the lake, leading to eutrophication, which fosters excessive algal growth and depletes oxygen levels, harming aquatic life.

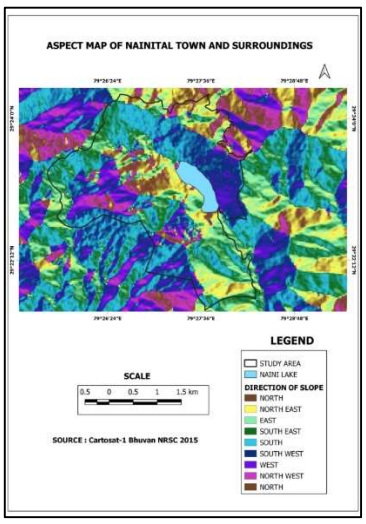
To mitigate these impacts, the EIA recommends measures like sustainable waste management, controlled urban development, erosion control, eco-friendly tourism practices, and biodiversity conservation. It also outlines an environmental monitoring plan to ensure ongoing assessment of key indicators and calls for stakeholder engagement to involve local communities in the preservation efforts. The EIA emphasizes compliance with environmental laws, considers the economic costs and benefits, and aligns proposed actions with sustainable development goals.

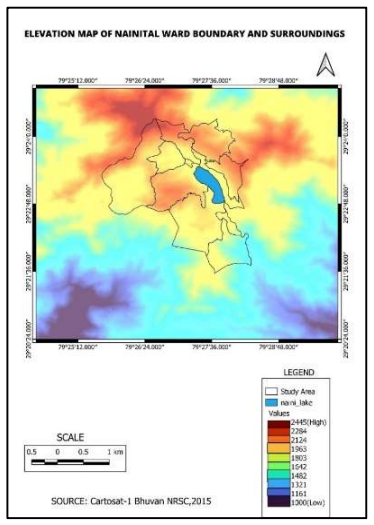
LANDSLIDE VULNERABILITY ASSESSMENT

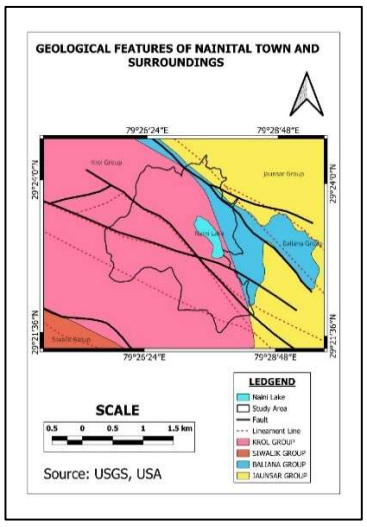
The mountain environment, which is already a fragile zone due to tectonic activities, slope instability and mass movements of highly crushed and deformed rocks, becomes highly vulnerable to slope failure when anthropogenic factors disturb the stability of the region. In order to reduce the damage caused by landslide initiations and reactivations, a landslide susceptibility map is really needed (Van Den Eeckhaut et al., 2006). Landslide is a recurring disaster often occurring in conjunction with and triggered by other disasters like cloud bursts and further causing disasters like flood in the Himalayas.

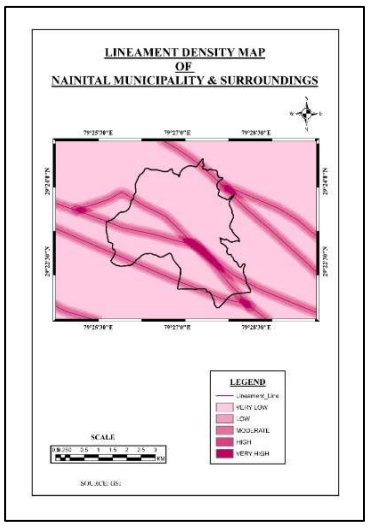


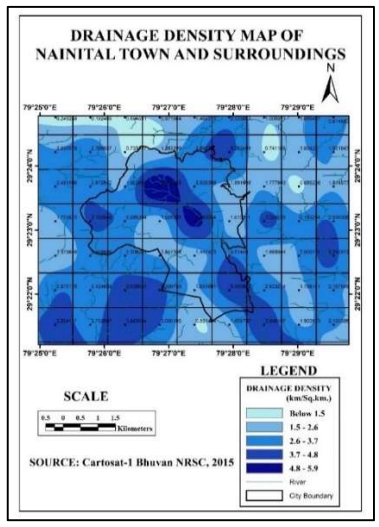


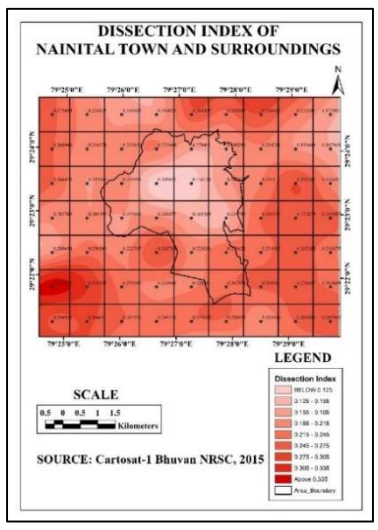


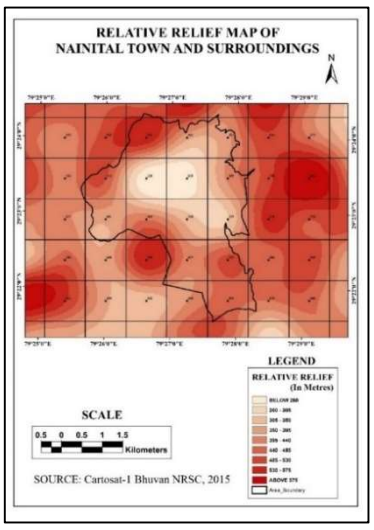


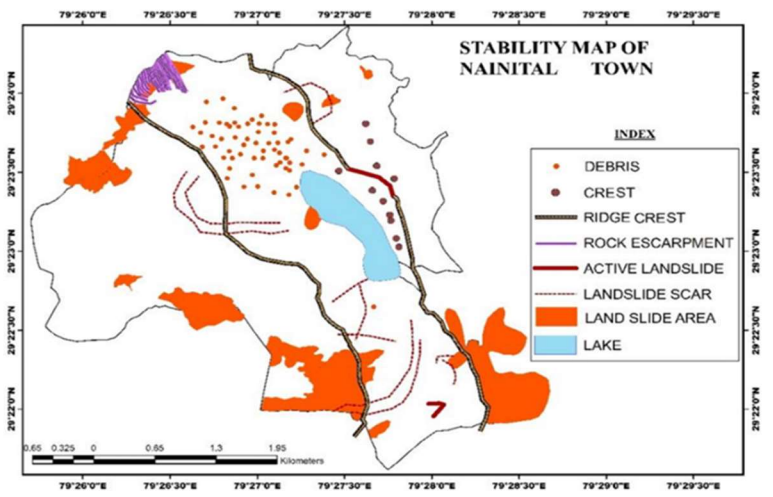


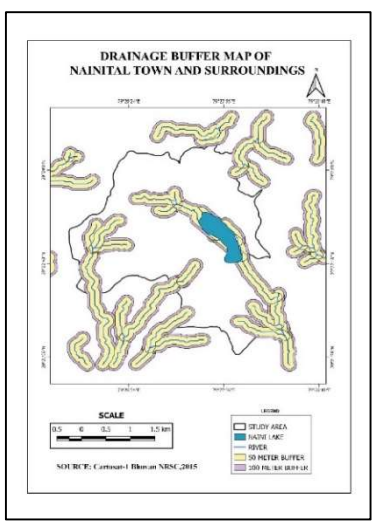


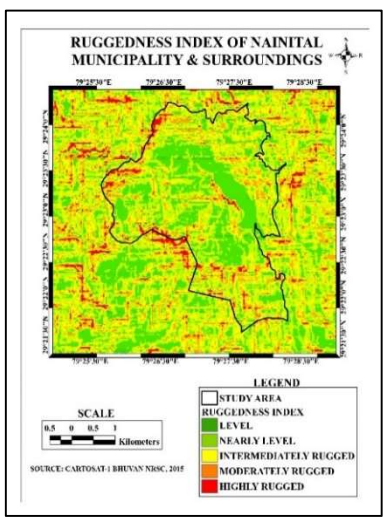


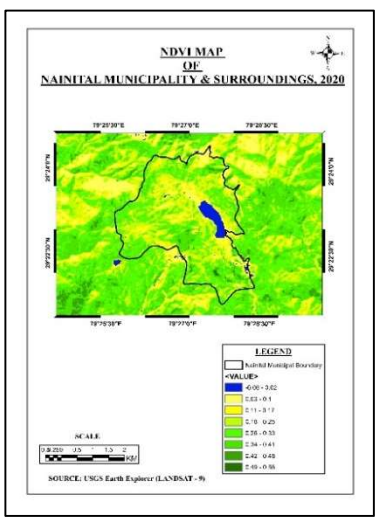


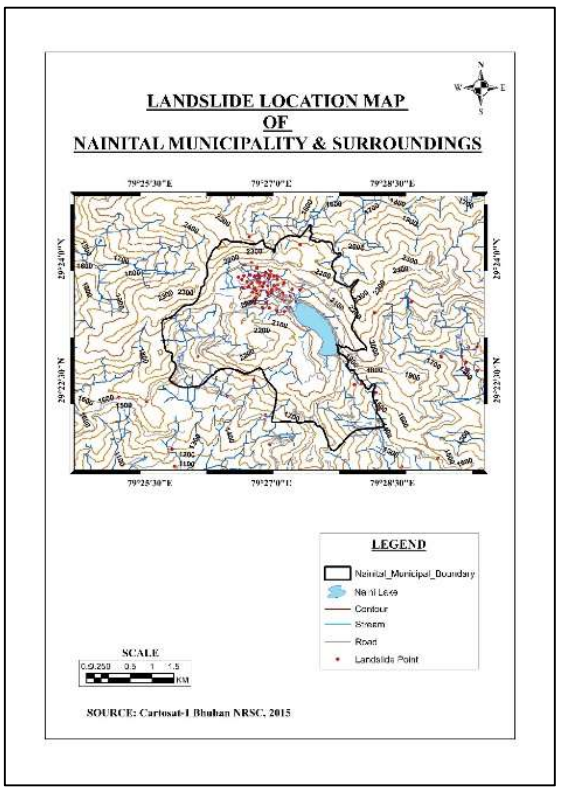


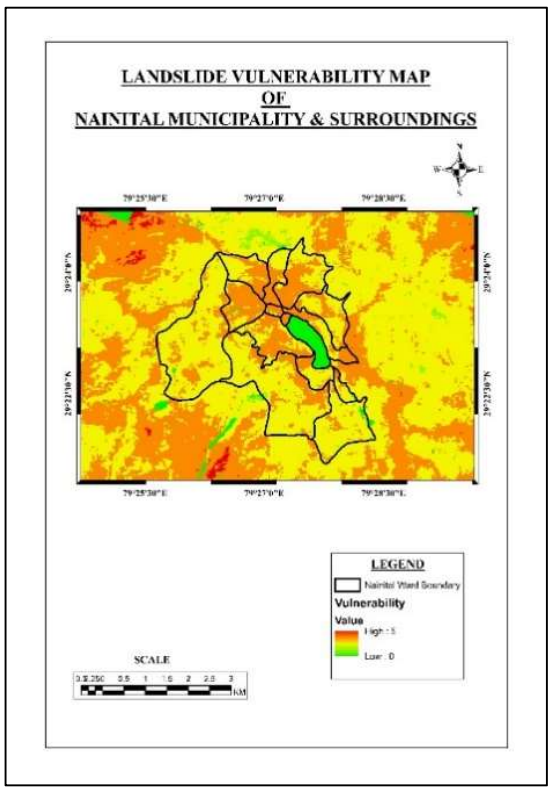












- ✓ The steep slopes (38º to 49º) and moderately steep slopes (26º to 37º), bordering the Lake have a subclass value to 3 and 2 respectively. Only a small part of escarpment to the southwest part of the town has a subclass value of 1. These areas are more probable to suffer due to landslides. Other areas having moderate and gentle slopes can be assigned subclass values of 4 and 5 respectively. These have a high probability of occurrence of landslides.
- ✓ The area surrounding the lake has a sub-class value of 4. The north and south part has a sub-class values of 7 and 8 respectively indicating that they have a greater potential of being affected by landslides.
- ✓ The northern part has a high subclass value of 5, as the DD here is more than 4.8 km/sq. km. In other parts of northern and northeastern Nainital, the assigned subclass values are 5 and 4. Thus, it is clear that with respect to drainage density the probability of landslides is very high here.
- ✓ The built-up area in the high relief part itself is an indication of high probability slope instability. The settlements have been assigned a high sub-class value of 7; light vegetation area have been assigned a sub-class value of 6. The presence of these indicates the vulnerability of this area to landslides.
- ✓ As the road is present around the Lake area which also has steep slope the probability of landslide becomes high as here the assigned subclass value is 9.