

## LIST OF FIGURES AND PHOTOPLATES

Figures	Particulars	Page
1.1	Conceptual frame showing components and processes of land-use systems which are influenced by physical environment and human driving force at a watershed level	11
3.1	Location map of Mamlay watershed showing drainage pattern and settlements	45
3.2	Geological map of Mamlay watershed	46
3.3	Mean monthly rainfall (mm) and temperature (°C) for 1999 and 2000 in (a) temperate belt and (b) subtropical belt of Mamlay watershed	47
3.4	Mean monthly evaporation (mm) for 2000 in (a) temperate belt and (b) subtropical belt of Mamlay watershed	48
4.1	Land-use/cover map of the Mamlay watershed, 1988	76
4.2	Land-use/cover map of the Mamlay watershed, 2001	77
5.1	Seasonal stream discharge ( $l s^{-1}$ ) for 1999 and 2000 in different streams (a) Pockcheykhola, (b) Chemcheykhola, (c) Tirikhola, (d) Sombareykhola, (e) Rangrangkhola and the watershed outlet Rinjikhola	102
5.2	Seasonal sediment concentration ( $mg l^{-1}$ ) for 1999 and 2000 in different streams (a) Pockcheykhola, (b) Chemcheykhola, (c) Tirikhola, (d) Sombareykhola, (e) Rangrangkhola and the watershed outlet Rinjikhola	103
5.3	Organic carbon in parent soil (PS) and eroded soil (ES) in different land-use/cover	104
6.1	Relationship between tree basal area ( $m^2 ha^{-1}$ ) and (a) long-term carbon, (b) total vegetation carbon and (c) total stand carbon	139
6.2	Relationship between (a) standing biomass and carbon content in biomass, (b) floor litter biomass and carbon content in litter biomass and (c) humus and carbon content in humus of different forests and agroforestry systems	140
6.3	Profile of soil total carbon distribution by land-use/covers	141
6.4	Profile of soil organic carbon distribution by land-use/covers	142

6.5	Relationship between (a) vegetation carbon and soil organic carbon and (b) floor litter carbon and soil organic carbon	143
6.6	Relationship between microbial biomass carbon and organic carbon	144
6.7	Seasonal variation in microbial biomass in different land-use/covers	145
6.8	Compartmental allocation of carbon in (a) temperate natural forest dense and (b) temperate natural forest open	146
6.8	Compartmental allocation of carbon in ( c ) subtropical natural forest open and (d) cardamom based agroforestry system	147
6.8	Compartmental allocation of carbon in (e) mandarin based agroforestry system and (f) open cropped area temperate	148
6.8	Compartmental allocation of carbon in (g) open cropped area subtropical, (h) wasteland area temperate and (i) wasteland area subtropical	149
7.1	Seasonal CO <sub>2</sub> flux from (a) litter, (b) humus and ( c ) soil of different land-use/covers	180
7.2	Mean annual CO <sub>2</sub> flux from (a) litter, (b) humus and (c) soil of different land-use/covers	181
7.3	Distribution of mean CO <sub>2</sub> flux rates along gradients of (a) soil temperature and soil moisture and (b) soil organic carbon and microbial biomass carbon	182
7.4a	Compartmental flow of carbon in temperate natural forest dense	183
7.4b	Compartmental flow of carbon in temperate natural forest open	184
7.4c	Compartmental flow of carbon in subtropical natural forest open	185
7.4d	Compartmental flow of carbon in cardamom based agroforestry system	186
7.4e	Compartmental flow of carbon in mandarin based agroforestry system	187
7.4f	Compartmental flow of carbon in open cropped area temperate	188

7.4g	Compartmental flow of carbon in open cropped area subtropical	189
7.4h & i	Compartmental flow of carbon in wasteland area temperate and wasteland area subtropical	190
8.1	Compartment diagram for the circulation of carbon in the Mamlay watershed. The number of each compartment, corresponding to its variable assignment in the model equations is boxed in each compartment	203

### **Photoplates**

Plate 1	Different types of forest cover	-
Plate 2	Dominant agroforestry systems of the watershed	-
Plate 3	Rainfed cultivation in the watershed	-
Plate 4	Timber utilization, fuelwood and fodder collection in the watershed	-
Plate 5	Soil erosion measurement plot, throughfall and stem flow collectors and CO <sub>2</sub> infrared gas analyzer	-