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## Anhang

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Table 3.1. The studied landslides and slopes and their characteristics

Tab. 3.1. Die untersuchten Erdrutsche und Böschungen mit ihren Eigenschaften

mon = monsoon, dry = dry season, sl = slide, disp = disposal

Study plot	Transect No.	Vegetation type of anchor	Altitude a.s.l.	Aspect 0-400°	Slope %	Type	Occurred	Stabilization measures
1	1- 3	mesohygrophilous forest	1120	375	65	slide	mon 80	technical/fence/ Alnus
2	4- 6	mesohygrophilous forest	1180	375	68	slide	mon 77	technical
3	7	xerophilous forest	1450	225	80	cut/sl	mon 80+81	technical/ Alnus + Eupatorium
4	8	shrubland	1690	150	70	disp	dry 76/77	technical/fence/ Alnus
5	9	shrubland	1690	200	70	disp	dry 76/77	-
6	10	mesohygrophilous forest	1810	250	80	cut/sl	mon 81+82	technical
7	11	Pinus patula-afforestation	1970	300	85	slide	mon 81+82	-
8	12-13	hygrophilous forest	1990	350	90	slide	mon 79	-
9	14	shrubland/hygrophilous forest	1990	75	90	cut/sl	dry 77/78	-
10	15	shrubland/hygrophilous forest	2010	400	75	disp/sl	dry 77/78 mon 80	technical/fence/ Alnus
11	16-18	shrubland/hygrophilous forest	2040	250	85	disp	dry 77/78	technical/ Alnus
12	19	shrubland/hygrophilous forest	2040	200	75	slide	ca. 1955	-
13	20	shrubland/hygrophilous forest	2090	250	80	cut/sl	dry 77/78 mon 78	technical/ Alnus + point turfing
14	21	hygrophilous forest	2120	25	65	slide	mon 78	-
15	22	hygrophilous forest	2170	325	95	cut/sl	mon 78-80	technical/ Alnus + var. seeds
16	23	pasture land	2570	250	75	disp	dry 77/78	-
17	24	pasture land	2620	100	90	cut	dry 78/79	fence/ point turfing
18	25	pasture land	2560	125	78	cut	dry 78/79	technical
19	26-27	pasture land	2500	150	90	disp/sl	dry 78/79	-
20	28	pasture land	2500	150	85	disp	dry 78/79	Alnus
21	29	pasture land	2530	150	95	cut	dry 78/79	technical/ Alnus
22	30-31	mesohygrophilous forest	2550	275	73	slide	mon 82	technical/ Alnus
23	32	mesohygrophilous forest	2440	275	90	disp	dry 78/79	Alnus
24	33	mesohygrophilous forest	2350	200	70	slide	mon 82	technical/ Alnus
25	34	shrubland	2100	50	80	cut	mon 78/79	technical/ Alnus + point turfing
26	35	shrubland	2100	125	73	cut/sl	dry 78/79 mon 79	technical/ Alnus
27	36-37	shrubland	1975	175	50	slide	ca. 1970	technical/fence/ Alnus
28	38	shrubland	1950	210	70	slide	mon 83	technical/fence/
29	39	shrubland	1890	250	85	disp	dry 82/83	Alnus
30	40	shrubland	2050	290	95	cut	dry 78/79	point turfing
31	41	shrubland	2020	300	75	disp	dry 78/79	-
32	42	shrubland	1800	175	70	disp	dry 78/79 dry 82/83	Eupatorium + Alnus
33	43	shrubland	1750	200	112	cut	dry 78/79	technical/ var. seeds
34	44	mesohygrophilous forest	1730	200	80	disp	dry 78/79	Alnus + Eupatorium
35	45	mesohygrophilous forest	1730	300	80	disp	dry 78/79	Engelhardtia





Table 4.3. Plant composition and frequency, group 3, last survey (Oct. 1985)  
 (For legend see Table 4.1)

Tab. 4.3. Zusammensetzung und Frequenz der Pflanzenarten auf den Untersuchungsflächen der Gruppe 3, letzte Aufnahme (Okt. 1985) (Legende siehe Tab. 4.1)

PLANT COMMUNITY	TRANSECT NO												
	1	1	1	1	1	1	1	1	1	1	1	1	1
SECTION NO	1	2	3	4	5	6	7	8	9	10	11	12	13
SECTION SYMBOL	○	○	○	○	○	○	○	○	○	○	○	○	○
NO. SPECIES													
54 CENTELLA ASIATICA	+	2	1										5
219 MICROMERIA BIFLORA	2	3	5										5
202 SETARIA PALUDOSA	2	3	1										
342 SUEPTIA SP.	2	2	1		1	2							
163 NEPENTHA COMPRESSA	1	1	1										5
248 PASPALUM SCROBICULATUM	2	+	1										1
17 AETIDEUM LANCEOLATUM	2	+	3		1								1
38 BRACHIARIA VILLOSA	3	5	2	1									2
93 OXYSTYLIS SP.	2	4	+	3									
333 SONCHUS APOER	1	1	1	3									
74 CENOCRESSA SP.	3	4	1	1									
253 PHYLANTHUS PARVIFOLIUS	2	2	3										
177 IMPATIENS CYLINDRICA	6	2	6	1									1
183 ISSON CRETSA	7	5	4	4									4
242 POGONATHERUM CRINITUM/PANICEUM	4	4	5	4									2
9 ANAPALIS CONTORTA	6	5	3	7	1								6
118 ERANTHUS RUFIFOLIUS	1	6	2										6
16 ANTHEMIS VULGARIS	1	4	3										5
302 SACCILEPIS INDICA	1	2	5										
189 ELSHOLTZIA BLANDA	2	+	1										2
123 EULALIA HOLLIS	5	+	3	9	7								5
263 POLYDALIA TETRALIX	1	1	5										5
259 VERONICA CINEREA/CONYZA JAPONICA	4	+	5	1	3								1
240 PLANTAGO MAJOR	+	1	3	1	5								5
161 ANEMONE BIFIDA	+	1	2	4	3	2							2
94 DIGITARIA ASCENSIOENSIS	+	5	3										5
82 ANEMONE PTERIDICATA	+	2	5										4
18 ANAPALIS TRIPLEX	9	7	1	1	5	7	2	7	6				4
273 POGONATHERUM HIRSISSIMUM	+	2	4	1	1								5
267 POLYGONUM UNCINATUM	+	3	4	5	2								3
11 ANAPALIS TRIPLEX	+	1	4	3	1								1
4 AGROSTIS PILLOSA	+	4	5	6	1	1							5
227 MYRACIS NEPALENSIS	+	3	2	4	1	1							4
176 IMPATIENS MACROSPORA	+	4	1	4	4								2
23 ASTILBE RIVULARIS	+	5	3	2		1							4
187 ELLIPTICUM PINNATUM	+	4	5	3	7	5							5
229 MICROSTEGIUM CILIATUM	4	7	4	3	3	2	6						6
169 HYPOCYRTIS NEPALENSIS/PODANTHA	2	5	7	6	4	2	5						6
216 LYONIA MANJIFOLIA	+	1	3	6	5	7							4
145 SUEPTIA FIMBRISTYLIS	3	+	1	5	2	7							5
334 SOLANUM SP.	5	5	9	5	2	3							7
347 RHODOPHYM BIGNONIUM	2	3	2	1									3
260 PTERIDIS STRIATUS	1	1	9	5	1	3							7
231 NEILIA THREPSIFLORA	1	2	1	5									7
289 RADIA TETRASPORA	+	1	1										2
295 ROSCOEA PURPUREA	+	1	4										6
246 STERILANTHES SP.	+	1	4										5
138 EURYA JAPONICA	+	1	2										3
287 LYCOPodium CLAVATUM	+	2	4										9
129 EURYA CERISIFOLIA	+	1	2										5
242 VIBURNUM STELLATUM	+	1	1										4
294 RUBIA CHINENSIS	2	3											5
283 PYRACANTHA CRUCIATA	2	3											2
281 PTERIDIUM ABUILLIUM	+	1	1										4
182 DRYOPTERIS LEYDORFIA	+	1	1										5
27 ATHYRIUM SP.	+	1	1										2
237 OPLISMENUS COMPOSITUS	+	4	4										4
38 CALADIUM NEPALENSE	+	2	2										2
179 INDIGERMA COLUMBICA	+	2	2										2
252 PHYLANTHUS FLUEGELIIFORMIS	3												2
230 MYRSINE SPICIFLORA	3												5
286 LUCULA BRASSICATA	1												3
237 STELLARIA INTENS	3	1	3										3
134 SPERMATIS CHINENSIS	3												2
243 OVALIS CONVULSATA	+	1											2
341 VIBURNUM ERIOGONUM	+	1											5
348 TETRASTICHUM SERULATUM	+	1											2
344 VIOLA SERPENS	+	1	2										3
49 CAREX DACTYLOIDES	+	1	2	3									5
48 CAREX CRUCIATA	+	2	3										3
144 GALIUM SP.	+	3	1	3	3	5	1	3					5
318 SELAGINELLA SP.	+	1	5	3	5	7	1	4	5	6	7	5	5
124 EUPHORBIA ADSPERSUM	+	9	7	7	5	5	7	8	9	7	8	8	7
385 POGONATHERUM SERICEUM	7	7	5	8	4	3	7	9	8	7	8	4	3
4 ALANIS NEPALENSIS (partly cult.)	6	1	5	9	7	5	8	9	7	9	7	8	4
211 MICROSTEGIUM NUDUM	1	2											6
249 MACRANTHA SP.	5	4	3	7	4	1	7						5
214 DICRANELLA SP.	5	4	2	1	6	3	4	2					6
22 ARUNDINELLA NEPALENSIS	2	3	2	7	3								7
116 ENARGIS PAPPOSA/NIBRA	5	4	3	5	1	8	2	3	7	5	5	6	2
147 SERTIMA CAPSATA	1	2	2	5									4
298 RUBUS ELLIPTICUS	2	2	5	3	7	4							8
38 BERBERIS ARISTATA/ASIATICA	+	2	2	1	5								3
173 HYPERICUM URALICUM	+	1	3	3	5	4	4	1	2	4	3		2
55 CHAMAENIA COSTATA	+	1	8	9	5	5	1	5	4	5	2	8	9
292 RHODODENDRON ANGIOREUM	+	8	1	5	3	3							5
184 ISSON STRIATUS	+	1	3	3	1	2	5	2	5	3			3
239 STERILANTHES ATROPURPUREA	+	1	3	1									4
154 SONCHETIA ALTA	+	1	1										4
286 PRINUS CERASOIDES	+	1											1
324 SHUTERIA INMOLUCATA	+	3	2										2
171 HYPERICUM JAPONICUM	+	1	5										5
74 CISTICLAGIA ALBIDA	+	1											7
43 CALAMINTE UMBROSUM	+	1											6
48 CONYZA STRICTA	+	2											5
253 TRIPPOD FILIFORMIS	+	5											1
241 OSBECKIA STELLATA	+	1											4
46 OPILOIDIA ASSIMILE	1	1											2
223 HISCANTHUS NEPALENSIS	4												3
41 BUPLEIUM SP.	2	1											3
189 CAMPYLOPS SP.	4												2
172 HYPERICUM NEPALENSE	1												3
144 HEDYCHYDIA HETEROPHYLLUM	+	2											6
82 DAPHNIPHYLLUM HIMALAYENSE	+	2											8
152 BLEICHENIA BIGNONIA	+	5											7
90 DICHRAPTERIS LINEARIS	+	1											3
212 SCHEMUM WALLICHI	1												7
148 HOUTTUNIA CORDATA	+	1											4
247 CYTODOCUM SP.	+	1											3
285 MERICUS FENESTRA	+	1											5
254 VILVA CORULIFOLIA	+	5	2										7
159 ANTHOCEROS SP.	+	2											4
285 LITSEA CUBENA	+	1											5
47 COPPELUM PALUOSUM	+	1											4
141 FRAXINA SP.	+	2											3
5 AJUWA LONGATA	+	3	5										6

Species only found in one or two sections:

Anchor: *Geranium nepalense*, *Elsholtzia flava*, *Populus* sp. (Sp.no 274), *Polystichum squarrosum*, *Symplocos* sp., *Carex nubigena*, *Calypogea* sp., *Pratia nummularia*, *Melastoma heterophyllum*, *Agapetes serpens*, *Microstegium vineum*, *Smilax menispermoides*, *Rubus acuminatus*, *Fimbristylis dichotoma*, *Labiatae I*, *Smilax lancifolius*, *Osbeckia nepalensis*, *Rubus javanicus*, *Sporobolus fertilis*, *Zanthoxylum acanthopodium*, *Leucocentrum canum*, *Desmodium confertum*, *Cyperus rotundus*, *Eriobotrya dubia*, *Eulalia* sp., *Polygonum lachnopus*, *Bulbostylis capillaris*, *Valeriana hardwickii*, *Gnaniotome versicolor*, *Polygonum molle*

Transition: *Thelypteris* sp., *Symplocos* sp., *Microstegium vineum*, *Sambucus adnata* (Sp.no 304), *Quercus fenestra*, *Arisaema costatum*, *Dichroa febrifuga*, *Ficus nemoralis*, *Fern* sp., *Polygonum nepalensis*, *Cheilanthes farinosa*, *Eurya acuminata*, *Kyllinga brevifolia*, *Polygonum molle*

Slide: *Carex atrata* (Sp.no 47), *Fimbristylis dichotoma*, *Sporobolus fertilis*, *Desmodium confertum*, *Bothriochloa intermedia*, *Melasma arvense*, *Eriophorum comosum*, *Boeninghausenia albiflora*, *Borreria latifolia*, *Buddleja asiatica*, *Erigeron floribundus*, *Scrophulariaceae?*, *Athyrium atkinsonii*, *Flemingia strobilifera*, *Cheilanthes farinosa*, *Oxyspora paniculata*, *Engelhardtia spicata*, *Eurya acuminata*, *Eulalia* sp., *Eragrostis atrovirens*, *Campanula coloratum*, *Cynodon dactylon*, *Osbeckia nepalensis*, *Ledanthus pedunculatus*, *Mazus japonicus* (Sp.no 215), *Pteris wallichiana*, *Hypericum confidolium*, *Polygonum spaecephalum*, *Crassocephalus crepidioides*, *Orchidaceae* sp., *Eulalia* sp., *Shuteria ferruginea*, *Athyrium nigripes*, *Elsholtzia pilosa*

SECTION GROUPS	slide group				transition group		anchor group
	dry aspect SW pH > 6.6	wet aspect N pH < 6.7	dry aspect SW pH > 6.6	wet aspect N pH < 6.7			
CHARACTERISTICS OF SECTION SUBGROUPS	poor soil	some humus	poorer soil	poor soil	some humus		grassland shrubland overgrazed forest
	<i>Eulalia</i> <i>Polygala</i> <i>Pogonatherum</i>	<i>Drymaria</i> <i>Microsteg.</i> <i>Impatiens</i> <i>Hydrocotyle</i>					<i>Eurya</i> <i>Neillia</i> <i>Randia</i> <i>Roscoea</i>





Table 4.6. Change of plant frequency during the postmonsoon records (1983, 1984, 1985), group 1  
 Tab. 4.6. Entwicklung der Frequenzen der Pflanzenarten nach dem Monsun (1983, 1984, 1985) auf den Untersuchungsflächen der Gruppe 1

Season: 1 = 1983, 4 = 1984, 7 = 1985; section symbols as Table 4.1; for relevé group compare Fig. 4.34

RELEVÉ GROUP NO	1 1 1 1	2 2 2	3 3 3 3	4 4 4 4 4 4 4 4 4 4	5 5 5 5 5 6 6 5 6 6	7 7 7 7 7 7 7 7 7 7 7 7	8 8 8 9 9	1 1 1 1 1 1 1 1 1 1
TRANSECT NO	7 7 7 7	7 7 7	7 7 7 7	1 1 1 2 2 2 3 2 2 1 1	3 1 3 1 2 1 1 1 1 1	4 4 5 5 5 4 4 6 6 6 4 6	2 2 2 2 2 1	4 4 4 5 5 5 5 4 4
SECTION NO	4 4 4 5	3 3 3	2 1 2 2	2 2 2 2 2 1 3 3 3 4	1 3 1 3 3 4 4 5 5 5	3 3 1 1 1 3 4 4 1 1 4 1	4 4 4 1 1 1	2 2 2 2 2 2 3 5 1
SEASON	7 4 1 7	4 1 7	7 7 4 1	4 1 7 7 1 4 7 4 7 7	4 4 1 1 1 4 1 4 1 7	7 4 4 7 1 1 4 1 7 4 7 1	7 4 1 7 7	7 4 1 4 1 7 7 7 7
SECTION: SYMBOL	△△△□	○○○	□△△△	○○○○○○○○○○○○	○○○○○○○○△△△	○○○○○○○○○○○○	△△△□□	○○○○○○□□□
NO SPECIES								
253 PHYLLANTHUS PARVIFOLIUS		1		3 5 2	5 5	1 2 4 2 2 5 5 4 5	5 5 5 6 5 4 7 6 7 7 8 7	5 4 5 5 5 7 8 8 8 7 5
232 NEPHROLEPIS CORIOFOLIA				5 5 6 1	1 2 7	+	5 5 6 6 5 5	5 4 5 7 8 8 8 8
210 LYONIA OVALIFOLIA				5 3 3	2 7	+	5 5 1 3 2 2 5 1	5 7 7 7 7 5
305 POGONATUM SECHINUDUM	3 5 5	4	2	3 7 5 5 2 1 3 5 4	4 1 2 2		6 5 7 6 5 7 5 7 6 2 7 1	6 2 3 8 7 9 6 4 8 6 6
138 FIMBRISTYLIS DICHOTOMA	1 2 2	4 4		5 3 3 2	2 5 4	6 4	6 6 7 6 5 5 4 6 7 6 6	2 2 2 2 2
177 IMPERATA CYLINDRICA	+	7	2	6 5 3 5 3 1 5	5 5 5 5	4 4	6 4 4 6 4 4 3 3 6 5 3 5	8 8 2 2 2 3 7 1
313 SCHIZACHYRIUM BREVIFOLIUM	2 1 5			2 2 5 5 3 6 5 5 7 6	7 7 7 7 4 3 5 5 4 8		5 6 6 7 5 6 7 7 6 6 7 6	6 5 2 2 5 1
156 GONOSTEGIA HIRTA	+	5		2 6 3 5 6 2 2 7 6	6 6 5 6 1 5 5 7 7 8		5 5 5 4 4 5 6 5 5 5 5 5	5 2 3 5 4 4 2 4 6 5 5
6 ALNUS NEPALENSIS	5 2 5			5 5 7 5 5 5 7 7 8 7	7 8 7 5 7 8 6			
273 POGONAT JUNGHUNIANUM	1 1			7 5 3 3 1 5 2 7	2 6 2 5 5 9 9		2 3 1 2 4 5 3 4 5 5 5	4 5 4 4 1 7 7 7 7
214 CERATODON PURPUREUS	1			5 6 4 5 1 5 3	6 5 5 2 5 9 3 7 7		2 4 2 1 7 7 7 1 5	4 5 7 7 2
258 PINUS ROXBURGHII	9 9 7 9	4 1 6	6					
180 INDIGOFERA DOSNA	3 7 8 8	2 4 6	6 7 4 4	3 3 3 3	2		5 5 4 5 6 5 4	4 7 6 4 5 5 6 6 4 5
57 CHEILANTHES FARINOSA	7 5 7 7	1 2 5	7 4	4 4 5 5	5	3 3 5 5	1 2 3 5 1 2 1 1 1 1	6 5 7 2 5 2
302 SACCILEPIS INDICA	5 5 6	6 4 6		2			1 2 3 5 1 2 1 1 1 1	7 2 5 2
127 EUPHORBIA HIRTA	5 5 3	2 2 1	7 5 6 8	3			1	
354 TRIUMFETTA PILOSA	7 7 5 3	+	4 5	+	3	2 3		
279 PRUNELLA VULGARIS	7 7 7 5	+	4 5 9	5 5 3				2 4
281 PTERIDIUM AQUILINUM		+	7 5 4 6	3 5 3				5
35 BIOPHYTUM SENSITIVUM	5 5	5 1	7 8					1 3 1 2
233 BORRERIA STRICTA	8	5 6 5	7 7 4	5 1 5 5				4 3
158 HACKENCHLOA GRANULARIS		8 1 2		5 1 1 5 5	1	+		4
111 ENGELHARDTIA SPICATA				5 6 5			1 2 2 1 1 1	2 7 6
90 DICRAHOPTERIS LINEARIS				5 5 6				4 9 7
225 MURDANNIA MUDIFLORUM	+	1 1	4	2 3 3 1 1 2	+	5 5 2 4 6	5 3 5 6 5 1 1 6 5 2 3	2 2 2 5
359 VERNONIA CINEREA/COHYZA JAPONICA	3	1		2 2 2	1 2 2	4	4 1 1 2 1 2 1 1 1 1	4 5 3 2 2 4 5 1
217 MELASTOMA NORMALE		+		3 3			4 5 5 2 3 1 2 4 2 2	4 2 2 4 3
300 PTYCHANTHUS SP.				3			1 1 4 1 1 3 6 4 2	2 2 2 3 4 5
77 CYPERUS ARISTATUS				2			1 5 3 3 5 1 3 3 3 3	2 2 2 5
52 CASTANOPSIS INDICA							4 2 3 1 5 5 3	5
318 SELAGINELLA SP.				+			1 3 2 1 1 1 1 1	2 5 5
194 KYLLINGA BREVIFOLIA	+			+			2 2 1 1 1 1 1 1	2 2 3
334 TAXITHELIUM SP.							1 1 1 1 1 1 1 1	2 5 3
286 QUERCUS GLAUCA							2 2 2 1 2 3 1	3 3
238 OREOCHIDE FRUTICOSA						3	5 5 2 3 1 1	2 2 2 3
237 OPLISHEMUS COMPOSITUS/BURMAHII							2 5 5 5 5 2 3 1	4 2 2
17 ARTHRAXON LANGIFOLIUS	+			5		5	1 5 5 5 2 1 1	4 2 2
298 RUBUS ELLIPTICUS							2 1 1 5 5 4 2 1 1	4 2 2
264 POLYGONUM CAPITATUM							2 2 1 4 2 3 2 3	2 2
147 GENTIANA CAPITATA							2 2 2 1 2 1 1 1	2 2
121 ERIUCAULON NEPALENSE							2 2 2 1 2 1 1 1	2 2
40 BULBOGYLIS CAPILLARIS(=DENSE)	+						2 5 1 4 1 1 1 1	2 2 4 2 5 3
102 DRYOPTERIS CHRYSOCOMA							3 1 2 1 1 1 1 1	2 2 4 2 2 1
97 DIGITARIA VIOLASCENS						1	1 1 1 1 1 1 1 1	5 5
128 EURYA ACUMINATA								
132 DRYOPTERIS MARGINATA								
19 ARTHURKERIS SP.								
248 PASPALUM SCRODICULATUM	5	5 4 5	3 5 4	+	+	+	2 2 1 2 3 1 1 3 3 1	2 2 2 2
96 DIGITARIA SP.	5	3 1 5	5 4					
34 BIDEENS PILOSA	5	2 4				2		2
358 VANDELLIA MUMMULARIFOLIA	3	5 4		+	3		1 1 1 1 1 1 1 1	2 2
219 MICROIERIA BIFLORA	3	2 1 2	6 1 6 4				2 1 1 1 1 1 2	2 2
76 CYNOGLOSSUM SP.		4 4						
181 INULA CAPPA	5	+	1 5 4					
106 ELEPHANTOPUS SCABER		+	2			2		
171 HYPERICUM JAPONICUM	3 2 5	+	4				2 2 3 5 4 2 2	2 2
320 SETARIA PALLIDE-FUSCA	2 2 2	5 7 4					2 1 1 1 1 1 1 1	2 2
33 BIDEENS BIPINNATA		+	5 7 4			4		
317 SCUTELLARIA REPENS		+	6 4					
326 SIDA RHOMBIFOLIA		+	5					
325 SHUTERIA VESTITIA		+	5					
333 SONGHUS ASPER		1 1						1
119 ERIGERON FLORIBUNDUS/MULTICAULIS	1 1 1		2	1 3 3	+	1 2 4	1 1 1 1 1 1	
69 CRASSOCEPHALUS CREPIDIODES		+		3 1 1 1	+	2 3 4 4	1 1 1 1 1 1	
234 OLDENLANDIA CORYMBOSA	1 1 1	3		5 2 2 3	1 2	2 5 3 4 4		2
70 CROTALARIA ALBICA	1 1 1			2				
117 ERAGRISTIS UNILOIDES	+					4	1 1 1 1 1 1 1 1	
293 RHUS JAVANICA		4 2 5		3		5 3	2 2 2 2 2 2	5 2
191 PHILONOTIS TURNERIANA				1 5 5 8			1 3 2 1 3	2 4 5 2
306 JAMESONIELLA SP.		5 2 5	5 7	2 7	2 2	5	1 3 2 1 3	2 2 2 3 3 6
84 DESHODIUM CONCINNUM		3		3 1 3 3	+	3 3 7 6 7	2 2 2 2 1 1	3 6
154 GLOCHIDIUM VELUTINUM							1 1 1 1 1 1 1 1	
46 CAPILLIPEDUM ASSIHILE								
79 CYPERUS ROTUNDUS				3 1 1 3 3	+	+		
72 CROTALARIA SESSLIFLORA	1			3 1 2 2	+	2 2 2 2	1 1 1 1 1 1 1 1	2 2
150 GERBERA SP.								
316 SCUTELLARIA DISCOLOR	1 1 1						1 1 2 1 1 1 1 1	2 2
93 DIGITARIA SP.				3				
188 JUSTICIA PROCUMBENS	5 3	+		5 3		3 4	1 1 2 1 1 1 1 1	2 2 2 2
22 ARUNDINELLA NEPALENSIS	1 1 1	+		5 5 5 1	1	1 3 3 4	1 1 2 1 1 1 1 1	2 5 2 2 2 2 1
357 VANDELLIA SP.		+		5 5 5 1 2 3	2 2 2 1		3 2 1 3 2 1	2 3 3 3 3 3
18 ARTHRAXON QUARTINIANUS				6				
324 SHUTERIA INVOLUCRATA				4 2				
367 WOODFORDIA FRUTICOSA								
85 DESHODIUM CONFERTUM								
146 GENIOSPORUM COLORATUM								
136 FIGUS CUNIA								
312 SCHIMA WALLICHII	1 1 1	+		1 3 3 1		3 3 3	1 1 1 1 1 1 1 1	9 9 9 7
48 CAREX CRUCIATA								
222 MICROSTEGIUM VININEUM						5	2 2 1 1 1 1 1 1	2 2 5 5 3 3
349 THELYPTERIS MULTILIHEATA								
352 ORCHIDACEAE								
99 DIOSCOREA GLABRA								
28 BARLERIA CRISTATA								
242 OSYRIS ARDORA								
240 OSDECKIA NEPALENSIS	5 3 2 5	3 2 5		5 4 4 7 7 5 5 4 6 6	6 5 6 4 2 4	9 9 9	5 4 5 6 6 5 6 4 4 6 3	5 4 5 4 2
126 EUPATORIUM AEMOPHORUM	7 8 8 7	8 8 7 8	9 9 7 6	4 2 5 7 7 8 8 8 8 9	9 9 8 8 7 9 9 9 9 9	9 9 9	9 9 9 9 8 8 8 9 9 9 8	8 8 7 7 8 7 8 9
262 POGONATHERUM CRINITUM/PAHICEUM		5 4 7	7 7 8 4	9 9 9 9 9 9 9 9 9 9	8 7 6 6 6 9 9 9 9 9	8 8 8 7 7 7 8 8 9 9 9 8	8 9 8 9 9 9 9 9 9 9 9	9 9 9 9 9 9 9 9
316 SPOROBOLUS PILIFERUS	1 2 2 1			5 3 1 3 3 3	3 3 1 4 3 6 4		1 1 1 1 1 1 1 1	1 1 1 1
336 BRACHIARIA VILLOSA	5 5 5 7	5 5 6 8	6 6 5 7	2 2 5 6 3 4 5 5 3 3	3 4 4 3 5 5 7 5 6		2 3 2 4 3 1 3 1 2 2 2	4 4 3 4 2 2 2 2 4 7 2 5
170 HYPERICUM CORIOFOLIUM	4 1 5	7 3 9 7		3			2 3 3 4 3 2 5 4	6 4 2 4 2 2 2 4 7 2 5
335 SPOROBOLUS PILIFERUS								
11 ANAPHALIS TRIPLINERVIS							1 5 1 1 1 1 1 1	
189 CAMPYLOPUS SP.								2
87 DESHODIUM MICROPHYLLUM	3	+						
249 MARCHANTIA SP.								
98 DIOSCOREA BULBIFERA								
215 MAZUS JAPONICUS								
115 ERAGRISTIS ATROVIRENS	+			3		2		
9 ANAPHALIS CONTORTA								
241 OSDECKIA STELLATA						1	1 1 1 1 1 1 1 1	

Table 4.7. The most represented species in the three sections of the four groups

Tab. 4.7. Die häufigsten Pflanzenarten in den drei Sektionen der vier Gruppen

Group	Anchor	Transition	Slide
Group 1 Low altitude	<p>Engelhardtia spicata Schima wallichii Pinus roxburghii Indigofera dosna Hypericum cordifolium Imperata cylindrica Oplismenus compositus Cheilanthes farinosa Dicranopteris linearis Pteridium aquilinum</p>	<p>Schima wallichii Osbeckia nepalensis Phyllanthus parvifolius Lyonia ovalifolia Eupatorium adenophorum Pogonatherum spp. Imperata cylindrica Brachiaria villosa Hackeochloa granularis Bidens bipinnata Borreria stricta Biophytum sensitivum Euphorbia hirta Triumfetta pilosa Nephrolepis cordifolium Pogonatum seminudum</p>	<p>Alnus nepalensis (cult.) Osbeckia nepalensis Eupatorium adenophorum Desmodium concinuum Schizachyrium brevifolium Pogonatherum spp. Vandellia sp. Gonostegia hirta Pogonatum junghuhnianum Jamesoniella sp. Ceratodon purpureus</p>
Group 2 lower middle altitude generally southern aspect	<p>Schima wallichii Lyonia ovalifolia Rhododendron arboreum Eurya acuminata Gaultheria fragrantissima Arundinella nepalensis Pogonatherum spp. Carex cruciata Roscoea purpurea Strobilanthes atropurpureus Dicranopteris linearis</p>	<p>Alnus nepalensis Schima wallichii Berberis aristata/asiatica Osbeckia nepalensis Osbeckia stellata Eupatorium adenophorum Arundinella nepalensis Capillipedum assimile Pogonatherum spp. Imperata cylindrica Bulbostylis capillaris Anaphalis contorta Gonostegia hirta Selaginella sp. Pogonatum seminudum</p>	<p>Brachiaria villosa Sporobolus piliferus Arthraxon lancifolius Eragrostis atrovirens Paspalum scrobiculatum Fimbristylis dichotoma Vandellia nummularia Polygonum nepalensis Hypericum japonicum Gentiana capitata Pogonatum junghuhnianum Ceratodon purpureus Campylopus sp.</p>
Group 3 higher middle altitude generally northern aspect	<p>Daphniphyllum himalayense Alnus nepalensis Eurya cerasifolia Eurya japonica Myrsine semiserrata Randia tetrasperma Neillia thyrsoflora Viburnum stellatum Arundinella nepalensis Carex cruciata Strobilanthes sp. Ellisophyllum pinnatum Roscoea purpurea Lycopodium clavatum Selaginella sp. Pteridium aquilinum Athyrium sp. Ptychanthus striatus Rhodobryum giganteum Gollania sp.</p>	<p>Alnus nepalensis Gaultheria fragrantissima Phyllanthus parvifolius Eupatorium adenophorum Eulalia mollis Agrostis pilosula Microstegium spp. Pogonatherum spp. Artemisia sp. Ellisophyllum pinnatum Isodon coetsa Myriactis nepalensis Galium spp. Carex daltonii/longipes Selaginella sp. Dicranella sp. Marchantia sp.</p>	<p>Alnus nepalensis Eupatorium adenophorum Chambainia cuspidata Centella asiatica Drymaria diandra Anaphalis contorta Dennstaedtia appendiculata Pogonatum junghuhnianum Pogonatum seminudum Dicranella sp.</p>
Group 4 high altitude	<p>Quercus semecarpifolia Rhododendron arboreum Edgeworthia gardneri Berberis wallichiana Arundinella hookeri Oryzopsis lateralis Carex cruciata Commelina paludosa Cyanotis vaga Roscoea purpurea Anaphalis triplinervis Anemone rivularis Chambainia cuspidata Fragaria sp. Valeriana hardwickii Viola serpens Selaginella sp. Ectropothecinus sp.</p>	<p>Rubus nepalensis Agrostis pilosula Arundinella hookeri Arthraxon lancifolius Eragrostis papposa Tripogon filiformis Carex atrata Bulbostylis capillaris Anaphalis contorta Elsholtzia pilosa Gonostegia hirta Hemiphragma heterophyllum Impatiens racemosa/serrata Potentilla fulgens Pogonatum microstomum Campylopus sp.</p>	<p>Arthraxon lancifolius Anaphalis contorta Impatiens racemosa/serrata Pogonatum junghuhnianum Pogonatum seminudum Dicranella sp.</p>

Table 4.8. Plant frequency at the end of the dry season 1985 on selected plots of group 1 and 2 (for legend see Table 4.1)

Tab. 4.8. Frequenz der Pflanzenarten am Ende der Trockenzeit 1985 auf ausgewählten Untersuchungsflächen der Gruppen 1 und 2 (Legende s. Tab. 4.1)

TRANSECT NO	4	4	4	4	4	4	4
SECTION NO	4	8	6	0	0	4	4
SECTION SYMBOL	3	1	1	1	2	2	4
SECTION SYMBOL	○	○	○	○	△	△	△
SECTION SYMBOL	□	□					
NO SPECIES							
171 HYPERICUM JAPONICUM	+	1	4				
281 PTERIDIUM AQUILINUM		5	3				
6 ALNUS NEPALENSIS		6	6				
170 HYPERICUM CORDIFOLIUM		2	2				
237 OPLISMENUS COMPOSITUS/BURMANII		1	1				
264 POLYGONUM CAPITATUM		5					
148 GENTIANA PEDICELLATA		5					
232 NEPHROLEPIS CORDIFOLIA		7					
321 SCHIMA WALLICHII		2					
293 RHUS JAVANICA		2					
217 MELASTOMA NORMALE		3					
52 CASTANOPSIS INDICA		3					
115 ERAGROSTIS ATROVIRENS	+	+	+				
11 ANAPHALIS TRIPLINERVIS	+		+				
124 EULALIA SP.			2				
22 ARUNDINELLA NEPALENSIS		1	1	7			
194 KYLLINGA BREVIFOLIA		1	5	+	3		
177 IMPERATA CYLINDRICA		+	5	7	9		
219 MICROMERIA BIFLORA			1	3	2		
248 PASPALUM SCROBICULATUM		1	1		2		
9 ANAPHALIS CONTORTA				7	7		
145 GAULTHERIA FRAGRANTISSIMA			1	7			
48 CAREX CRUCIATA				3			
284 PYRUS PASHIA				5			
241 OSBECKIA STELLATA			2	2			
243 OXALIS CORNICULATA			1	2			
30 BERBERIS ARISTATA/ASIATICA					7		
359 VERNONIA CINEREA	1	5		2	5		
240 OSBECKIA NEPALENSIS	1	3	6		7		
111 ENGELHARDTIA SPICATA		1		8		9	
156 GONOSTEGIA HIRTA	+	2	+		5		
210 LYONIA OVALIFOLIA		2			5	9	
90 DICRANOPTERIS LINEARIS					8	7	
229 MYRSINE CAPITELLATA					5	7	
56 LABIATAE ?						5	
360 VIBURNUM CORIACEUM						5	
292 RHODODENDRON ARBOREUM						5	
120 ERIOBOTHRYA DUBIA						7	
262 POGONATHERUM CRINITUM/PANICEUM	3	9	2	2	5	7	
126 EUPATORIUM ADENOPHORUM	6	5	8	3	3	5	9
273 POGONATUM JUNGHUHNIANUM		+	5	2		4	
253 PHYLLANTHUS PARVIFOLIUS		6	+			6	
349 THELYPTERIS MULTILINEATA		1					
302 SACCIOLEPTIS INDICA		1					
300 PTYCHANTHUS SP.		1					
298 RUBUS ELLIPTICUS		1					
128 EURYA ACCUMINATA		1					
102 DRYOPTERIS CHRYSOCOMA		1					
77 CYPERUS ARISTATUS		1					
57 CHEILANTHES FARINOSA		1					
18 ARTHRAXON QUARTINIANUS		1					

Species found scarcely (freq. 1%) in only one slide section:

Cyanotis vaga, Oxyspora paniculata, Lycopodium clavatum, Litsea polyantha, Desmodium confertum, Desmodium concinuum, Capillipedum assimile, Maesa macrophylla, Saccharum spontaneum, Prunus pashia, Flemingia strobilifera, Conyza stricta

Table 4.9. Plant frequency at the end of the dry season 1985 on selected plots of group 3 and 4 (for legend see Table 4.1)

Tab. 4.9. Frequenz der Pflanzenarten am Ende der Trockenzeit 1985 auf ausgewählten Untersuchungsflächen der Gruppen 3 und 4 (Legende s. Tab. 4.1)

TRANSECT NO	2 2 2 2 2 2 2 2 3	2 2 2 3 3	2 2 2 3
SECTION NO	1 1 1 1 1 3 3 7 3	1 1 3 3 3	1 1 3 3
SECTION SYMBOL	○ ○ ○ ○ ○ ○ ○ ○ ○ ○	△ △ △ △ △	□ □ □ □
NO SPECIES			
198 LEDANTHUS PEDUNCULARIS	5 1		
169 HYDROCOTYLE NEPALENSIS	3 3 5 3 3		
205 LITSEA CUBEBA	1 1		
260 PLANTAGO MAJOR	3 2		
83 DENNSTAETIA APPENDICULATA	3 1 1		
21 ARUNDINELLA HOOKERI		1 5	
74 CYANOTIS VAGA	1		1
281 PTERIDIUM AQUILINUM		2 1	
263 POLYGALA TRIPHYLLA	9	7	
6 ALNUS NEPALENSIS	5 7 3	5 4	
9 ANAPHALIS CONTORTA		7 8 7 4	7
141 FRAGARIA SP.	2 2 2 3	5	
47 CAREX ATRATA	8 1 2 5 6 1	5 5 3	
116 ERAGROSTIS PAPPOSA	3 3 5 5 7	5 7 6	
227 MYRIACTIS NEPALENSIS	5	1 3	5 2
273 POGONATUM JUNGHUANIUM	2 1 4		4
210 LYONIA OVALIFOLIA	3 5		7
243 OXALIS CORNICULATA		7	4 2
276 POTENTILLA FULGENS		2 1	2 2
156 GONOSTEGIA HIRTA		1 2	5
43 CALAMINTHE UMBROSUM	5 3 1 4		5 7
164 HEMIPHRAGMA HETEROPHYLLUM	1 5 7 5 6	5 7 2	2
182 ISACHNE ALBENS	1	7	9
194 KYLLINGA BREVIFOLIA		5	4
48 CAREX CRUCIATA	1 2 +	5 5	4 4
304 SAMBUCUS ADNATA		7	2
364 VIOLA SERPENS		4	2
361 VIBURNUM ERUBESCENS	2		5 4 5 4
294 RHUS SUCCEDANEA		4	9
149 GERANIUM NEPALENSE		2	4 8
82 DAPHNIPHYLLUM HIMALAYENSE			7
87 DESMODIUM MICROPHYLLUM			9
104 EDGEWORTHIA GARDNERI			7
292 RHODODENDRON ARBOREUM			9
288 QUERCUS SEMECARPIFOLIA			9 5
55 CHAMBAINIA CUSPIDATA	3 8 7 8 7 6 + 4	9 4 8 7	9 7 9 5
337 STELLARIA PATENS	3 2 3 3 + 1		2 5 4
126 EUPATORIUM ADENOPHORUM	5 5 1 1	7 3	5 7
144 GALIUM SP.	3 6 1 6	6 7	6 4
298 RUBUS ELLIPTICUS	5 2	4	4
4 AGROSTIS PILOSULA	1	+ 5	2 2 4
319 SENECIO DENSIFLORUM		5	6 4
267 POLYGONUM UNCINATUM	4 5	6	6 5 5
173 HYPERICUM URALUM	6 1	2	8 2 4
107 ELLISIOPHYLLUM PINNATUM	5 5 5	8	5 8
221 MICROSTEGIUM NUDUM	5 7 8 1 6	9 6 7	4 8 4
340 STROBILANTHES SP.		2 5	4 7
50 CAREX NUBIGENA	6	2	2
8 ANAPHALIS BUSUA	1	4	2
5 AJUGA LOBATA	5 5	5	4
23 ASTILBE RIVULARIS	2		2
342 SWERTIA SP.		1 1	2 4
249 MARCHANTIA SP.	5		5 4
299 RUBUS NEPALENSIS/FOCKEANUS	8 7	9	5

Species found only in one section:

Anchor: *Tetrastigma serrulatum*, *Phyllanthus flueggeiformis*, *Pratia nummularia*, *Elsholtzia flava*

Transition: *Boeninghausenia albiflora*, *Dryopteris lepidopoda*, *Rubia charaefolia*, *Centella asiatica*, *Arundinella nepalensis*

Slide: *Sonchus asper*, *Impatiens racemosa*, *Conyza japonica*, *Scirpus sedateus*, *Mazus japonicus*, *Sporobolus piliferus*, *Conyza stricta*, *Carex daltonii*, *Bulbostylis capillaris*, *Anaphalis triplinervis*, *Leucosceptrum canum*, *Zanthoxylum acanthopodium*, *Cyperus rotundus*

Table 4.10. Plant frequency in early monsoon 1985: Group 1 (for legend see Table 4.1)

Tab. 4.10. Frequenz der Pflanzenarten am Anfang des Monsuns 1985 auf den Untersuchungsflächen der Gruppe 1 (Legende s. Tab. 4.1)

TRANSECT NO	1	1	5	2	1	2	3	4	4	4	5	6	7	1	2	7	1	2	4	4	5	7	7
SECTION NO	2	4	2	2	3	3	1	2	3	4	1	1	3	5	4	2	4	1	1	5	3	1	5
SECTION SYMBOL	○	○	○	○	○	○	○	○	○	○	○	○	○	△	△	△	□	□	□	□	□	□	□
NO SPECIES																							
4 ALNUS NEPALENSIS	7	8	5	8	7	7								5									
84 DESMODIUM CONCINNUM	2	5		2							1		+										
79 CYPERUS ROTUNDUS	2			2									+										
273 POGONATUM JUNGHUNIANUM	7			3	2	1				2	5	1	3										
306 JAMESONIELLA SP.	5	8			1	2					5	2	3										
214 CERATODON PURPUREUS				3		2	2						+										
336 SPOROBOLUS PILIFERUS						2	2						+										1
94 DIGITARIA ASCENDENS													+									1	
136 FICUS CUNIA													+										
222 MICROSTEGIUM VIMINEUM																							3
171 HYPERICUM JAPONICUM																							
217 MELASTOMA NORMALE																							
298 RUBUS ELLIPTICUS																							
119 ERIGERON FLORIBUNDUS																							
313 SCHIZACHYRIUM BREVIFOLIUM																							
240 OSBECKIA NEPALENSIS	5	3		6	4	5	5	5	5	4	6	3		4	4	5				3	2		3
33 BIDENS BIPINNATA																							
312 SCHIMA WALLICHII																							
352 ORCHIDACEAE																							
354 TRIUMFETTA PILOSA																							
49 CAREX DALTONII/LONGIPES																							
48 CAREX ATRATA	2																						
284 QUERCUS GLAUCA																							
132 DRYOPTERIS MARGINATA																							
242 OSYRIS ARBOREA																							
281 PTERIDIUM AQUILINUM																							
114 ERAGROSTIS PAPPOSA																							
181 INULA CAPPATA																							
233 BORRERIA STRICTA																							
35 BIOPHYTUM SENSITIVUM																							
127 EUPHORBIA HIRTA																							
96 DIGITARIA SP.																							
258 PINUS ROXBURGHII																							
325 SHUTERIA VESTITIA																							
126 EUPATORIUM ADENOPHORUM	4	7	6	5	7	8	8	5	8	7	8	8	5	6	8	7	5	5	8	2	5	6	5
262 POGONATHERUM CRINITUM/PANICEUM	9	9	9	8	8	9	8	8	8	7	9	5	9	9	6	9	9	8	9	9	7		
57 CHEILANTHES FARINOSA	5	4	3	3	6	4	1	1	1														
17 ARTHRAXON LANCIFOLIUS	2																						
38 BRACHIARIA VILLOSA																							
177 IMPERATA CYLINDRICA																							
170 HYPERICUM CORDIFOLIUM	4	3	1	4	5	2	4																
99 DIOSCOREA GLABRA	4																						
232 NEPHROLEPIS CORDIFOLIA	8	3	4	4	5	5	5	6															
253 PHYLANTHUS PARVIFOLIUS	8	5	1	2	6	7	5	6															
210 LYONIA OVALIFOLIA	5	8	5	+	2	5	2																
138 FIMBRISTYLIS DICHOTOMA																							
146 GENIOSPORUM COLORATUM	6	2																					
293 RHUS JAVANICA	2	3																					
156 GONOSTEGIA HIRTA	4	5	6	2	5	5	6	5	3	3	+	6											
180 INDIGOFERA DOSNA																							
248 PASPALUM SCROBICULATUM																							
305 POGONATUM SEMINUDUM																							
194 KYLLINGA BREVIFOLIA																							
302 SACCIOLEPIS INDICA																							
219 MICROMERIA BIFLORA																							
40 BULBOSTYLIS CAPILLARIS																							
225 MURDANNIA NUDIFLORUM																							
46 CAPILLIPEDUM ASSIMILE																							
359 VERNONIA CINEREA																							
98 DIOSCOREA BULBIFERA																							
22 ARUNDINELLA NEPALENSIS	4																						
111 ENGELHARDTIA SPICATA																							
300 PTYCHANTHUS SP.																							
154 GLOCHIDIUM VELUTINUM																							
85 DESMODIUM CONFERTUM																							
324 SHUTERIA INVOLUCRATA	4																						
52 CASTANOPSIS INDICA																							
345 SYZYGIIUM CUMINI																							
28 BARLERIA CRISTATA																							
367 WOODFORDIA FRUTICOSA																							
331 SMITHIA CILIATA																							
90 DICRANOPTERIS LINEARIS																							
349 THELYPTERIS MULTILINEATA																							
275 LITSEA SP?																							
316 SCUTELLARIA DISCOLOR																							
128 EURYA ACUMINATA																							
237 OPLISMENUS COMPOSITUS/BURMANII																							
334 TAXITHELIUM SP.																							
143 GALINSOGA PARVIFLORA/CILIATA																							
70 CROTALARIA ALBIDA																							
320 SETARIA PALLIDE-FUSCA																							
106 ELEPHANTOPUS SCABER																							

Species only found in one or two sections:

Anchor: Bidens pilosa, Polygonum sp?, Maoutia puya, Triumfetta rhomboidea, Premna sp., Labiatae 2, Maoutia puya, Castanopsis tribuloides, Clematis buchanania, Smilax sp., Oxalis corniculata, Selaginella sp., Litsea polyantha, Gonatanthus pumilus, Arisaema erubescens, Castanopsis tribuloides, Zingiberaceae, Cynoglossum sp., Laggera alata, Justicia procumbens, Hypoxis aurea, Cyanotis vaga, Vandellia nummularifolia, Sida rhombifolia, Scutellaria repens, Hackeochloa granularis

Transition: Gerbera sp., Labiatae 2, Scutellaria repens

Slide: Pavetta tomentosa, Gerbera sp., Bidens pilosa, Polygonum uncinatum, Labiatae 1, Impatiens racemosa, Philonotis turneriana, Oxalis corniculata, Dryopteris chrysocoma, Indigofera atropurpurea, Polygonum capitatum, Oxyspora paniculata, Anaphalis triplinervis, Impatiens racemosa, Philonotis turneriana, Drymaria diandra, Dreocnide fruticosa, Anthromeris sp., Hedyotis scandens, Clematis sp., Berberis aristata, Indigofera atropurpurea, Litsea polyantha, Anaphalis triplinervis, Hemanthria compressa, Eulalia sp., Digitaria violascens, Drymaria diandra, Cynoglossum sp., Sphenomeris chinensis, Sida rhombifolia

Table 4.11. Soils, parent materials and landforms of Lamosangu-Kharidhunga area (after ESPINOSA 1975)

Tab. 4.11. Böden, Muttergestein und Relief im Gebiet von Lamosangu-Kharidhunga (nach ESPINOSA 1975)

Parent materials	Soil series	Main landform characteristics
Metamorphosed sandstone in situ	Guchchhe, Lapse	Steep to very steep hills. Severe soil/rock creep in places
Soil material derived from metamorphosed sandstone in situ	Lapse	nearly level bench terraces on or near hill summits
Phyllite in situ	Deorali, Golme Danda	Steeply dissected ridges with some undulating summits
Soil material derived from phyllite in situ	Golme Danda, Kharka, Parebha, SunKhani	Nearly level bench terraces in steep mountainous areas
Alluvium/colluvium derived from metamorphosed sandstone and phyllite	Bhalukhop, Birta Besi Birta Pakhar, Timbure	Nearly level bench terraces on moderately steep to steep colluvial slopes
Rock/soil creep material: metamorphosed sandstone and phyllite	Kaping	Very steep, dissected hills
Soil material derived from metamorphosed sandstone and phyllite in situ	Dhuseni, Kathaika, Mesipo, Pedku, Ratankot	Nearly level bench terraces in steep hilly areas
Augen gneiss (feldspatic schist) in situ	Sarai Danda	Steep to very steep, dissected mountains. Severe soil/rock creep in places
Colluvium derived from augen gneiss (feldspatic schist)	Girke Danda	Nearly level bench terraces on steep, dissected colluvial slopes
Soil material derived from augen gneiss (feldspatic schist) in situ	Chanaute, Chitre, Pakha Deb, Sarai Danda Sarangthali, Tauthali	Nearly level bench terraces in steep to very steep mountainous areas
Soil material derived from carbonaceous slate in situ	Burana	Ditto
Soil material derived from metamorphosed limestone in situ	Onchi	Ditto
Magnesite with talc lenses in situ	Kharidhunga	Steep to very steep, dissected mountainous areas
Alluvium/colluvium derived from chlorite schist; talc and iron ores	Khari, Mane	Nearly level bench terraces in rolling basin, probably of a synclinal type

Note: Golme Danda, Lapse and Sarai Danda series occur on both bench terraces and non-terraced slopes.

Table 4.12. Soil classification of Lamosangu-Kharidhunga area (after ESPINOSA 1975)

Tab. 4.12. Klassifikation der Böden im Gebiet von Lamosangu-Kharidhunga (nach ESPINOSA 1975)

USDA SOIL CLASSIFICATION, 7th APPROXIMATION				Soil series	Legend of the FAO/UNESCO Soil Map of the World
Order	Suborder	Great Group	Subgroup		
Entisols	Aquents	Haplaquents	Typic Haplaquents	Timbure Girkha Danda	Dystric Gleysols Dystric Regosols
	Orthents	Udorthents	Typic Udorthents		
Inceptisols	Aquepts	Haplaquepts	Typic Haplaquepts	Birta Besi Birta Pakhar	Dystric Gleysols Dystric Gleysols
			Fluventic Haplaquepts		
	Ochrepts	Dystrochrepts	Typic Dystrochrepts	Dhuseni, Lapse, Khari, Kathaike Balukhop, Kharka Chitre, Mesipo, Pedku Kaping, Pakha Deb Deorali <u>1</u> Onchi Guchchhe, Sarangthali Burana, Chanaute Mane, Ratankot	Dystric Cambisols Dystric Cambisols Dystric Gleysols Dystric Cambisols Dystric Cambisols Dystric Cambisols Eutric Cambisols Humic Cambisols Humic Cambisols
			Aquic Dystrochrepts		
			Fluventic Dystrochrepts		
			Lithic Dystrochrepts		
			Rhodic Dystrochrepts		
			Dystric Eutrochrepts		
	Umbrepts	Eutrochrepts Haplumbrepts	Dystric Eutrochrepts		
			Typic Haplumbrepts Cumulic Haplumbrepts		
Alfisols	Udalfs	Hapludalfs	Typic Hapludalfs	Golme Danda <u>2</u> Parebha <u>2</u> Sunkhani <u>2</u> Thautali <u>2</u> Sarai Danda Kharidhunga	Orthic Acrisols Orthic Acrisols
			Mollic Hapludalfs		

1 Integrate between Dystrochrepts and Rhodustalfs

2 May be ultic Hapludalf if base saturation is less than 60% at 125 cm below the top of the argillic horizon, or in a layer above hard rock if shallower.

Table 4.13. Soil survey of study area  
 Tab. 4.13. Ergebnisse aus den Bodenuntersuchungen im Untersuchungsgebiet

- A1 anchor/position in transect  
 T2 transition/position in transect  
 S1 slide/position in transect
- 1) 1 = 0.0356 mg P<sub>2</sub>O<sub>5</sub>/100 g dry soil  
 2) 1 = 1.0 mg K<sub>2</sub>O/100 g dry soil
- \* for CEC-value see Table 4.14

Plot No	Transect	No Section	Altitude a.s.l.	Aspect 0-400° (estimated)	Texture/Humus	pH (Hellige)	pH (H <sub>2</sub> O)	P <sub>2</sub> O <sub>5</sub> 1)	K <sub>2</sub> O 2)	Texture/Humus (measured) Clay% Silt% Sand% Humus%	CEC	Soil Serie ESPINOSA	Vegetation Type		
1	2	A 1	1130 m	375	sandy loam with little humus	5.0	6.0	4.0	6.3			Kaping series: dystric Cambisol	overexploited broadleaf forest		
1	2	S 1	1130 m	375	sandy loam with little humus	5.0	6.0	4.0	1.5	10.6	36.6	49.7	3.1	dystric Regosol	
1	2	T 2	1130 m	375	sand poor in humus	5.0	6.1	1.5	3.4					dystric Regosol	
1	3	S 1	1130 m	375	sand poor in humus	5.0	6.2	0.6	0.9					dystric Regosol	
2	4	A 1	1180 m	375	loamy sand with little humus	5.0	6.1	2.1	2.7					Kaping series: dystric Cambisol	overexploited forest/shrubland
2	4	A 2	1180 m	375	loamy sand with little humus	5.0	5.8	2.6	2.1					dystric Cambisol	overexploited forest/shrubland
2	4	S 1	1180 m	375	sand poor in humus	5.0	6.1	1.2	0.5					dystric Regosol	
2	4	S 2	1180 m	375	loamy sand poor in humus	5.0	6.3	1.5	1.1					dystric Regosol	
3	7	A 1	1450 m	225	sandy loam poor in humus	5.0	6.0	0.2	2.5					Lapse series: dystric Cambisol	Pinus roxburghii forest
3	7	A 2	1450 m	225	sandy loam poor in humus	5.0	5.9	0.6	2.0					dystric Cambisol	Pinus roxburghii forest
3	7	S 1	1450 m	225	loamy sand poor in humus	5.0	5.8	0.2	1.2	11.6	36.6	51.5	0.7	dystric Regosol	
4	8	S 1	1690 m	150	sand poor in humus	5.0	5.7	0.1	0.5					dystric Regosol	
4	8	A 2	1690 m	150	sandy loam with little humus	5.0	5.6	0.6	0.5					Golme danda s: orthic Acrisol	uncultivated terrace
5	8	S 1	1680 m	200	loamy sand poor in humus	5.0	6.4	5.2	2.4					dystric Regosol	
6	10	A 2	1800 m	250	loamy sand poor in humus	5.0	5.4	0.9	2.2					Golme danda s: orthic Acrisol	broadleaf forest
6	10	S 1	1800 m	250	sand poor in humus	5.0	5.7	0.3	0.3					dystric Regosol	
6	10	T 1	1800 m	250	loamy sand poor in humus	5.0	5.6	0.2	0.6					dystric Regosol	
7	11	A 1	1980 m	300	loamy sand with humus	4.5	5.6	0.5	0.8	12.0	34.6	48.0	5.4	Duchche s: humic Cambisol	afforested with Pinus patula
7	11	A 2	1980 m	300	sandy loam with humus	4.5	5.4	1.6	0.9					humic Cambisol	afforested with Pinus patula
7	11	S 1	1980 m	300	sand poor in humus	4.8	5.5	0.1	0.4	6.8	31.8	60.7	0.7	dystric Regosol	
8	12	A 1	1990 m	350	sandy loam with humus	4.5	5.2	2.0	1.8					Duchche s: humic Cambisol	overexploited broadleaf forest
8	12	A 2	1990 m	350	sandy loam with little humus	4.5	5.5	1.6	1.7					humic Cambisol	overexploited broadleaf forest
8	12	S 1	1990 m	350	sand poor in humus	4.5	5.4	0.2	0.2					Lithosol	
9	14	A 1	1990 m	75	loamy sand poor in humus	5.0	5.5	0.1	0.4					dystric Regosol	shrubland
9	14	S 1	1990 m	75	loamy sand poor in humus	5.0	5.6	0.1	1.3					Lithosol	
10	15	A 1	2010 m	400	loamy sand with little humus	4.5	7.0	0.5	2.3					Golme danda s: orthic Acrisol	shrubland
10	15	A 2	2010 m	400	loamy sand with little humus	4.5	7.2	0.1	0.4					orthic Acrisol	shrubland
10	15	S 1	2010 m	400	loamy sand poor in humus	5.0	7.6	0.3	1.1					dystric Regosol	
11	16	A 2	2040 m	250	sandy loam with humus	6.0	6.7	0.9	0.6					Golme danda s: orthic Acrisol	overexploited broadleaf forest
11	17	A 1	2040 m	250	sandy loam poor in humus	5.0	7.5	0.4	3.0	10.0	29.6	58.6	1.8	orthic Acrisol	grassland
11	18	S 1	2040 m	250	sand poor in humus	5.0	7.8	0.3	0.3	2.0	23.2	74.3	0.5	dystric Regosol	
12	19	S 1	2030 m	200	sandy loam poor in humus	7.5	7.7	0.2	1.0					Golme danda s: calcare Regosol	
13	20	S 1	2100 m	250	sandy loam with little humus	5.0	5.7	0.2	0.4					Golme danda s: dystric Regosol	
14	21	A 1	2130 m	25	sandy loam poor in humus	5.0	6.1	0.5	0.9					Burana series: humic Cambisol	overexploited broadleaf forest
14	21	A 2	2130 m	25	sandy loam with humus	5.0	5.5	0.6	2.1					humic Cambisol	broadleaf forest
14	21	S 1	2130 m	25	loamy sand with humus	5.0	6.6	0.2	0.6					dystric Regosol	
14	21	S 2	2130 m	25	sandy loam with little humus	4.8	6.5	0.7	0.6					dystric Regosol	
15	22	A 1	2180 m	325	sandy loam with little humus	5.0	5.5	0.3	0.4					Burana series: humic Cambisol	shrubland
15	22	R 2	2180 m	325	sandy loam poor in humus	5.0	5.0	1.1	4.4					Lithosol	
15	22	A 1	2180 m	325	sandy loam with humus	4.0	4.5	0.8	0.7					Burana series: humic Cambisol	overexploited broadleaf forest
16	23	A 1	2570 m	250	loamy sand with little humus	4.5	5.4	0.6	0.5					Sarai danda s: humic Acrisol	shrubland
16	23	S 1	2570 m	250	sand poor in humus	5.0	4.5	0.6	0.8					dystric Regosol	
17	24	A 1	2620 m	100	sandy loam with little humus	4.5	4.9	0.2	0.6					Sarai danda s: humic Cambisol	grassland
17	24	A 2	2620 m	100	sandy loam with humus	5.0	4.6	0.7	1.3					humic Cambisol	
17	24	S 1	2620 m	100	sandy loam poor in humus	5.0	5.3	0.0	0.2					Lithosol	
18	25	A 1	2560 m	125	sandy loam with little humus	5.0	5.3	0.4	1.1					Chitre series: dystric Cambisol	uncultivated terrace
18	25	A 2	2560 m	125	sandy loam with humus	5.0	5.0	0.6	0.8					dystric Cambisol	shrubland
18	25	S 1	2560 m	125	sandy loam poor in humus	4.8	5.3	0.1	0.2					Lithosol	
19	27	A 1	2500 m	150	sandy loam with humus	4.3	4.9	0.6	0.9					Chitre series: dystric Cambisol	shrubland
19	27	S 2	2500 m	150	sandy loam with little humus	5.0	4.5	0.1	0.4					dystric Regosol	
20	28	S 1	2500 m	150	sand poor in humus	5.0	5.6	0.1	0.4					dystric Regosol	
21	29	A 2	2530 m	150	loam with humus	4.7	5.1	0.2	0.2	24.4	45.0	22.2	8.4	Chitre series: dystric Cambisol	grassland
21	29	S 1	2530 m	150	loamy sand poor in humus	5.0	5.6	0.0	0.4	12.4	13.8	73.3	0.5	Lithosol	
22	30	A 1	2590 m	275	sandy loam with little humus	4.5	5.0	0.3	1.1					Sarai danda s: humic Acrisol	overexploited Quercus semecarp.forest
22	30	A 2	2590 m	275	loam rich in humus	4.5	5.9	1.3	0.5	20.3	31.7	36.2	11.8	humic Acrisol	overexploited Quercus semecarp.forest
22	30	S 1	2590 m	275	sandy loam with humus	4.5	5.0	0.2	0.6	10.4	30.0	52.3	7.3	Regosol	
22	30	S 2	2590 m	275	loamy sand poor in humus	5.0	5.5	0.3	0.2					Regosol	
23	32	A 2	2450 m	275	sandy loam with little humus	4.5	5.2	0.9	1.5					Sarai danda s: humic Acrisol	shrubland
23	32	S 1	2450 m	275	loamy sand with little humus	5.5	5.0	0.2	0.6					dystric Regosol	
24	33	A 1	2350 m	200	sandy loam with little humus	4.5	5.3	2.0	1.3					Sarai danda s: humic Acrisol	shrubland
24	33	A 2	2350 m	200	sandy loam with little humus	4.5	5.2	1.5	2.7					humic Acrisol	overexploited broadleaf forest
24	33	S 1	2350 m	200	sandy loam with humus	5.0	5.6	1.3	1.9					Regosol	
25	34	A 1	2100 m	50	loam poor in humus	4.5	5.4	0.1	1.1					Golme danda s: orthic Acrisol	grassland
25	34	A 2	2100 m	50	sandy loam poor in humus	4.5	5.5	0.5	1.3					orthic Acrisol	shrubland
25	34	S 1	2100 m	50	loam with little humus	4.7	5.2	2.3	0.2					dystric Regosol	
26	35	A 1	2090 m	125	loamy sand poor in humus	4.5	4.9	0.3	2.0					Golme danda s: orthic Acrisol	grassland
26	35	A 2	2090 m	125	loam rich in humus	4.5	4.6	0.4	0.8	25.2	45.0	19.5	10.3	orthic Acrisol	shrubland
26	35	S 1	2090 m	125	sand poor in humus	5.5	5.5	0.1	0.2					dystric Regosol	
26	35	S 2	2090 m	125	sandy loam poor in humus	5.0	5.3	0.2	0.2	12.8	30.0	55.6	1.6	Lithosol	
27	36	S 3	2000 m	175	sand poor in humus	5.0	6.1	0.3	0.4					dystric Regosol	
27	37	A 1	2000 m	175	loamy sand with little humus	4.5	5.2	0.3	1.1					Golme danda s: orthic Acrisol	cultivated terrace
27	37	A 2	2000 m	175	loamy sand poor in humus	5.0	5.4	0.2	2.2					orthic Acrisol	cultivated terrace
27	37	S 1	2000 m	175	loamy sand poor in humus	5.0	5.6	0.1	0.6					dystric Regosol	
27	37	S 2	2000 m	175	loamy sand poor in humus	5.0	5.4	0.2	0.9					dystric Regosol	
28	38	A 1	1950 m	210	loamy sand with little humus	4.5	5.5	0.8	2.0	10.4	21.4	63.2	5.0	Girka danda s: dystric Regosol	grassland
28	38	A 2	1950 m	210	sand with little humus	5.0	5.3	0.5	1.4	9.0	23.4	64.8	2.8	dystric Regosol	shrubland
28	38	S 1	1950 m	210	sand poor in humus	5.0	6.1	0.3	0.4					dystric Regosol	
29	39	A 1	1890 m	250	loamy sand poor in humus	4.5	5.5	0.5	2.4					Duchche s: humic Cambisol	overexploited broadleaf forest
29	39	S 1	1890 m	250	loamy sand with little humus	5.0	5.4	0.4	0.9					dystric Regosol	
29	39	S 2	1890 m	250	sand poor in humus	5.0	5.6	0.1	0.3					dystric Regosol	
30	40	A 2	2050 m	290	loamy sand with little humus	5.0	5.4	0.5	0.7					Sarai danda s: humic Acrisol	grassland
30	40	AB	2050 m	290	loamy sand with little humus	5.0	5.4	0.9	2.2					humic Acrisol	shrubland
30	40	S 1	2050 m	290	loamy sand poor in humus	5.0	5.5	0.0	0.2					Lithosol	
31	41	A 2	2020 m	300	loamy sand poor in humus	4.5	5.5	0.2	1.1					Duchche s: humic Cambisol	shrubland
31	41	S 1	2020 m	300	loamy sand poor in humus	5.0	5.3	0.1	0.5					Regosol	
32	42	S 1	1800 m	175	sand poor in humus	5.0	5.8	0.3	1.4					dystric Regosol	
32	42	S 2	1800 m	175	sand poor in humus	5.0	6.0	0.4	0.6					dystric Regosol	
33	43	AB	1750 m	200	loamy sand poor in humus	5.5	5.9	1.3	3.4					chronic Cambisol	shrubland
33	43	S 1	1750 m	200	sand poor in humus	5.0	6.0	0.2	0.8					Lithosol	
34	44	A 2	1730 m	200	loamy sand with humus	5.0	5.7	0.6	3.7	14.4	20.4	56.2	9.0	Deorall s: chronic Cambisol	overexploited broadleaf forest
34	44	S 1	1730 m	200	sand with little humus	5.0	5.6	0.1	0.7	5.2	21.3	73.1	0.4	Regosol	
35	45	A 1	1730 m	300	sand with little humus	5.0	5.8	0.5	3.8					chronic Cambisol	overexploited broadleaf forest
35	45	S 1	1730 m	300	sand with little humus	5.0	6.0	0.1	0.8					Regosol	
s 1					sandy loam poor in humus	5.0	5.9							Lapse series: dystric Cambisol	Pinus roxburghii forest
s 2			1570 m	225	loamy sand poor in humus	5.0	5.8	0.3	2.1					dystric Cambisol	Pinus roxburghii forest
s 3			1700 m	225	sandy loam poor in humus	5.0	5.7	0.3	0.8	11.6	34.2	52.2	2.0	dystric Regosol	shrubland

Parent materials	Soil series	Main landform characteristics
Metamorphosed sandstone in situ	Guchchhe, Lapse	Steep to very steep hills. Severe soil/rock creep in places
Soil material derived from metamorphosed sandstone in situ	Lapse	nearly level bench terraces on or near hill summits
Phyllite in situ	Deorali, Golme Danda	Steeply dissected ridges with some undulating summits
Soil material derived from phyllite in situ	Golme Danda, Kharka, Parebha, Sunkhani	Nearly level bench terraces in steep mountainous areas
Alluvium/colluvium derived from metamorphosed sandstone and phyllite	Bhalukhop, Birta Besi Birta Pakhar, Timbure	Nearly level bench terraces on moderately steep to steep colluvial slopes
Rock/soil creep material: metamorphosed sandstone and phyllite	Kaping	Very steep, dissected hills
Soil material derived from metamorphosed sandstone and phyllite in situ	Dhuseni, Kathaike, Mesipo, Pedku, Ratankot	Nearly level bench terraces in steep hilly areas
Augen gneiss (feldspatic schist) in situ	Sarai Danda	Steep to very steep, dissected mountains. Severe soil/rock creep in places
Colluvium derived from augen gneiss (feldspatic schist)	Girke Danda	Nearly level bench terraces on steep, dissected colluvial slopes
Soil material derived from augen gneiss (feldspatic schist) in situ	Chanaute, Chitre, Pakha Deb, Sarai Danda Sarangthali, Tauthali	Nearly level bench terraces in steep to very steep mountainous areas
Soil material derived from carbonaceous slate in situ	Burana	Ditto
Soil material derived from metamorphosed limestone in situ	Onchi	Ditto
Magnesite with talc lenses in situ	Kharidhunga	Steep to very steep, dissected mountainous areas
Alluvium/colluvium derived from chlorite schist; talc and iron ores	Khari, Mane	Nearly level bench terraces in rolling basin, probably of a synclinal type

Note: Golme Danda, Lapse and Sarai Danda series occur on both bench terraces and non-terraced slopes.

Table 4.15. Monthly rainfall, runoff and soil loss at Dandapakhar (1984/ 1985) and Bonch (1985)

Tab. 4.15. Monatlicher Niederschlag, Abfluss und Boden-Abtrag in Dandapakhar (1984/1985) und in Bonch (1985)

Testplots Dandapakhar

1984 / Month		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
Experiment														
Rainfall	Amount (mm)	20	31	9	126	274	555	958	529	436	53	0	8	2999
	Erosivity <sub>2</sub> (10 <sup>-2</sup> Joules.m <sup>-2</sup> .cm.h <sup>-1</sup> )	-	-	-	?	189.8	378.0	461.4	281.7	138.8	21.8	-	-	1471.5
Plot 1 (bare)	Runoff (m <sup>3</sup> .h <sup>-1</sup> )													5598
	Runoff (% rainfall)	-	-	-	?	21.7	24.6	24.1	19.5	6.8	-	-	-	18.7
	Soilloss (t.ha <sup>-1</sup> )	-	-	-	?	10.3	3.2	1.8	0.8	0.1	-	-	-	16.2
Plot 2 (over- grown)	Runoff (m <sup>3</sup> .h <sup>-1</sup> )													5303
	Runoff (% rainfall)	-	-	-	?	24.9	25.7	22.9	14.0	5.9	-	-	-	17.7
	Soilloss (t.ha <sup>-1</sup> )	-	-	-	?	2.7	0.4	0.2	0	0	-	-	-	3.3

1985 / Month		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
Experiment														
Rainfall	Amount (mm)	17	13	2	30	120	425	1048	839	440	252	11	54	3251
	Erosivity <sub>2</sub> (10 <sup>-2</sup> Joules.m <sup>-2</sup> .cm.h <sup>-1</sup> )	-	-	-	-	78.8	300.2	430.6	532.1	187.2	92.3	-	-	1621.2
Plot 1 (bare)	Runoff (m <sup>3</sup> .h <sup>-1</sup> )													2454
	Runoff (% rainfall)	-	-	-	-	3.9	16.9	5.6	7.8	8.6	4.0	-	-	7.8
	Soilloss (t.ha <sup>-1</sup> )	-	-	-	-	1.3	2.4	1.4	0.3	0	0	-	-	5.4
Plot 2 (over- grown)	Runoff (m <sup>3</sup> .h <sup>-1</sup> )													277
	Runoff (% rainfall)	-	-	-	-	0	2.1	0.9	0.2	1.3	0.4	-	-	0.9
	Soilloss (t.ha <sup>-1</sup> )	-	-	-	-	0.1	0.1	0.2	0	0	0	-	-	0.4

Testplots Bonch

1985 / Month		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
Experiment														
Rainfall	Amount (mm)	15	25	7	93	246	420	910	1000	605	268	8	64	3661
	Erosivity <sub>2</sub> (10 <sup>-2</sup> Joules.m <sup>-2</sup> .cm.h <sup>-1</sup> )	-	-	-	50.8	94.5	178.6	375.2	767.9	338.8	107.1	-	-	1912.9
Plot 1 (bare)	Runoff (m <sup>3</sup> .h <sup>-1</sup> )													9001
	Runoff (% rainfall)	-	-	-	22.4	23.7	17.1	18.6	36.2	26.4	21.9	-	-	25.1
	Soilloss (t.ha <sup>-1</sup> )	-	-	-	13.7	15.5	7.2	7.8	11.5	9.0	1.9	-	-	66.6
Plot 2 (over- grown)	Runoff (m <sup>3</sup> .h <sup>-1</sup> )													2466
	Runoff (% rainfall)	-	-	-	21.1	13.9	10.1	6.0	6.6	3.8	3.2	-	-	6.9
	Soilloss (t.ha <sup>-1</sup> )	-	-	-	2.7	0.9	0.1	0	0	0	0	-	-	3.7