Therefore the severity of the impacts will vary among countries as will the ability to respond. In tropical countries the managed forests characteristically employ exotic species, whereas in the northern countries greater reliance is placed on indigenous species.

Biophysical effects on forest ecosystems

Impacts on forest ecosystems will be at the tree and microsite levels, at the stand/watershed level and at the regional level. Impacts on individual trees include tolerance of drought and winds, the possible effects of altered seasonality (active vs dormant stages), altered photosynthetic rates and increased water use efficiency. At the microsite level, moisture may be limited and biological soil processes may be enhanced. Forest renewal will be adversely affected if there is a shortage of moisture at the critical establishment phase.

On stand levels, insects and diseases can be expected to cause significant losses to forests and these losses can be expected to increase with increasing change. Fire severity will increase, and while managed forests may have less fuel available than unmanaged ecosystems, this will not lessen the incidence of fire, nor will it affect the weather conditions giving rise to the rates of spread or the extent of the areas burned. Developed countries can barely cope with the current state and the extent of areas burned seem to be rising. The incidence of fire may be less in the tropics as the climate there changes less, but many plantations are in semi-arid zones and will be suffer adverse impacts. Costs associated with flooding, resulting from rising sea-levels and disruption of weather patterns, can be expected. There will be problems in using the lower quality wood grown under stress and large costs associated with moving processing facilities and infrastructure as the wood supply zones move northward. The most important feature of these costs and disruptions from a global point of view is that the changes will differ among countries and that some countries are better able than others to cope with the impacts.

Major forest-type zones and species ranges could shift significantly as a result of climate change. Results of several Northern Hemisphere studies show that both high-latitude and low-latitude boundaries of temperate and northern forests (and tree species) may shift hundreds of kilometres poleward. In contrast, studies in the Southern Hemisphere suggest that Australian species could adapt and grow at temperatures much warmer than those of their natural distribution.

At the stand level, the following effects of climate change on forests are likely: increased mortality owing to physical stress; increased susceptibility to and infestations of insects and diseases; increased susceptibility to and incidences of fire; changed stand growth rates, both increases and decreases; more difficult stand establishment by both natural and artificial regeneration; and changed composition of species.

Two broad types of forests are likely to be sensitive to a changing climate: (i) boreal forests, where stands are mainly even-aged and often temperature-limited, and where temperature changes are expected to be large; and (ii) forests in arid and semi-arid regions where increased temperatures and stable or decreasing precipitation could render sites inhospitable to the continued existence of current forest stands. However, there could be compensating effects of faster growth owing to higher ambient CO_2.