

Bryophytes of river valleys and kaingin areas of Mount Pangasugan, Leyte, Philippines

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ABSTRACT

Fifty one bryophyte species were collected from June to December 1991. In the undisturbed river valleys, the number of species varied from 7 to 26 while in the kaingin farms (slash and burn farming) the species number varied from 2 to 13. These data give evidence that kaingin farming is changing environmental conditions unfavorably for at least 50% of the species observed. The bryophytes' role within the ecosystem for the retention of water, the disintegration of rocks and the stabilization of substrata making them suitable for seed plant colonization is thus reduced significantly.

Key words: Bryophytes, kaingin, Mt. Pangasugan

INTRODUCTION

Bryophytes are small plants represented by mosses and liverworts. Though these plants are minute and are often given the least attention, their contribution to the stability of a tropical rainforest ecosystem is enormous. They are important primary producers in the ecosystem and at the same time contribute to the broadening of biodiversity and hence help ensure stability of the system. This is an addition to the very significant role they play in soil formation.

There are already a number of studies on bryophytes in the Philippines (Del Rosario, 1975; Iwatzuki and Tan, 1979; Tixier, 1978; Tan and Iwatzuki, 1983; Iwatzuki and Tan, 1980; Del

Rosario and Van Zanten, 1979 and Del Rosario, 1986). However, since these are pioneer studies, much attention was given to the taxonomic aspects of this group. This study then, made use of these reports to know the bryophyte species found in Mt. Pangasugan and to have an insight on their occurrence as affected by the habitat and elevation. This study is the first ever made on bryophytes in Mt. Pangasugan.

Mt. Pangasugan is contained within the 626,524.3 hectares ViSCA Forest Reservation. This forest reserve extends up to about 500 m above sea level as surveyed by Ms. Perly Lumasag in 1976. It is bounded by the highest points of Bato and Gabi-gabi mountains and by the Mt. Pangasugan and Calbiga-a rivers.

MATERIALS AND METHODS

Samples were collected by removing portions of clumps of bryophytes present in every interval of 20m altitude above sea level (asl) from seven sites namely: Lago-lago river (5-170 m asl), Guinlamingan creek (5-150 m asl), Calbiga-a river (5-145 m asl), Hubasan creek (61-165 m asl), Guinlamingan (81-280 m asl), Hubasan (81-170 m asl) and Kanagahan (21-260 m asl). The first four sites mentioned were considered undisturbed areas because farmers never utilized them due to risks of flooding. The latter three sites were considered disturbed areas because they are where farmers practice the destructive slash and burn farming termed "kaingin".

The species-area curve was determined through quadrat nesting (Mueller-Dombois and Ellenberg, 1974) to know the minimum sample area which contain the characteristic species composition of the bryophytes community. However, only the preliminary data, such as species presence and frequency of occurrence in the sample sites, were considered in this paper.

Samples collected were examined under the stereoscope and representative portions were utilized for preparation of herbarium specimens and for permanent mounting on microscope slides. From the slides, photomicrographs were taken and illustrations made.

Actual collections were made from June to December 1991. During this period, monthly rainfall distribution were gathered from the ViSCA weather station within the vicinity and data on air temperature and light intensity were collected in each sample site.

RESULTS AND DISCUSSION

The map of Mt. Pangasugan showing the different sample areas is presented in Figure 1. During the sampling period, air temperature in river valleys ranged from 27.2 °C to 33 °C and

light intensity from 36 fc to 2,000 fc depending on canopy cover. In kaingin areas on the other hand, air temperature ranged from 29 °C to 38 °C and light intensity from 350 fc to 4,500 fc. The average rainfall distribution gathered by the weather station ranged from 5.1 mm in the month of September to 16.3 mm during the month of November.

Table 1 lists the bryophyte species collected and their respective frequencies of occurrence in the various sites. Among the species collected 27 belong to Class Musci, 22 belong to Class Hepaticae while 2 belong to Class Anthocerotae. Though all the 51 species collected were found to be present in the riverine sites, only 28 of these were present in the kaingin sites. With respect to classes, a 40% reduction in number of species was observed in Class Musci and about 63.6% reduction in Class Hepaticae.

Frequency of occurrence of the species vary with type of habitat. Frequencies were always relatively higher in the river valleys than in kaingin sites. The five most common bryophyte genera found in the river valleys were *Hypnum*, *Macromitrium*, *Fissidens*, *Orthodontium* and *Calymperes*, while in the kaingin sites they were *Calymperes*, *Lejeunea*, *Macromitrium*, *Frullania* and *Orthodontium* as ranked in decreasing order of frequency. In total, however, it was found that *Macromitrium* is the most common genus in Mt. Pangasugan followed by *Hypnum*, *Calymperes*, *Fissidens* and *Orthodontium*.

The number of species in the different sites based on elevation is presented in Table 2. Though data were fragmented because of the natural existence of ravines and very steep slopes, it was quite evident that the average number of species in river valley (15.75) was about twice that in kaingin sites (7.53). It was also noted that though the number of species vary with elevation no distinct trend was observed at least within the first 5-280 m elevation of Mt Pangasugan (Fig. 2). These results strongly demonstrate that at

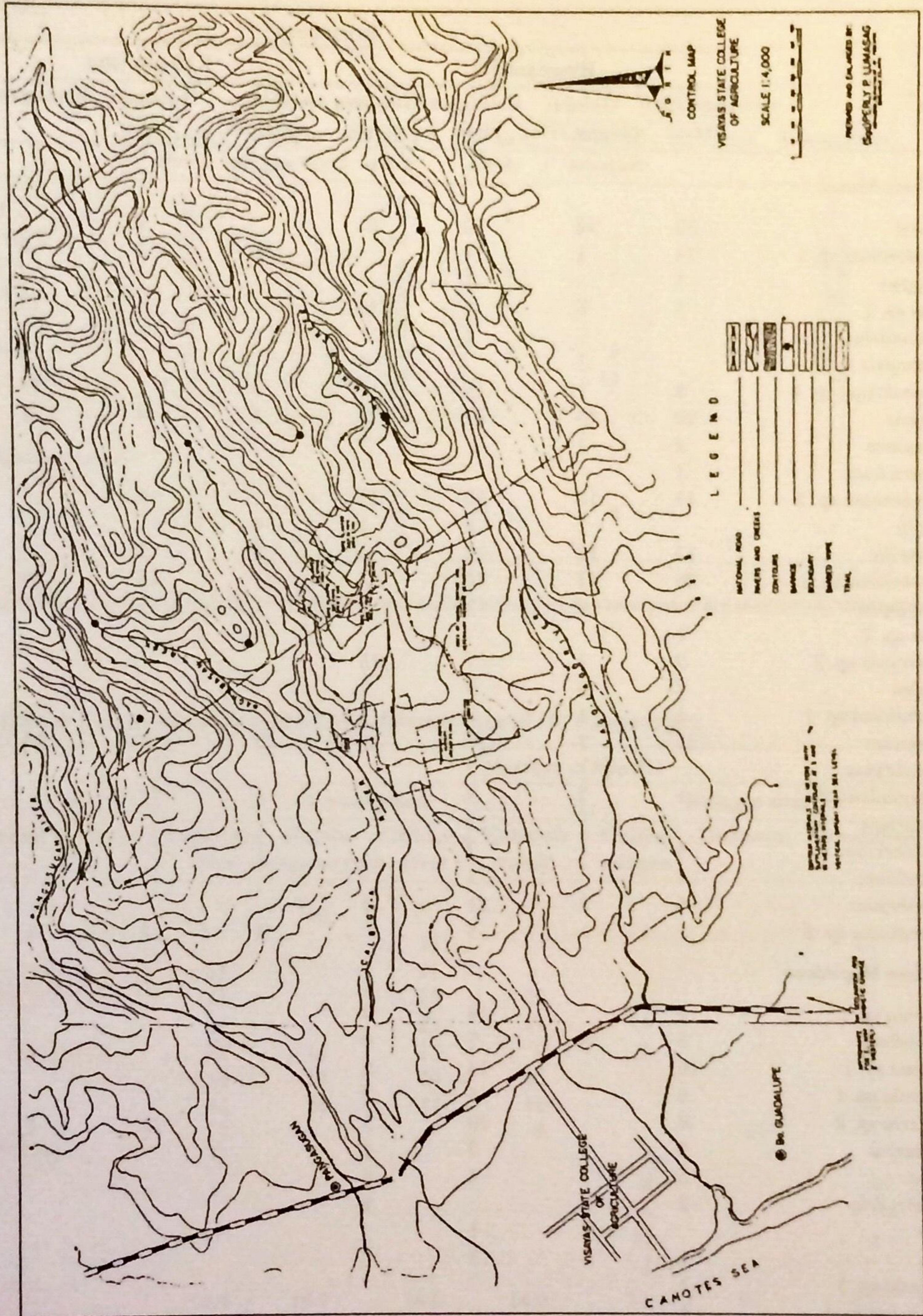


Figure 1. Topographic map of Mt. Pangasugan showing the different sampling sites.

Table 1. Frequency of occurrence of bryophytes, Class Musci, Class Hepaticae and Anthocerotae, collected in Mt. Pangasugan

Genera*	Frequency							Total
	River valleys				Kaingin sites			
	Lagu-lagu river	Guinla-mingan river	Calbiga-a river	Hubasan creek	Guinla-mingan	Hubasan	Kanagahan	
A. Class Musci								
<i>Hypnum</i>	52	38	50	61		2		203
<i>Orthodontium</i> sp. 1	14	1	11		29	2	8	65
<i>Plagiopus</i>	3		1					4
<i>Bryum</i> sp. 1	5	6	2	19		1	15	48
<i>Ptychomitrium</i>			1					1
<i>Neckeropsis</i> sp. 1		1		4			2	7
<i>Macromitrium</i> sp. 1	8		15	1	3		13	40
<i>Fissidens</i>	10	19	42	22	5	4	1	103
<i>Buxbaumia</i>	4	2		7				13
<i>Orthotrichum</i>	1							1
<i>Orthodontium</i> sp. 2	13	10	50	15		5		93
<i>Barbula</i>		1	8	1	4			14
<i>Dicranella</i>	13	10	12	4	5	3	6	53
<i>Macromitrium</i> sp. 2	26	43	76	52	17	15	14	243
<i>Campylopus</i>		6	3	2		2		13
<i>Bryum</i> sp. 2	1				1			2
<i>Neckeropsis</i> sp. 2	9	3	7	16				35
<i>Zygodon</i>	7	6	9	2	1			25
<i>Dicranoloma</i> sp. 1	1	1	8	2			8	20
<i>Calymperes</i>	25	7	13	11	22	4	30	112
<i>Clastrobryum</i>			1					1
<i>Symphysodontella</i>	1	2	3	5	1	1		13
<i>Acroporium</i>			2					2
<i>Calytothecium</i>	4		7		1			12
<i>Taxithellium</i>	4		3					7
<i>Anomobryum</i>	6	2	21	3				32
<i>Dicranoloma</i> sp. 2			5		3	2	1	8
B. Class Hepaticae								
<i>Frullania</i> sp. 1	1		14	7				22
<i>Cyathodium</i>	8	3	7	9				27
<i>Bazzania</i> sp. 1	16		14	8				38
<i>Metzgeria</i> sp. 1	4		6	7				17
<i>Metzgeria</i> sp. 2	9		10	3				25
<i>Marchantia</i>	5	2	7	1		2	1	15
<i>Aneura</i>	5	1	4	4				14
<i>Apometzgeria</i>	2			1				3
<i>Riccia</i>			1					1
<i>Pellia</i>	1		3					4
<i>Metzgeria</i> sp. 3	3							3
<i>Lophocolea</i> sp. 1	1							1
<i>Bazzania</i> sp. 2	2							2
<i>Bazzania</i> sp. 3	1		2	2				6
								1

Table 1 cont'n...

Genera*	Frequency							Total
	River valleys				Kaingin sites			
	Lagu-lagu river	Guinla- mingan river	Calbiga-a river	Hubasan creek	Guinla- mingan	Hubasan	Kanagahan	
<i>Frullania</i> sp. 2	2		2	2				6
<i>Lophocolea</i> sp. 2	10		14	1	2		1	28
<i>Bazzania</i> sp. 4	3	2	9	6	2		6	28
<i>Frullania</i> sp. 3	7	1	4				33	45
<i>Apotreubia</i>	10		26					36
<i>Bazzania</i> sp. 5	1		6	4	6	2		19
<i>Lejeunea</i>	6	5	10		11		36	68
<i>Blasia</i>			4	1				5
C. Class Anthocerotae								
<i>Anthoceros</i> sp. 1	4		15	1	5			25
<i>Anthoceros</i> sp. 2	1		8			1		10

*Samples were identified at the genus level - Different species but belonging to same genus are numbered correspondingly.

Table 2. Number of species by elevation in the different sites of Mt. Pangasugan.

Elevation (m)	Number of Species						
	River valleys				Kaingin sites		
	Lagu-lagu river	Guinla- mingan creek	Calbiga-a river	Hubasan creek	Guinla- mingan	Hubasan	Kanagahan
5-20		18					
21-40			18				12
41-60	13		21				4
61-80	18		26	22			7
81-100	26		23	19	13	6	7
181-120	22	11	15	9	5	7	5
121-140	16	12	14	15			
141-160	11	20	14	10			7
161-180	7			9		13	
181-200					6		
201-220					8		6
221-240					6		
241-260					10		6
261-280					2		
Average	16.1	14.3	18.6	14.0	7.1	8.7	6.7

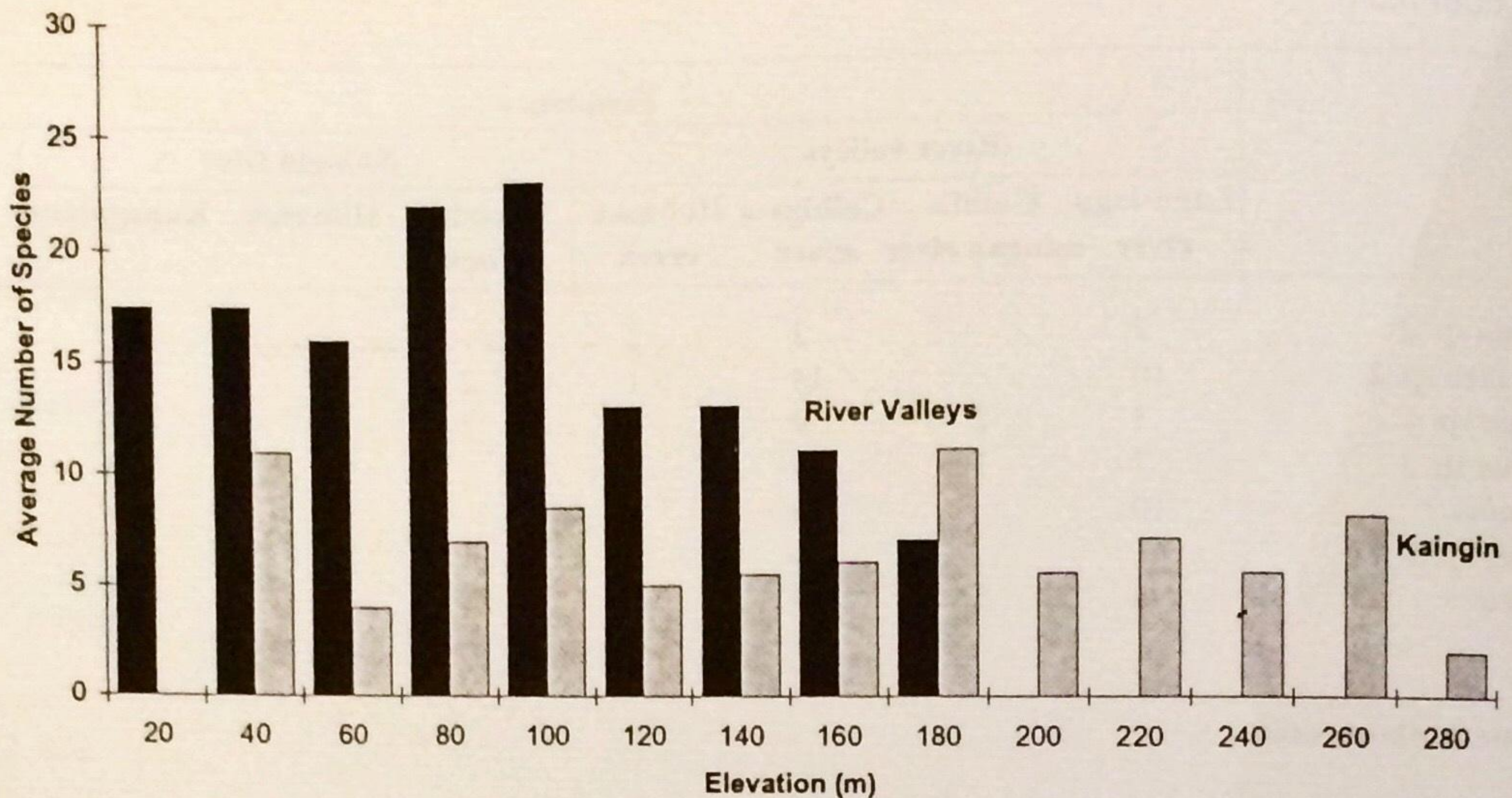


Figure 2. Average number of species by elevation and habitat.

low elevations where man's activities are extensive particularly because of easy access, bryophyte distribution is not very much affected by elevation. Though it had been known to be strongly influenced by variations in climate, in recent times, the activities of man have become increasingly important in altering distribution patterns of bryophytes.

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