|  |  |  |
| --- | --- | --- |
| **Archipelago** | **Population** | **Area, elevation** |
| **Northern New Zealand** | Number of dwellings counted manually inspecting aerial imagery on Google Earth, https://www.stats.govt.nz/ | https://data.linz.govt.nz/layer/50768-nz-contours-topo-150k/ |
| **Seychelles** | https://www.nbs.gov.sc/ |  |
| **Samoa** | https://www.sbs.gov.ws/, https://www.usa.gov/statistics, https://www.census.gov/en.html |  |
| **Channel Islands** | https://www.gov.gg/, https://www.gov.je/Pages/default.aspx |  |
| **Hawaii** | http://dbedt.hawaii.gov/economic/, https://www.usa.gov/statistics, https://www.census.gov/en.html |  |
| **Zhoushan** | Yu et al. 2019 (https://doi.org/10.1016/j.baae.2019.05.002), Yu et al. 2020 (https://doi.org/10.1111/jbi.13790) | |
| **Kuril Islands** | https://eng.rosstat.gov.ru/ | https://www.burkemuseum.org/static/okhotskia/ikip/index.htm |
| **Virgin Islands** | https://bvi.gov.vg/statistics, https://www.usa.gov/statistics, https://www.census.gov/en.html |  |
| **Ionian Islands** | https://www.statistics.gr/en/home/ |  |
| **Shetland** | https://www.shetland.gov.uk/ |  |

**Table S1**

Full list of online sources consulted for population sizes, island area and elevation. For island area and elevation, the Island Directory (http://islands.unep.ch/isldir.htm, Dahl 1991) and a topographic map (https://en-nz.topographic-map.com/, Yamazaki et al. 2017) were also consulted.

**References**

Dahl, Arthur Lyon. 1991. Island Directory. UNEP Regional Seas Directories and Bibliographies No. 35. UNEP, Nairobi (573 pp.)

Yamazaki D., D. Ikeshima, R. Tawatari, T. Yamaguchi, F. O'Loughlin, J.C. Neal, C.C. Sampson, S. Kanae & P.D. Bates (2017) A high accuracy map of global terrain elevations. Geophysical Research Letters, vol.44, pp.5844-5853, 2017 doi: 10.1002/2017GL072874

Yu J, Shen L, Li D, Guo S (2019) Determinants of bryophyte species richness on the Zhoushan Archipelago, China. Basic Appl Ecol 37:38–50.

Yu J, Li D, Zhang Z, Guo S (2020) Species–area relationship and small-island effect of bryophytes on the Zhoushan Archipelago, China. J Biogeogr 1–15.

**Table S2**

Island characteristics of 10 archipelagos across the globe. Entries are mean and standard deviation for area, elevation, first and second nearest mainland.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Archipelago** | **Population** | | **Area (km2)** | | **Elevation (m)** | | **First nearest mainland (km)** | | **Second nearest mainland (km)** | |
|  | mean | sd | mean | sd | mean | sd | mean | sd | mean | sd |
| Northern New Zealand | 77.59 | 440.56 | 8.92 | 35.42 | 115.14 | 124.00 | 9.00 | 11.79 |  |  |
| Seychelles | 1369.49 | 10707.63 | 5.84 | 22.10 | 68.56 | 143.40 | 1132.30 | 260.68 |  |  |
| Samoa | 11138.00 | 32967.94 | 137.63 | 422.06 | 316.47 | 469.19 | 2778.18 | 75.50 |  |  |
| Channel Is. | 4086.85 | 18166.54 | 5.01 | 21.06 | 24.08 | 54.72 | 28.87 | 12.37 | 28.87 | 12.37 |
| Hawaii | 30242.20 | 145157.30 | 369.88 | 1590.41 | 3645.08 | 827.14 | 3643.09 | 183.64 |  |  |
| Zhoushan | 16399.59 | 79399.27 | 17.79 | 63.19 | 151.48 | 122.02 | 45.94 | 25.43 |  |  |
| Kuril Is. | 581.46 | 1811.04 | 314.63 | 709.11 | 770.00 | 665.21 | 368.33 | 182.28 |  |  |
| Virgin Is. | 3036.94 | 10776.35 | 13.54 | 38.22 | 112.60 | 132.00 | 355.79 | 30.82 |  |  |
| Ionian Is. | 5055.15 | 17001.23 | 104.90 | 361.32 | 248.18 | 330.97 | 13.30 | 15.47 | 271.40 | 120.14 |
| Shetland | 661.91 | 3162.47 | 42.21 | 165.10 | 106.97 | 105.66 | 210.91 | 30.50 | 347.29 | 31.94 |

**Table S3**

Moran’s coefficients testing for spatial autocorrelation for dependent and independent variable used in the global test. Entries are independent and dependent variables, Moran’s coefficients, z-scores and p-values.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Variables | Moran’s coefficient | z-score | p-value |  |
| Area | 0.0217 | 0.0867 | 0.9310 |  |
| Elevation | 0.0946 | 0.2460 | 0.8055 |  |
| Isolation | 0.3016 | 0.7487 | 0.4541 |  |
| Population size | 0.0157 | 0.0594 | 0.9526 |  |

**Table S4**

Overdispersion parameter and model chosen for statistical analyses for all islands and the 10 archipelagos separately. For each model were reported null and residual deviance and their difference. Explained deviance is also reported in percentage, for both full models and with area alone, along with the number of restrictions and p-value (chi-squared test).

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Archipelago** | **Overdispersion parameter** | **Model** | **Null deviance** | **Residual deviance** | **Δ deviance** | **Deviance explained (%)** | **Deviance explained by area alone (%)** | **Restrictions (n)** | **p-value** |
| **Global** | 33091.94 | Quasipoisson | 22764306 | 8670522 | 14093784 | 62 | 62 | 3 | ≤0.0001 |
| **Seychelles** | 16667.70 | Quasipoisson | 825109 | 33921 | 791188 | 96 | 86 | 2 | ≤0.0001 |
| **Samoa** | 6507.39 | Quasipoisson | 1014478 | 120465 | 894013 | 88 | 85 | 2 | ≤0.0001 |
| **Hawaii** | 96267.08 | Quasipoisson | 7764328 | 2612963 | 5151365 | 66 | 66 | 1 | ≤0.0001 |
| **Virgin Islands** | 1637.45 | Quasipoisson | 691702 | 69373 | 622329 | 90 | 84 | 2 | ≤0.0001 |
| **Northern New Zealand** | 195.24 | Quasipoisson | 31159 | 7874 | 23285 | 75 | 68 | 2 | ≤0.0001 |
| **Zhoushan** | 2124.90 | Quasipoisson | 5308392 | 113081 | 5195311 | 98 | 97 | 2 | ≤0.0001 |
| **Kuril Islands** | 786.39 | Quasipoisson | 85736 | 19245 | 66491 | 78 | 77 | 3 | ≤0.0001 |
| **Channel Islands** | 0.23 | Poisson | 959908 | 13 | 959895 | 99 | 99 | 3 | ≤0.0001 |
| **Ionian Islands** | 3405.21 | Quasipoisson | 1078007 | 137542 | 940465 | 87 | 80 | 3 | ≤0.0001 |
| **Shetland** | 225.39 | Quasipoisson | 124458 | 4726 | 119732 | 96 | 93 | 3 | ≤0.0001 |

**Table S5**

Pearson correlation coefficients for 10 archipelagos across the globe. Variables were removed from models with correlation coefficients above 0.8 (in bold) and VIFs above 3 (see Table S5) and. Area was always preferred over elevation. Island area and elevation were log-transformed, isolation was not transformed except for Northern New Zealand (square root-transformed) and for the Ionian Islands (log-transformed).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Archipelago** | **Variable** | **Elevation** | **First nearest mainland** | **Second nearest mainland** |
| **Seychelles** | Area | 0.458 |  |  |
| **Samoa** | Area | 0.796 |  |  |
| **Hawaii** | Area | **0.851** |  |  |
| **Virgin Islands** | Area | **0.820** | 0.017 |  |
| Elevation |  | 0.308 |  |
| **Northern New Zealand** | Area | **0.814** | 0.278 |  |
| Elevation |  | 0.449 |  |
| **Zhoushan** | Area | **0.919** | -0.575 |  |
| Elevation |  | -0.454 |  |
| **Kuril Islands** | Area | 0.720 | -0.053 |  |
| Elevation |  | -0.087 |  |
| **Channel Islands** | Area | **0.853** | 0.233 | 0.074 |
| Elevation |  | 0.232 | 0.075 |
| First nearest mainland |  |  | 0.138 |
| **Ionian Islands** | Area | **0.856** | -0.024 | 0.050 |
| Elevation |  | -0.134 | 0.049 |
| First nearest mainland |  |  | 0.306 |
| **Shetland** | Area | **0.835** | -0.177 | 0.052 |
| Elevation |  | -0.357 | 0.204 |
| First nearest mainland |  |  | 0.521 |

**Table S6**

Variance inflation factors for 10 archipelagos across the globe. Variables were removed from models with VIFs above 3 (in bold) and Pearson correlation coefficients above 0.8 (see Table S4). Area was always preferred over elevation. Island area and elevation were log-transformed, isolation was not transformed except for Northern New Zealand (square root-transformed ) and for the Ionian Islands (log-transformed).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Archipelago** | **Area** | **Elevation** | **First nearest mainland** | **Second nearest mainland** |
| **Seychelles** | 1.27 | 1.27 |  |  |
| **Samoa** | 2.73 | 2.73 |  |  |
| **Hawaii** | **3.63** | **3.63** |  |  |
| **Virgin Islands** | **3.77** | **4.16** | 1.36 |  |
| **Northern New Zealand** | **3.05** | **3.52** | 1.29 |  |
| **Zhoushan** | **8.05** | **6.78** | 1.58 |  |
| **Kuril Islands** | 2.07 | 2.08 | 1.01 |  |
| **Channel Islands** | **3.68** | **3.68** | 1.08 | 1.02 |
| **Ionian Islands** | **3.89** | **3.95** | 1.16 | 1.11 |
| **Shetland** | **3.56** | **3.94** | 1.54 | 1.39 |

**Table S7**

Pearson correlation tests (italics) and Variance inflation factors (VIF, in bold) for island characteristics of 486 islands across the globe. Variables were removed from model with correlation coefficients above 0.8 and VIFs above 3.

|  |  |  |  |
| --- | --- | --- | --- |
|  | log(Area) | log(1+Elevation) | log(1+ Nearest mainland) |
| log(Area) | **2.781** |  |  |
| log(1+Elevation) | *0.795* | **2.835** |  |
| log(1+Nearest mainland) | *-0.026* | *-0.141* | **1.042** |

**Table S8**

Results from multiple generalized linear models exploring the relationship between the human population sizes and island characteristics on 486 islands worldwide. Entries are t and p values for fixed effects, and variance and standard deviation for random effects. Statistical significance: \*P < 0.05, \*\*P < 0.01, \*\*\*P < 0.001.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | linear | | quasipoisson | |
| **Fixed effects** | **t-value** | **p-value** | **t-value** | **p-value** |
| log(Area) | 18.653 | **< 0.0001\*\*\*** | 11.403 | **< 0.0001\*\*\*** |
| log(Elevation) | -1.781 | 0.0755 | -1.160 | 0.246 |
| log(Nearest mainland) | -1.308 | 0.1930 | -0.481 | 0.631 |
| **Random effects** | **Variance** | **S.D.** |  |  |
| Archipelago | 3.101 | 1.761 |  |  |
| Residual | 4.085 | 2.021 |  |  |