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The study of changes detection of land covers in Zagros Mountain ,West of Iran .

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Key points This study was performed using TM & ETM+ data taken in 1990 and 2002 in order to investigating the trend and rate of cover degradation in Zagros Mountain ,Iran .The study area was located in part of central Zagros Mountain .The supervised classification was performed for the images using ML (maximum likelihood) .Ground truth maps were prepared for degradation cover class in 63 ha of area and also for forest sparse / non forest classes in 200 ha of area (3% of total area) using GPS .Also ,the overall accuracy and Kappa were obtained 83.38% and 53.23% for classifying forest sparse/non forest classes . With respect to comparison of classified map of 1990 and 2002 datasets ,12 year period .The degraded area is calculated on 81.47 ha .The average of degradation per year has been 6.8 ha or 0.1% of area .

Key words : change detection ,Zagros Mountain ,degradation cover .

Introduction Change detection and monitoring involve the use of multi date image to evaluate differences in land cover (Singh , 1989) .Rangeland and forest ecosystems of the Zagros Mountain in west of Iran are remarkably diverse and productive concluding to variety in landforms ,hydrology ,flora ,fauna ,and ecosystem processes .Satellite data over various spatial and temporal scales offers the most reliable ,time and cost effective means of assessing land cover change .Change detection essentially comprises the quantification of temporal phenomena from multi-date imagery (Coppin , 2002) .The usefulness of satellite data in change detection is dependant not only on radiometric and spatial resolution of the data but also on subsequent processing and quality of the preprocessed data (Anuta , 1984) .Degradation of vegetation is as a critical problem in Zagros Mountain ,west of Iran ,that regions have rangeland forest sparse in generally .In this study TM and ETM+ images recorded in time frame between 1990 and 2002 was evaluated to produce land cover maps for change detection analysis and determination Zagros plant cover change .Comparison of classification results each other and also with the available maps was realized in the GIS environment to show the cover changes happened in the interest area .

Materials and methods

Data This study performed in Zagros central mountain ,western of Iran is located in the between 46°33' & 46°26' E longitude and 33°43' & 33°37' N Latitude (shown in Figure 1 .) .This area have heterogeneous topographic with 1300 to 2650 m .

One was the TM image acquired on July 5 ,1990 and the other was the ETM+ image on august 7 ,2002 .Hence ,the resampling was done using non-parametric method ,nearest neighbor interpolation and affine transformation for both of datasets .The 2002 image was registered to available reference map (RMSE=18.35 m) ,using 8-GCPs with 1 nd order polynomial statistics using nearest neighbor interpolation and affine transformation ,which further acted as reference image for image to image registration with 1990 image .Image to image registration was done using 13- GCPs uniformly distributed over the image plane (RMSE=13.05 m) .

Methodology Training areas were selected in two datasets with (TM4 ,3 ,2 and ETM+4 ,3 ,2) band combinations and field work . The ground truth map determined of the areas that degraded by road construction ,using by GPS in 63 ha .Of the area by field work ; in order to this ,the boundaries of degradation used as ground truth for cover degradation .Also forest sparse and non-forest ground truth map provided using systematic-random method from 3% of the total area (about 200 ha ,in samples with 300×300 m²) .For tacking the classes information used GPS (field work) ,FCC image and toposheets .Post-classification change detection technique was applied .In order to better detection of plant cover for classification ,used NDVI .After selecting and correcting training samples histogram ,their separability was controlled using Bhattacharya distance index .The maximum of separability between training areas were 1.99 and 1.93 for ETM+ and TM data respectively .

Results and discussion The degraded area is calculated on 81.47 ha .The average of degradation per year has been 6.8 ha or 0.1% of area .Hence ,1.84% of total area has been degraded in the 12 year period of time .Overall accuracy and Kappa coefficient were obtained 91% and 92% for determining degradation ,respectively .Land degradation processes in the study area are ; degradation of natural vegetation due to new road construction and fuel consumption ,fire .This needs to be seriously studied , through multi-dimensional fields including socioeconomic in order to preserve the newly reclaimed land .

Conclusions The changes in land cover led to vegetation degradation(81.47 ha .) and water logging in part of the study area . studies regarding change techniques have been carried for a long time ,and have had developed many useful techniques .As these studies do not provide uniform methods ,hence further investigation is needed with the scale of application for different studies . Further ,an integration of other aspects as slope ,digital elevation model ,socio-economic attributes etc by the aid of GIS layer seems to be a promising for change detection analysis .It is necessary to used of high spatial resolution as SPOT ,IRS 1C (5 m resolution) and more recent IKONOS (1 m resolution) satellite imaging systems .