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Assessment of Diversity of Pteridophytes along Some Hill Roads in a Biodiversity Hot Spot Region of India – A Case Study of Mizoram

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ABSTRACT: Mizoram state of India is one of the biodiversity hotspots of the world, the Eastern Himalayan biodiversity hotspot of South Asia. Panoramic view of its roadside flora reveals that it is replete with rich diversity of Pteridophytes. This is due to unique location of Mizoram, its topography with hills and valleys, and also its geology which provide immense ranges of microclimatic conditions which facilitates its growth. These pteridophytes are one of the source of carbon sink along the road. Some work related to pteridophytes have been reported by some researchers in some protected areas like sanctuaries and some forests in Mizoram. Till date no work has been reported on the diversity, ecology and IUCN red list status of pteridophytes growing along the Hill Roads in Mizoram. The paper enlists the current diversity, habitat and ecology of such pteridophytes. Effort has been made to ascertain their status in the IUCN red list and in Catalogue of Life (COL). The study is likely to help in further capacity augmentation/widening of these roads without harming the current diversity of the pteridophytes growing there. The study also provides a protocol to be followed for monitoring and management of biodiversity along other roads of this hotspot.

KEYWORDS: Hill roads, Pteridophytes, Diversity, Ecology, Hotspots, Catalogue of life, IUCN red list

I. INTRODUCTION

The Eastern Himalayas is hottest of the 34 biodiversity hotspots of the world. It comprises of a mountain range in South Asia which is youngest of all mountain ranges existing on the face of the earth. It is still in an evolving state. The ecosystem of the region, therefore, naturally exhibit great dynamism (Zobel & Singh, 1997). It also holds great significance from ecological and evolutionary point of view. This region is rich in biodiversity and harbours largest number of endemics and Schedule I species as compared to any other part of India (MacKinnon, 1986).

Mizoram, a state situated in North –East of India, belongs to this, Eastern Himalayan biodiversity hotspot, region. Within India, the entire North-East region, in which Mizoram is situated, represents the transition zone between India, Indo-Malayan and Indo-Chinese geographic regions. It is recognized under the National Biodiversity Strategy and Action Plan to be an eco-region. Mizoram possesses a geologically distinctive terrain in this region with low but steep hills ranging in height from 900 - 1,100 meters. Its unique location, topography with hills and valleys, and geology provide immense ranges of microclimatic conditions which support diverse gene pools of a variety of flora and fauna, making it a “biodiversity rich” area (Swamlina, 2013). Pteridophytes constitute formidable part of the vegetation of Mizoram. Development has necessitated construction of hill roads from time to time. Till date these hill roads hold flora which are treat to watch. They are mostly Pteridophytes comprising of epiphytic component possessing large, beautiful, graceful and fascinating foliage. These Pteridophytes are also one of the source of the carbon sink along the road (India State of Forest report 2015).

Pteridophytes thriving in some protected area like sanctuaries and some forests have been reported earlier. Vanlalpeka and Laha (2015) reported 32 species of Pteridophytes from eight selected forest sites in Champhai district. Out of the 32 species, 27 species were terrestrial and the other 5 species were epiphytes. Barbhuia and Singh (2014) reported 36 taxa (28 terrestrial, 7 lithophyte, 1 epiphyte) belonging to 19 genera and 15 families of pteridophytes from Thorangtnag Wild Life Sanctuary. Singh *et al* (2016) reported 37 taxa of pteridophytic flora from Tawi Wildlife Sanctuary,



Mizoram. This includes 11 taxa. Sharma et al (2013) also collected a total of 35 species of pteridophyte under 23 genera and 21 families from Pualreng Wildlife Sanctuary, Kolasib Mizoram.

Further construction and widening of the road is in offing as the area is in path of rapid modernization. This will impact diversity of these plants.. In order to prevent diversity loss of such pteridophytes during construction of hill road, their current diversity and ecology have been studied here. Status of enlisted pteridophytes growing along hill roads is also ascertained from IUCN red list and list of catalogue of life (COL). The study is likely to help in further capacity augmentation/widening of these roads without harming the current diversity of the pteridophytes growing there .The study also provides a protocol to be followed for monitoring and management of biodiversity along other roads of this hotspot. Pteridophytes growing along hill roads of Mizoram has not yet reported.

II. MATERIALS AND METHODS

For listing of the Pteridophytes along the roads, three major roads of Mizoram situated in three different locations were selected , namely - Aizawl- Lunglei road, Sheling – Champhai road and Lunglei –Tlabung road (Figure -1).

All the roads were surveyed with team of experts for two consecutive years during the months of October to January (2017& 2018). Data were collected within 200m (considering corridor of impact) of the roads by traversing on foot along all the pteridophytic habitats on both side of the roads (valley side and hill side). Vegetation, water channels, ridges and various habitats within the corridor of impact (200m of the road) were also considered for the listing of the pteridophytes.

TAXONOMY:

The taxonomy of recorded species was done as per Fraser-Jenkins (2009). However, the genera and species within the families are listed alphabetically. The authorities of names follow Brummitt and Powell (1992) while the taxonomic citation is based on published literature and IPNI, Tropicos and The Plant List.

COLLECTION OF SPECIMEN:

All the specimens were collected in fertile stage and were processed through conventional herbarium (Jain, 1977).They were identified by matching them with herbarium specimens of local universities and research institutions and also by using different floras of nearby areas (Beddome ,R.H., 1892, Ghosh, S.R *etal.*, 2004, Ghosh,, C,*etal* 2008, Singh 2005) Identifications of specimens were based on field characters with the aid of existing literature (Baishya and Rao 1982; Jamir and Rao 1990; Kholia 2010a, 2014; Benniamin ,2012)

Status of the listed pteridophytes in IUCN Red list along the roads under study has been assessed as per of the IUCN Red list 2017 version 3.1. Those not finding place in IUCN red list were assessed as per annual Catalogue of life checklist 2017.

III. RESULTS AND DISCUSSION

The results here is the first report of Pteridophytes growing along hill roads of Mizoram,so far their diversity, ecology and status in IUCN Red List and List of Catalogue of Life is concerned.

Mizoram has total road-length much below India's national average. In view of this, Mizoram is planning to construct 300 km of new road within 5 years. State is also targeting to widen its existing 6220 km of road within 10 years. This will create impact on biodiversity (Mizoram Economic Survey 2014 – 15), especially diversity of pteridophytes which dominate the roadside flora. Three major roads of Mizoram were surveyed to enlist the pteridophytes growing along the roadside in the present work. The current diversity,taxonomy,ecology and status in IUCN Red list and Catalogue of Life is discussed here:

III.I DIVERSITY, TAXONOMY, ECOLOGY OF PTERIDOPHYTES ALONG THE ROADS

Along the Aizawl – Thenzal – Lunglei road, 40 species of pteridophytes were identified and listed (Table 1). They represent 20 families of Pteridophytes. Members of family Selaginellaceae and Tectariaceae dominate the roadside flora followed by members of family Polypodiaceae and Lycopodiaceae. Habitat wise distribution of the pteridophytes indicate the fact that out of total pteridophytes listed along the road 33% are terrestrial, 27% are sciophytes , 18% are hydrophytes , 10% are lithophytes and 12% are epiphytes.

Along the Seling - Champhai Road road, 33 species of Pteridophytes were identified and listed (Table 1)which represent 19 families of Pteridophytes. Members of family Pteridaceae and Polypodiaceae are the dominant along the road followed by members of family Cyathaceae, Lycopodiaceae, Thelypteridaceae and Marsilliaceae. Habitat wise



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distribution of the pteridophytes indicate the fact that out of total pteridophytes listed along the road 33% are terrestrial, 19.4 % are sciophytes, 11.1% are hydrophytes and lithophytes and Epiphytes are 16.6% .

Along Lunglei- tlabung –Kwarpuicchuah road forty two (41) species of pteridophytes were listed which represent 20 families of pteridophytes (Table 1). Dominant species of the pteridophytes along the road is represented by the members of the family Dryopteridaceae followed by members of the family Pteridaceae and Polypodiaceae. Habitat wise distribution of the pteridophytes indicate the fact that out of total pteridophytes listed along the road 45.2 % are terrestrial, 12 % are sciophytes, 14.2 % are hydrophytes, lithophytes 16.6% and Epiphytes are 12% .

III.II STATUS OF THE LISTED PTERIDOPHYTES ALONG THE SELECTED ROADS IN IUCN RED LIST AND CATALOGUE OF LIFE

Status of the listed pteridophytes in IUCN Red list along the roads under study has been assessed as per of the IUCN Red list 2017 version 3.1 and shown separately in Table 1. As per the list most of the pteridophyte species identified along the roads considered for study have not been assessed for IUCN red list. Only *Marsilea minuta* L., *Marsilea quadrifolia* L., *Diplazium esculentum* (Retz.) Sw., *Leptochilus decurrens* Blume, *Leptochilus pteropus* (Blume) and *Pteris vittata* L. have been listed as least concern as per the IUCN Red list 2017 version 3.1. Pteridophyte species *Tectaria polymorpha* (Wall. ex Hook.), *Dryopteris pulvinulifera* (Beddome) Kuntze *Diplazium dilatatum* Blume, Enum. Pl. Javae, *Cyathea khasyana* (Moore. ex. khum), *Blechnum orientale* (L.), *Angiopteris evecta* (G. Forst.), *Angiopteris indica* (Hook & Grev.), *Adiantum caudatum* L., *Anisocampium cuspidatum* Bedd.) Y.C. Liu, W.L. Chiou & M. Kato, *Dicranopteris linearis* (Burm. f.) Underw, *Drynaria propinqua* (Wall. ex Mett.) Bedd, *Dryopteris hirtipes* (Blume) Kuntze, *Lycopodiella cernua* (L.) Pic. Serm, *Lygodium flexuosum* (L.) Sw., *Asplenium finlaysonianum* Wall. ex Hook, *Cyathea gigantea* (Wall. ex Hook.) , Underw, *Dipteris wallichii* (R. Br.), *Dicranopteris linearis* (Burm. f.) Underw, *Diplazium pseudosetigerum* (Christ), C.V. Morton, *Pteris khasiana* (C.B. Clarke), *Thelypteris nudata* (Roxb.) C.V. Morton which were not assessed by IUCN red list have found a place in Catalogue of life annual checklist 2017. Study reveal the fact that out of total 73 different types of pteridophytes listed in all the three roads 6 species has been listed in IUCN red list (IUCN red list 2017) and 21 species have been listed in Catalogue of Life and 46 pteridophytes have neither been assessed in IUCN red list nor included in Catalogue of Life.

IV. CONCLUSION

Roadside flora of Mizoram are rich in pteridophytes. They dominate the ground vegetation of many roads and also form an important component of many epiphytic plant communities. They function as one of the source of carbon sink along the road (India State of Forest report 2015). Their graceful look and beautiful foliage provide a fascinating sight attracting many plant lovers to Mizoram. Factors like climate change, encroachment of lands for road development pose a major threat to the survival of these groups of plants along the roads. Unplanned felling of road side trees for road maintenance and widening are a major threat for epiphytic pteridophytes. Present study reveals the fact that out of listed pteridophytes in all the three roads 14% species has been listed in IUCN red list (IUCN red list 2017) and 50% species have been listed in Catalogue of Life and 36% pteridophytes have not been assessed in IUCN red list (Fig. 8). The Catalogue of Life is used to support the major biodiversity and conservation information services such as the Global Biodiversity Information Facility (GBIF), Integrated Taxonomic information System (ITIS), Encyclopedia of Life (EoL) and the International Union for Conservation of Nature Red List. It is recognized by the Convention on Biological Diversity as a significant component of the Global Taxonomy Initiative and a contribution to Target 1 of the Global Strategy for Plant Conservation.

Hence, more than 64% of the listed pteridophytes along the roads are of global biodiversity concern. Proper attention should be made during further capacity augmentation /widening of these roads for conservation of these pteridophytes. The study would be helpful in monitoring and management of population of the pteridophyte vegetation along other roads also. Similar protocol may be followed to curb biodiversity loss in any given region. Out of total pteridophytes listed along the roads 43% are terrestrial, 15% are epiphytes, 9% are lithophytes, 21% are sciophytes and 9% are hydrophytes (figure 2).

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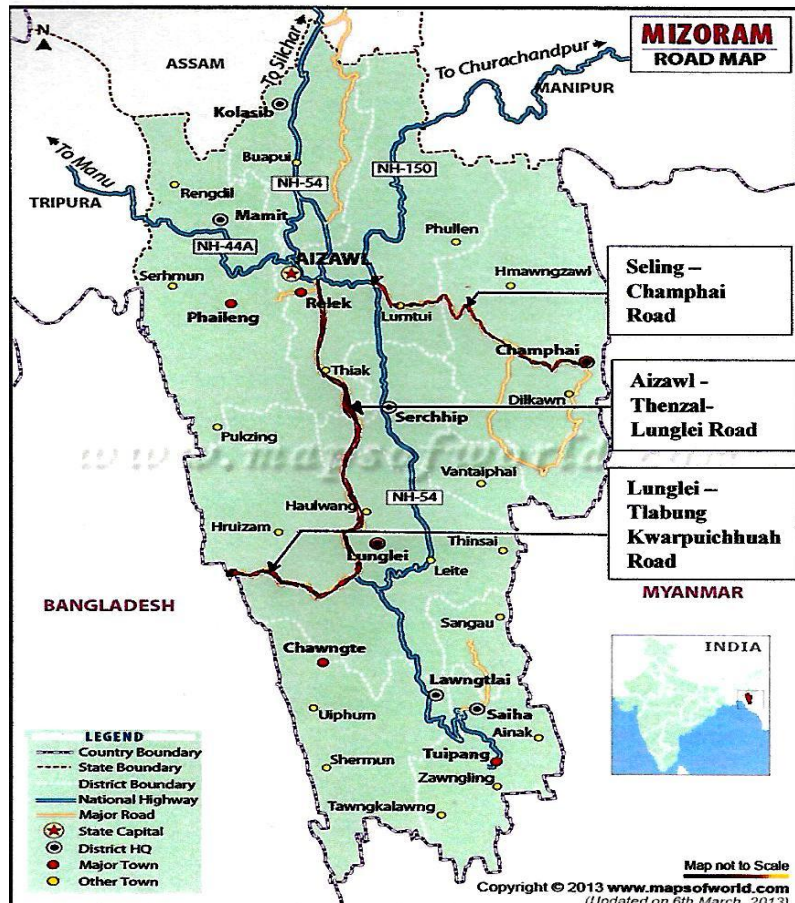


Figure 1: Roads considered for study

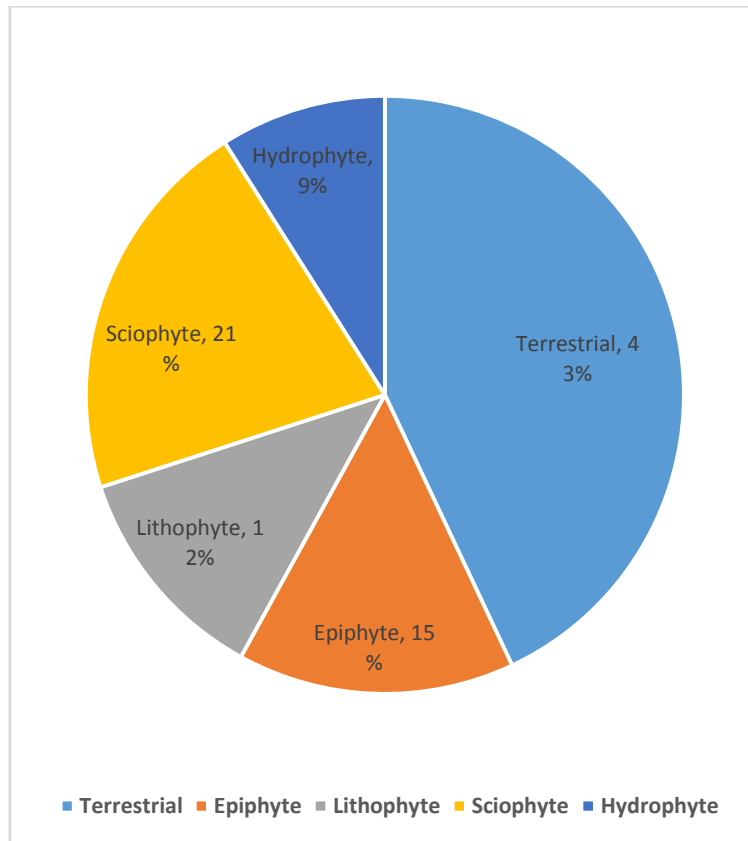


Figure 2: Habitat wise distribution of pteridophytes along the roads

Sl. No	Name of the Pteridophyte species	Family	Habitat and Ecology	Status as per IUCN Red list Version 3.1 an Catalog ue of life annual checklist 2017	Distribution of Pteridophytes along the road		
					Aizawl – Thenzal Lunglei	Seling - Champhai	Lunglei – Tlabung – Kwarpuiccha
1.	<i>Adiantum lunulatum</i> Burnhand.	Pteridaceae	Terrestrial, growing on moist surface of hills and also on road side	NA	-	+	+
2.	<i>Adiantum philippense</i> L.	Pteridaceae	Terrestrial, growing on moist surface of hills and also on road	NA		+	



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			side				
3.	<i>Adiantum caudatum</i> L.	Pteridaceae	Terrestrial, growing on moist surface of hills and also on road side	NA/COL		+	+
4.	<i>Anisocampium cuspidatum</i> Bedd.)Y.C.Liu,W.L. Chiou & M. Kato	Athyriaceae	Terrestrial, growing on moist surface of hills and also on road side.	NA/COL		+	
5.	<i>Angiopteris evecta</i> (G.Forst.)	Marattiaceae	Sciophytes , growing on hill slopes in wet and shady places	NA , COL	+	+	+
6.	<i>Angiopteris indica</i> (Hook & Grev.)	Marattiaceae	Sciophytes , growing on hill slopes in wet and shady places	NA , COL	+	-	-
7.	<i>Angiopteris helferiana</i> C. Presl	Marattiaceae	Terrestrial, growing on moist surface of hills side	NA			+
8.	<i>Asplenium nidus</i> (L.)	Aspleniaceae	Epiphyte, growing on tree trunk , valley side trees	NA	-	+	-
9	<i>Asplenium obscurum</i> (Blume)	Aspleniaceae	Epiphyte, growing on tree trunks both hill side and valley side trees	NA	-	+	+
10.	<i>Asplenium finlaysonianum</i> Wall. ex Hook	Aspleniaceae	Lithophytes, growing on degraded rock surface generally on hill side	NA/COL			+
11	<i>Azolla pinnata</i> (Lamarck)	Azollaceae	Hydrophyte , growing on road side waterbody	NA	+	+	+
12	<i>Blechnum orientale</i> (L.)	Blechnaceae	Lithophytes, growing on Degraded rock surface generally on both side of the road	NA, COL	+	+	+
13	<i>Bolbitis heteroclite</i> (C.Presl)	Bolbitidaceae	Sciophytes , growing on moist and shady places on road edge valley side of the road	NA	+	-	+



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14	<i>Bolbitis nodiflora</i> (Fraser –Jenk)	Bolbitidaceae	Sciophytes , growing on moist and shady places on road edge valley side of the road	NA	+	–	+
15	<i>Cyathea chinensis</i> (Copel) Philipp	Cyatheaceae	Terrestrial, growing on road side surface	NA	+	+	+
16	<i>Cyathea khasyana</i> (Moore.ex.khum)	Cyatheaceae	Terrestrial, growing on road side surface	NA / COL	+	+	+
17	<i>Cyathia spinulosa</i> Wall.	Cyathaceae	Terrestrial, growing on road side surface	NA	+	–	–
18	<i>Cyathea gigantea</i> (Wall. ex Hook.)	Cyatheaceae	Terrestrial , growing on valley side of the road	NA/ COL			+
19.	<i>Christella dentata</i> (Forssk.) Brownsey &Jermy	Thelypteridacea e	Lithophytes, growing on Degraded rock surface generally on both side of the road	NA	–	+	–
20.	<i>Cyclosorus megaphyllus</i> (Ching)	Thelypteridacea e	Sciophytes , growing on moist and shady places both side of the road	NA	+	–	–
21.	<i>Davallia trichomanoides</i> Blume	Davalliaceae	Epiphytic growing on tree trunks and sometime epilithic on different kinds of rocks, mostly in wet places	NA		+	+
22.	<i>Dicranopteris linearis</i> (Brum F.)	Dicranopteridaea e	Terrestrial, growing on valley side exposed surface o road with some shade and moisture	NA	+	+	+
23.	<i>Diplazium dilatatum</i> Blume, Enum. Pl. Javae	Athyriaceae	Sciophytes , growing on moist and shady places on valley side of the road	NA , COL	+	–	+
24.	<i>Diplazium esculentum</i> (Retz.) Sw.	Athyriaceae	Sciophytes , growing on moist and shady places on valley side of the road	Least concern	–	+	–



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Sl. No	Name of the Pteridophyte species	Family	Habitat and Ecology	Status as per IUCN Red list Version 3.1 an Catalogue of life annual checklist 2017	Distribution of Pteridophytes along the road		
					Aizawl – Thenzal Lunglei	Seling - Champhai	Lunglei – Tlabung – Kwarpuiccha
25.	<i>Diplazium pseudosetigerum</i> (Christ)	Woodsiaceae	Terrestrial, growing on moist surface of hills and also on road side	NA/COL			+
26	<i>Dipteris wallichii</i> (R.Br.)	Dipteridaceae	Terrestrial , growing on hillside moist soil	NA	+	-	+
27	<i>Dryopteris maginata</i> (Clarke)	Dryopteridaceae	Terrestrial, growing on moist and shady places on road edge valley side of the road	NA	+	-	-
28.	<i>Drynaria propinqua</i> (Wall. ex Mett.) Bedd	Polypodiaceae	Lithophytes growing on degraded rock of hill surface. Sometimes found in man-made structures like brick walls	NA/Col	-	+	+
29.	<i>Drynaria quercifolia</i> (L.) J.Sm.	Polypodiaceae	Epiphytic growing on tree trunks	NA		+	
30.	<i>Drynaria coronans</i> (Wall. ex Mett.)	Polypodiaceae	Epiphyte , Growing on tree trunk	NA/COL			+
31.	<i>Dryopteris pulvinulifera</i> (Beddome) Kuntze	Dryopteridaceae	Lithophytes, growing on overhanging rock crevices	NA, COL	+	-	-
32.	<i>Dryopteris hirtipes</i> (Blume) Kuntze	Dryopteridaceae	Sciophytes, growing on humus-rich mountain slopes in light or deep shade.	NA/COL		+	
33.	<i>Dryopteris sparsa</i> (D.Don) Kuntze	Dryopteridaceae	Terrestrial, growing on valley side exposed surface o road with some shade	NA		+	+



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			and moisture				
34.	<i>Hymenophyllum exsertum</i> (Wall.ex Hook)	Hymenophyllaceae	Lithophytes, growing on degraded rock surface generally on both side of the road	NA	+	-	-
35.	<i>Leptochilus decurrens</i> Blume	Polypodiaceae	Epilithic or epiphytic on trunk bases, sometimes terrestrial, often on rocks beside road side streams	Least concern		+	+
36.	<i>Lindsaea ensifolia</i> (SW.)	Lindsaeaceae	Lithophytes, growing on degraded rock surface generally on both side of the road	NA	+	+	+
37.	<i>Lycopodiella cernua</i> (L.)	Lycopodiaceae	Sciophytes ,growing on hill slopes in wet and shady places (creepers)	NA	+	+	+
38.	<i>Lycopodiella phlegmaria</i> (L.)	Lycopodiaceae	Epiphyte , growing on tree branches, hanging from hill side tree branches	NA	+	+	-
39.	<i>Lygodium altum</i> (Clarke)	Lygodiaceae	Terrestrial , growing on road side surface	NA	+	-	-
40.	<i>Lygodium flexuosum</i> (L.)	Lygodiaceae	Terrestrial , growing on road side surface	NA	+	+	+
41.	<i>Lygodium salicifolium</i> (C.Presel)	Lygodiaceae	Terrestrial , growing on road side surface	NA	+	-	+
42.	<i>Marsilea minuta</i> L.	Marsileaceae	Hydrophyte , growing on road side waterbody	Least Concern	+	+	+
43.	<i>Marsilea quadrifolia</i> L.	Marsileaceae	Hydrophyte , growing on road side waterbody	Least Concern	+	+	+
44.	<i>Micosorum punctatum</i> (L.)	Polypodiaceae	Epiphyte, Growing on tree trunk , valley side trees	NA	+	-	-
45.	<i>Microlepia candigera</i> (T. Moore)	Dennstaedtinaceae	Terrestrial , growing on moist and shady places on valley side of	NA	+	-	-



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			the road				
46.	<i>Microlepia hancei</i> Prantl	Dennstaedtiaceae	Terrestrial , growing on road side moist and shady places on valley side of the road	NA		+	+
47.	<i>Microlepia speluncae</i> (L.)	Dennstaedtiaceae	Terrestrial, growing on moist surface of hills and also on road side	NA			+
48.	<i>Platyserium wallichii</i> Hook.	Polypodiaceae	Epiphyte , growing on tree branches, hanging from hill side tree branches	NA		+	
49.	<i>Pityrogramma calomelanos</i> (L.)	Pteridaceae	Lithophytes , growing on degraded rock	NA	+	-	-
50.	<i>Pteris pseudopellucida</i> (Ching)	Pteridaceae	Terrestrial, growing on moist and shady places of the road as well as hills slopes.	NA	+	-	-
51.	<i>Pteris vittata</i> L.	Pteridaceae	Terrestrial , growing on hill side moist and shady places	Least concern		+	
52.	<i>Pteridium aquilinum</i> (L.)Kuhn	Dennstaedtiaceae	Terrestrial , growing on road side as well as hill side moist and shady places	NA	+	+	
53.	<i>Pteridium revolutum</i> (Blume)	Dennstaedtiaceae	Terrestrial , growing on road side moist and shady places	NA			+
54.	<i>Pteris khasiana</i> (C.B.Clarke)	Pteridaceae	Terrestrial , growing on road side moist and shady places	NA/COL			+
55.	<i>Pteris vittata</i> L.	Pteridaceae	Terrestrial , growing on road side moist and shady places	Least concern			+
56.	<i>Polystichum pseudotsus-simense</i> Ching.	Dryopteridaceae	Terrestrial, growing on moist surface of hills and also on road side	NA			+

57.	<i>Pyrossia lanceolata</i> (L.)	Polypodiaceae	Terrestrial , growing on valley side exposed surface of road with some shade and moisture	NA	+	-	+
58.	<i>Pyrossia manni</i> (Giesenh.)	Polypodiaceae	Terrestrial , Growing on surface of road with some shade and moisture	NA	+	-	-
59.	<i>Selaginella ciliaris</i> (Retz.)	Silaginallaceae	Sciophytes, growing on hill slopes in wet and shady places	NA	+	-	-
60.	<i>Selaginella repanda</i> (Desv. expoir)	Silaginallaceae	Sciophytes, growing on hill slopes in wet and shady places	NA	+	-	-
61.	<i>Selaginella vaginiata</i> (Spring)	Silaginallaceae	Sciophytes, growing on hill slopes in wet and shady places	NA	+	-	-
62.	<i>Selaginella wallichii</i> (Hook & Grev.)	Silaginallaceae	Sciophytes, growing on hill slopes in wet and shady places	NA	+	+	+
63.	<i>Selaginella bisulcata</i> Spring	Selaginellaceae	Sciophytes , growing on hill slopes in wet and shady places	NA		+	
64.	<i>Selaginella involvens</i> (Sw.)	Selaginellaceae	Sciophytes , growing on hill slopes in wet and shady places	NA			+
65.	<i>Tectaria imressa</i> (Fee)	Tectariaceae	Hydrophytes, Growing near water bodies of the road	NA	+	-	-
66.	<i>Tectaria paradoxa</i> (Fee)	Tectariaceae	Hydrophytes, Growing near water bodies of the road	NA	+	+	+
67.	<i>Tectaria gemmifera</i> (Fée) Alston	Tectariaceae	Hydrophytes, Growing near water bodies of the road	NA		+	+
68.	<i>Tectaria polymorpha</i> (Wall.ex Hook.)	Tectariaceae	Hydrophytes, Growing near water bodies of the road	NA, COL	+	-	+
69.	<i>Thelypteris procera</i> (D.Don) Fraser- Jenkins	Thelypteridacea e	Terrestrial growing on hill surface and some	NA		+	



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			time on degraded rock of (Lithophytes)				
70	<i>Thelypteris nudata</i> (Roxb.) C.V. Morton	<i>Thelypteridaceae</i>	Terrestrial, grows along road in moist and shady places	NA/COL			+
71	<i>Thelypteris tenera</i> (Roxb.)	<i>Thelypteridaceae</i>	Terrestrial, grows along road in moist and shady places	NA			
72.	<i>Vittaria fleuosa</i> (Fee in Meni)	Vittariaceae	Epiphyte, growing on tree trunk , valley side trees	NA	+	-	-
73.	<i>Vittaria zosterfolia</i> (Willd.)	Vittariaceae	Epiphyte, growing on tree trunk valley side trees	NA	+	-	-

Table 1. Distribution of Pteridophytes along the roads with their status in IUCN RED List and Catalogue of Life (COL)