LLDPE was blended with poly (vinyl alcohol) and mechanical, thermal, spectroscopic properties and biodegradability were investigated. The biodegradability of LLDPE/PVA blends has been studied in two environments, viz. (1) a culture medium containing *Vibrio sp.* and (2) a soil environment over a period of 15 weeks. Nanoanatase having photo catalytic activity was synthesized by hydrothermal method using titanium-iso-propoxide. The synthesized TiO$_2$ was characterized by X-Ray diffraction (XRD), BET studies, FTIR studies and scanning electron microscopy (SEM). The crystallite size of titania was calculated to be $\approx 6$nm from the XRD results and the surface area was found to be about 310m$^2$/g by BET method. SEM shows that nanoanatase particles prepared by this method are spherical in shape. Linear low density polyethylene films containing polyvinyl alcohol and a pro-oxidant (TiO$_2$ or cobalt stearate with or without vegetable oil) were prepared. The films were then subjected to natural weathering and UV exposure followed by biodegradation in culture medium as well as in soil environment. The degradation was monitored by mechanical property measurements, thermal studies, rate of weight loss, FTIR and SEM studies. Higher weight loss, texture change and greater increments in carbonyl index values were observed in samples containing cobalt stearate and vegetable oil. The present study demonstrates that the combination of LLDPE/PVA blends with (i) nanoanatase/vegetable oil and (ii) cobalt stearate/vegetable oil leads to extensive photodegradation. These samples show substantial degradation when subsequent exposure to *Vibrio sp.* is made. Thus a combined photodegradation and biodegradation process is a promising step towards obtaining a biodegradable grade of LLDPE.