Abstract

The thesis attempts to address three important issues: environmental accounting, carbon sequestration potential and policies for carbon mitigation of forests. The thesis adjusts the net domestic product (NDP) in two steps. First, it adjusts the value added in the forest sector to include non-market production of timber, fuelwood, and non-timber forest products left out of the NDP estimates. This converts NDP to adjusted NDP (ANDP). Second, it adjusts ANDP for the depletion and degradation of forest assets. This yields environmentally adjusted net domestic product (EDP). The results show that the current economic contribution of forests is 2.6% of ANDP as against 1.38% of NDP. The EDP equals 98.9% of ANDP for 1993-94. The reduction in the value of forest stock is substantial being equal to 40 per cent of the value added in the sector. This implies that due to the neglect of the forest resources in the decision-making forests are being depleted and needs adequate attention. In order to examine the carbon sequestration services provided by the forests, the thesis first estimates the carbon present in the forest biomass as the estimates of carbon sequestered are very sensitive to the estimates of biomass. The results indicate that the total biomass in Indian forests ranges from 14 t/ha to 218 t/ha with an average carbon stock of 45.8 t C/ha. The carbon stored in the biomass is transferred to the atmosphere, wood products and soils due to various human and natural disturbances. Entire carbon flows to and from the ecosystem should be tracked for assessing the role of forests in the global carbon cycle. Despite the large mass of carbon harvested from II1dia very less carbon is retained in wood products, because approximately 90% of the carbon is immediately released into the atmosphere due to the burning of fuel wood. The results of the carbon balance model for India indicate that the Indian forests at present are a source of carbon at the rate of 13 Mt C (including accumulation of C in soil C pool) for the reference year 1993-94. This will be the case till an alternative source of supply of timber and fuelwood, winch decreases the over dependence on the forests, exists. However, India has lot of potential to sequester carbon. If the entire technically feasible land is made available for forestry, the natural forests along with newly afforested plantations can sequester around 153 Tg C/yr (mean net carbon storage after 30 years from the time of implementation), equivalent to 1990 fossil fuel emissions of India. Even if India continues to afforest at the rate of 1.2 M ha per year, with the right choice of species, Indian forests can sequester carbon equivalent to 83 Tg C/yr with further potential for carbon sequestration. The thesis computes the additional cost incurred to sequester ton of carbon. The results show that the cost of investment per ton of

carbon varies from Rs. 420 in the case of natural regeneration to Rs. 3,500 in case of raising plantations on completely degraded lands. Hence, the major barrier to implement various mitigation options in the forest sector is the financial barrier. As Indian forests have lot of potential for sequestering carbon, India can implement bilateral and multilateral programs like Clean Development Mechanism. The compensation paid to developing countries for participating in global climate change mitigation should not be just based on the estimated value of forests as carbon store but allow for the huge opportunity costs faced when they set aside forests or manage them sustainably. Such international co-operation can improve finances as well as provide expertise, equipment, and data and increase the attractiveness of C sequestration option.