**Table S3.** In-situ ecology parameters recorded in undisturbed and disturbed forests in Peninsular Malaysia.

**Table S3(a):** In-situ ecology parameters recorded in undisturbed forests in Peninsular Malaysia.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Replicates | Temperature (oC) | | Relative Air Humidity  (1-100%) | | Light Intensity, PPFD  (µmol m-2 s-1) | | Tree Bark Moisture (1-100%) | |
| **Min** | **Max** | **Min** | **Max** | **Min** | **Max** | **Min** | **Max** |
| 1 | 29.9 | 31.6 | 71.0 | 86.0 | 66.6 | 135.2 | 33.3 | 66.7 |
| 2 | 29.8 | 30.4 | 73.0 | 87.0 | 29.4 | 100.1 | 42.9 | 71.4 |
| 3 | 25.8 | 30.0 | 69.0 | 88.0 | 15.5 | 138.8 | 21.4 | 64.3 |
| 4 | 26.4 | 33.7 | 59.0 | 91.0 | 12.0 | 274.0 | 19.0 | 73.8 |
| 5 | 26.2 | 31.8 | 63.0 | 92.0 | 11.7 | 272.9 | 26.2 | 69.0 |
| 6 | 27.1 | 30.6 | 72.0 | 90.0 | 8.7 | 121.9 | 28.6 | 97.6 |
| 7 | 28.2 | 36.2 | 72.0 | 90.0 | 25.9 | 116.7 | 40.5 | 88.1 |
| 8 | 28.9 | 31.5 | 78.0 | 89.0 | 14.6 | 182.7 | 23.8 | 73.8 |
| 9 | 26.4 | 34.2 | 79.0 | 85.0 | 3.3 | 112.5 | 33.3 | 66.7 |
| 10 | 29.8 | 30.2 | 71.0 | 87.0 | 3.7 | 254.4 | 38.1 | 88.1 |
| 11 | 28.3 | 31.3 | 76.0 | 91.0 | 7.2 | 348.3 | 31.0 | 97.6 |
| 12 | 28.5 | 30.4 | 77.0 | 95.0 | 17.5 | 341.0 | 42.9 | 100.0 |
| 13 | 29.7 | 31.4 | 78.0 | 99.0 | 18.5 | 336.9 | 33.3 | 92.9 |
| 14 | 29.7 | 31.1 | 76.0 | 80.0 | 4.7 | 202.0 | 16.7 | 95.2 |
| 15 | 27.8 | 30.9 | 77.0 | 85.0 | 12.6 | 414.4 | 40.5 | 100.0 |
| 16 | 27.3 | 31.0 | 71.0 | 85.0 | 27.6 | 255.1 | 31.0 | 69.0 |
| 17 | 25.8 | 31.2 | 83.0 | 87.0 | 62.9 | 141.5 | 45.2 | 59.5 |
| 18 | 27.4 | 30.9 | 82.0 | 89.0 | 8.2 | 103.8 | 33.3 | 78.6 |
| 19 | 26.5 | 31.0 | 82.0 | 87.0 | 14.3 | 128.2 | 40.5 | 59.5 |
| 20 | 26.0 | 30.9 | 82.0 | 86.0 | 24.1 | 251.6 | 31.0 | 90.5 |
| 21 | 27.2 | 30.6 | 83.0 | 88.0 | 22.0 | 259.0 | 35.7 | 83.3 |
| 22 | 29.9 | 30.1 | 84.0 | 87.0 | 48.8 | 99.3 | 23.8 | 97.6 |
| 23 | 27.5 | 31.1 | 80.0 | 87.0 | 59.8 | 87.7 | 28.6 | 61.9 |
| 24 | 27.0 | 30.8 | 83.0 | 88.0 | 37.6 | 62.0 | 31.0 | 88.1 |
| 25 | 28.5 | 30.6 | 80.0 | 85.0 | 39.0 | 79.2 | 42.9 | 81.0 |
| 26 | 26.7 | 30.2 | 83.0 | 89.0 | 7.9 | 74.9 | 33.3 | 92.9 |
| 27 | 28.4 | 30.0 | 84.0 | 99.0 | 26.8 | 65.7 | 47.6 | 76.2 |
| 28 | 29.9 | 30.9 | 81.0 | 99.0 | 7.8 | 63.1 | 50.0 | 81.0 |
| 29 | 25.6 | 30.3 | 80.0 | 99.0 | 45.7 | 68.1 | 52.4 | 59.5 |
| 30 | 27.0 | 31.1 | 84.0 | 99.0 | 29.6 | 59.9 | 45.2 | 64.3 |
| Mean | 27.8 | 31.2 | 77.1 | 89.6 | 23.8 | 171.7 | 34.8 | 79.6 |
| Standard Deviation | 1.4 | 1.3 | 6.4 | 5.0 | 18.0 | 103.1 | 9.2 | 13.7 |
| Standard Deviation of Mean (Standard Error) | 0.3 | 0.2 | 1.2 | 0.9 | 3.3 | 18.8 | 1.7 | 2.5 |
| Margin of error | 0.5 | 0.5 | 2.3 | 1.8 | 6.5 | 36.9 | 3.3 | 4.9 |
| Conf. Interval | 27.3 | 30.7 | 74.8 | 87.8 | 17.3 | 134.8 | 31.5 | 74.7 |

**Table S3(b):** In-situ ecology parameters recorded in disturbed forests in Peninsular Malaysia.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Replicates | Temperature (oC) | | Relative Air Humidity  (1-100%) | | Light Intensity, PPFD  (µmol m-2 s-1) | | Tree Bark Moisture (1-100%) | |
| **Min** | **Max** | **Min** | **Max** | **Min** | **Max** | **Min** | **Max** |
| 1 | 25.3 | 35.2 | 73.0 | 91.0 | 10.1 | 469.0 | 33.3 | 97.6 |
| 2 | 26.1 | 31.8 | 79.0 | 99.0 | 3.9 | 575.4 | 54.8 | 83.3 |
| 3 | 27.2 | 34.6 | 62.0 | 80.0 | 35.1 | 563.8 | 23.8 | 83.3 |
| 4 | 29.1 | 31.1 | 78.0 | 97.0 | 102.3 | 314.3 | 47.6 | 92.9 |
| 5 | 28.4 | 40.6 | 75.0 | 83.0 | 108.0 | 825.1 | 38.1 | 95.2 |
| 6 | 26.9 | 36.3 | 68.0 | 83.0 | 6.3 | 833.4 | 66.7 | 83.3 |
| 7 | 20.2 | 38.6 | 62.0 | 91.0 | 34.9 | 685.4 | 38.1 | 90.5 |
| 8 | 28.0 | 43.9 | 77.0 | 84.0 | 16.3 | 803.8 | 45.2 | 100.0 |
| 9 | 28.0 | 32.0 | 39.0 | 93.0 | 36.0 | 431.5 | 54.8 | 90.5 |
| 10 | 26.8 | 31.6 | 55.0 | 86.0 | 8.7 | 354.6 | 35.7 | 95.2 |
| 11 | 28.0 | 30.1 | 74.0 | 91.0 | 70.7 | 349.7 | 38.1 | 78.6 |
| 12 | 28.0 | 33.4 | 72.0 | 93.0 | 63.8 | 561.9 | 23.8 | 71.4 |
| 13 | 28.0 | 31.8 | 78.0 | 91.0 | 2.1 | 569.8 | 40.5 | 85.7 |
| 14 | 25.7 | 32.5 | 67.0 | 93.0 | 14.6 | 314.5 | 69.0 | 78.6 |
| 15 | 26.4 | 43.1 | 73.0 | 81.0 | 119.5 | 417.2 | 57.1 | 95.2 |
| 16 | 25.9 | 31.6 | 49.0 | 83.0 | 191.5 | 512.9 | 16.7 | 81.0 |
| 17 | 29.9 | 34.0 | 59.0 | 93.0 | 200.7 | 565.6 | 26.2 | 90.5 |
| 18 | 29.3 | 35.0 | 77.0 | 84.0 | 18.1 | 370.0 | 0.0 | 76.2 |
| 19 | 21.5 | 37.4 | 79.0 | 91.0 | 187.4 | 347.1 | 28.6 | 71.4 |
| 20 | 25.0 | 42.5 | 68.0 | 81.0 | 154.5 | 363.3 | 23.8 | 85.7 |
| 21 | 24.5 | 31.4 | 65.0 | 90.0 | 274.7 | 378.3 | 19.0 | 78.6 |
| 22 | 22.6 | 33.8 | 56.0 | 80.0 | 114.2 | 387.6 | 31.0 | 83.3 |
| 23 | 23.8 | 39.9 | 49.0 | 93.0 | 85.6 | 420.0 | 52.4 | 88.1 |
| 24 | 25.7 | 32.0 | 52.0 | 88.0 | 56.4 | 434.8 | 38.1 | 71.4 |
| 25 | 23.3 | 30.5 | 41.0 | 89.0 | 296.0 | 340.4 | 61.9 | 76.2 |
| 26 | 23.9 | 37.8 | 36.0 | 93.0 | 177.4 | 370.0 | 64.3 | 92.9 |
| 27 | 26.9 | 40.3 | 52.0 | 85.0 | 68.8 | 284.4 | 26.2 | 71.4 |
| 28 | 26.3 | 41.4 | 70.0 | 92.0 | 45.1 | 272.3 | 64.3 | 71.4 |
| 29 | 27.8 | 36.3 | 73.0 | 87.0 | 37.0 | 278.8 | 28.6 | 78.6 |
| 30 | 29.5 | 39.3 | 68.0 | 99.0 | 92.5 | 299.1 | 57.1 | 81.0 |
| Mean | 26.3 | 35.7 | 64.2 | 88.8 | 87.7 | 456.5 | 40.2 | 84.0 |
| Standard Deviation | 2.4 | 4.2 | 12.7 | 5.5 | 81.0 | 162.1 | 17.3 | 8.7 |
| Standard Deviation of Mean (Standard Error) | 0.4 | 0.8 | 2.3 | 1.0 | 14.8 | 29.6 | 3.2 | 1.6 |
| Margin of error | 0.9 | 1.5 | 4.5 | 2.0 | 29.0 | 58.0 | 6.2 | 3.1 |
| Conf. Interval | 25.4 | 34.2 | 59.7 | 86.8 | 58.8 | 398.5 | 34.0 | 80.9 |

**Table S3(c).** In-situ ecology parameters recorded in adjacent undisturbed and disturbed forests in Peninsular Malaysia.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Replicates | Temperature (oC) | | | | Relative Air Humidity  (1-100%) | | | | Light Intensity, PPFD  (µmol m-2 s-1) | | | | Tree Bark Moisture  (1-100%) | | | |
| **Undisturbed forests** | | **Disturbed forests** | | **Undisturbed forests** | | **Disturbed forests** | | **Undisturbed forests** | | **Disturbed forests** | | **Undisturbed forests** | | **Disturbed forests** | |
| **Min** | **Max** | **Min** | **Max** | **Min** | **Max** | **Min** | **Max** | **Min** | **Max** | **Min** | **Max** | **Min** | **Max** | **Min** | **Max** |
| 1 | 29.7 | 29.8 | 29.3 | 38.6 | 83.0 | 84.0 | 41.0 | 86.0 | 49.0 | 135.2 | 70.1 | 420.0 | 42.9 | 66.7 | 16.7 | 69.0 |
| 2 | 30.1 | 30.2 | 29.1 | 41.9 | 84.0 | 86.0 | 43.0 | 77.0 | 19.6 | 251.6 | 68.8 | 279.0 | 33.3 | 71.4 | 26.2 | 78.6 |
| 3 | 30.2 | 30.4 | 29.1 | 41.4 | 85.0 | 86.0 | 40.0 | 73.0 | 28.7 | 259.0 | 6.4 | 249.6 | 26.2 | 97.6 | 0.0 | 83.3 |
| 4 | 30.6 | 30.8 | 29.5 | 40.6 | 85.0 | 86.0 | 41.0 | 71.0 | 15.7 | 100.1 | 6.3 | 263.3 | 28.6 | 88.1 | 40.5 | 90.5 |
| 5 | 31.2 | 31.4 | 29.9 | 41.2 | 82.0 | 83.0 | 36.0 | 62.0 | 29.6 | 138.8 | 6.4 | 363.1 | 40.5 | 73.8 | 33.3 | 76.2 |
| 6 | 29.7 | 29.9 | 30.1 | 41.4 | 87.0 | 88.0 | 38.0 | 83.0 | 28.7 | 103.8 | 16.3 | 387.6 | 23.8 | 66.7 | 23.8 | 95.2 |
| 7 | 29.9 | 30.0 | 31.1 | 41.1 | 89.0 | 90.0 | 39.0 | 83.0 | 25.9 | 274.0 | 27.6 | 177.4 | 21.4 | 83.3 | 26.2 | 88.1 |
| 8 | 31.0 | 31.1 | 33.4 | 41.1 | 91.0 | 92.0 | 39.0 | 73.0 | 19.8 | 272.9 | 27.9 | 241.1 | 19.0 | 88.1 | 33.3 | 90.5 |
| 9 | 31.3 | 31.6 | 33.3 | 40.6 | 85.0 | 92.0 | 41.0 | 78.0 | 15.5 | 121.9 | 18.1 | 314.3 | 33.3 | 78.6 | 33.3 | 71.4 |
| 10 | 30.9 | 31.1 | 33.1 | 40.6 | 87.0 | 88.0 | 42.0 | 73.0 | 28.1 | 116.7 | 34.9 | 825.1 | 16.7 | 90.5 | 35.7 | 47.6 |
| 11 | 30.6 | 31.1 | 33.1 | 40.5 | 85.0 | 90.0 | 52.0 | 78.0 | 29.6 | 128.2 | 28.3 | 187.4 | 33.3 | 97.6 | 54.8 | 76.2 |
| 12 | 30.9 | 30.9 | 31.3 | 43.9 | 90.0 | 91.0 | 52.0 | 79.0 | 19.6 | 99.3 | 30.7 | 191.5 | 42.9 | 100.0 | 61.9 | 81.0 |
| 13 | 30.8 | 30.8 | 31.8 | 42.1 | 89.0 | 91.0 | 48.0 | 79.0 | 28.3 | 65.7 | 85.6 | 561.9 | 35.7 | 85.7 | 40.5 | 78.6 |
| 14 | 30.6 | 30.8 | 30.5 | 40.1 | 89.0 | 90.0 | 47.0 | 80.0 | 12.0 | 68.1 | 90.7 | 575.4 | 14.3 | 92.9 | 35.7 | 71.4 |
| 15 | 30.7 | 30.9 | 31.3 | 40.3 | 89.0 | 91.0 | 48.0 | 62.0 | 11.7 | 66.6 | 92.0 | 563.8 | 16.7 | 95.2 | 50.0 | 90.5 |
| 16 | 30.4 | 30.4 | 31.1 | 39.9 | 87.0 | 88.0 | 46.0 | 72.0 | 8.7 | 64.0 | 93.4 | 569.8 | 40.5 | 100.0 | 38.1 | 71.4 |
| 17 | 30.3 | 30.4 | 35.2 | 39.4 | 87.0 | 88.0 | 49.0 | 72.0 | 8.9 | 64.4 | 98.1 | 228.5 | 45.2 | 71.4 | 23.8 | 64.3 |
| 18 | 30.5 | 30.8 | 36.3 | 39.3 | 87.0 | 89.0 | 49.0 | 86.0 | 12.4 | 59.8 | 56.4 | 469.0 | 19.0 | 69.0 | 33.3 | 59.5 |
| 19 | 30.9 | 30.9 | 37.9 | 39.1 | 85.0 | 86.0 | 50.0 | 77.0 | 11.5 | 66.6 | 91.6 | 833.4 | 16.7 | 64.3 | 35.7 | 61.9 |
| 20 | 30.9 | 31.0 | 37.8 | 38.9 | 84.0 | 85.0 | 55.0 | 71.0 | 26.2 | 59.9 | 88.3 | 434.8 | 26.2 | 73.8 | 57.1 | 64.3 |
| Mean | 30.6 | 30.7 | 32.2 | 40.6 | 86.5 | 88.2 | 44.8 | 75.8 | 21.5 | 125.8 | 51.9 | 406.8 | 28.8 | 82.7 | 35.0 | 75.5 |
| Standard Deviation | 0.5 | 0.5 | 2.8 | 1.3 | 2.5 | 2.7 | 5.5 | 6.7 | 10.0 | 76.0 | 34.6 | 197.9 | 10.2 | 12.4 | 14.3 | 12.3 |
| Standard Deviation of Mean  (Standard Error) | 0.1 | 0.1 | 0.6 | 0.3 | 0.6 | 0.6 | 1.2 | 1.5 | 2.2 | 17.0 | 7.7 | 44.3 | 2.3 | 2.8 | 3.2 | 2.8 |
| Margin of error | 0.2 | 0.2 | 1.2 | 0.6 | 1.1 | 1.2 | 2.4 | 2.9 | 4.4 | 33.3 | 15.2 | 86.7 | 4.5 | 5.4 | 6.3 | 5.4 |
| Conf. Interval | 30.4 | 30.5 | 31.0 | 40.0 | 85.4 | 87.0 | 42.4 | 72.8 | 17.1 | 92.5 | 36.7 | 320.0 | 24.3 | 77.3 | 28.7 | 70.1 |

**Table S3(d).** In-situ ecology parameters recorded in logging sites in Peninsular Malaysia.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Replicates | Temperature (oC) | | Relative Air Humidity  (1-100%) | | Light Intensity, PPFD (µmol m-2 s-1) | | Tree Bark Moisture  (1-100%) | |
| **Min** | **Max** | **Min** | **Max** | **Min** | **Max** | **Min** | **Max** |
| 1 | 36.3 | 41.9 | 62.0 | 86.0 | 56.4 | 354.6 | 0.0 | 71.4 |
| 2 | 37.8 | 41.4 | 41.0 | 77.0 | 84.2 | 363.1 | 0.0 | 71.4 |
| 3 | 30.1 | 40.6 | 43.0 | 73.0 | 85.6 | 378.3 | 31.0 | 71.4 |
| 4 | 33.4 | 41.2 | 40.0 | 71.0 | 88.3 | 387.6 | 35.7 | 76.2 |
| 5 | 31.8 | 41.1 | 36.0 | 67.0 | 90.7 | 420.0 | 26.2 | 78.6 |
| 6 | 26.8 | 40.5 | 38.0 | 77.0 | 91.6 | 431.5 | 40.5 | 78.6 |
| 7 | 30.9 | 40.3 | 39.0 | 79.0 | 92.0 | 434.8 | 33.3 | 78.6 |
| 8 | 32.5 | 40.1 | 41.0 | 79.0 | 93.4 | 469.0 | 35.7 | 88.1 |
| 9 | 32.1 | 41.4 | 50.0 | 91.0 | 97.6 | 825.1 | 38.1 | 90.5 |
| 10 | 30.0 | 43.1 | 55.0 | 93.0 | 98.1 | 833.4 | 16.7 | 90.5 |
| 11 | 31.4 | 35.0 | 59.0 | 77.0 | 68.8 | 349.7 | 26.2 | 95.2 |
| 12 | 31.6 | 37.4 | 62.0 | 79.0 | 70.1 | 299.1 | 0.0 | 61.9 |
| 13 | 32.0 | 39.9 | 49.0 | 71.0 | 162.6 | 296.0 | 28.6 | 64.3 |
| 14 | 36.3 | 42.5 | 67.0 | 73.0 | 177.4 | 462.5 | 23.8 | 64.3 |
| 15 | 37.8 | 42.5 | 49.0 | 74.0 | 78.6 | 340.4 | 31.0 | 69.0 |
| 16 | 37.9 | 38.6 | 52.0 | 78.0 | 167.6 | 347.1 | 19.0 | 57.1 |
| 17 | 33.1 | 38.9 | 56.0 | 79.0 | 207.2 | 354.6 | 23.8 | 57.1 |
| 18 | 31.8 | 39.1 | 64.0 | 81.0 | 278.2 | 284.4 | 26.2 | 57.1 |
| 19 | 31.3 | 39.3 | 65.0 | 91.0 | 278.8 | 299.1 | 31.0 | 57.1 |
| 20 | 33.3 | 39.4 | 68.0 | 93.0 | 274.7 | 279.0 | 33.3 | 59.5 |
| Mean | 32.9 | 40.2 | 51.8 | 79.5 | 132.1 | 410.5 | 25.0 | 71.9 |
| Standard Deviation | 2.9 | 1.9 | 10.7 | 7.6 | 74.2 | 154.2 | 12.3 | 12.4 |
| Standard Deviation of Mean (Standard Error) | 0.7 | 0.4 | 2.4 | 1.7 | 16.6 | 34.5 | 2.8 | 2.8 |
| Margin of error | 1.3 | 0.8 | 4.7 | 3.4 | 32.5 | 67.6 | 5.4 | 5.4 |
| Conf. Interval | 31.6 | 39.4 | 47.1 | 76.1 | 99.6 | 342.9 | 19.6 | 66.5 |