Supplementary material
Appendix 1.

**Table A1.** Number of species after each filter by class and percentage from the described number of species (in brackets). Described in the IUCN database refers to the number of species that include the IUCN database as species; IUCN spatial database refers to the number of species which are included in the spatial database of the IUCN (Include Extinct species); Systems refers to the number of species selected after select species living only in terrestrial systems for Birds, for Mammals we directly selected the spatial information which include only terrestrial species as defined by the IUCN. Categorized refers to the species categorized in the IUCN red list. Excluded (Excl.) by B&D criteria and unknown Population trend refers to the number of listed species in the IUCN Red List excluding species categorized by B&D criteria and excluding species categorized by unknown population trend. Multifragment refers to the number of species after select only species with a minimum of two fragment in its distribution.

<table>
<thead>
<tr>
<th></th>
<th>Described</th>
<th>Spatial data</th>
<th>Systems</th>
<th>Categories</th>
<th>Excl. by B&amp;D criteria; unknown Pop. Trend</th>
<th>Multifragment</th>
<th>Extinction risk; Population trend</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amphibians</td>
<td>6,414</td>
<td>6,277 (97.86)</td>
<td>-</td>
<td>4,744 (73.96)</td>
<td>3,014 (46.99); 3764 (58.68)</td>
<td>1,482 (23.11); 1,676 (26.13)</td>
<td></td>
</tr>
<tr>
<td>Birds</td>
<td>10,425</td>
<td>10,424 (99.99)</td>
<td>9,400 (90.17)</td>
<td>9,347 (89.66)</td>
<td>7,529 (72.22); 8669 (83.16)</td>
<td>7,147 (68.56); 6,979 (66.94)</td>
<td></td>
</tr>
<tr>
<td>Mammals</td>
<td>5,408</td>
<td>5,269 (97.43)</td>
<td>-</td>
<td>4,499 (83.19)</td>
<td>3,823 (70.69); 2975 (55.01)</td>
<td>2,423 (44.80); 1,840 (34.02)</td>
<td></td>
</tr>
</tbody>
</table>
Table A2. Spearman correlation between the variables used in the analysis of extinction risk. *Area* and shape (*Circularity*) and/or fragmentation (*N_frag* and *Heterogeneity*).

<table>
<thead>
<tr>
<th></th>
<th>Area</th>
<th>Circularity</th>
<th>N_frag</th>
<th>Heterogeneity</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Amphibians</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Area</td>
<td>1.00</td>
<td>-0.46</td>
<td>0.23</td>
<td>0.46</td>
</tr>
<tr>
<td>Circularity</td>
<td>1.00</td>
<td>-0.24</td>
<td>-0.35</td>
<td></td>
</tr>
<tr>
<td>N_frag</td>
<td>1.00</td>
<td></td>
<td>-0.28</td>
<td></td>
</tr>
<tr>
<td>Heterogeneity</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Birds</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Area</td>
<td>1.00</td>
<td>-0.20</td>
<td>0.50</td>
<td>0.27</td>
</tr>
<tr>
<td>Circularity</td>
<td>1.00</td>
<td>-0.31</td>
<td>-0.19</td>
<td></td>
</tr>
<tr>
<td>N_frag</td>
<td>1.00</td>
<td></td>
<td>-0.14</td>
<td></td>
</tr>
<tr>
<td>Heterogeneity</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Mammals</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Area</td>
<td>1.00</td>
<td>-0.39</td>
<td>0.27</td>
<td>0.30</td>
</tr>
<tr>
<td>Circularity</td>
<td>1.00</td>
<td>-0.27</td>
<td>-0.24</td>
<td></td>
</tr>
<tr>
<td>N_frag</td>
<td>1.00</td>
<td></td>
<td>-0.36</td>
<td></td>
</tr>
<tr>
<td>Heterogeneity</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table A3. Spearman correlation between the variables used in the analysis with Population Trend. *Area* and shape (*Circularity*) and/or fragmentation (*N_frag* and *Heterogeneity*).

<table>
<thead>
<tr>
<th></th>
<th>Area</th>
<th>Circularity</th>
<th>N_frag</th>
<th>Heterogeneity</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Amphibians</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Area</td>
<td>1.00</td>
<td>-0.63</td>
<td>0.34</td>
<td>0.52</td>
</tr>
<tr>
<td>Circularity</td>
<td>1.00</td>
<td>-0.25</td>
<td>-0.50</td>
<td></td>
</tr>
<tr>
<td>N_frag</td>
<td>1.00</td>
<td></td>
<td>-0.22</td>
<td></td>
</tr>
<tr>
<td>Heterogeneity</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Birds</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Area</td>
<td>1.00</td>
<td>-0.23</td>
<td>0.51</td>
<td>0.28</td>
</tr>
<tr>
<td>Circularity</td>
<td>1.00</td>
<td>-0.32</td>
<td>-0.20</td>
<td></td>
</tr>
<tr>
<td>N_frag</td>
<td>1.00</td>
<td></td>
<td>-0.13</td>
<td></td>
</tr>
<tr>
<td>Heterogeneity</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Mammals</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Area</td>
<td>1.00</td>
<td>-0.52</td>
<td>0.34</td>
<td>0.34</td>
</tr>
<tr>
<td>Circularity</td>
<td>1.00</td>
<td>-0.30</td>
<td>-0.30</td>
<td></td>
</tr>
<tr>
<td>N_frag</td>
<td>1.00</td>
<td></td>
<td>-0.32</td>
<td></td>
</tr>
<tr>
<td>Heterogeneity</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table A4. Results of the univariable LMM analyses aimed to predict each variable (Circularity, $N_{frag}$ and Heterogeneity) as a function of Area to test if there was a significative correlation. Models, in the same way as we included in the analysis of extinction risk/population trend, include taxonomic information (order, family, and genus) as random factors to control for evolutionary non-independence of the observations following González-Suárez and Revilla (2013). We report T-values (coefficient/SE).

<table>
<thead>
<tr>
<th>Variable</th>
<th>T-values (coefficient/SE) Red List Status</th>
<th>T-values (coefficient/SE) Population Trend</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Amphibians</td>
<td>Birds</td>
</tr>
<tr>
<td></td>
<td>(n= 1,482)</td>
<td>(n=7,147)</td>
</tr>
<tr>
<td>Circulary</td>
<td>-22.07*</td>
<td>-26.85*</td>
</tr>
<tr>
<td>Heterogeneity</td>
<td>17.29*</td>
<td>21.55*</td>
</tr>
<tr>
<td>$N_{frag}$</td>
<td>10.43*</td>
<td>48.87*</td>
</tr>
</tbody>
</table>

* p < 0.05
Table A5. Values of *Area* (in km$^2$), number of fragments (*N_frag*) and shape (*Circularity*) used to define predicted values for main text Fig. 2, 3, and supplementary figures A4 and A5.

<table>
<thead>
<tr>
<th>Descriptor</th>
<th>Size/quantity (percentile)</th>
<th>Amphibians</th>
<th>Birds</th>
<th>Mammals</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Red List</td>
<td>Pop Trend</td>
<td>Red List</td>
</tr>
<tr>
<td><em>Area</em></td>
<td>Small (10)</td>
<td>3,224</td>
<td>391</td>
<td>20,447</td>
</tr>
<tr>
<td></td>
<td>Large (80)</td>
<td>723,374</td>
<td>1,146,874</td>
<td>4,143,878</td>
</tr>
<tr>
<td><em>N_frag</em></td>
<td>Few (20)</td>
<td>2</td>
<td>-</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Many (80)</td>
<td>8</td>
<td>-</td>
<td>160</td>
</tr>
<tr>
<td><em>Circularity</em></td>
<td>Irregular (10)</td>
<td>0.255</td>
<td>-</td>
<td>0.264</td>
</tr>
<tr>
<td></td>
<td>Regular (90)</td>
<td>0.821</td>
<td>-</td>
<td>0.635</td>
</tr>
</tbody>
</table>

* percentile 5
Table A6. Number of species used in the regression analysis by Red list category.

<table>
<thead>
<tr>
<th>Class</th>
<th>Red List Status</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>LC</td>
<td>NT</td>
<td>VU</td>
<td>EN</td>
<td>CR</td>
</tr>
<tr>
<td>Amphibians</td>
<td>1,211</td>
<td>192</td>
<td>13</td>
<td>10</td>
<td>56</td>
</tr>
<tr>
<td>Birds</td>
<td>6,069</td>
<td>649</td>
<td>276</td>
<td>99</td>
<td>54</td>
</tr>
<tr>
<td>Mammals</td>
<td>1,916</td>
<td>194</td>
<td>159</td>
<td>99</td>
<td>55</td>
</tr>
</tbody>
</table>

Table A7. Number of species used in the regression analysis by Population Trend category.

<table>
<thead>
<tr>
<th>Class</th>
<th>Population trend</th>
<th>Decreasing</th>
<th>Stable</th>
<th>Increasing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amphibians</td>
<td>931</td>
<td>726</td>
<td>19</td>
<td></td>
</tr>
<tr>
<td>Birds</td>
<td>3,195</td>
<td>3,312</td>
<td>472</td>
<td></td>
</tr>
<tr>
<td>Mammals</td>
<td>961</td>
<td>830</td>
<td>49</td>
<td></td>
</tr>
</tbody>
</table>
Table A8. T-values (coefficient/SE) of the best alternative overall GLMM models predicting conservation status as a function of several descriptors of distribution spatial configuration. Models selection results are shown in table 1. We modeled the probability of increase in Red List Status (higher risk) and Population Trend (more declining trend). A dash (-) indicates variables not included in the best models. \( Het = Heterogeneity \). Sample sizes (n) indicate the number of species included in each model.

<table>
<thead>
<tr>
<th>Variables</th>
<th>T-values (coefficient/SE) Red List Status</th>
<th>T-values (coefficient/SE) Population Trend</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mammals (n=2,423)</td>
<td>Amphibians (n= 1,676)</td>
</tr>
<tr>
<td>Area</td>
<td>-2.90</td>
<td>-2.98</td>
</tr>
<tr>
<td>Circularity</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Heterogeneity</td>
<td>2.64</td>
<td>2.67</td>
</tr>
<tr>
<td>N_frag</td>
<td>-1.10</td>
<td>-1.23</td>
</tr>
<tr>
<td>Area* Circularity</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Area* N_frag</td>
<td>0.76</td>
<td>0.54</td>
</tr>
<tr>
<td>Area* Heterogeneity</td>
<td>-3.31</td>
<td>-3.36</td>
</tr>
<tr>
<td>N_frag* Heterogeneity</td>
<td>-</td>
<td>0.76</td>
</tr>
</tbody>
</table>
Figure A1. Correlation among the variable \textit{Area} and the other variables used in the analysis (\textit{Circularity}, \textit{N\_frag}, \textit{Ratio}) for the data used in the analysis of spatial configuration and extinction risk (a) and the data used in the analysis of spatial configuration and population trend (b).
Figure A2. Frequency distributions for the variables *Area, Circularity, N_frag* and *Heterogeneity* for multi-fragment ranges of amphibians, panels a, b, c, d respectively, mammals, panels e, f, g, h respectively, and birds, panels i, j, k, l respectively. Non-threatened species (Least Concern and Near Threatened Status) are in light grey (1,403 species of amphibians, 6,718 species of birds and 2,110 species of mammals which were included in our regression analyses), threatened (Vulnerable, Threatened and Critically Endangered) species classified based on criterion B and D (608 species of amphibians, 382 species of birds and 291 species of mammals which were not included in our regression analyses) are in medium grey, and all other threatened species (79
species of amphibians, 429 species of birds and 313 species of mammals which were included in our regression analyses, Table A2) are in dark grey.
Figure A3. Frequency distributions for the variables *Area*, *Circularity*, *N_frag* and *Heterogeneity* for multi-fragment ranges of amphibians, panels a, b, c, d respectively, mammals, panels e, f, g, h respectively, and birds, panels i, j, k, l respectively. Species within increasing Population Trend are in light grey (19 species of amphibians, 472 species of birds and 49 species of mammals; generally few species and thus, sometimes not clearly visible), stable Population Trend are in medium grey (726 species of amphibians, 3,312 species of birds and 830 species of mammals), and decreasing Population Trend are in dark grey (931 species of amphibians, 3195 species of birds and 961 species of mammals which were included in our regression analyses, table S3).
Figure A4. Predicted marginal probabilities for each Red List Status (Table S2), with dark green for Least Concern (LC), light green for Near Threatened (NT), yellow for Vulnerable (VU), orange for Endangered (EN) and red for Critically Endangered species (CR), based on the two best alternative models, Mammals (1) and Mammals (2), for mammal class (Tables 1 and A6). In some plots, the probably associated to some threat categories was low or zero, partly reflecting the relatively small number of species in these categories (see lower right panel). To show interaction effects we explored predictions for the observed the range of Heterogeneity values with two possible values for $N_{\text{frag}}$ and Circularity based on percentiles of the observed data (see table S1 for values).
Figure A5. Predicted marginal probabilities for each category of Population Trend (Table S3), with dark green for Increasing, light green for Stable, and red for Decreasing trends, based on the best alternative model, for amphibian class (Tables 1 and A6). Note that in some plots the predicted probably of Increasing trend was very small or zero, partly reflecting the small number of species in that category. To show interaction effects we explored predictions for the observed range of Heterogeneity values with two possible values for \( N_{\text{frag}} \) and Circularity based on percentiles of the observed data (see table S1 for values).