

Executive summary

The IPCC Working Groups on scientific analysis (Working Group I), impacts (Working Group II) and response strategies (Working Group III) were established in November 1988 and proceeded to work in parallel under instructions from IPCC. The responsibility of Working Group II is to describe the environmental and socio-economic implications of possible climate changes over the next decades caused by increasing concentrations of greenhouse gases.

The report of Working Group II is based on the work of a number of subgroups, using independent studies which have used different methodologies. Based on the existing literature, the studies have used several scenarios to assess the potential impacts of climate change. These have the features of:

- (i) an effective doubling of CO_2 in the atmosphere between now and 2025 to 2050 for a 'business-as-usual' scenario;
- (ii) a consequent increase of global mean temperature in the range of 1.5°C to $4^\circ\text{--}5^\circ\text{C}$;
- (iii) an unequal global distribution of this temperature increase, namely a smaller increase of half the global mean in the tropical regions and a larger increase of twice the global mean in the polar regions; and
- (iv) a sea-level rise of about 0.3-0.5 m by 2050 and about 1 m by 2100, together with a rise in the temperature of the surface ocean layer of between 0.2° and 2.5°C .

These scenarios pre-date, but are in line with, the recent assessment of Working Group I which, for a 'business-as-usual'

scenario (scenario A in Working Group I Report) has estimated the magnitude of sea-level rise at about 20 cm by 2030 and about 65 cm by the end of the next century. Working Group I has also predicted the increase in global mean temperatures to be about 1°C above the present value by 2025 and 3°C before the end of the next century.

Any predicted effects of climate change must be viewed in the context of our present dynamic and changing world. Large-scale natural events such as El Niño can cause significant impacts on agriculture and human settlement. The predicted population explosion will produce severe impacts on land use and on the demands for energy, fresh water, food and housing, which will vary from region to region according to national incomes and rates of development. In many cases, the impacts will be felt most severely in regions already under stress, mainly the developing countries. Human-induced climate change due to continued uncontrolled emissions will accentuate these impacts. For instance, climate change, pollution and ultra-violet-B radiation from ozone depletion can interact, reinforcing their damaging effects on materials and organisms. Increases in atmospheric concentrations of greenhouse gases may lead to irreversible change in the climate which could be detectable by the end of this century.

Comprehensive estimates of the physical and biological effects of climate change at the regional level are difficult. Confidence in regional estimates of critical climatic factors is low. This is particularly true of precipitation and soil moisture, where there is considerable disagreement between various general circulation model and palaeoanalog results. Moreover, there are several