**Supplementary Material Section S1. Details for Methods**

**Field and laboratory methods**

Field sampling was carried out between September 2008 and October 2011 in one fixed-area plot per site in 42 sites (Weerakoon 2013) pre-assigned to many different vegetation types by Bambaradeniya & Ekanayake (2003). Sites for each vegetation type in the Weerakoon (2013) study were randomly selected from sites identified by Bambaradeniya & Ekanayake (2003). Current study vegetation types UMo, DMo, Ca, and USM had the most sites to choose from, followed by USE, Che, and MFP with the fewest to choose from. Ten trees per plot (250 1 cm2 trunk grid squares/tree; 2,500 squares/plot) were sampled for lichens following a well-tested protocol (Gradstein *et al.* 1996, 2003; Wolseley *et al.* 1994, 2007). Data on several different plot vegetation and environmental factors, and several tree-level factors were compiled or collected for each site. For the 42 plots in the study data subset, descriptions of the three climate zones, seven vegetation types within them, and disturbance histories by vegetation type are summarized from literature (Bambaradeniya & Ekanayake 2003; de Rosyro 1958; Greller & Balasubramanium 1990; Fernando 2010, Weerakoon 2002): Exact dates of disturbances were not available in most cases; the general date range is given here. Years from first disturbance in Table S1.1 is the estimated average number of years before 2010 (with the exception of MFP).

**Montane climate zone:** Mountain slopes above 1300m; average annual temperature 17.2°C; humidity 77-100%; mist and clouds often present all day; moderate to strong winds. Relatively low seasonality.

1. **Undisturbed montane forest (UMo):** native evergreen trees with natural multi-layered forest structure and high canopy cover.
2. **Disturbed montane forest (DMo):** native evergreen trees and mostly natural forest structure; natural regeneration after abandonment of tea plantations, with moderate to high canopy cover. Logging carried out at about 1815; about 1817 tea plantations established. Native trees were retained, probably at moderate canopy cover as was typical for tea plantations then, as trees were thinned for tea planting. On DMo sites tea plantations were abandoned relatively soon after establishment (no exact dates) due to lack of labour and less suitable climate for tea than in other areas (Bambaradeniya & Ekanayake 2003). We selected 180 years before 2010, or 1825, for quantitative analyses, representing abandonment an average 13 years after establishment.
3. **Cardamom plantations (Ca):** larger than average native trees retained when forest sites were thinned ~1955-1965 for planting of cardamom shrubs. Most intermediate height vegetation was cut down for cardamom bushes. This structure allows more light on tree trunks, while the bushes contribute to high (above 80%) humidity at tree trunk level (Bambaradeniya & Ekanayake 2003). Moderate to high canopy cover.

**Submontane climate zone:** Upland and mountain slopes at middle elevations ~1000-1300m; average annual temperature 18.5°C; humidity 70-90%; mist and clouds frequent late evening through early morning; low to moderate winds, low to moderate seasonality. Natural vegetation mostly evergreen forest trees.

1. **Undisturbed submontane forest (USM):** native mostly evergreen trees with natural forest structure; high canopy cover.
2. **Mixed forest plantations (MFP):** mostly evergreen forest plantations that were all established in 1987 on previously cleared land. Three sites had been planted with multiple species of native timber trees (one original vegetation type). Three other sites had been planted with multiple species of mixed native plus exotic timber trees in *Acacia, Eucalyptus*, or *Pinus* (a second original plantation vegetation type). By the 2010 lichen surveys trees were of a moderate size, with moderate canopy cover.

**Semi-evergreen forest climate zone:** Upland slopes mostly at low elevations ~700-1000m, but pockets of similar climate at much higher elevations in rain-shadow locations; strongly seasonal with wet seasons July-August, November and dry season February-April. Wet season average temperature 22.5°C, average humidity 92%, no mist, some clouds, windiest season July-August. Dry season average temperature 35.5°C, average humidity 57%, few/no clouds, dry hot winds.

1. **Undisturbed semi-evergreen forest (USE):** native evergreen and drought-deciduous trees with natural forest structure; moderate canopy cover.
2. **Chena cultivation sites (Che):** scattered small/medium size drought- and fire-tolerant, and economically useful, native tree species retained in agricultural plots, for low canopy cover. Traditional Chena shifting cultivation, begun in the Knuckles region about 450-550 years before 2010, involves dry-season burning to clear land, planting crops, repeating that practice for a few years, abandoning them to recover while shifting to other plots, and then repeating the entire process in rotation. Study sites were in the abandoned resting stage 2-3 years after the last burning and cultivation, with <1m-tall understory of colonizing native woody species. Assuming trunk lichens would have been killed by burning, sampled lichens had colonized trees at most 3-4 years earlier. Lichens were collected from the two most frequent tree species: *Tectona grandis* Linn. (used for timber) and *Caryota urens* L. (Toddy tree or Jaggery palm, used for nuts).

Details are included here for 20 plot environment and vegetation variables explored; 15 were retained for final analyses (Table 2, ms Methods, Supplementary Material Section S2). Location, disturbance variables, and lichen and tree species variables are reported in Table S1.1 for each plot by vegetation type. Plot categorical variables were pre-assigned vegetation type, climate zone, and land surface structure; within-site disturbance group was assigned in this study. Disturbed vegetation types represented different kinds of within-site disturbance; only the three undisturbed vegetation types had completely equivalent disturbance status. Variations on sets of disturbance groups were explored: the final selection of four groups as described in main text Methods best served the goals of the study to improve evaluation of lichen response to disturbance. Variable “years from disturbance” is defined as years to 2010 from a clearly documented major disturbance to forest structure or composition. Disturbance date was exact for MFP sites, estimated from historical records and local knowledge for sites in other disturbed vegetation types. The three pre-assigned “undisturbed” USE plots with immediately adjacent villages (Table S1.1) had different histories. The village next to plot USE 3 was first established ~1975, the village next to USE 4 in 1960-1970, and the village next to USE 6 in ~1995. Preliminary data exploration showed that plots near villages had lower lichen cover (avg 453cm2 vs 1989cm2/plot) and fewer total lichen species (avg 6.3 vs 10.3/plot) than truly undisturbed USE plots (Table S1.1). Data exploration compared inclusion of USE village plots in either undisturbed group 1 (Tables 1, 2) or moderately disturbed group 2. For the same three USE plots distance to undisturbed forest was coded either as zero, or as 0.5km reflecting that the plot itself was possibly disturbed but other site forest away from the village was likely undisturbed. Comparisons supported assigning those three plots to disturbance group 2 and setting their distance to undisturbed forest as 0.5km; reported analyses used that coding. Lacking obvious and documented within-site disturbance, these plots remained coded as having zero years from disturbance. Plot variables latitude, longitude, presence/absence of bryophytes or ferns, and land cover type all gave very weak patterns with lichen response during data exploration and were not included in final analyses.

Variables measured at tree-level by Weerakoon (2013) were averaged or summed for the plot in this study: tree DBH, tree lean, bark surface type, bark pH, percentage canopy cover, number and cover for lichen species recorded in tree trunk quadrats. Visually-estimated percentage canopy cover (Lemmon 1956, 1957) was recorded near each sample tree. Bark surface of sampled trees was recorded in the field by category following Cáceres *et al*. (2007): a) completely smooth (<0.5 cm deep bark crevices), b) uneven with substructures such as lenticels or >0.5-1 cm deep bark crevices, c) rough with shallow ridges or structures (>0.1-1.5 cm deep bark crevices), and d) bark deeply ridged (>2 cm deep bark crevices). For this study a) and b) were combined as ± smooth coded 1; c) and d) as ± rough coded 2 for an ordinal variable. Tree trunk lean was measured as number of degrees from vertical. Bark pH was measured in the laboratory with a surface electrode (Jenway 3510) following Wolseley *et al.* (2002), for three dried samples of bark (ca.1 cm × 1 cm) per sampled tree from trunk height 1-1.5 m. Values were averaged for one bark pH/tree. Bark surface type gave very weak preliminary results in statistical analyses and was not included in final analyses.

The lichen data collection method – cover by species in quadrats on 10 randomly selected trees – was modified from Gradstein *et al.* (1996, 2003) and Wolseley *et al*. (1994, 2007). The five quadrats (clear plastic 10 cm high x 25 cm wide rectangle gridded into 1 cm2 squares) were each placed independently on the trunk based on random selection of cardinal direction and height in 0.1m increments within the designated range, with the constraint that quadrats could not overlap each other. Total tree trunk quadrat area examined for lichens was thus 250 cm2/quadrat, 1250 cm2/tree, 12,500 cm2/site, and 525,000 cm2 for all 42 sites. Lichen field identification was aided by spot tests for secondary chemical compounds with K (10% KOH in distilled water) and C (Sodium hypochlorite or commercial bleach). Lichen identification in the laboratory with a dissecting microscope and thin sections under a compound microscope repeated chemical spot tests as appropriate. Identification was supplemented with microscope cameras JENOPTIC ProgRes C3 and C5 to record features for documentation. High performance thin layer chromatography (HPTLC) using standard methods with solvents A and C was also employed for identification of some specimens (Lumbsch 2002; Arup *et al.* 1993). Species name, authority, family, and six-letter analysis code for each of the 74 taxa are listed in Table S1.2; those whose taxonomic assignment changed from Weerakoon (2013) are listed in Table S1.3. Preliminary analyses (ISA, see section “Data Analyses” below) found that a lichen species occurring at only two of six sites was never a significant indicator. Those 50 uncommon species were not analyzed singly in this study; they are listed in Weerakoon (2013). Lichen species number and cover in tree trunk quadrats at sites from all 124 taxa found as well as the 74 frequent taxa were included as vegetation variables (Tables 1 and 3, Table S1.1).

Table S1.1. Location, disturbance, and species variables for 42 sites in seven vegetation types.

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Vegetation type** | **Site Code** | **Latitude N** | **Longitude E** | **Altitude (m)** | **Distance to undisturbed forest (km)** | **Years from disturbance** | **Within-site disturbance group** | **Number of all tree species** | **Number of frequent lichen species** | **Number of all lichen species** | **Cover of frequent lichen species,** cm2 | **Cover of all lichen species,** cm2 |
| 1. Undisturbed Montane (UMo) | UMo.1 | 7.20˚N | 80.50˚E | 1382 | 0 | 0 | 1 | 6 | 10 | 11 | 1697 | 1699 |
| UMo.2 | 7.27˚N | 80.48˚E | 1436 | 0 | 0 | 1 | 6 | 10 | 14 | 1121 | 1138 |
| UMo.3 | 7.23˚N | 80.48˚E | 1547 | 0 | 0 | 1 | 12 | 18 | 29 | 4152 | 4209 |
| UMo.4 | 7.20˚N | 80.50˚E | 1560 | 0 | 0 | 1 | 11 | 16 | 20 | 3307 | 3329 |
| UMo.5 | 7.31˚N | 80.44˚E | 1476 | 0 | 0 | 1 | 10 | 15 | 19 | 2624 | 2640 |
| UMo.6 | 7.31˚N | 80.46˚E | 1578 | 0 | 0 | 1 | 9 | 14 | 16 | 2726 | 2735 |
| 2. Disturbed montane (DMo) | DMo. 1 | 7.21˚N | 80.50˚E | 1425 | 2.5 | 180 | 2 | 6 | 8 | 13 | 1881 | 2674 |
| DMo. 2 | 7.22˚N | 80.50˚E | 1375 | 3.5 | 180 | 2 | 5 | 6 | 8 | 1028 | 3143 |
| DMo. 3 | 7.31˚N | 80.44˚E | 1303 | 4 | 180 | 2 | 4 | 5 | 9 | 843 | 2696 |
| DMo. 4 | 7.23˚N | 80.48˚E | 1317 | 5 | 180 | 2 | 6 | 7 | 12 | 538 | 1487 |
| DMo. 5 | 7.26˚N | 80.47˚E | 1385 | 2 | 180 | 2 | 7 | 9 | 11 | 843 | 1539 |
| DMo. 6 | 7.29˚N | 80.48˚E | 1367 | 4 | 180 | 2 | 5 | 7 | 9 | 615 | 1116 |
| 3. Cardomom plantation (Ca) | Ca.1 | 7.26˚N | 80. 47˚E | 1562 | 1 | 50 | 2 | 11 | 16 | 19 | 2664 | 2674 |
| Ca.2 | 7.23˚N | 80.49˚E | 1467 | 2.5 | 50 | 2 | 9 | 14 | 16 | 3138 | 3143 |
| Ca.3 | 7.31˚N | 80. 44˚E | 1559 | 1 | 50 | 2 | 10 | 16 | 19 | 2686 | 2696 |
| Ca.4 | 7.26˚N | 80. 46˚E | 1305 | 4 | 50 | 2 | 7 | 12 | 12 | 1487 | 1487 |
| Ca.5 | 7.26˚N | 80. 47˚E | 1328 | 4 | 50 | 2 | 5 | 11 | 14 | 1524 | 1539 |
| Ca.6 | 7.23˚N | 80.48˚E | 1308 | 3 | 50 | 2 | 4 | 10 | 15 | 1096 | 1116 |
| 4. Undisturbed Sub-montane (USM) | USM.1 | 7.26˚N | 80.47˚E | 1250 | 0 | 0 | 1 | 7 | 8 | 10 | 1906 | 1920 |
| USM.2 | 7.20˚N | 80.50˚E | 1217 | 0 | 0 | 1 | 5 | 8 | 9 | 836 | 839 |
| USM.3 | 7.22˚N | 80.51˚E | 1250 | 0 | 0 | 1 | 12 | 18 | 19 | 3328 | 3338 |
| USM.4 | 7.20˚N | 80.50˚E | 1246 | 0 | 0 | 1 | 8 | 12 | 13 | 1826 | 1829 |
| USM.5 | 7.31˚N | 80.44˚E | 1257 | 0 | 0 | 1 | 9 | 15 | 18 | 1846 | 1858 |
| USM.6 | 7.31˚N | 80.46˚E | 1260 | 0 | 0 | 1 | 10 | 16 | 16 | 2010 | 2016 |
| 5. Mixed ForestPlantation (MFP) | MFP.1 | 7.19˚N | 80. 51˚E | 1231 | 2 | 23 | 3 | 5 | 6 | 9 | 953 | 967 |
| MFP.2 | 7.21˚N | 80. 51˚E | 1107 | 3 | 23 | 3 | 3 | 4 | 5 | 187 | 191 |
| MFP.3 | 7.20˚N | 80. 51˚E | 1120 | 2.5 | 23 | 3 | 4 | 5 | 8 | 460 | 470 |
| MFP.4 | 7.20˚N | 80. 51˚E | 1140 | 5 | 23 | 3 | 3 | 5 | 8 | 386 | 399 |
| MFP.5 | 7.19˚N | 80. 51˚E | 1118 | 2 | 23 | 3 | 4 | 4 | 8 | 285 | 304 |
| MFP.6 | 7.21˚N | 80. 51˚E | 1190 | 4.5 | 23 | 3 | 2 | 3 | 4 | 370 | 374 |
| 6. Undisturbed Semi-evergreen (USE) | USE.1 | 7.27˚N | 80.50˚E | 1637 | 0 | 0 | 1 | 9 | 11 | 14 | 3749 | 3758 |
| USE.2 | 7.25˚N | 80.52˚E | 1436 | 0 | 0 | 1 | 5 | 6 | 8 | 882 | 894 |
| USE.31 | 7.26˚N | 80.51˚E | 887 | 0.5 | 0 | 2 | 4 | 5 | 9 | 593 | 609 |
| USE.41 | 7.25˚N | 80.52˚E | 990 | 0.5 | 0 | 2 | 4 | 4 | 5 | 432 | 434 |
| USE.5 | 7.31˚N | 80.46˚E | 825 | 0 | 0 | 1 | 6 | 6 | 9 | 1304 | 1316 |
| USE.61 | 7.26˚N | 80.50˚E | 970 | 0.5 | 0 | 2 | 3 | 3 | 5 | 304 | 316 |
| 7. Chena cultivation(Che) | Che.1 | 7.25˚N | 80.52˚E | 1580 | 2 | 500 | 4 | 2 | 2 | 2 | 252 | 252 |
| Che.2 | 7.19˚N | 80.51˚E | 924 | 4 | 500 | 4 | 1 | 1 | 1 | 350 | 350 |
| Che.3 | 7.31˚N | 80.46˚E | 712 | 4 | 500 | 4 | 2 | 3 | 3 | 164 | 164 |
| Che.4 | 7.26˚N | 80.50˚E | 980 | 3 | 500 | 4 | 2 | 3 | 3 | 405 | 405 |
| Che.5 | 7.26˚N | 80.51˚E | 950 | 4 | 500 | 4 | 3 | 4 | 4 | 364 | 364 |
| Che.6 | 7.30˚N | 80.46˚E | 812 | 2 | 500 | 4 | 1 | 2 | 2 | 222 | 222 |

1This USE site was adjacent to a village; its value for years from disturbance remained 0; its value for distance to undisturbed site and coding for within-site disturbance group were revised after data exploration as described in text.

Table S1.2. The 74 frequent lichen species in the current study listed in alphabetical order, with their authority, family and six-letter code used for data analysis files (see Supplementary Material Section S2).

|  |  |  |
| --- | --- | --- |
| **Family** | **Species name** | **Species code** |
| Ramalinaceae | *Bacidia medialis (Tuck.) Zahlbr.*  | Ba medi |
| Graphidaceae | *Chapsa indica* A. Massal. | Ch indi |
| Graphidaceae | *Chapsa leprocarpa* (Nyl.) Frisch  | Ch lepr |
| Graphidaceae | *Chapsa patens* (Nyl.) Frisch  | Ch pate |
| Cladoniaceae | *Cladonia mauritiana* Ahti & J.C. David  |  Cl maur |
| Cladoniaceae | *Cladonia submultiformis* Asahina  | Cl subm |
| Coccocarpiaceae | *Coccocarpia erythroxyli* (Spreng.) Swinscow & Krog | Co eryt  |
| Coccocarpiaceae | *Coccocarpia stellata* Tuck. | Co stel |
| Coenogoniaceae | *Coenogonium linkii* Ehrenb. | Co link |
| Caliciaceae | *Cratiria obscurior* (Stirt.) Marbach & Kalb  | Ct obsc  |
| Peltigeraceae | 1*Dendriscosticta platyphylloides* (Nyl.) Moncada & Lücking | Ds plat |
| Graphidaceae | *Graphis proserpens* Vain.  | Gr pros |
| Graphidaceae | *Graphis rhizicola* (Fée) Lücking & Chaves  | Gr rhiz |
| Graphidaceae | *Graphis rustica* Kremp.  | Gr rust |
| Graphidaceae | *Graphis srilankensis* Weerakoon, Wijey. & Lumbsch  | Gr sril |
| Graphidaceae | *Graphis stenotera* Vain. | Gr sten |
| Graphidaceae | *Graphis submarginata* Lücking  | Gr subm |
| Graphidaceae | *Graphis vittata* Müll. Arg.  | Gr vitt |
| Parmeliaceae | 1*Eumitria baileyi* Stirt. | Eu bail  |
| Graphidaceae | *Hemithecium aphanes* (Mont. & Bosch) M. Nakan. & Kashiw. | Hp aphn |
| Physciaceae | *Heterodermia comosa* (Eschw.) Follmann & Redón  | He como |
| Parmeliaceae | *Heterodermia diademata* (Taylor) D.D. Awasthi  | He diad |
| Physciaceae | *Heterodermia japonica* (M. Satô) Swinscow & Krog  | He japo |
| Physciaceae | *Heterodermia leucomelos* (L.) Poelt  | He leuc |
| Physciaceae | *Heterodermia dactyli*za (Nyl.) Swinscow & Krog  | He dact |
| Physciaceae | 1*Heterodermia speciosa* (Wulfen) Trevis. | He spec |
| Collemataceae | 1*Lepidocollema marianum* (Fr.) P.M. Jørg.  | Lc mari |
| Collemataceae | 1*Lepidocollema stylophorum* (Vain.) P.M. Jørg. | Lc styl |
| Collemataceae | *Leptogium cochleatum* (Dicks.) P.M. Jørg. & P. James  | Lp coch |
| Collemataceae | *Leptogium milligranum* Sierk | Lp mill |
| Collemataceae | *Leptogium denticulatum* Tuck.  | Lp dent |
| Graphidaceae | *Leucodecton bisporum* (Nyl.) Sipman & Lücking  | Ly bisp |
| Graphidaceae | *Leucodecton compunctellum* (Nyl.) Frisch  | Ly com2 |
| Graphidaceae | *Leucodecton compunctum* (Ach.) A. Massal. | Ly comp |
| Malmideaceae | *Malmidea ceylanica* (Zahlbr.) Kalb, Rivas Plata & Lumbsch  | Ma ceyl |
| Malmideaceae | *Malmidea granifera* (Ach.) Kalb, Rivas Plata & Lumbsch  | Ma gran |
| Malmideaceae | *Malmidea hypomelaena* (Nyl.) Kalb & Lücking  | Ma hypo |
| Megalosporaceae | *Megalospora sulphurata* Meyen  | Mg sulp |
| Megalosporaceae | *Megalospora tuberculosa* (Fée) Sipman  | Mg tube |
| Graphidaceae | *Myriotrema microporum* (Mont.) Hale  | Me micr |
| Graphidaceae | *Myriotrema subclandestinum* M. Cáceres, Aptroot & Lücking  | Me subc |
| Graphidaceae | 1*Ocellularia diplotrema* (Nyl.) Zahlbr. | Oc dipl |
| Graphidaceae | *Ocellularia eumorpha* (Stirt.) Hale  | Oc eumo |
| Graphidaceae | *Ocellularia mauretiana* Hale  | Oc maru |
| Graphidaceae | *Ocellularia monosporoides* (Nyl.) Hale  | Oc mono |
| Graphidaceae | *Ocellularia perforata* (Leight.) Müll. Arg. | Oc perf |
| Pannariaceae | *Parmeliella nigrocincta* (Mont.) Müll. Arg.  | Pl nigr |
| Pannariaceae | *Parmelinella wallichiana* (Taylor) Elix & Hale  | Pw wall |
| Parmeliaceae | *Parmotrema cristiferum* (Taylor) Hale  | Pa cris |
| Parmeliaceae | *Parmotrema ravum* (Krog & Swinscow) Sérus. | Pa ravu |
| Parmeliaceae | *Parmotrema tinctorum* (Despr. ex Nyl.) Hale  | Pa tinc |
| Parmeliaceae | *Parmotrema uberrimum* (Hue) Hale  | Pa uber |
| Pertusariaceae | *Pertusaria subradians* Müll. Arg. | Pe subr  |
| Pertusariaceae | *Pertusaria substerescens* Zahlbr. | Pe subs |
| Pertusariaceae | *Pertusaria truncata* Kremp. | Pe trun |
| Graphidaceae | *Phaeographis brasiliensis* (A. Massal.) Kalb & Matthes-Leicht  | Ph bras |
| Physciaceae | 1*Polyblastidium hypoleucum* (Ach.) Kalb | Pb hypo |
| Porinaceae | *Porina africana* Müll. Arg. | Po afri |
| Porinaceae | *Porina internigrans* (Nyl.) Müll. Arg. | Po inte |
| Porinaceae | *Porina tetracerae* (Ach.) Müll. Arg. | Po tetr |
| Lobariaceae | *Pseudocyphellaria argyrace*a (Delise) Vain. | Su argy |
| Pyrenulaceae | *Pyrenula circumfiniens* Vain. | Py circ |
| Pyrenulaceae | *Pyrenula mamillana* (Ach.) Trevis.  | Py mami |
| Caliciaceae | *Pyxine coralligera* Malme  | Py cora |
| Caliciaceae | *Pyxine subcinerea* Stirt. | Py subc  |
| Graphidaceae | 1*Sarcographa intricans* (Nyl.) Müll. Arg. | Sa intr |
| Peltigeraceae | *Sticta cyphellulata* (Müll. Arg.) Hue  | St cyph |
| Graphidaceae | *Thecaria quassiicola* Fée  | Th quas |
| Graphidaceae | *Thelotrema berkeleyanum* Mont. | Tl berk |
| Graphidaceae | *Thelotrema porinoides* Mont. & Bosch  | Tl pori |
| Graphidaceae | *Thelotrema rhodothecium* Vain.  | Tl rhod |
| Parmeliaceae | *Usnea cornuta* Körb.  | Us corn |
| Parmeliaceae | *Usnea steineri* Zahlbr. | Us stein  |
| Graphidaceae | 1*Wirthiotrema desquamans* (Müll. Arg.) Lücking  | Wt desq |

1This species name revised since Weerakoon 2013; see Table S1.3 for earlier name and code.

Table S1.3. Weerakoon 2013 name and code for species names that were changed for this study, alphabetical by names used in Table S1.2.

|  |  |
| --- | --- |
| **Species name in Table S1.2** | **Weerakoon 2013 name (code)** |
| *Dendriscosticta platyphylloides* (Nyl.) Moncada & Lücking | *Sticta platyphylloides* (St plat) |
| *Eumitria baileyi* Stirt. | *Usnea baileyi* (Us bail) |
| *Heterodermia speciosa* (Wulfen) Trevis. | *H.* cf *leucomelos*? (He leu2) |
| *Lepidocollema marianum* (Fr.) P.M. Jørg.  | *Parmeliella mariana* (Pl mari) |
| *Lepidocollema stylophorum* (Vain.) P.M. Jørg. | *Parmeliella stylophora* (Pl styl) |
| *Ocellularia diplotrema* (Nyl.) Zahlbr. | *Thelotrema diplotrema* (Tl dipl) |
| *Polyblastidium hypoleucum* (Ach.) Kalb | *Heterodermia hypoleuca* (He hypo) |
| *Sarcographa intricans* (Nyl.) Müll. Arg. | *Phaeographis intricans* (Ph intr) |
| *Thelotrema berkeleyanum* Mont. | *Stegobolus berkeleyanus* (Se berk) |
| *Wirthiotrema desquamans* (Müll. Arg.) Lücking  | *Myriotrema desquamans* (Me desq |

**Analysis methods**

For this study correlations were used to identify the strength of monotonic relationships between variables, to inform entry of variables into more complicated analyses and to aid ecological interpretation of factors influencing lichens. It was shown long ago that parametric statistical methods have greater statistical power than do nonparametric methods based on ranks, when parametric assumptions such as data normality and, for correlations, linearity of relationships between variables are met (Sokal & Rohlf 1995; Zuur et al. 2007). The obverse is that when a comparable nonparametric test gives a stronger result than the parametric test, a notable violation of one or more of the parametric assumptions by data should be suspected. Pearson Product-moment correlation, for instance, has been shown to be quite robust to mild violations of parametric assumptions. We performed correlations with >90 pairs of variables, so rather than first testing each pair for normality and linearity we calculated Pearson parametric and Spearman rank correlations for each pair. If the Spearman rank correlation was stronger (value higher, probability lower) than the Pearson correlation for that pair, then we suspected that data had probably violated a parametric assumption. We reported the stronger of the two simple correlations, and for partial correlations and General Linear Models (GLM) we logarithmbase 10 (log10) transformed a suspect variable before entry. Failure to meet a test for homogeneity of variances in GLM also triggered data transformation. Any zero values of a variable were replaced with 0.00001 before log10 transformation. Simple correlations including distance to undisturbed site were run twice, once coding sites USE.3, USE.4 and USE.6 (with adjacent villages) as having distance 0, and once coding them as having distance 0.5km, to evaluate the effect of this coding on correlation strength.

Nonmetric multidimensional scaling ordination (NMS) was conducted in PC-ORD v6 (McCune & Mefford 2011) using “slow and thorough” autopilot mode (250 runs of real data, maximum 500 iterations/run, significance tested by comparison with 250 randomized runs) to find the best fit (lowest stress and instability) and select the number of dimensions that gave the best solution. The Sørensen (Bray-Curtis) distance measure was chosen as the most appropriate for this data set because of the many zero observations and large environmental differences (McCune and Grace 2002). The data set of 74 frequent lichen species (names, authorities and letter codes in Table S1.2) x 42 plots had a relatively high coefficient of variation - 81% - for total plot lichen cover, so it was a reasonable candidate for relativization by plot (McCune & Grace 2002). Data were not relativized for final analyses because preliminary tests found that NMS solutions from unrelativized data were more stable, represented more of the original variation, and had more reasonable ecological interpretations. Principal axes rotation of the final best solution optimized display of important ecological patterns.

For Indicator Species Analysis (ISA) the indicator value (IV) for a taxon is the product of the relative abundance and the relative frequency of that taxon at plots within that group as compared with those values for that taxon at plots in all other groups in the analysis. Indicator value of one taxon from the same data set differs with number of plots per group and number of groups per factor, as well as with different grouping factors. An IV of 1.0 is obtained when a taxon is present in all plots within a group and occurs only in that group. Probability of the strongest group IV is calculated from 4999 runs of calculating IV from the entered species abundance values randomized for membership in the identified groups; p value for the same IV can thus differ between species. Preliminary ISA testing demonstrated that a lichen species occurring at only two of six plots in a single vegetation type and at no other plots was never a significant indicator for that vegetation type, even with maximum recorded cover for any infrequent species at each of those two plots. ISA of the 74 frequent lichen species was during exploratory analyses compared with within-site disturbance coded as two, three, or four groups. Undisturbed was always group 1; disturbance was represented as all in group 2, or by two to three different groups. ISA for within-site disturbance groups was compared for each set of groups, once coding plots USE.3, USE.4 and USE.6 as in undisturbed group 1, and once coding them as in disturbance group 2 (the least disturbed if more than one disturbed group). Using the set of four disturbance groups and coding the three USE plots with villages in least disturbed group 2 identified the greatest number of strong lichen species indicators for plot condition and achieve the study goal of developing tools to evaluate disturbance and conservation status of Knuckles range vegetation. These options were implemented for study ISA analyses (Tables 1, 2). ISA was also performed using these options on selected genus-level taxa identified by experts as visually distinct and suitable for field identification by non-specialist parataxonomists.

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