3.1. Background

Humans have ascertained their presence on the Earth’s land surface with long-term cumulative impacts through a wide range of direct consumptive and destructive mechanisms, and through other indirect processes, even to the extent of modifying the global climate (Cook et al., 2016; Franklin et al., 2016; Garonna et al., 2016). The major impacts of human activities on forest ecosystems include loss of forest area (Hansen et al., 2013), forest fragmentation (Haddad et al., 2015), transformation of structure and composition of forests (Trumbore et al., 2015), depletion of biomass (Hutchison et al., 2014; Liu et al., 2015) and carbon stocks (Carvalhais et al., 2014), species loss (Moritz & Agudo, 2013; Pacifici et al., 2015; Urban, 2015), species invasions (Mainali et al., 2015), soil degradation (Smith et al., 2016), and subsequent cascading effects on forests, such as increasing risks of forest fire events (Rocca et al., 2014). Although, forest ecosystems are dynamic and adaptive (Messier et al., 2013), but the future environmental changes of increasing rate and magnitude will underpin the ecological capital and supply of ecosystem services provided by the forests (Seidl et al., 2016). Superimposed on the anthropogenic pressures, human-induced global climate change is also likely to cause significant changes on forest ecosystems (Gottfried et al., 2012; Corlett & Westcott, 2013; Lindner et al., 2014; Gómez et al., 2015). Hence, one of the major concerns among forest researchers, practitioners, policy-makers and other stakeholders across the globe, is to maintain the long-term adaptive capacity of forests, without challenging their stability to changing various disturbance regimes, either due to anthropogenic or natural events, or both. Through understanding the spatial and temporal patterns of forest cover change, while acknowledging the coupled socio-ecological systems in any forest-dominated landscape, it will provide us a foundation for mitigating environmental damages, such as deforestation and forest degradation, especially in sensitive and ecologically valuable regions.

In this context, it should be noted that climate change is often recognized as the most challenging threat that will cripple ecological systems and societies across the entire Himalayan region. Therefore, based on an interdisciplinary theme, the work in this doctoral research aims to understand climate change-related impacts on forests and
forest-dependent people in the central Himalayan region. The aim and objectives for this study are as follows:

### 3.2. Aim and Objectives

The aim of this research work is to know the potential response of forest ecosystems and local communities to climate change exposure in the central Himalayan region in India. To achieve this aim, following objectives and research questions were formulated:

**Objective I**
To identify the changes in forest distribution (past anthropogenic disturbances and future climatic changes)

**Research Questions**

- **R.Q. 1.** How does land cover change among different forest cover types?
- **R.Q. 2.** What are the forest fragmentation mechanisms between natural and anthropogenic components?
- **R.Q. 3.** What will be the distribution of forests (species) as a potential response to climate change?

**Objective II**
To know the importance of forests and perceived climate change impacts among local communities

**Research Questions**

- **R.Q. 1.** What is the degree of dependency of communities on forests and forest-based resources? If so, what factors contribute to their dependency?
- **R.Q. 2.** Are there any differences in opinions that constitute variations in forest loss among local communities?
- **R.Q. 3.** What is the current level of awareness and quality of knowledge regarding climate change?
- **R.Q. 4.** What are the identifiable primary and secondary impacts based on people's perceptions on climate change?