Supplementary Materials for Safeguarding global terrestrial vertebrate species from future sea-level rise

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Results in Detail

1.1 The geographic pattern of SLR impacts on global terrestrial vertebrate species

Richness in Inundated Area

The regions with a higher number of amphibian species affected by SLR are mainly located at the Amazon River estuary (Figure S5, S10, S15, S20, S25). For reptile, the regions with a higher number of impacted species focused on Amazon River estuary, the coastal areas of Borneo, Malay Peninsula and Sumatra (Figure S6, S11, S16, S21, S26). For bird, the spatial distribution of regions with a higher number of impacted species is similar to that of combined four groups. The Amazon River estuary remains the region with the highest number of impacted species. (Figure S7, S12, S17, S22, S27). For Mammal, the regions with the highest number of impacted species located at the Amazon River estuary (Figure S8, S13, S18, S23, S28). When analyzing each taxonomic group separately, the Amazon River estuary remains the region with the highest number of species impacted by SLR.

Rarity-Weighted Richness in Inundated Area

For amphibian, the areas where important habitats are inundated are mainly concentrated on islands or island nations, such as Japan, the Philippines, Papua New Guinea, Madagascar, the nations and islands surrounding the Caribbean Sea, as well as the coastal regions of South Africa and the northern and southeastern coastal areas of Australia. Additionally, the eastern coastal region of the United States and amphibian-distributed countries along the Mediterranean coast are also significantly affected (Figure S5, S10, S15, S20, S25). For reptile, the areas where important habitats are projected to be inundated are mainly concentrated in the Ryukyu Islands, the Philippines, New Guinea, Madagascar, the northern islands of the Caribbean Sea, as well as the northwestern coastal region of Australia and the northwestern coastal region of South America (Figure S6, S11, S16, S21, S26). For widely distributed bird species, these regions are concentrated in coastal areas of low and mid-latitudes, including Japan, the islands of Southeast

Asia, the coastal regions of Australia and New Zealand, the eastern and southern coasts of Africa including Madagascar, the southern coastal regions of North America, and the coastal areas of Central and South America (Figure S7, S12, S17, S22, S27). For mammal, the important habitats projected to be inundated are mainly located in Japan, the islands of Southeast Asia, the southeastern and coastal regions of Madagascar, the western coastal region of North America, countries and islands around the Caribbean Sea (Figure S8, S13, S18, S23, S28).

Threatened Species Richness in Inundated Area

For amphibian, the regions where sea-level rise is expected to inundate habitats with a high number of threatened species are primarily concentrated in the Ryukyu Islands, the western coastal of United States, the northwestern coastal areas of Spain and Portugal, as well as the southeast coastal areas of Australian (Figure S5, S10, S15, S20, S25). For reptiles, these regions are located in Southeast Asia—including the coastal areas of Indochina, Borneo, the Malay Peninsula, and Sumatra—as well as the northeastern islands of the Caribbean (Figure S6, S11, S16, S21, S26). For bird, the regions where a high number of species are impacted by SLR are particularly highlighted in the Malay Peninsula and Borneo. Additionally, the Philippines, Sumatra, and the coastal regions of China, Thailand, Myanmar, and India are also projected to have a large number of threatened species will be impacted by SLR (Figure S7, S12, S17, S22, S27). For mammal, the Malay Peninsula, Borneo, and Sumatra stand out as the most prominent regions on the global map, suggesting that these areas harbor a greater number of threaten species, that will be impacted by SLR (Figure S8, S13, S18, S23, S28).

1.2 The geographic pattern of SLR refugia for global terrestrial vertebrate species

Based on the spatial distribution of refugia, amphibians are projected to require minimal conservation efforts by 2050. However, by 2100, the extent of critical areas increases substantially, with conservation priorities primarily concentrated in the Ryukyu Islands and the

Andaman Islands (Figures S37, S42, S47, S52, S57). For reptiles, priority refugia are projected to be located in Myanmar by 2050. By 2100, however, additional conservation efforts will be required in the Ryukyu Islands and northern Australia. As climate change intensifies (from SSP1-1.9 to SSP5-8.5), refugia are expected to expand across the Indochinese islands, Taiwan Province of China, the island of Java, and northern Australia (Figures S38, S43, S48, S53, S58). For widely distributed bird species, priority refugia are similarly projected to be located in Myanmar by 2050 across various climate scenarios. By 2100, as climate change intensifies, these refugia are expected to expand beyond Indochina, Sumatra, northeastern Russia, the islands of northwestern Africa, and the northwestern regions of South and North America, to include Borneo, the coastal regions of China, Japan, the Korean Peninsula, southwestern Europe, northwestern and eastern Australia, southeastern South America, and southern North America (Figures S39, S44, S49, S54, S59). Mammals are also projected to require limited conservation intervention by 2050. However, by 2100, with increasing climate pressure, priority refugia are expected to extend across Borneo, the Ryukyu Islands, the coastal region around Darwin in northern Australia, Iraq, southwestern Sumatra, and areas along the Río de la Plata in Uruguay and Argentina (Figures S40, S45, S50, S55, S60)

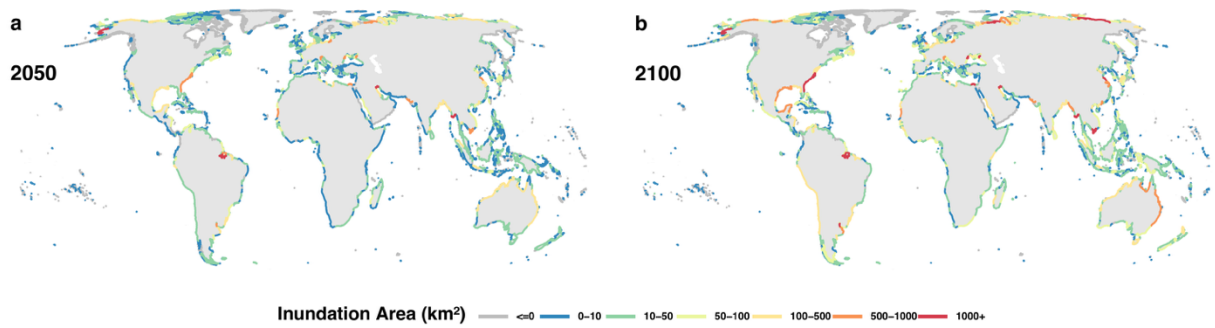

Figure S1 Spatial patterns of areal inundation by projected SLR. a and **b** illustrate respectively the extent of coastal inundation due to SLR predicted by 2050 and by 2100. The inundation area is illustrated for each of the 12,148 global coastline segments as defined by the Dynamic Interactive Vulnerability Assessment modeling framework according to region-specific biophysical characteristics (e.g. tidal regime) and socioeconomic consequences of SLR. Displayed above is for the medium SLR scenario (SSP119).

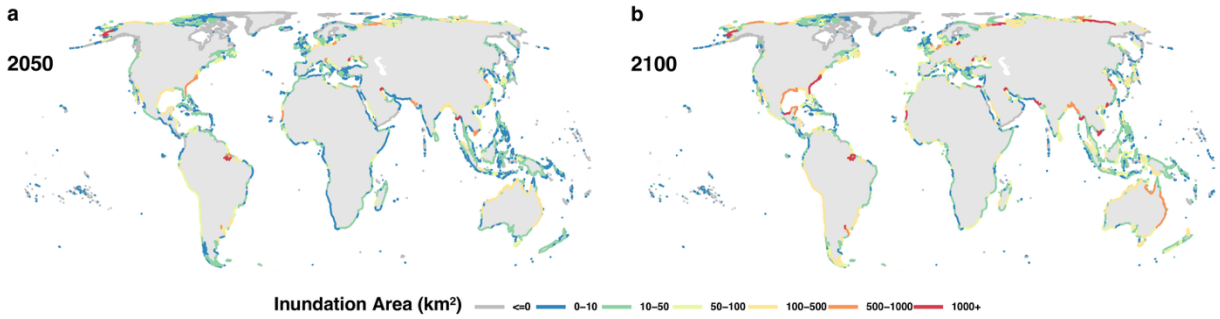

Figure S2 Spatial patterns of areal inundation by projected SLR. a and **b** illustrate respectively the extent of coastal inundation due to SLR predicted by 2050 and by 2100. The inundation area is illustrated for each of the 12,148 global coastline segments as defined by the Dynamic Interactive Vulnerability Assessment modeling framework according to region-specific biophysical characteristics (e.g. tidal regime) and socioeconomic consequences of SLR. Displayed above is for the medium SLR scenario (SSP126).

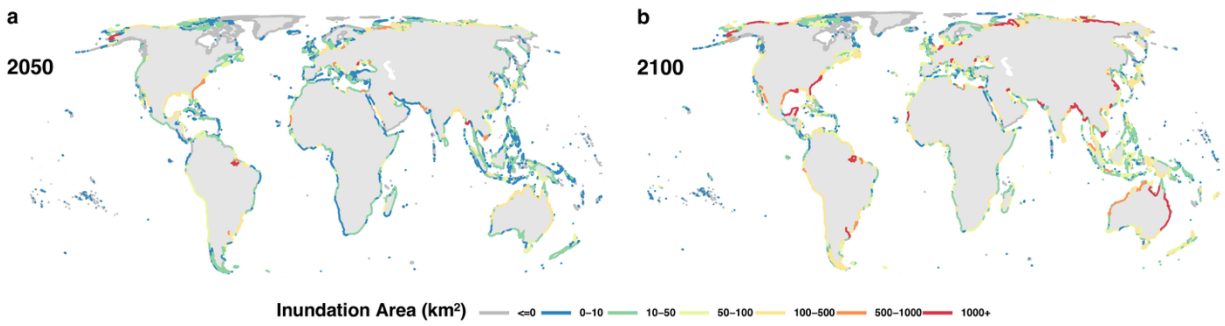

Figure S3 Spatial patterns of areal inundation by projected SLR. a and **b** illustrate respectively the extent of coastal inundation due to SLR predicted by 2050 and by 2100. The inundation area is illustrated for each of the 12,148 global coastline segments as defined by the Dynamic Interactive Vulnerability Assessment modeling framework according to region-specific biophysical characteristics (e.g. tidal regime) and socioeconomic consequences of SLR. Displayed above is for the medium SLR scenario (SSP370).

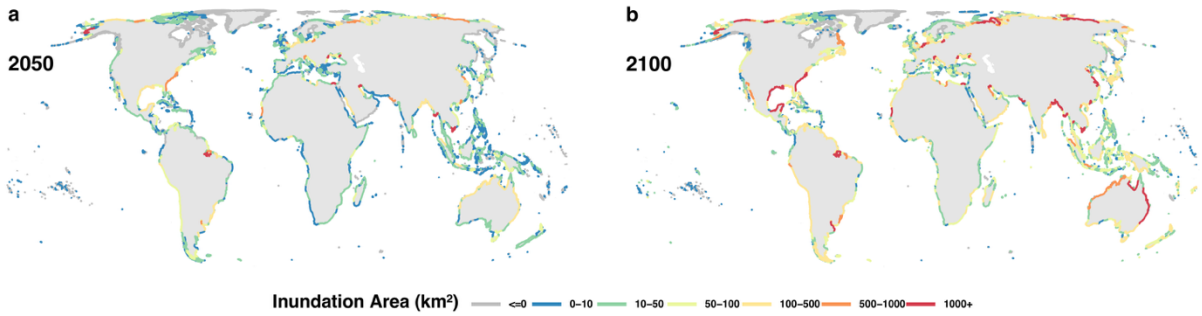

Figure S4 Spatial patterns of areal inundation by projected SLR. a and **b** illustrate respectively the extent of coastal inundation due to SLR predicted by 2050 and by 2100. The inundation area is illustrated for each of the 12,148 global coastline segments as defined by the Dynamic Interactive Vulnerability Assessment modeling framework according to region-specific biophysical characteristics (e.g. tidal regime) and socioeconomic consequences of SLR. Displayed above is for the medium SLR scenario (SSP585).

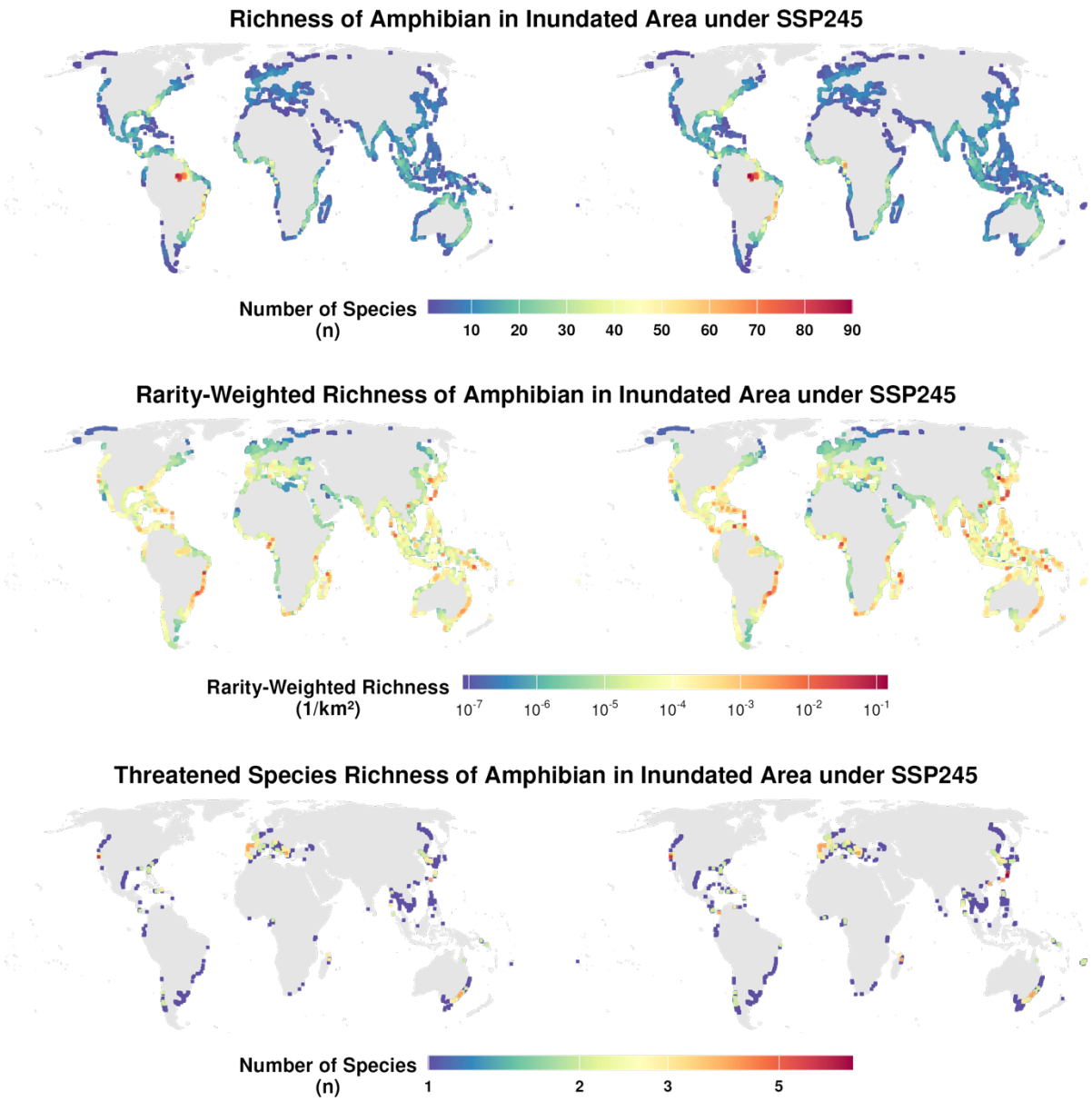

Figure S5 Spatial patterns of SLR impacts on amphibian. The first row refers respectively to species richness (defined as the number of species present in a given area) impacted by SLR by 2050 (1st column) and by 2100 (2nd column). The rarity-weighted richness impacted by SLR is shown in the second row. This metric represents the cumulative importance of an area to all species it supports, calculated as the sum of the reciprocals of total habitat of all species found in the area. The third row corresponds to threatened species richness by 2050 and by 2100 under predicted SLR. This metric indicates the number of species in a given area of inundation that are

currently classified as threatened according to the IUCN threat status. Displayed above is for the medium SLR scenario (SSP245) and all data are presented at 1 × 1 km spatial resolution.

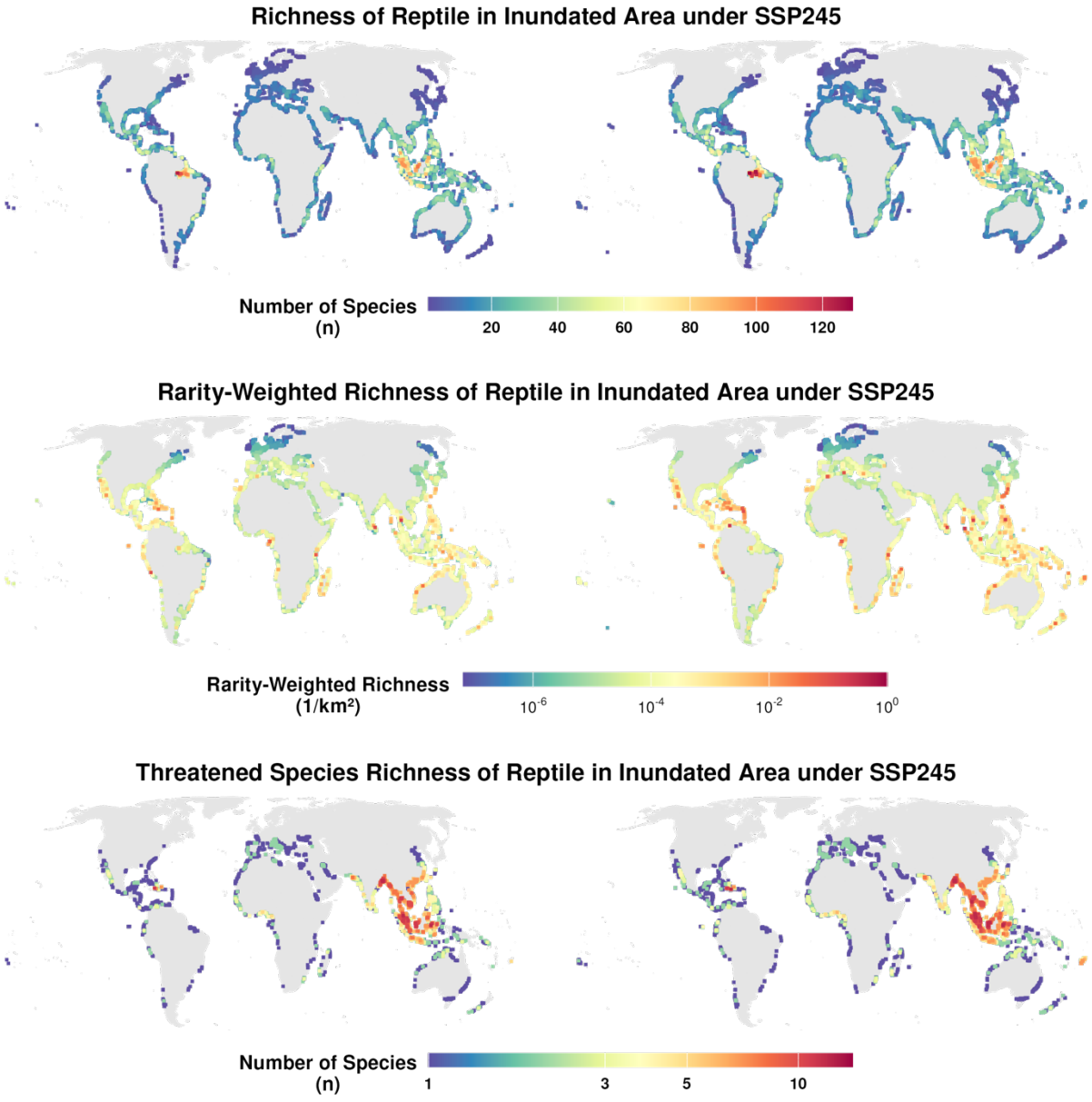

Figure S6 Spatial patterns of SLR impacts on reptile. The first row refers respectively to species richness (defined as the number of species present in a given area) impacted by SLR by 2050 (1st column) and by 2100 (2nd column). The rarity-weighted richness impacted by SLR is shown in the second row. This metric represents the cumulative importance of an area to all

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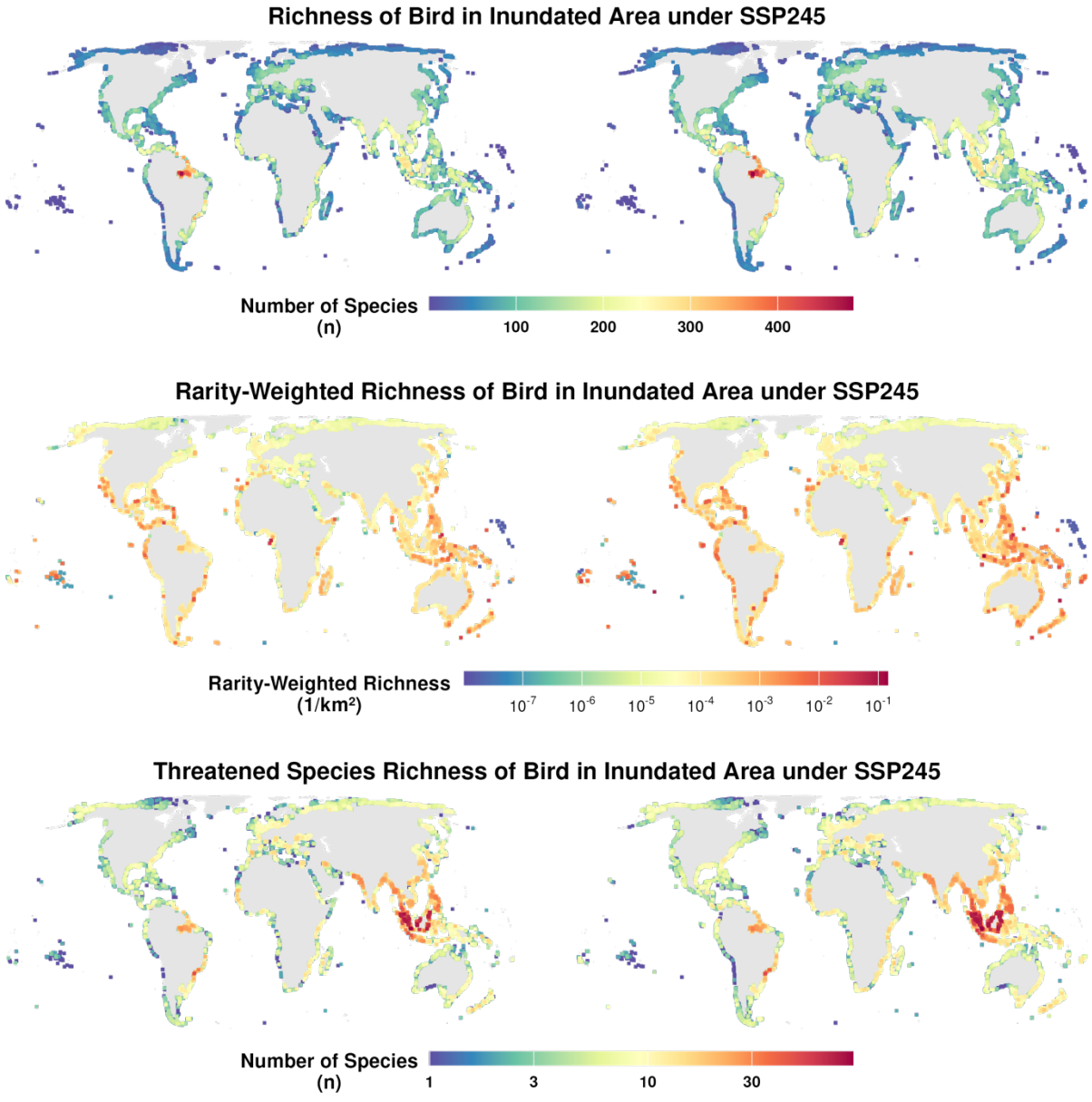
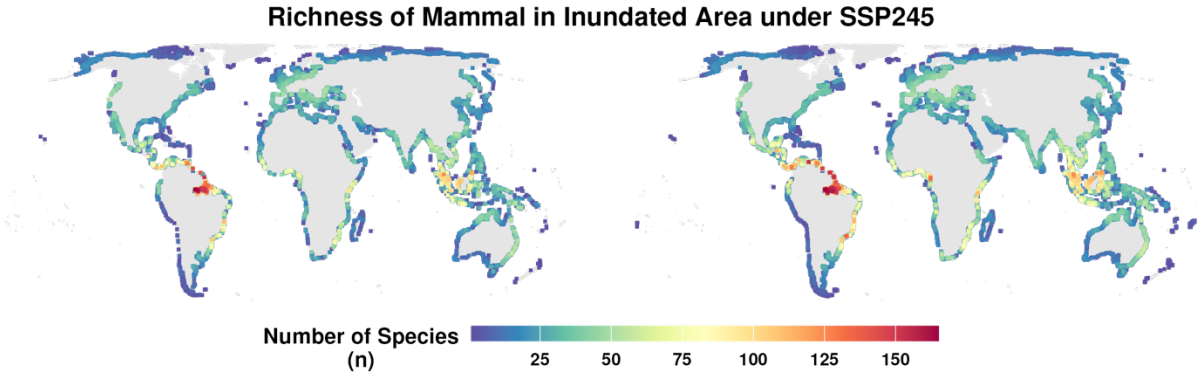
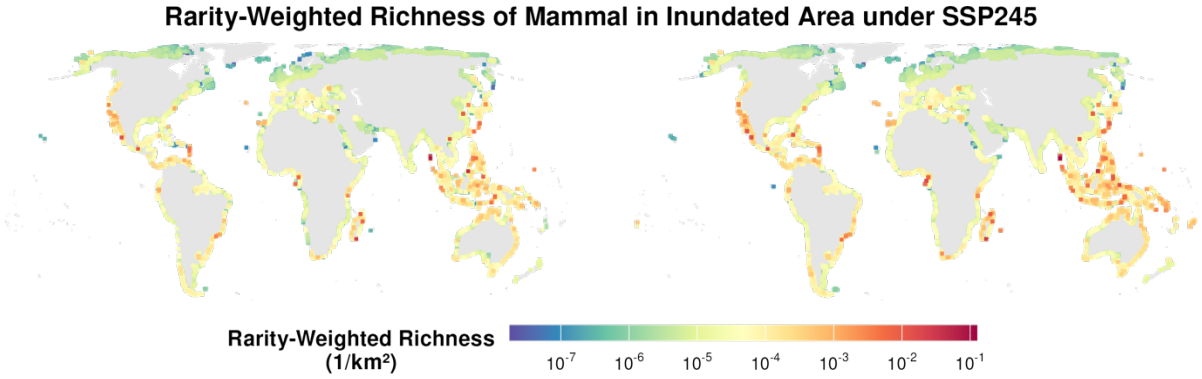


Figure S7 Spatial patterns of SLR impacts on bird. The first row refers respectively to species richness (defined as the number of species present in a given area) impacted by SLR by 2050 (1st

column) and by 2100 (2nd column). The rarity-weighted richness impacted by SLR is shown in the second row. This metric represents the cumulative importance of an area to all species it supports, calculated as the sum of the reciprocals of total habitat of all species found in the area. The third row corresponds to threatened species richness by 2050 and by 2100 under predicted SLR. This metric indicates the number of species in a given area of inundation that are currently classified as threatened according to the IUCN threat status. Displayed above is for the medium SLR scenario (SSP245) and all data are presented at 1 × 1 km spatial resolution.





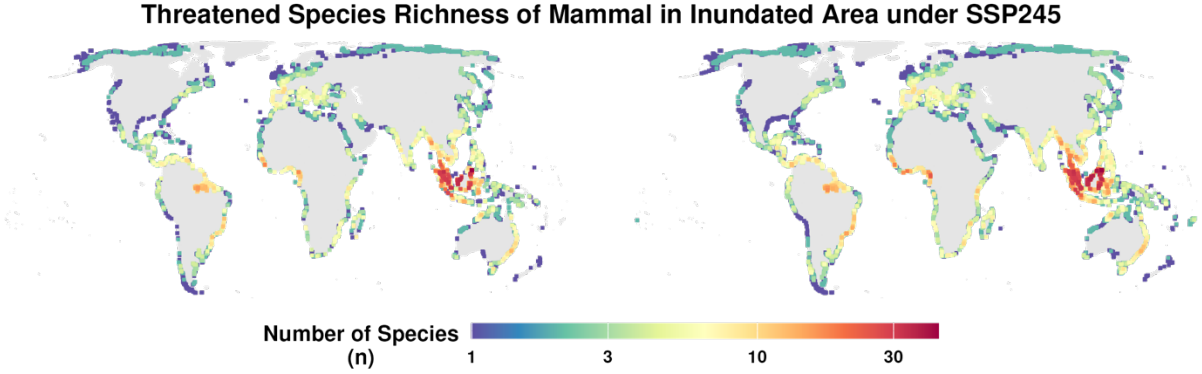


Figure S8 Spatial patterns of SLR impacts on mammal. The first row refers respectively to species richness (defined as the number of species present in a given area) impacted by SLR by 2050 (1st column) and by 2100 (2nd column). The rarity-weighted richness impacted by SLR is shown in the second row. This metric represents the cumulative importance of an area to all species it supports, calculated as the sum of the reciprocals of total habitat of all species found in the area. The third row corresponds to threatened species richness by 2050 and by 2100 under predicted SLR. This metric indicates the number of species in a given area of inundation that are currently classified as threatened according to the IUCN threat status. Displayed above is for the medium SLR scenario (SSP245) and all data are presented at 1 × 1 km spatial resolution.

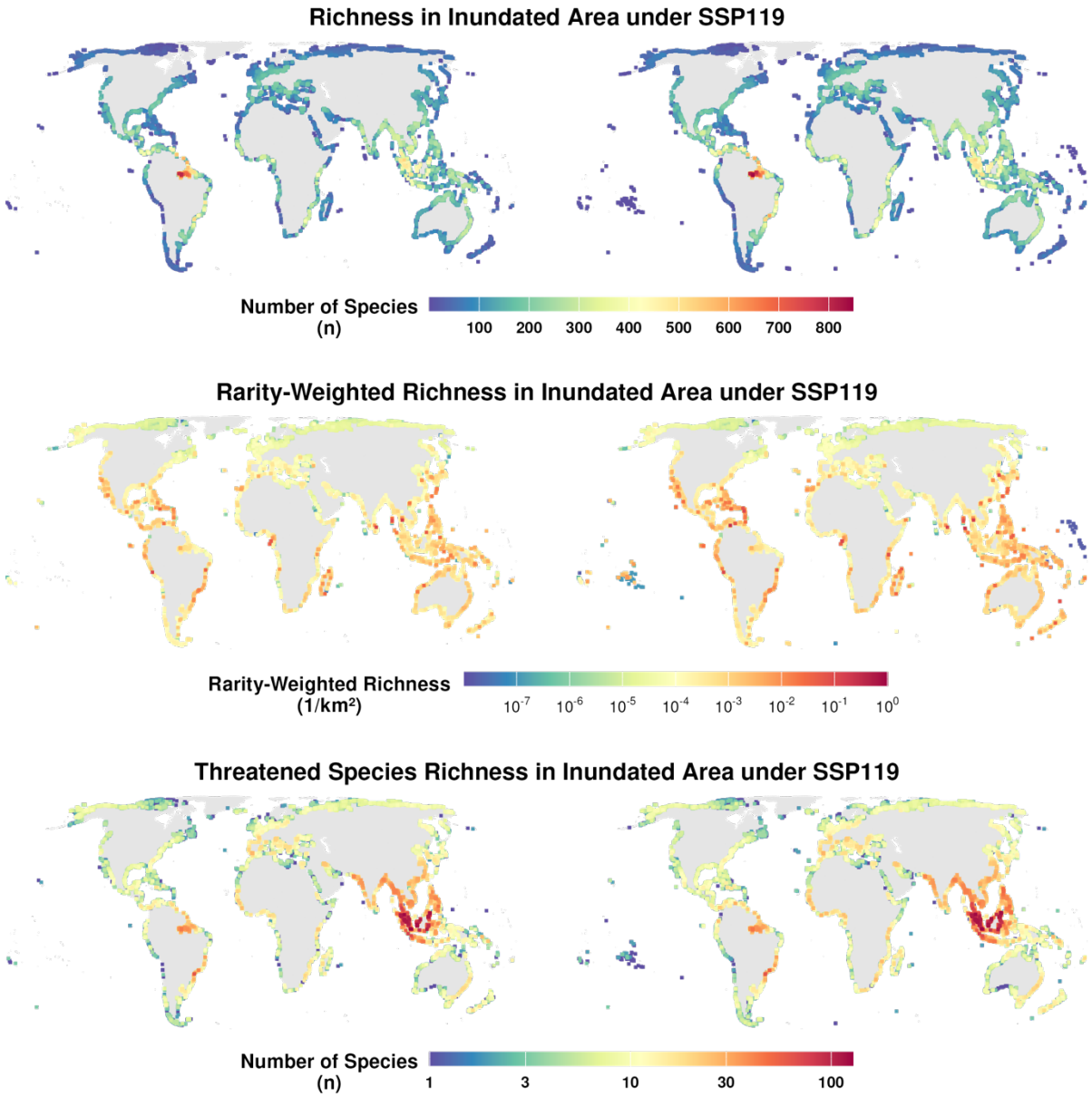


Figure S9 Spatial patterns of SLR impacts on terrestrial vertebrate species. The first row refers respectively to species richness (defined as the number of species present in a given area) impacted by SLR by 2050 (1st column) and by 2100 (2nd column). The rarity-weighted richness impacted by SLR is shown in the second row. This metric represents the cumulative importance of an area to all species it supports, calculated as the sum of the reciprocals of total habitat of all species found in the area. The third row corresponds to threatened species richness by 2050 and by 2100 under predicted SLR. This metric indicates the number of species in a given area of

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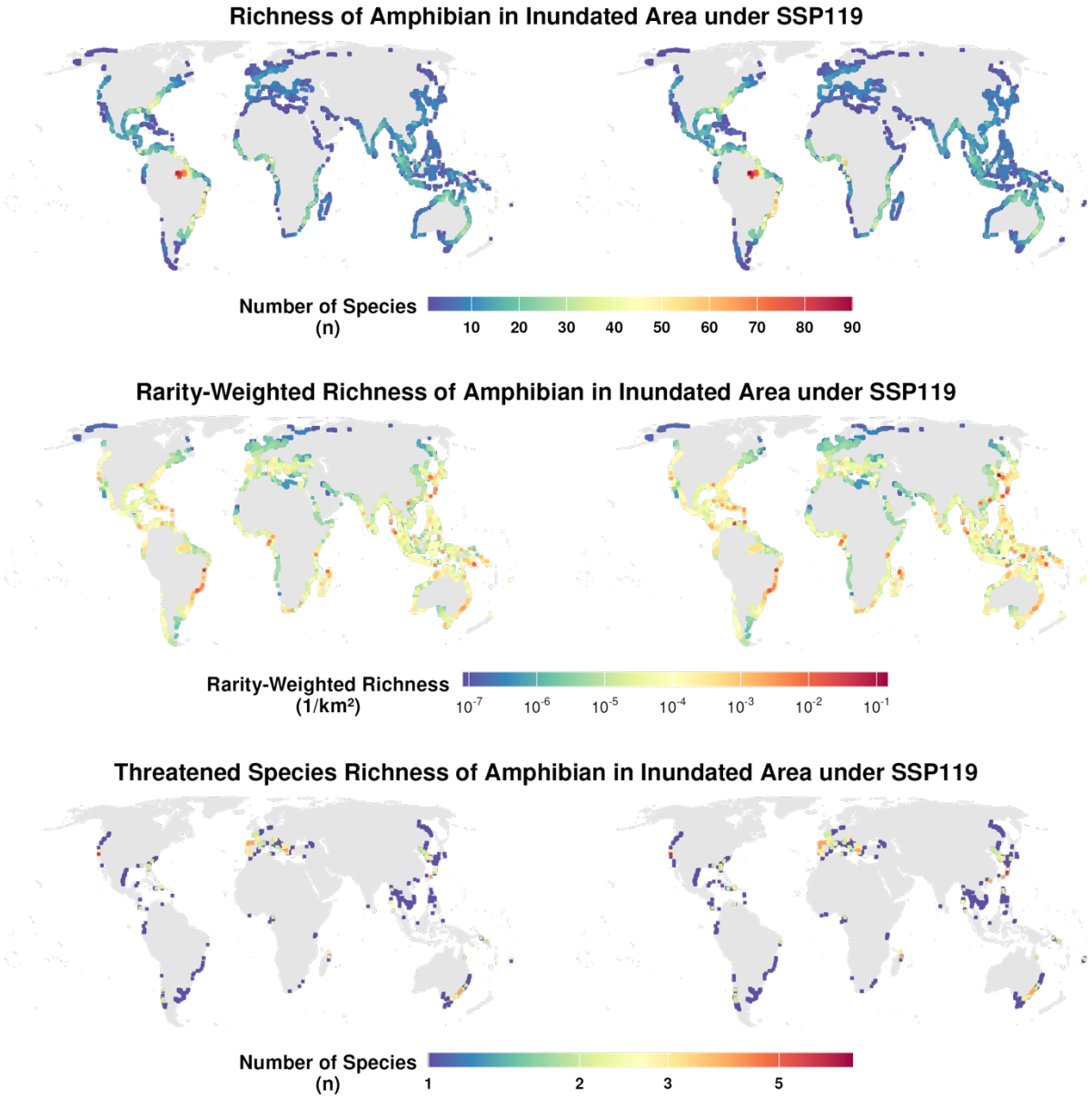

Figure S10 Spatial patterns of SLR impacts on amphibian. The first row refers respectively to species richness (defined as the number of species present in a given area) impacted by SLR by 2050 (1st column) and by 2100 (2nd column). The rarity-weighted richness impacted by SLR is shown in the second row. This metric represents the cumulative importance of an area to all

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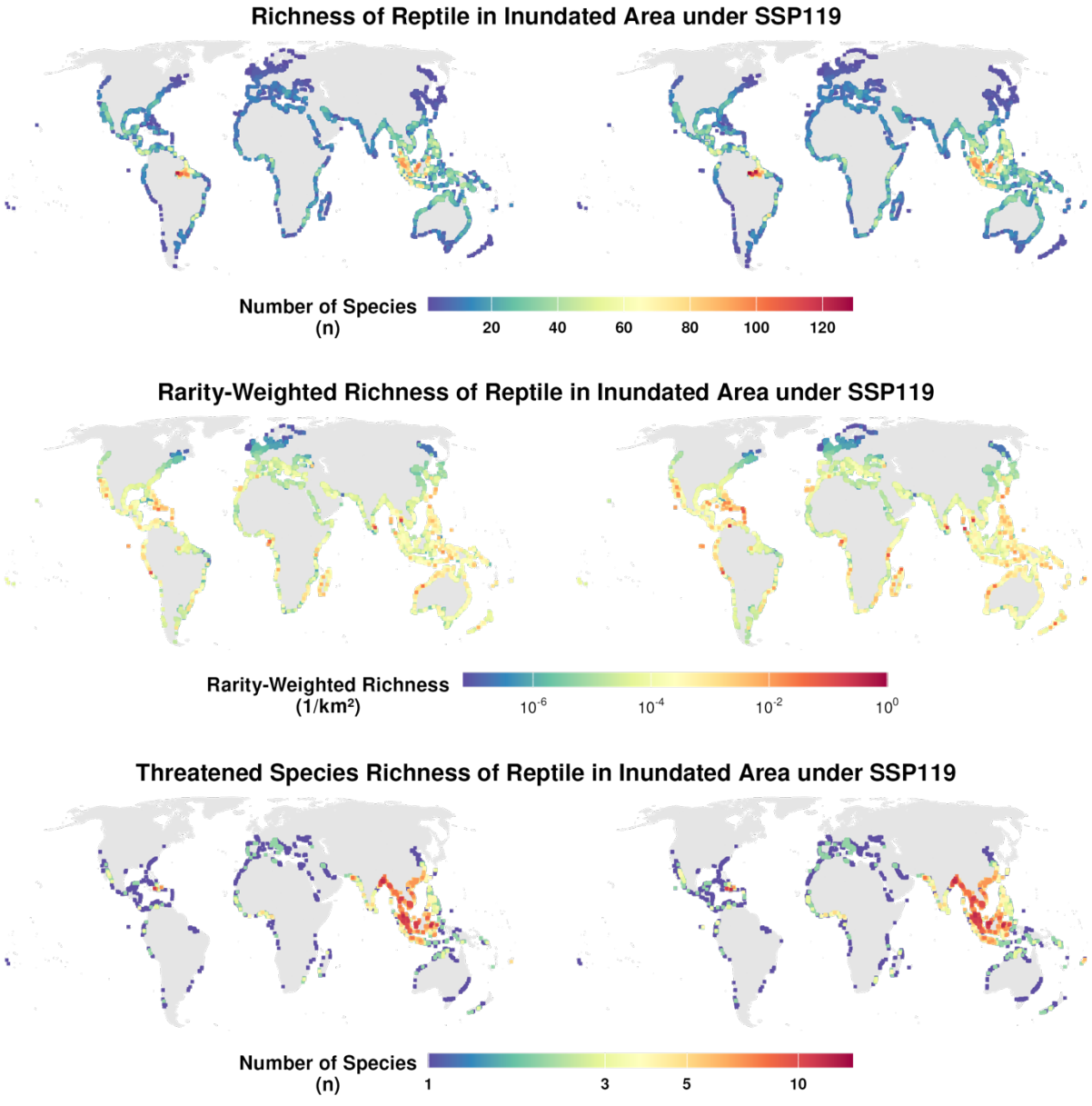

Figure S11 Spatial patterns of SLR impacts on reptile. The first row refers respectively to species richness (defined as the number of species present in a given area) impacted by SLR by

2050 (1st column) and by 2100 (2nd column). The rarity-weighted richness impacted by SLR is shown in the second row. This metric represents the cumulative importance of an area to all species it supports, calculated as the sum of the reciprocals of total habitat of all species found in the area. The third row corresponds to threatened species richness by 2050 and by 2100 under predicted SLR. This metric indicates the number of species in a given area of inundation that are currently classified as threatened according to the IUCN threat status. Displayed above is for the medium SLR scenario (SSP119) and all data are presented at 1 × 1 km spatial resolution.

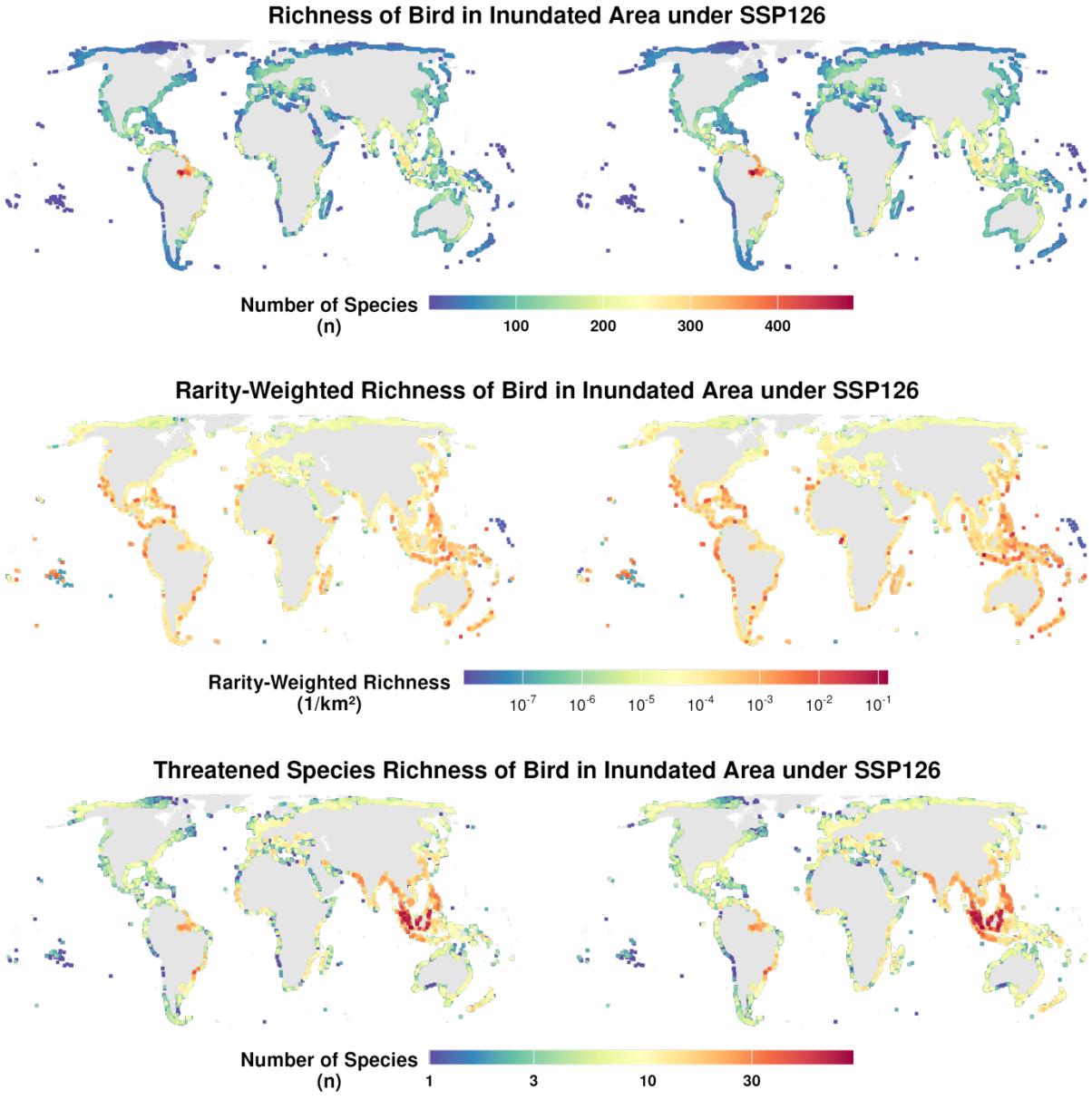

Figure S12 Spatial patterns of SLR impacts on bird. The first row refers respectively to species richness (defined as the number of species present in a given area) impacted by SLR by 2050 (1st column) and by 2100 (2nd column). The rarity-weighted richness impacted by SLR is shown in the second row. This metric represents the cumulative importance of an area to all species it supports, calculated as the sum of the reciprocals of total habitat of all species found in the area. The third row corresponds to threatened species richness by 2050 and by 2100 under predicted SLR. This metric indicates the number of species in a given area of inundation that are currently classified as threatened according to the IUCN threat status. Displayed above is for the medium SLR scenario (SSP119) and all data are presented at 1 × 1 km spatial resolution.

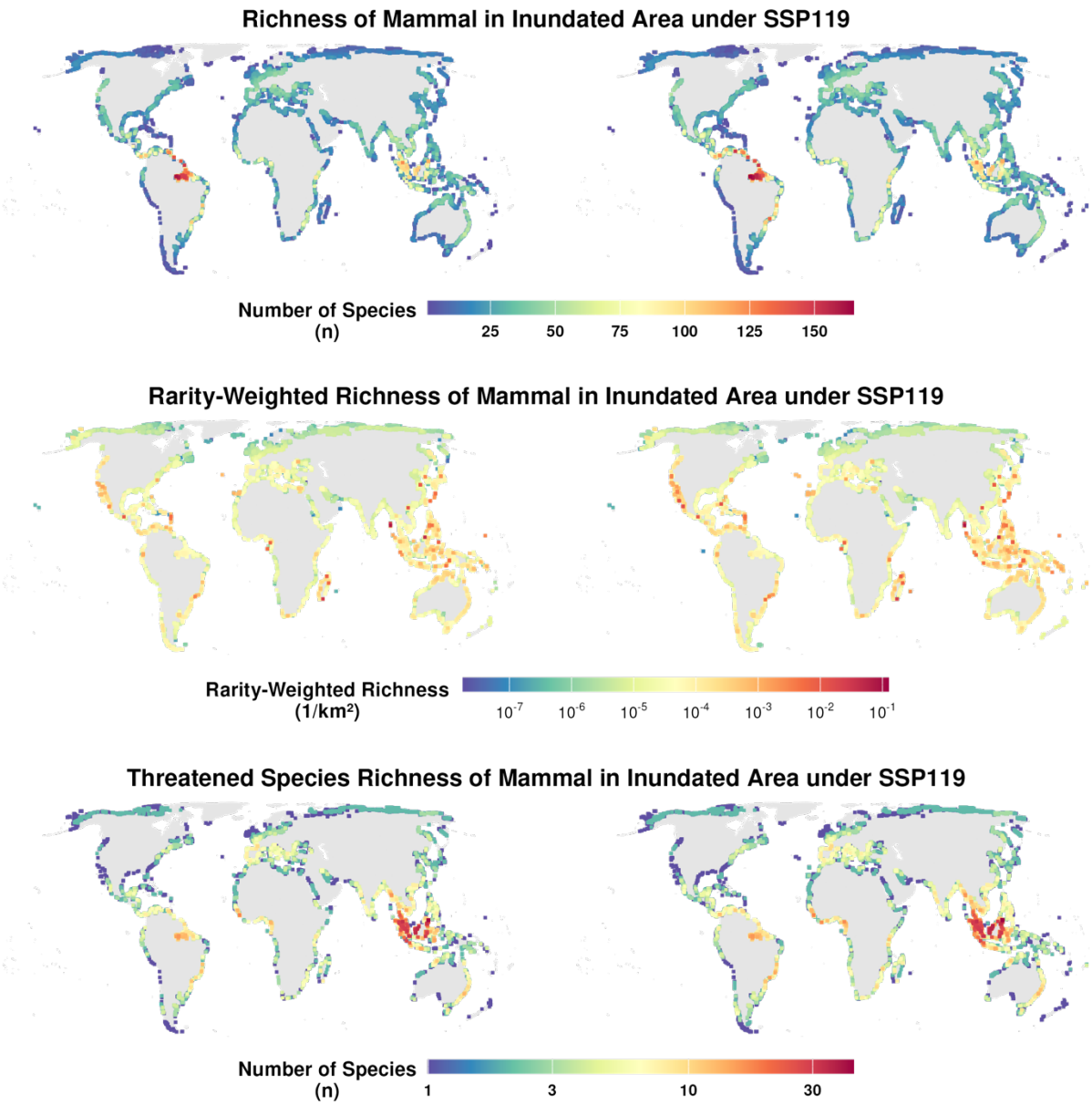

Figure S13 Spatial patterns of SLR impacts on mammal. The first row refers respectively to species richness (defined as the number of species present in a given area) impacted by SLR by 2050 (1st column) and by 2100 (2nd column). The rarity-weighted richness impacted by SLR is shown in the second row. This metric represents the cumulative importance of an area to all species it supports, calculated as the sum of the reciprocals of total habitat of all species found in the area. The third row corresponds to threatened species richness by 2050 and by 2100 under predicted SLR. This metric indicates the number of species in a given area of inundation that are

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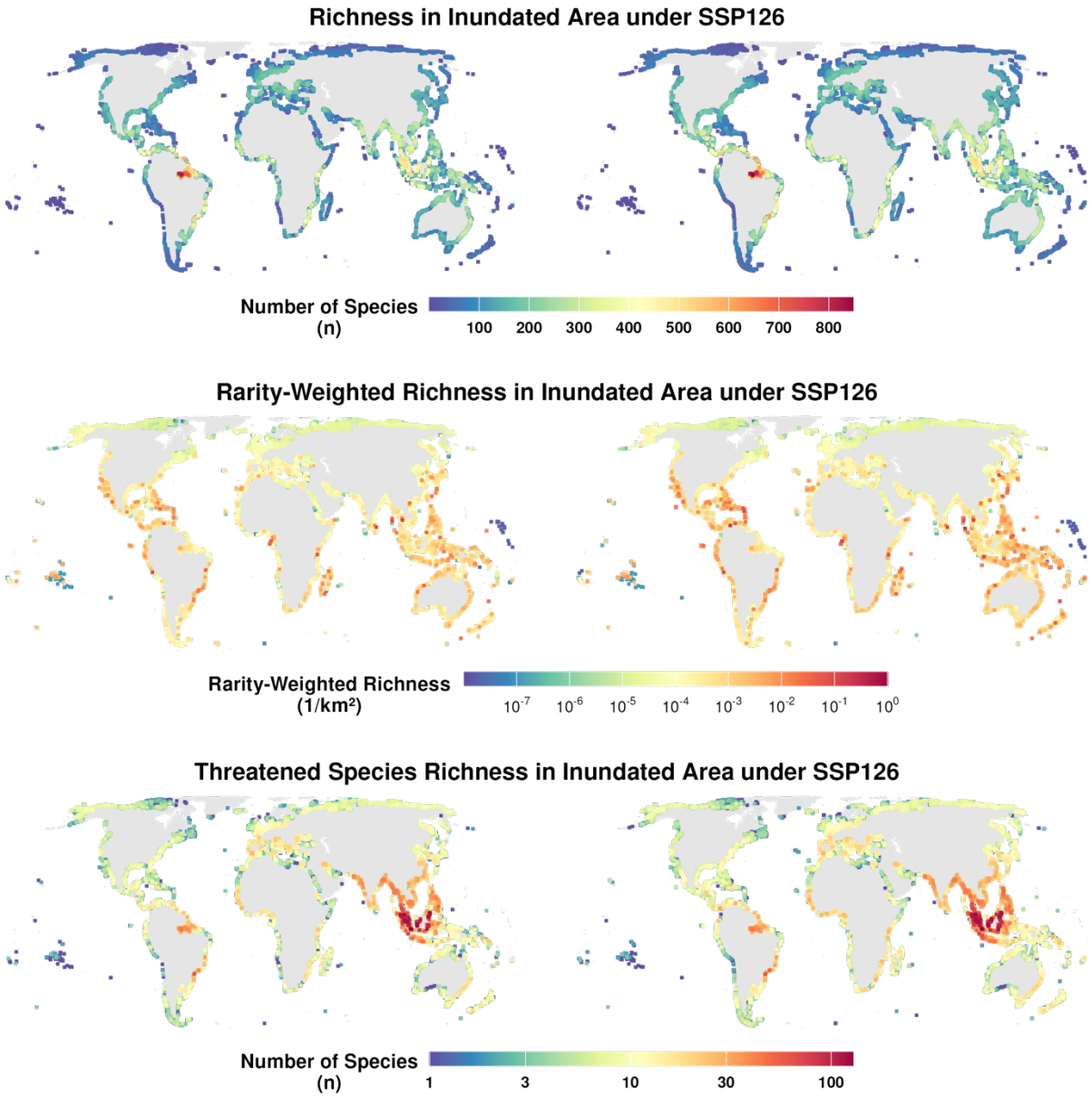

Figure S14 Spatial patterns of SLR impacts on terrestrial vertebrate species. The first row refers respectively to species richness (defined as the number of species present in a given area) impacted by SLR by 2050 (1st column) and by 2100 (2nd column). The rarity-weighted richness impacted by SLR is shown in the second row. This metric represents the cumulative importance of an area to all species it supports, calculated as the sum of the reciprocals of total habitat of all

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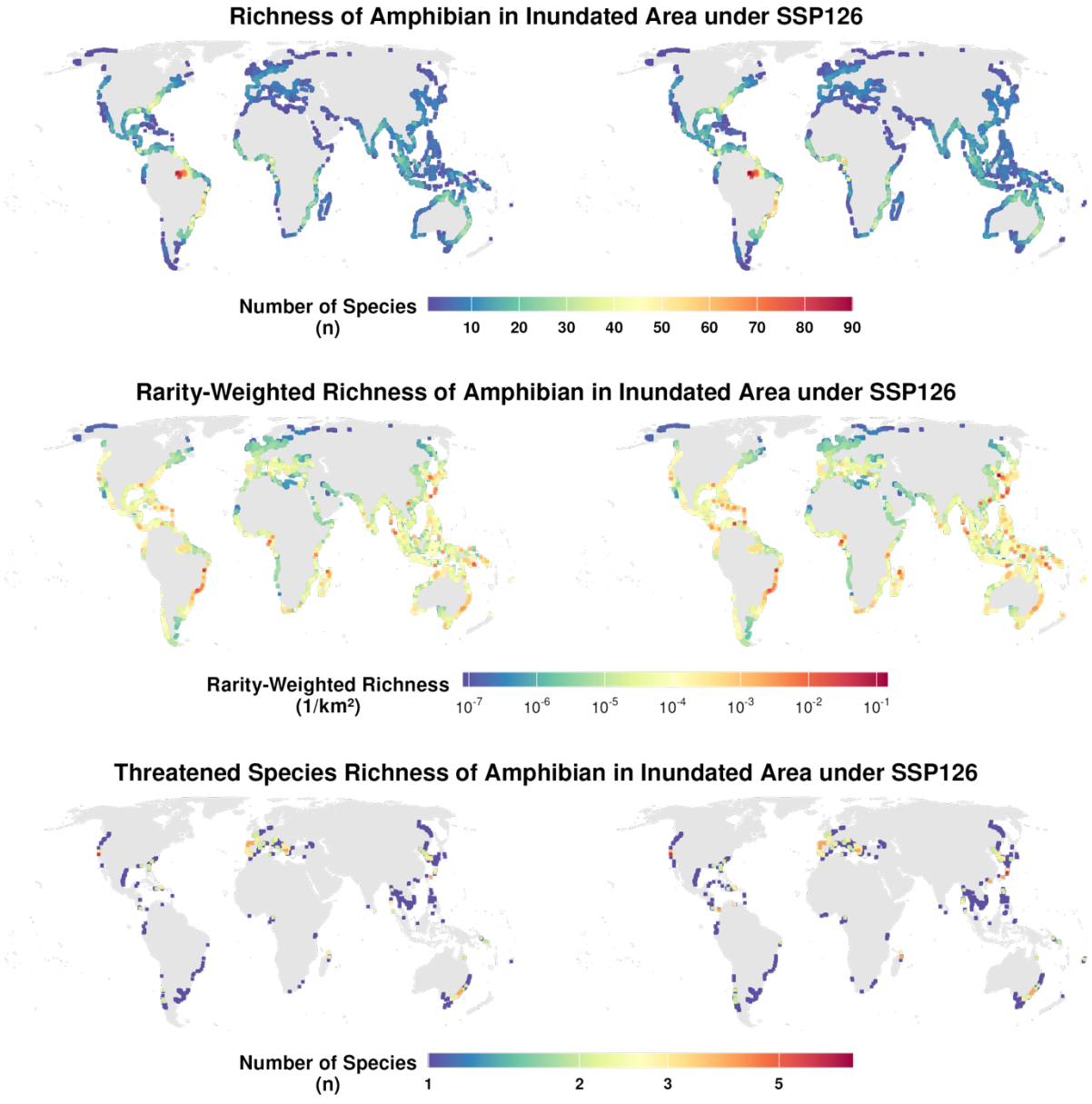

Figure S15 Spatial patterns of SLR impacts on amphibian. The first row refers respectively to species richness (defined as the number of species present in a given area) impacted by SLR

by 2050 (1st column) and by 2100 (2nd column). The rarity-weighted richness impacted by SLR is shown in the second row. This metric represents the cumulative importance of an area to all species it supports, calculated as the sum of the reciprocals of total habitat of all species found in the area. The third row corresponds to threatened species richness by 2050 and by 2100 under predicted SLR. This metric indicates the number of species in a given area of inundation that are currently classified as threatened according to the IUCN threat status. Displayed above is for the medium SLR scenario (SSP126) and all data are presented at 1 × 1 km spatial resolution.

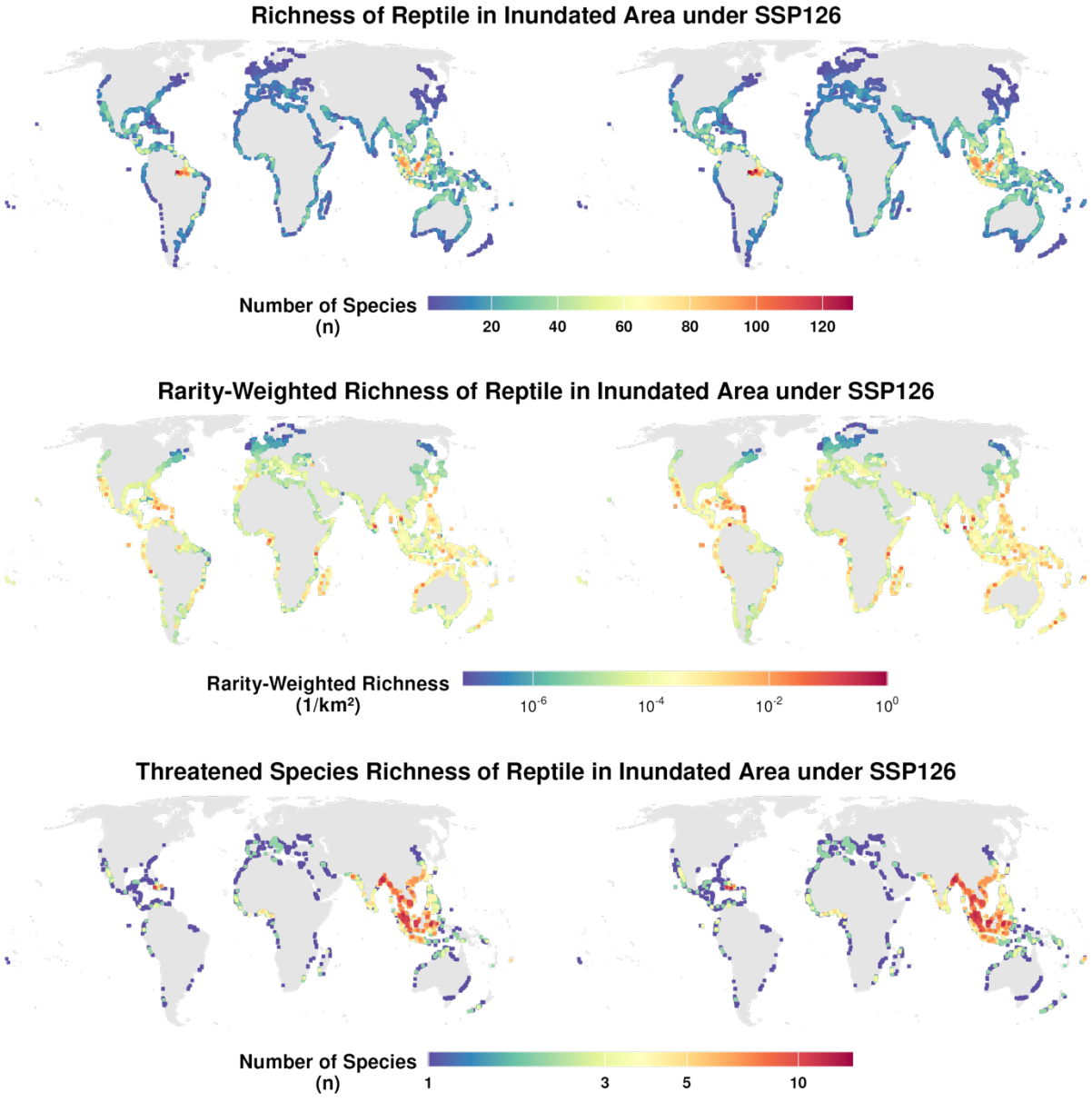

Figure S16 Spatial patterns of SLR impacts on reptile. The first row refers respectively to species richness (defined as the number of species present in a given area) impacted by SLR by 2050 (1st column) and by 2100 (2nd column). The rarity-weighted richness impacted by SLR is shown in the second row. This metric represents the cumulative importance of an area to all species it supports, calculated as the sum of the reciprocals of total habitat of all species found in the area. The third row corresponds to threatened species richness by 2050 and by 2100 under predicted SLR. This metric indicates the number of species in a given area of inundation that are currently classified as threatened according to the IUCN threat status. Displayed above is for the medium SLR scenario (SSP126) and all data are presented at 1 × 1 km spatial resolution.

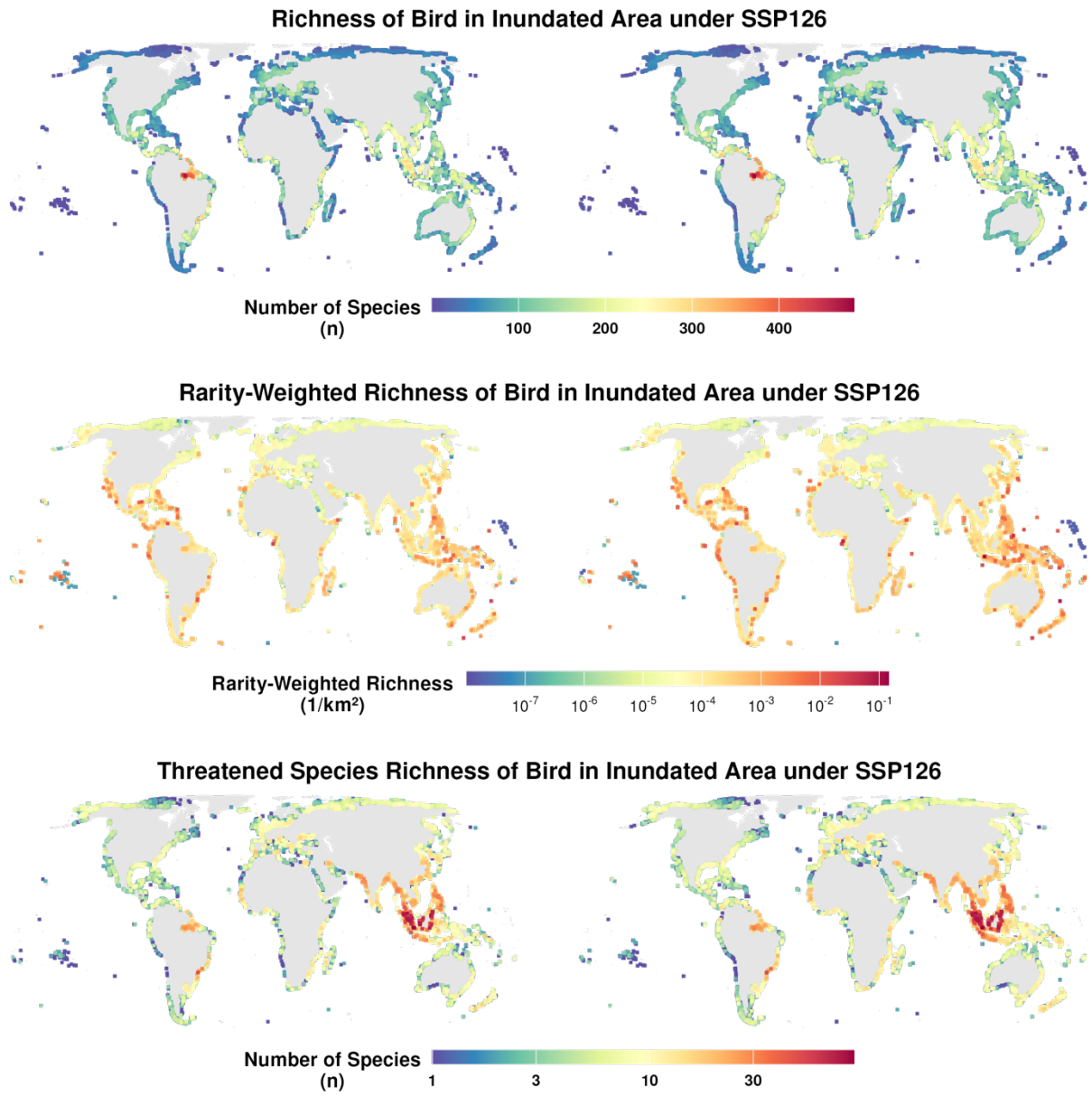

Figure S17 Spatial patterns of SLR impacts on bird. The first row refers respectively to species richness (defined as the number of species present in a given area) impacted by SLR by 2050 (1st column) and by 2100 (2nd column). The rarity-weighted richness impacted by SLR is shown in the second row. This metric represents the cumulative importance of an area to all species it supports, calculated as the sum of the reciprocals of total habitat of all species found in the area. The third row corresponds to threatened species richness by 2050 and by 2100 under predicted SLR. This metric indicates the number of species in a given area of inundation that are

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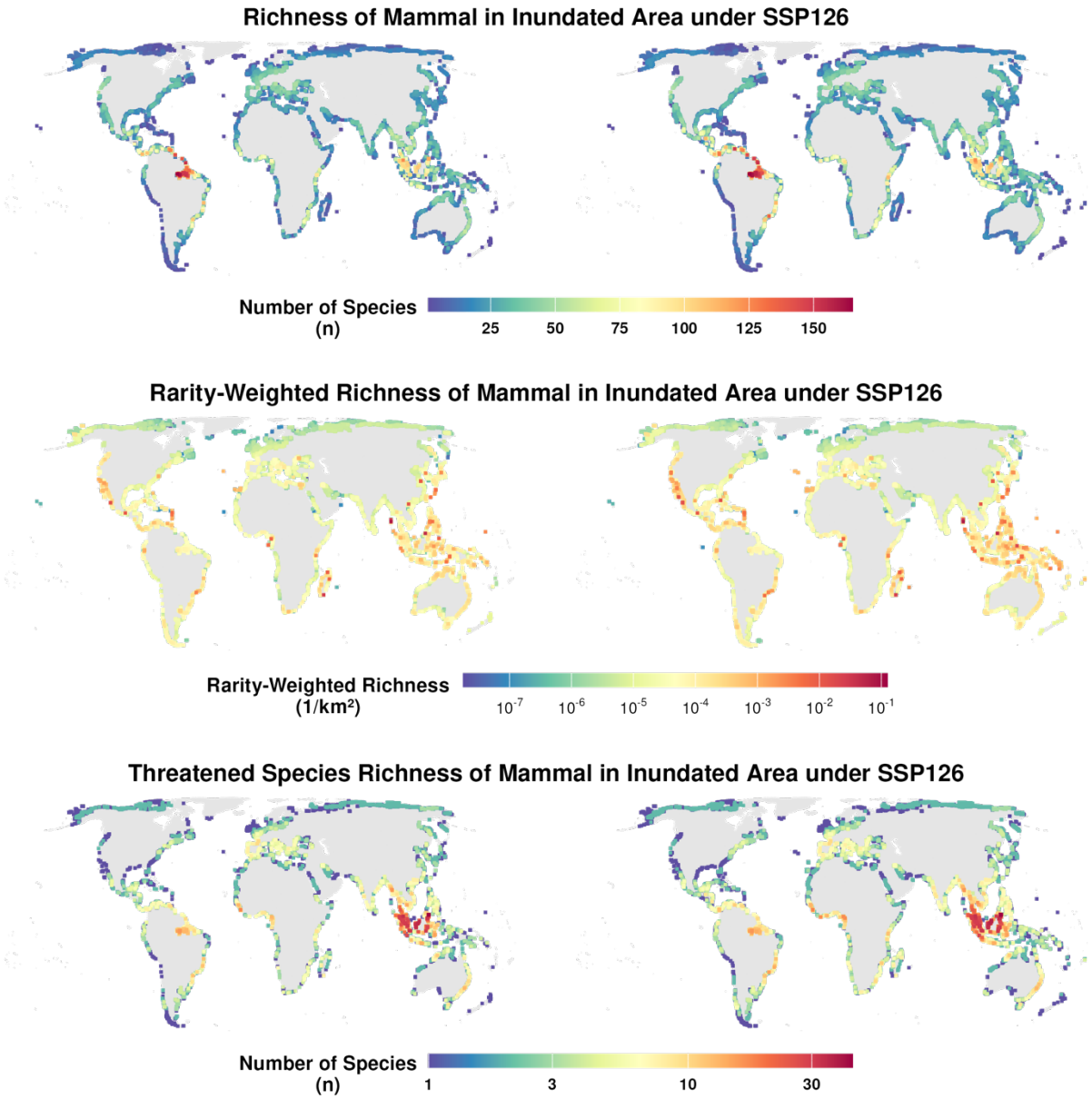

Figure S18 Spatial patterns of SLR impacts on mammal. The first row refers respectively to species richness (defined as the number of species present in a given area) impacted by SLR by 2050 (1st column) and by 2100 (2nd column). The rarity-weighted richness impacted by SLR is shown in the second row. This metric represents the cumulative importance of an area to all species it supports, calculated as the sum of the reciprocals of total habitat of all species found in

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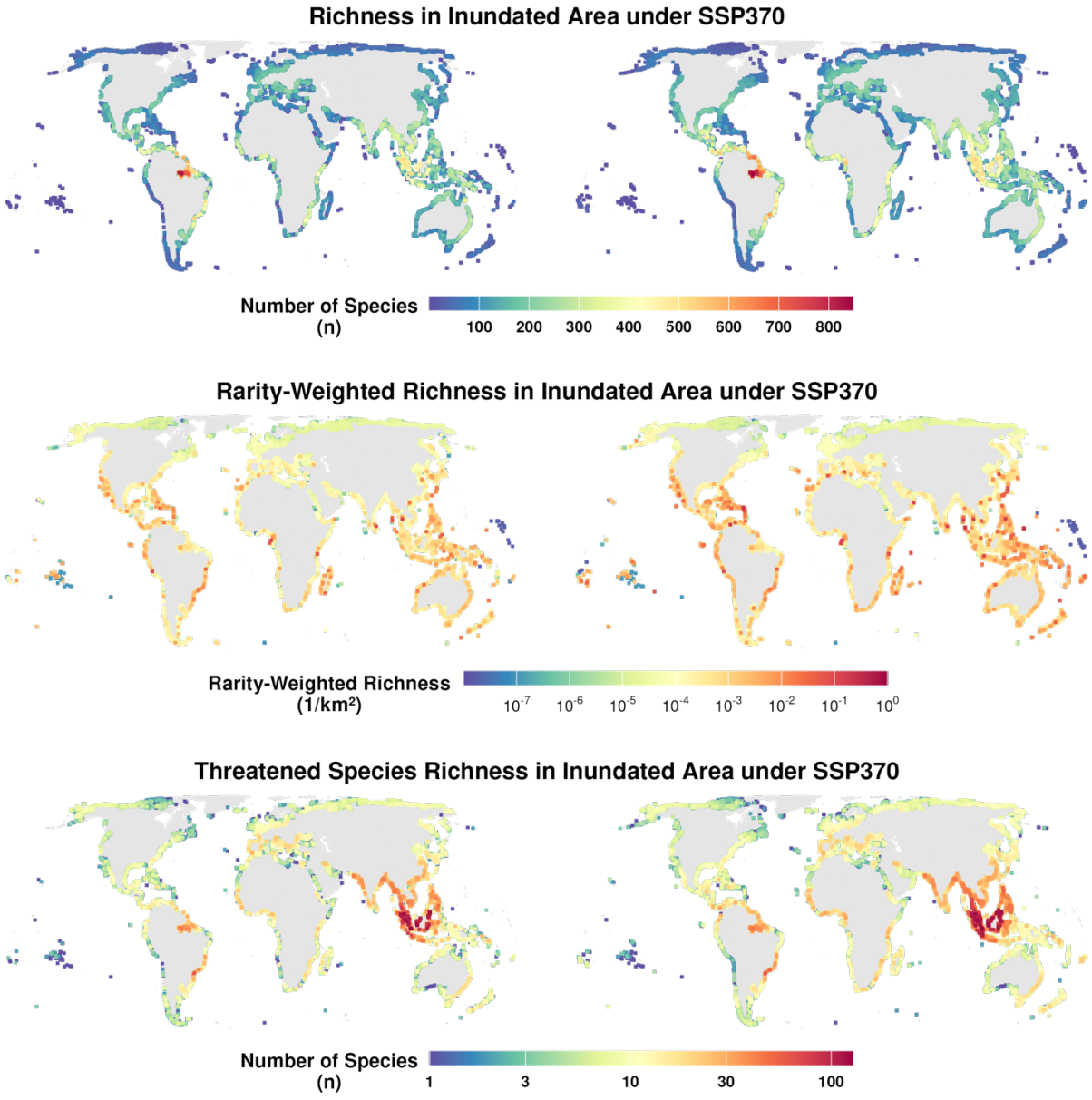

Figure S19 Spatial patterns of SLR impacts on terrestrial vertebrate species. The first row refers respectively to species richness (defined as the number of species present in a given area) impacted by SLR by 2050 (1st column) and by 2100 (2nd column). The rarity-weighted richness

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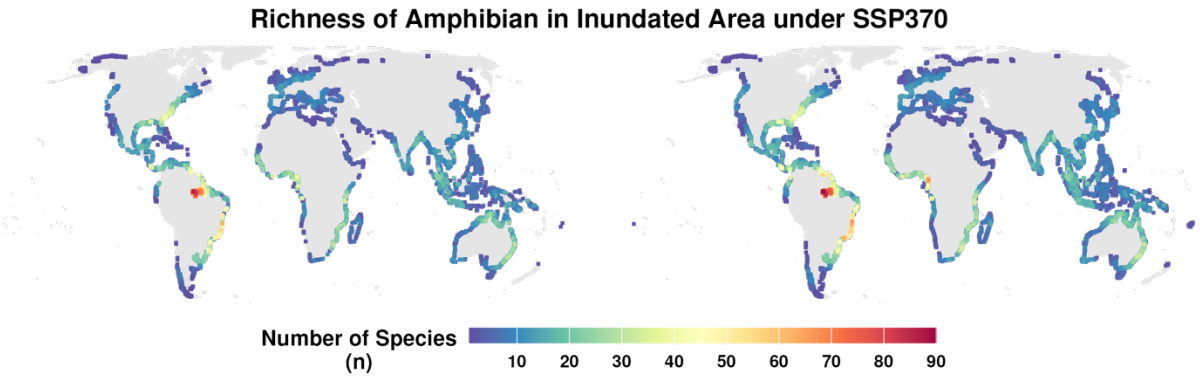

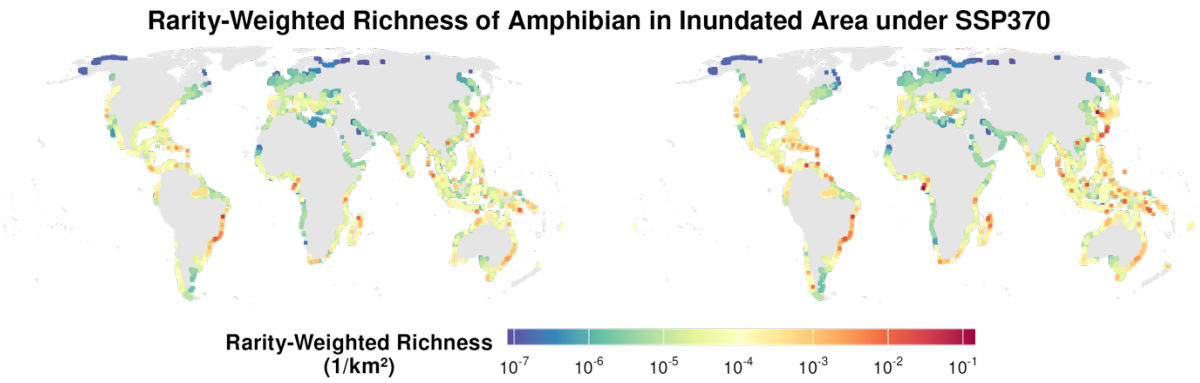

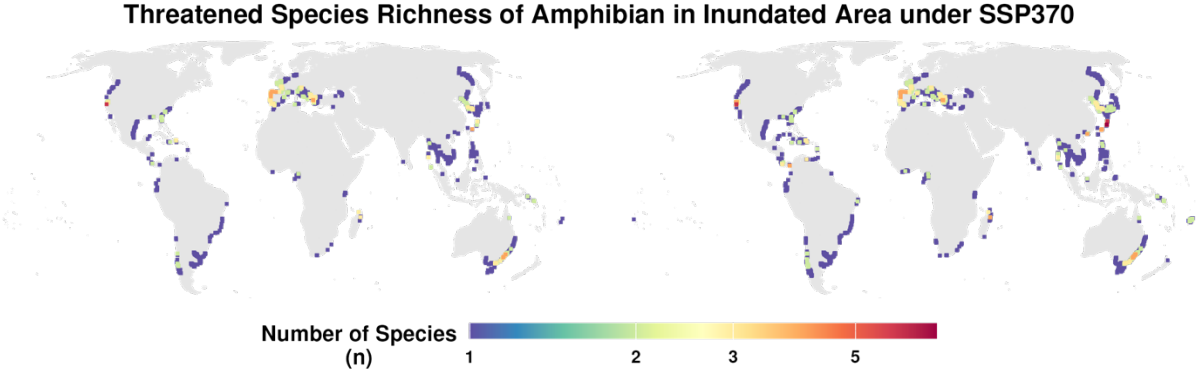

Figure S20 Spatial patterns of SLR impacts on amphibian. The first row refers respectively to species richness (defined as the number of species present in a given area) impacted by SLR by 2050 (1st column) and by 2100 (2nd column). The rarity-weighted richness impacted by SLR is shown in the second row. This metric represents the cumulative importance of an area to all species it supports, calculated as the sum of the reciprocals of total habitat of all species found in the area. The third row corresponds to threatened species richness by 2050 and by 2100 under predicted SLR. This metric indicates the number of species in a given area of inundation that are currently classified as threatened according to the IUCN threat status. Displayed above is for the medium SLR scenario (SSP370) and all data are presented at 1 × 1 km spatial resolution.

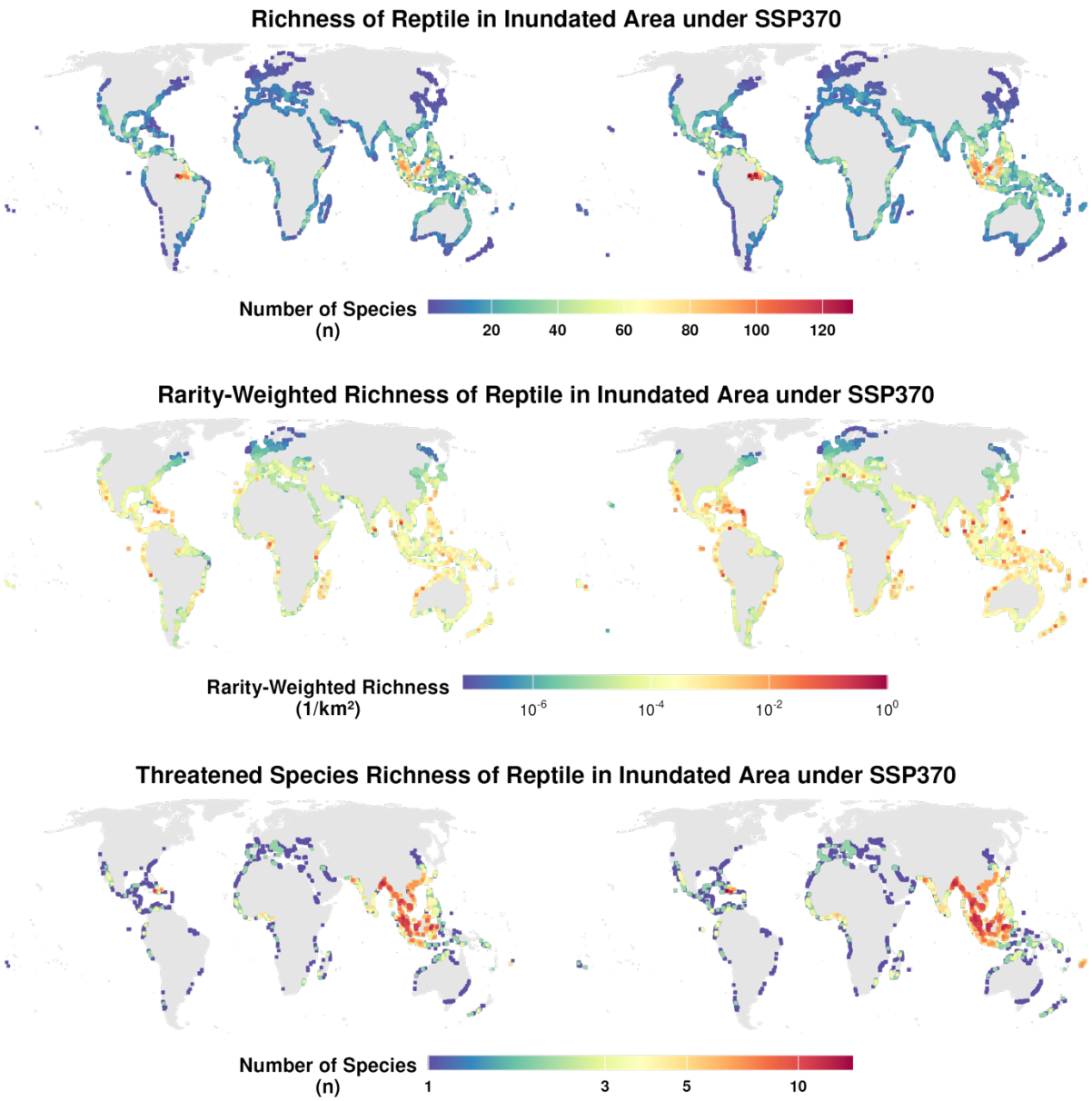

Figure S21 Spatial patterns of SLR impacts on reptile. The first row refers respectively to species richness (defined as the number of species present in a given area) impacted by SLR by 2050 (1st column) and by 2100 (2nd column). The rarity-weighted richness impacted by SLR is shown in the second row. This metric represents the cumulative importance of an area to all species it supports, calculated as the sum of the reciprocals of total habitat of all species found in the area. The third row corresponds to threatened species richness by 2050 and by 2100 under predicted SLR. This metric indicates the number of species in a given area of inundation that are

currently classified as threatened according to the IUCN threat status. Displayed above is for the medium SLR scenario (SSP370) and all data are presented at 1 × 1 km spatial resolution.

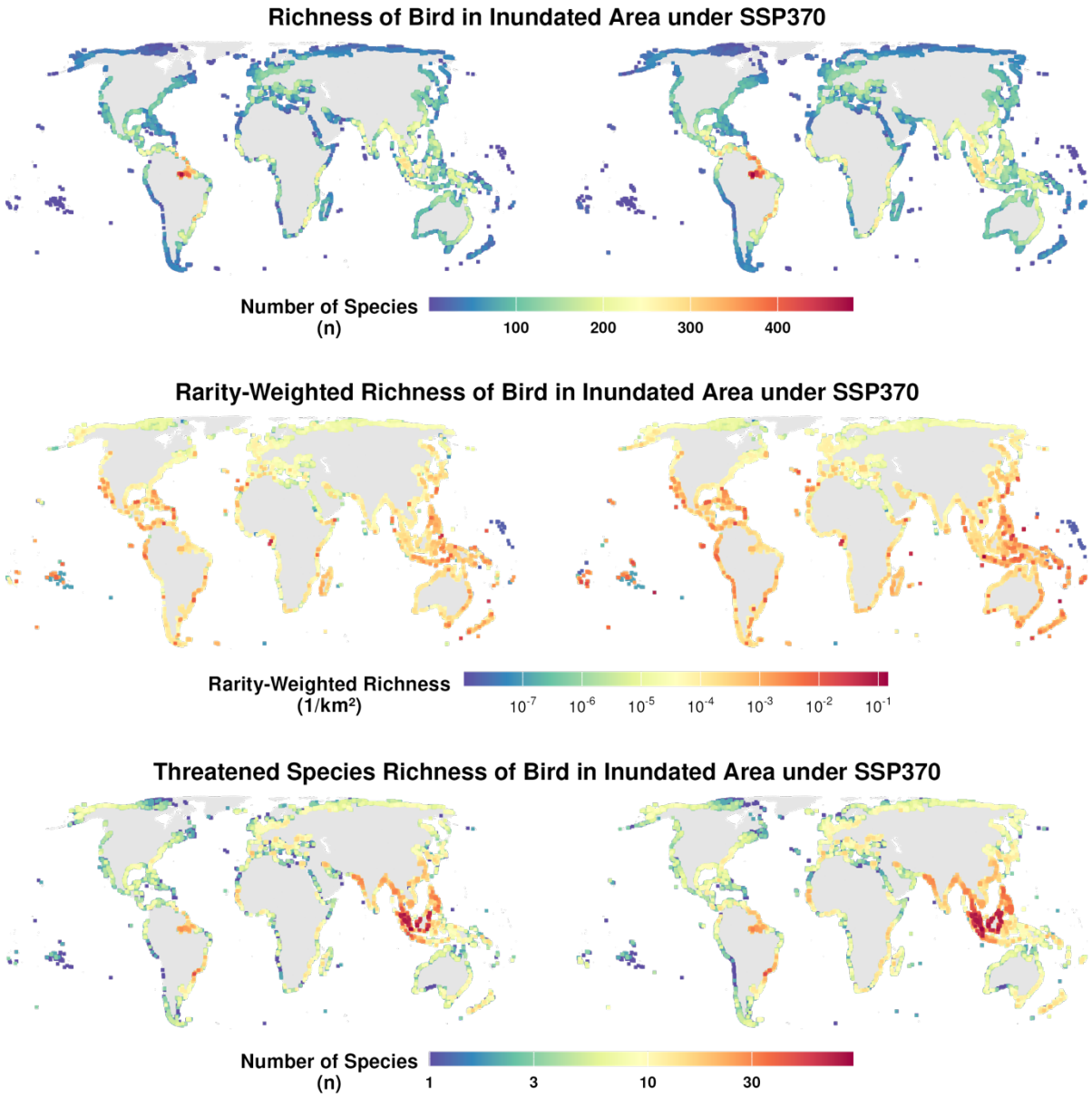

Figure S22 Spatial patterns of SLR impacts on bird. The first row refers respectively to species richness (defined as the number of species present in a given area) impacted by SLR by 2050 (1st column) and by 2100 (2nd column). The rarity-weighted richness impacted by SLR is shown in the second row. This metric represents the cumulative importance of an area to all species it supports, calculated as the sum of the reciprocals of total habitat of all species found in

the area. The third row corresponds to threatened species richness by 2050 and by 2100 under predicted SLR. This metric indicates the number of species in a given area of inundation that are currently classified as threatened according to the IUCN threat status. Displayed above is for the medium SLR scenario (SSP370) and all data are presented at 1 × 1 km spatial resolution.

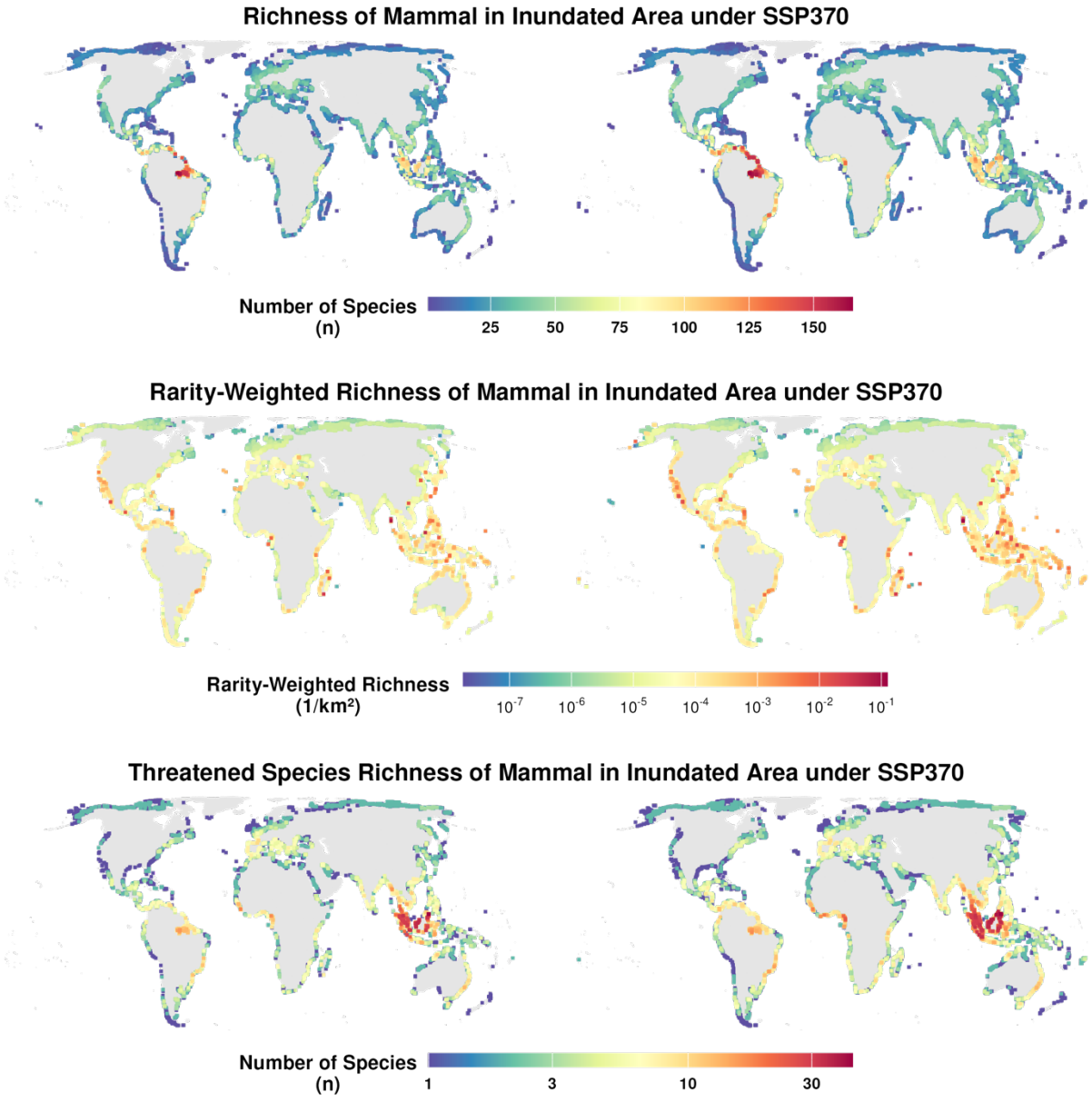

Figure S23 Spatial patterns of SLR impacts on mammal. The first row refers respectively to species richness (defined as the number of species present in a given area) impacted by SLR by 2050 (1st column) and by 2100 (2nd column). The rarity-weighted richness impacted by SLR is

shown in the second row. This metric represents the cumulative importance of an area to all species it supports, calculated as the sum of the reciprocals of total habitat of all species found in the area. The third row corresponds to threatened species richness by 2050 and by 2100 under predicted SLR. This metric indicates the number of species in a given area of inundation that are currently classified as threatened according to the IUCN threat status. Displayed above is for the medium SLR scenario (SSP370) and all data are presented at 1 × 1 km spatial resolution.

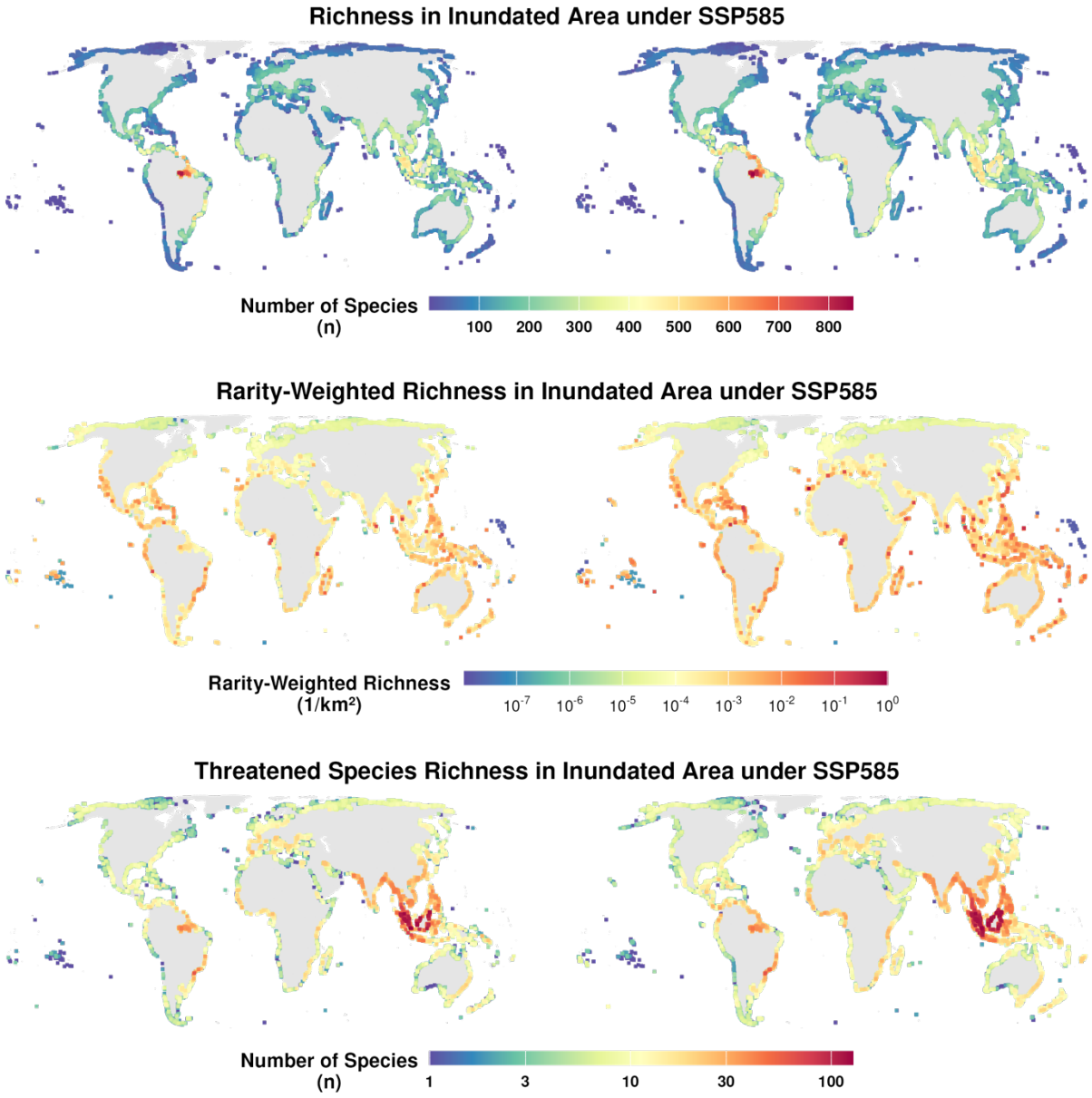

Figure S24 Spatial patterns of SLR impacts on terrestrial vertebrate species. The first row refers respectively to species richness (defined as the number of species present in a given area) impacted by SLR by 2050 (1st column) and by 2100 (2nd column). The rarity-weighted richness impacted by SLR is shown in the second row. This metric represents the cumulative importance of an area to all species it supports, calculated as the sum of the reciprocals of total habitat of all species found in the area. The third row corresponds to threatened species richness by 2050 and by 2100 under predicted SLR. This metric indicates the number of species in a given area of inundation that are currently classified as threatened according to the IUCN threat status. Displayed above is for the medium SLR scenario (SSP585) and all data are presented at 1 × 1 km spatial resolution.

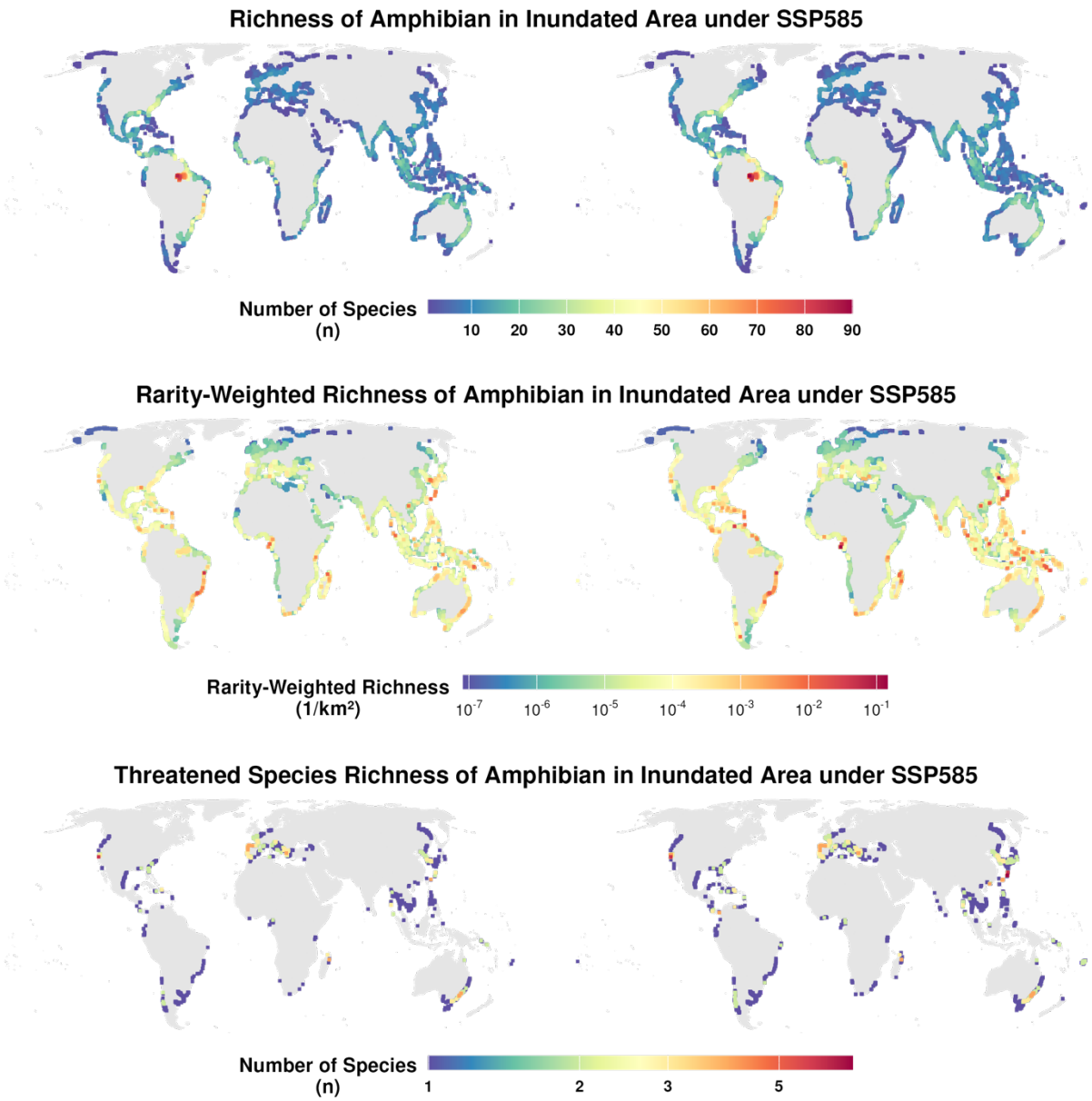

Figure S25 Spatial patterns of SLR impacts on amphibian. The first row refers respectively to species richness (defined as the number of species present in a given area) impacted by SLR by 2050 (1st column) and by 2100 (2nd column). The rarity-weighted richness impacted by SLR is shown in the second row. This metric represents the cumulative importance of an area to all species it supports, calculated as the sum of the reciprocals of total habitat of all species found in the area. The third row corresponds to threatened species richness by 2050 and by 2100 under predicted SLR. This metric indicates the number of species in a given area of inundation that are

currently classified as threatened according to the IUCN threat status. Displayed above is for the medium SLR scenario (SSP585) and all data are presented at 1 × 1 km spatial resolution.

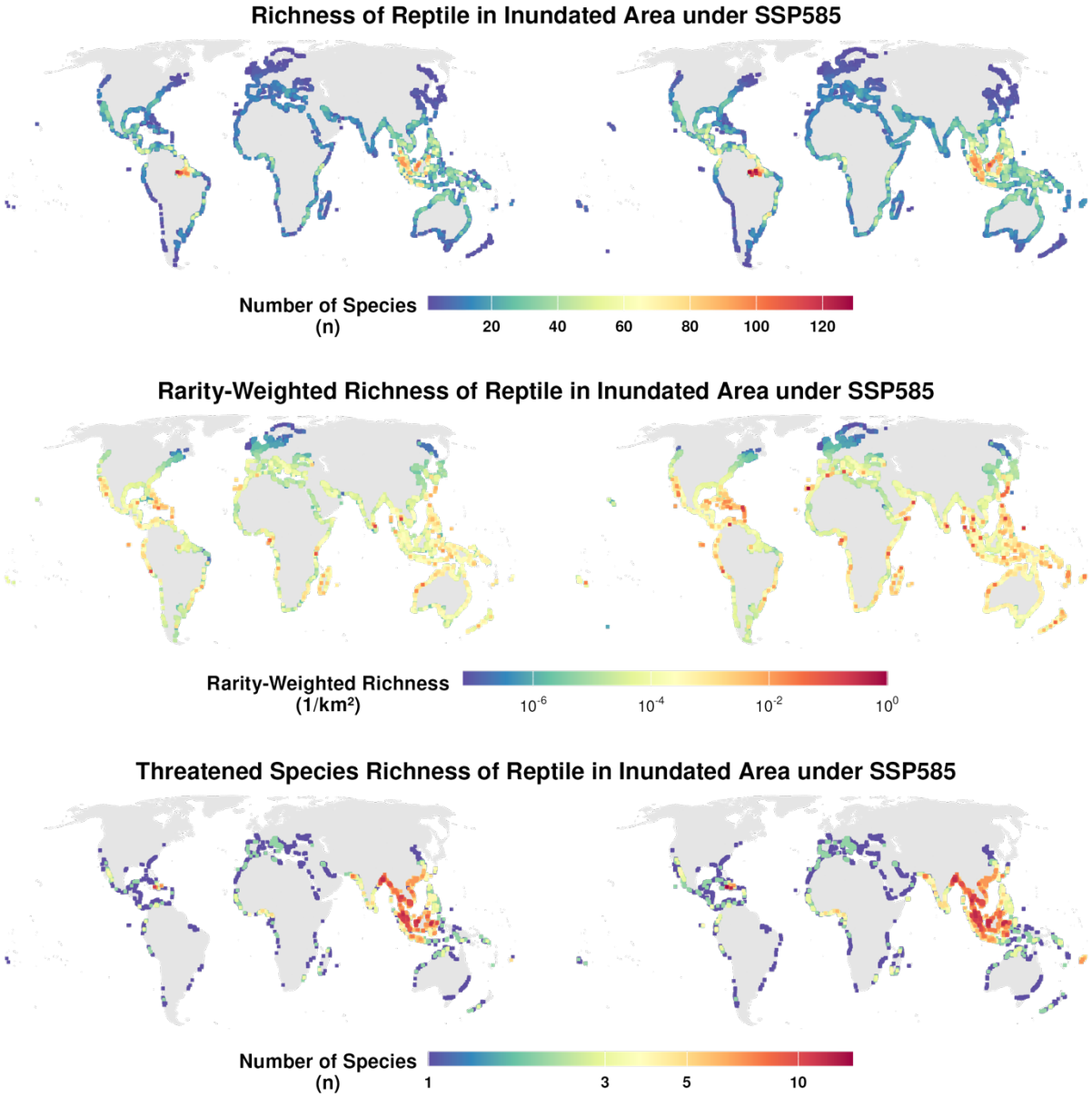

Figure S26 Spatial patterns of SLR impacts on reptile. The first row refers respectively to species richness (defined as the number of species present in a given area) impacted by SLR by 2050 (1st column) and by 2100 (2nd column). The rarity-weighted richness impacted by SLR is shown in the second row. This metric represents the cumulative importance of an area to all species it supports, calculated as the sum of the reciprocals of total habitat of all species found in

the area. The third row corresponds to threatened species richness by 2050 and by 2100 under predicted SLR. This metric indicates the number of species in a given area of inundation that are currently classified as threatened according to the IUCN threat status. Displayed above is for the medium SLR scenario (SSP585) and all data are presented at 1 × 1 km spatial resolution.

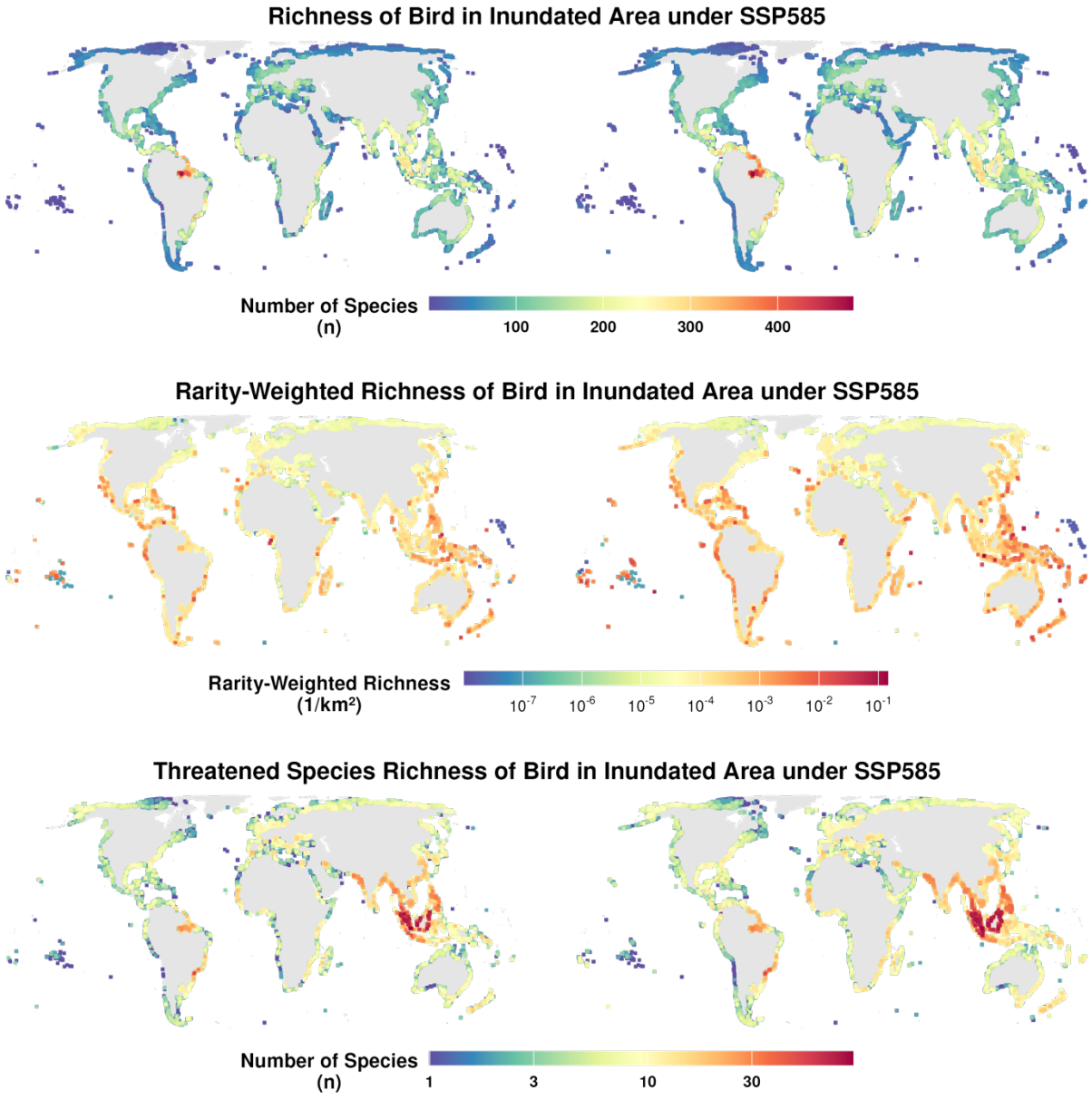

Figure S27 Spatial patterns of SLR impacts on bird. The first row refers respectively to species richness (defined as the number of species present in a given area) impacted by SLR by 2050 (1st column) and by 2100 (2nd column). The rarity-weighted richness impacted by SLR is

shown in the second row. This metric represents the cumulative importance of an area to all species it supports, calculated as the sum of the reciprocals of total habitat of all species found in the area. The third row corresponds to threatened species richness by 2050 and by 2100 under predicted SLR. This metric indicates the number of species in a given area of inundation that are currently classified as threatened according to the IUCN threat status. Displayed above is for the medium SLR scenario (SSP585) and all data are presented at 1 × 1 km spatial resolution.

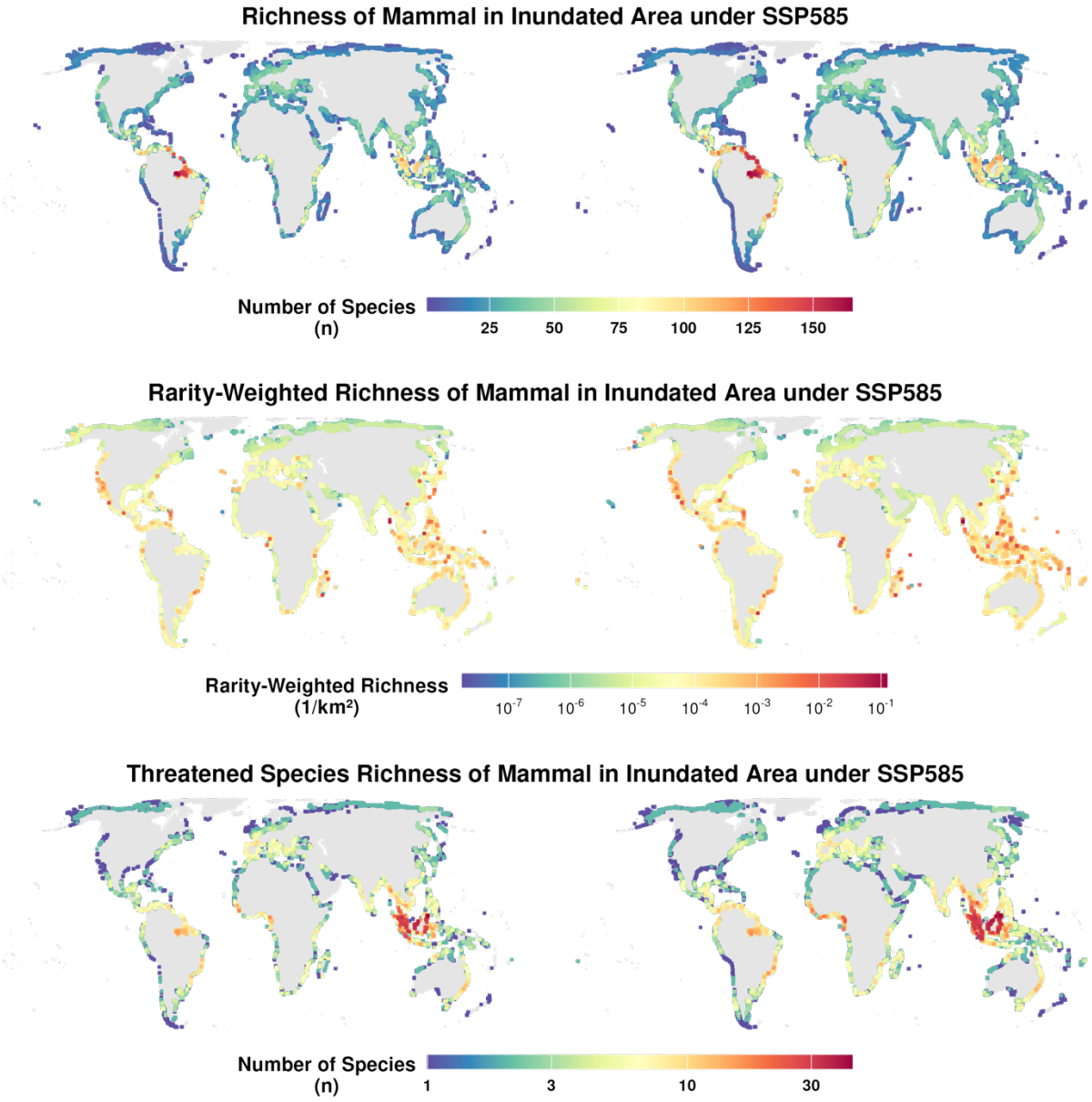

Figure S28 Spatial patterns of SLR impacts on mammal. The first row refers respectively to species richness (defined as the number of species present in a given area) impacted by SLR by 2050 (1st column) and by 2100 (2nd column). The rarity-weighted richness impacted by SLR is shown in the second row. This metric represents the cumulative importance of an area to all species it supports, calculated as the sum of the reciprocals of total habitat of all species found in the area. The third row corresponds to threatened species richness by 2050 and by 2100 under predicted SLR. This metric indicates the number of species in a given area of inundation that are currently classified as threatened according to the IUCN threat status. Displayed above is for the medium SLR scenario (SSP585) and all data are presented at 1 × 1 km spatial resolution.

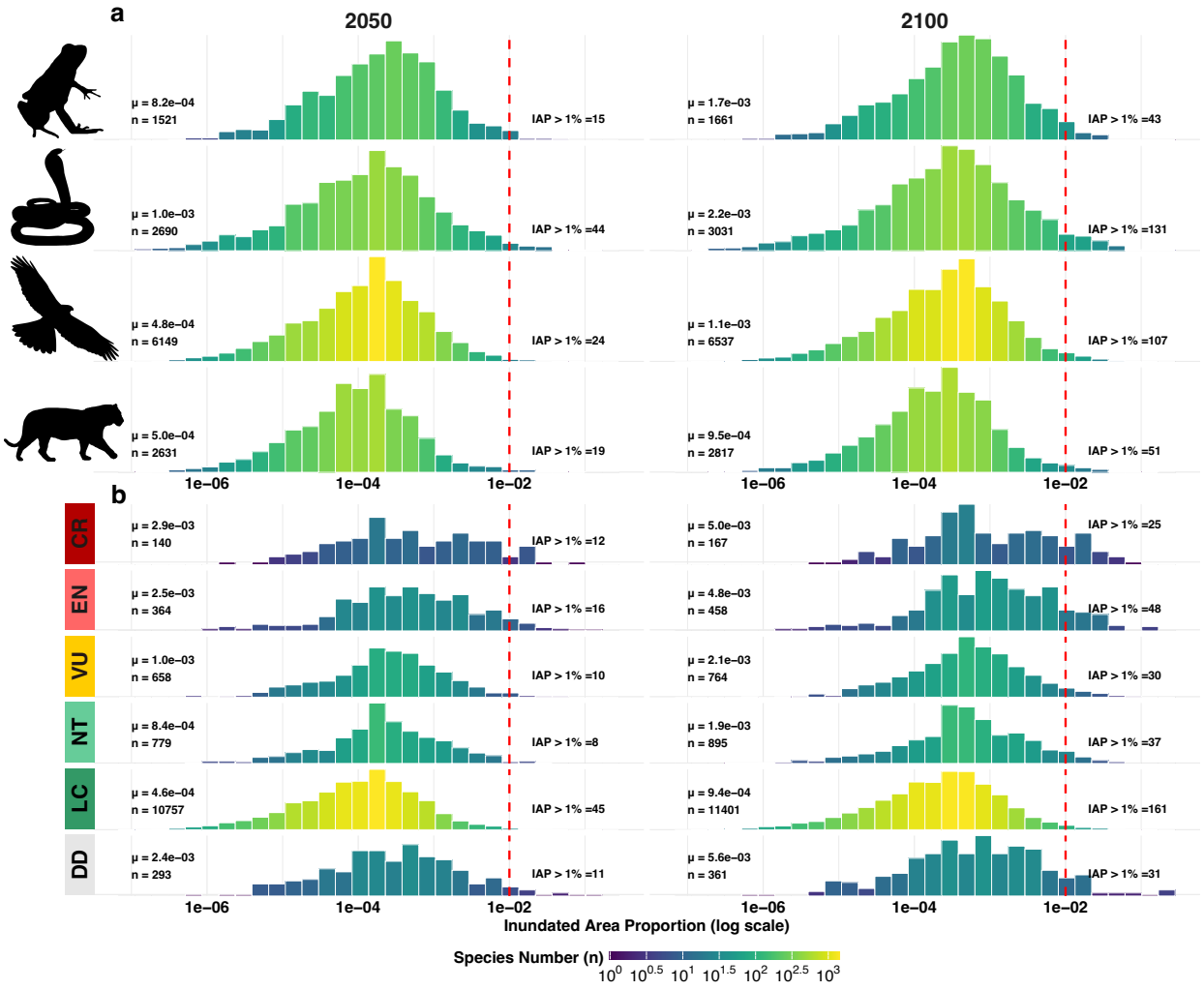

Figure S29 Species-specific vulnerability to SLR impacts. The proportion of habitat inundated (IAP) is presented for the four terrestrial vertebrate groups (a) and six IUCN threat statuses (b) according to SLR by 2050 (1st column) and by 2100 (2nd column). The four groups of terrestrial vertebrate species presented from top to bottom in a correspond to amphibian, reptile, bird and mammal. Similarly, the six IUCN threat statuses shown from top to bottom in b refer to Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Near Threatened (NT), Least Concern (LC) and Data Deficient (DD). The dashed red line marks where 1% of the habitat is inundated, μ represents the estimated mean proportion of habitat inundated of the group, and n denotes the number of species in the group. We also count the number of species whose habitat loss is beyond 1%, as indicated by "IAP > 1%". All displayed above is for the medium SLR scenario (SSP119).

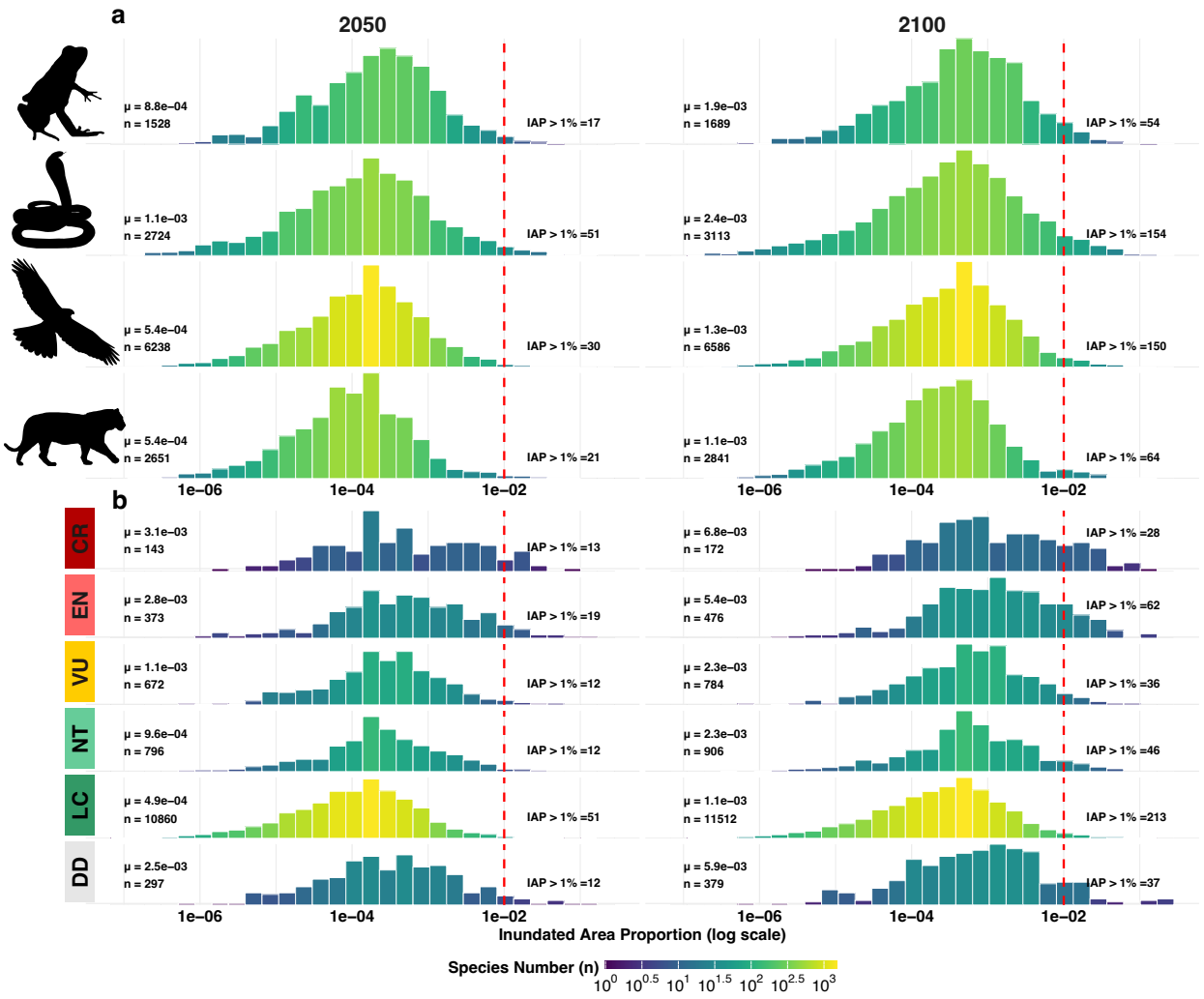

Figure S30 Species-specific vulnerability to SLR impacts. The proportion of habitat inundated (IAP) is presented for the four terrestrial vertebrate groups (a) and six IUCN threat statuses (b) according to SLR by 2050 (1st column) and by 2100 (2nd column). The four groups of terrestrial vertebrate species presented from top to bottom in a correspond to amphibian, reptile, bird and mammal. Similarly, the six IUCN threat statuses shown from top to bottom in b refer to Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Near Threatened (NT), Least Concern (LC) and Data Deficient (DD). The dashed red line marks where 1% of the habitat is inundated, μ represents the estimated mean proportion of habitat inundated of the group, and n denotes the number of species in the group. We also count the number of species whose habitat loss is beyond 1%, as indicated by "IAP > 1%". All displayed above is for the medium SLR scenario (SSP126).

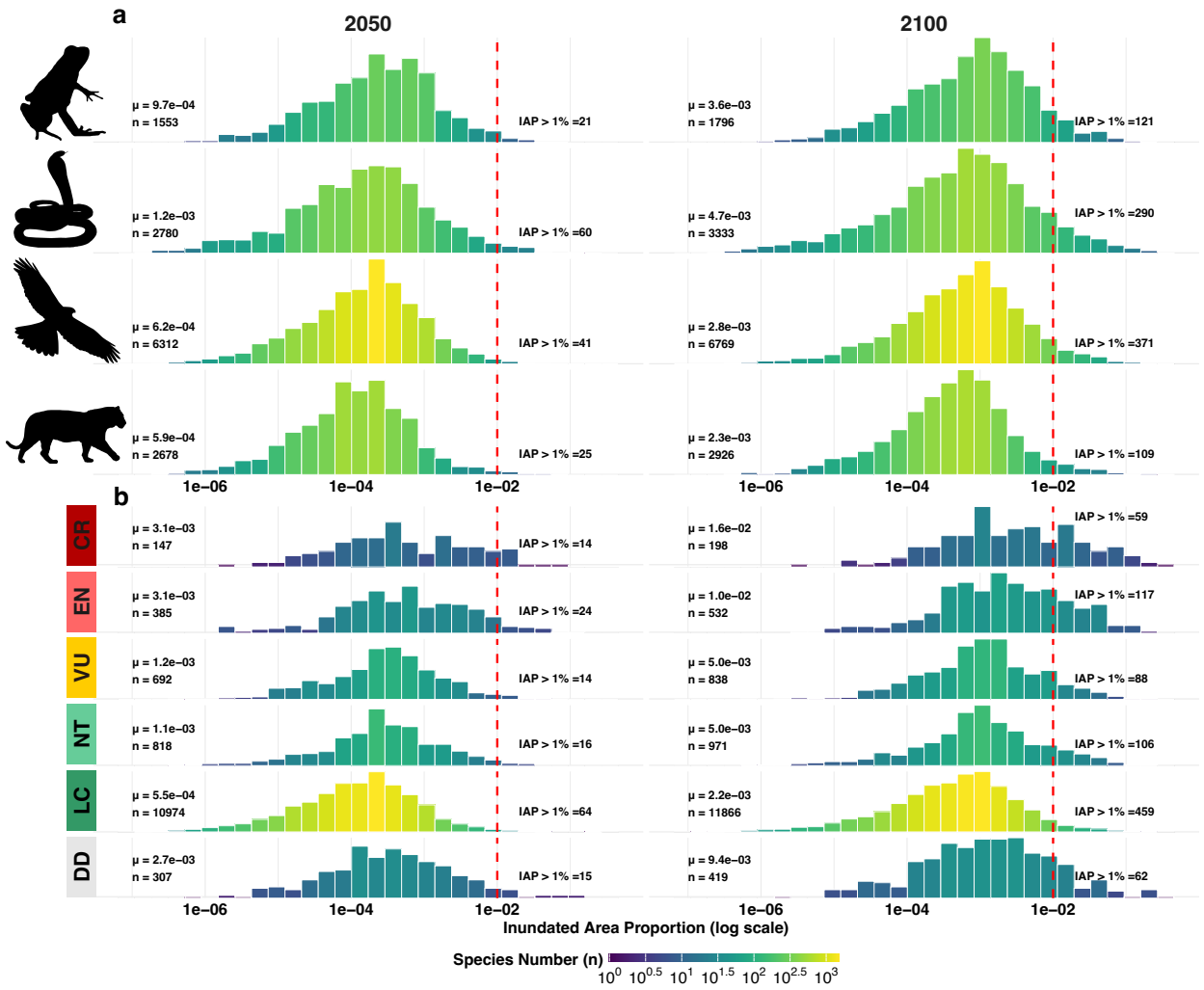

Figure S31 Species-specific vulnerability to SLR impacts. The proportion of habitat inundated (IAP) is presented for the four terrestrial vertebrate groups (a) and six IUCN threat statuses (b) according to SLR by 2050 (1st column) and by 2100 (2nd column). The four groups of terrestrial vertebrate species presented from top to bottom in a correspond to amphibian, reptile, bird and mammal. Similarly, the six IUCN threat statuses shown from top to bottom in b refer to Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Near Threatened (NT), Least Concern (LC) and Data Deficient (DD). The dashed red line marks where 1% of the habitat is inundated, μ represents the estimated mean proportion of habitat inundated of the group, and n denotes the number of species in the group. We also count the number of species whose habitat

loss is beyond 1%, as indicated by “IAP > 1%”. All displayed above is for the medium SLR scenario (SSP370).

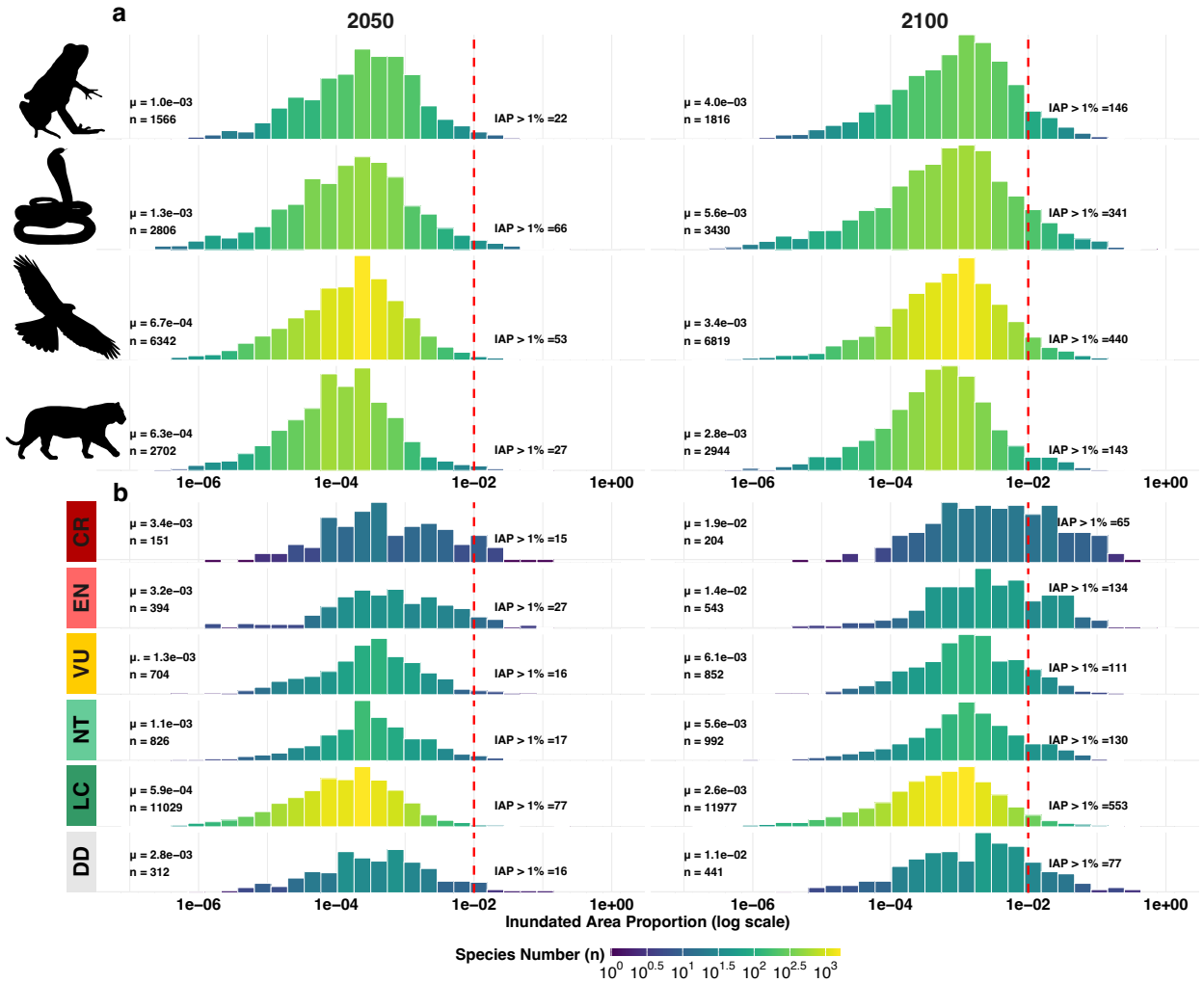

Figure S32 Species-specific vulnerability to SLR impacts. The proportion of habitat inundated (IAP) is presented for the four terrestrial vertebrate groups (a) and six IUCN threat statuses (b) according to SLR by 2050 (1st column) and by 2100 (2nd column). The four groups of terrestrial vertebrate species presented from top to bottom in a correspond to amphibian, reptile, bird and mammal. Similarly, the six IUCN threat statuses shown from top to bottom in b refer to Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Near Threatened (NT), Least Concern (LC) and Data Deficient (DD). The dashed red line marks where 1% of the habitat is inundated, μ represents the estimated mean proportion of habitat inundated of the group, and n

denotes the number of species in the group. We also count the number of species whose habitat loss is beyond 1%, as indicated by "IAP > 1%". All displayed above is for the medium SLR scenario (SSP585).

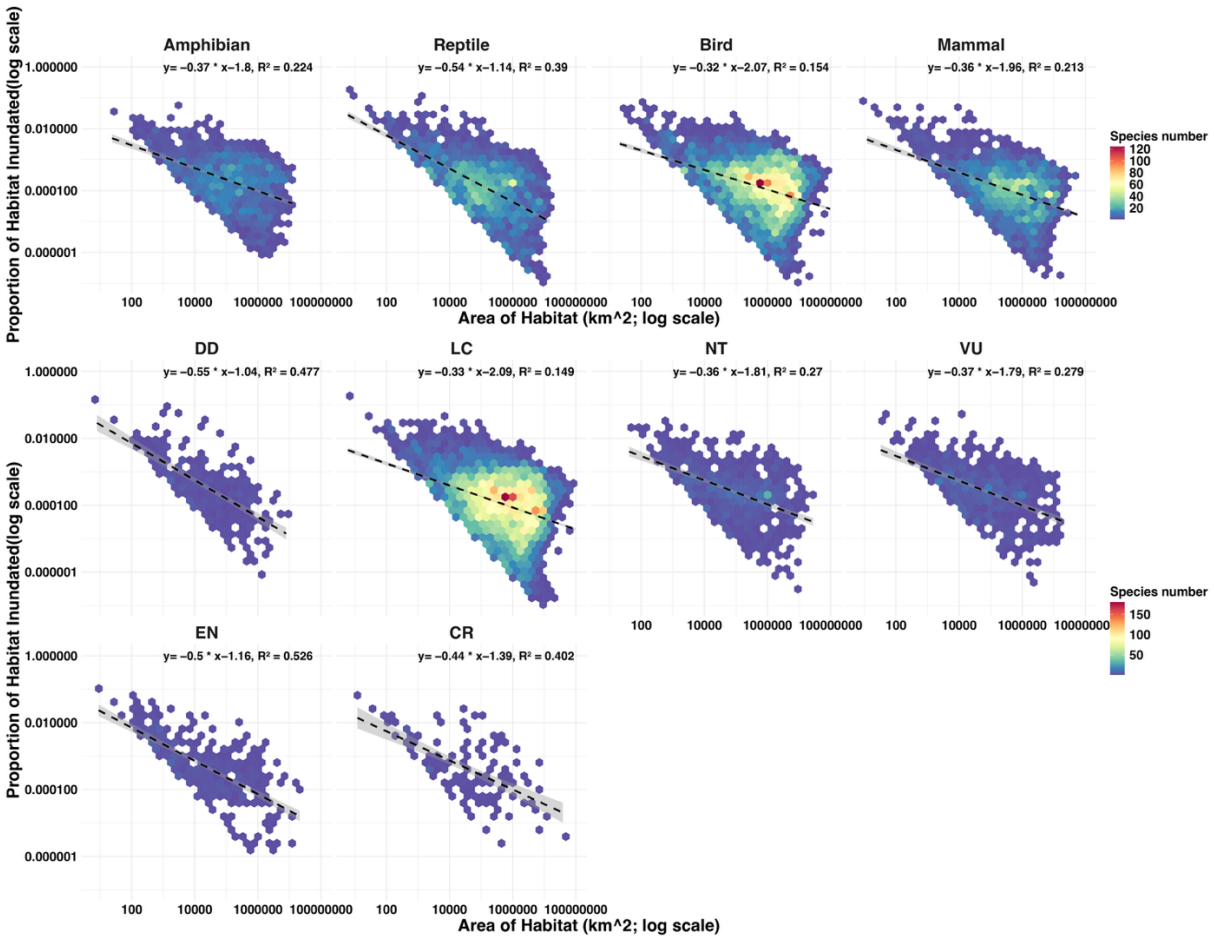

Figure S33 Proportion of habitat inundation is inversely correlated with species' AOH. The relationship is consistently significant regardless of changing terrestrial vertebrate groups or IUCN threat statuses. Displayed above is all for predictions by 2050 under medium SLR scenario (SSP245).

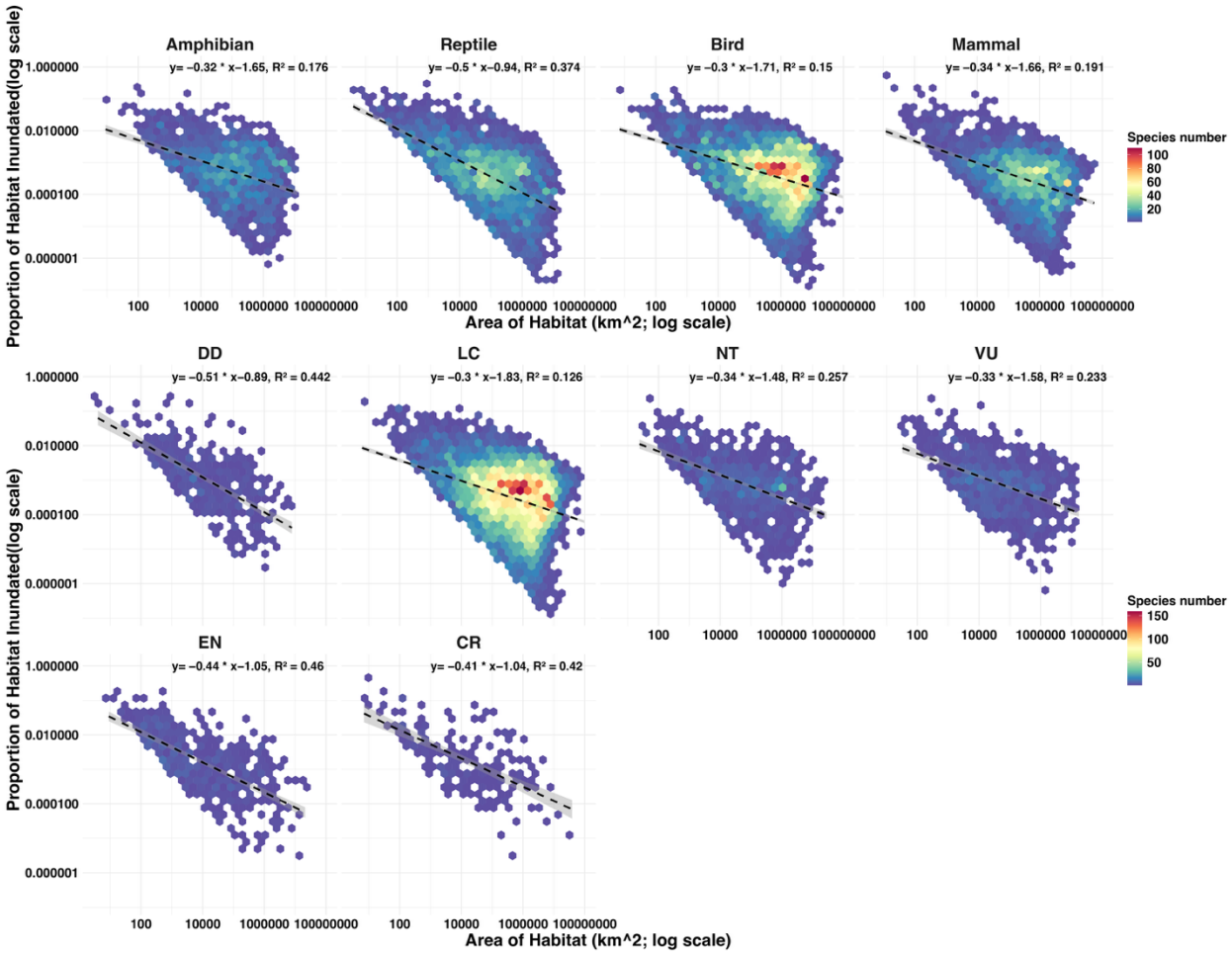

Figure S34 Proportion of habitat inundation is inversely correlated with species' AOH. The relationship is consistently significant regardless of changing terrestrial vertebrate groups or IUCN threat statuses. Displayed above is all for predictions by 2100 under medium SLR scenario (SSP245).

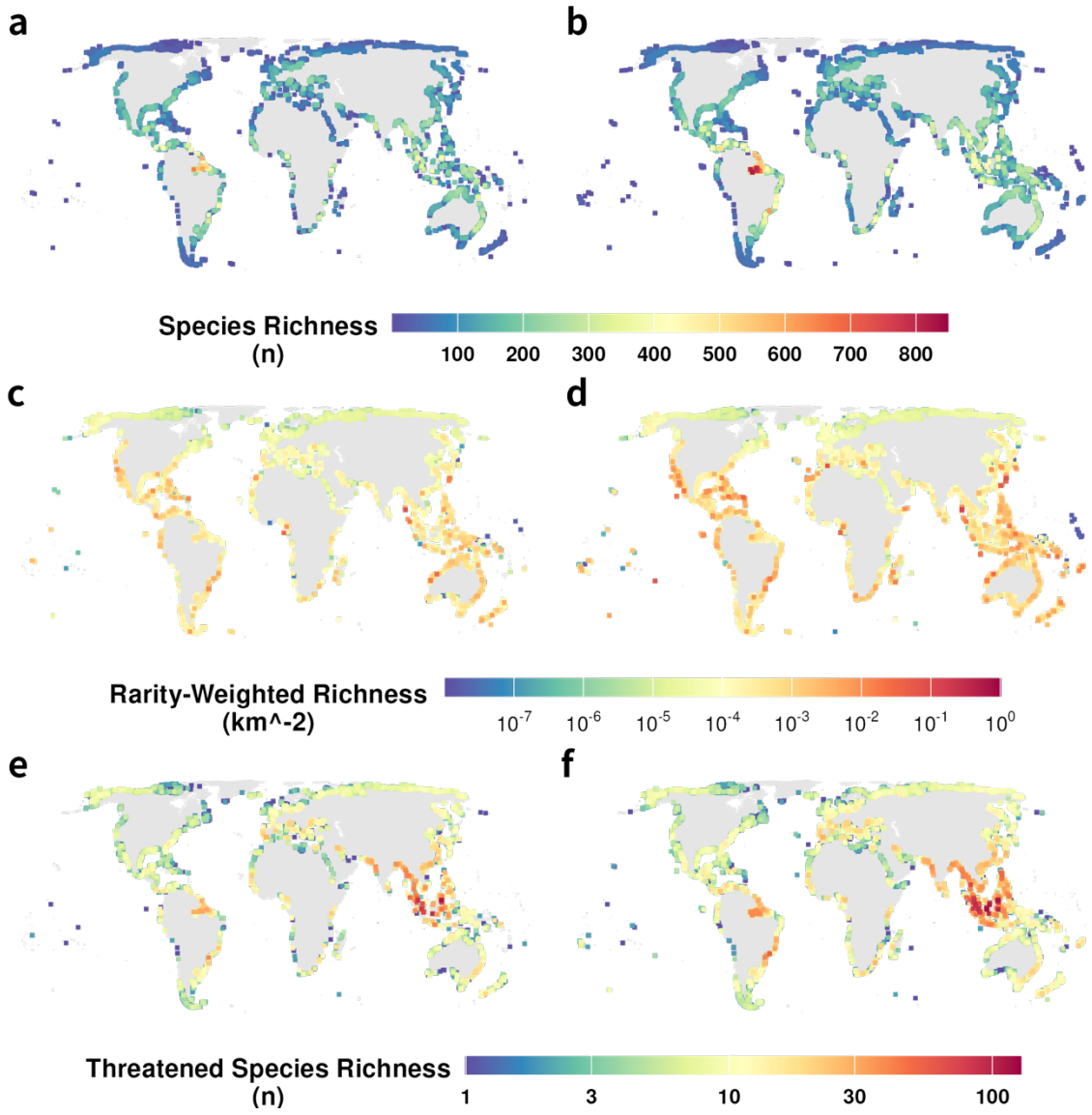

Figure S35 Spatial patterns of SLR impacts on terrestrial vertebrate after human intervention accounted. Human intervention is represented by the establishment of flood-defense barriers, assumed only in areas with a population density of at least 5 people per km^2 that are increasingly flooded by SLR. **a** and **b** refer respectively to species richness (defined as the number of species present in a given area) impacted by SLR by 2050 and by 2100. The rarity-weighted richness impacted by SLR is shown in **c** (by 2050) and **d** (by 2100). This metric represents the cumulative importance of an area to all species it supports, calculated as the sum of the reciprocals of total habitat of all species found in the area. **e** and **f** correspond to threatened

species richness by 2050 (**e**) and by 2100 (**f**) under predicted SLR. This metric indicates the number of species in a given area that are currently classified as threatened according to the IUCN threat status. Displayed above is for the medium SLR scenario (SSP245) and all data are presented at 1 × 1 km spatial resolution.

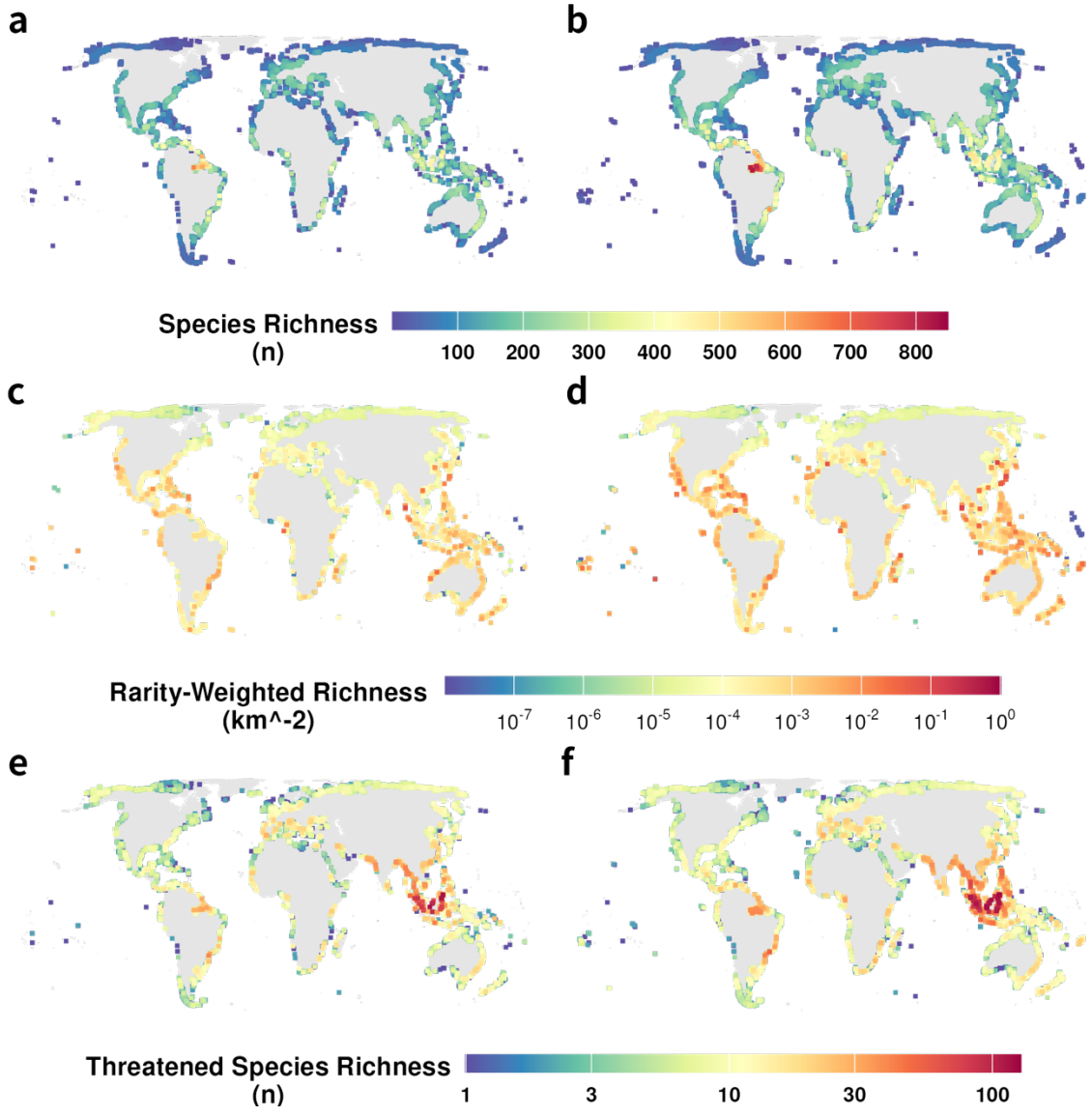

Figure S36 Spatial patterns of SLR impacts on terrestrial vertebrate after human intervention accounted. Human intervention is represented by the establishment of flood-defense barriers, assumed only in areas with a population density of at least 20 people per km^2

that are increasingly flooded by SLR. **a** and **b** refer respectively to species richness (defined as the number of species present in a given area) impacted by SLR by 2050 and by 2100. The rarity-weighted richness impacted by SLR is shown in **c** (by 2050) and **d** (by 2100). This metric represents the cumulative importance of an area to all species it supports, calculated as the sum of the reciprocals of total habitat of all species found in the area. **e** and **f** correspond to threatened species richness by 2050 (**e**) and by 2100 (**f**) under predicted SLR. This metric indicates the number of species in a given area that are currently classified as threatened according to the IUCN threat status. Displayed above is for the medium SLR scenario (SSP245) and all data are presented at 1 × 1 km spatial resolution.

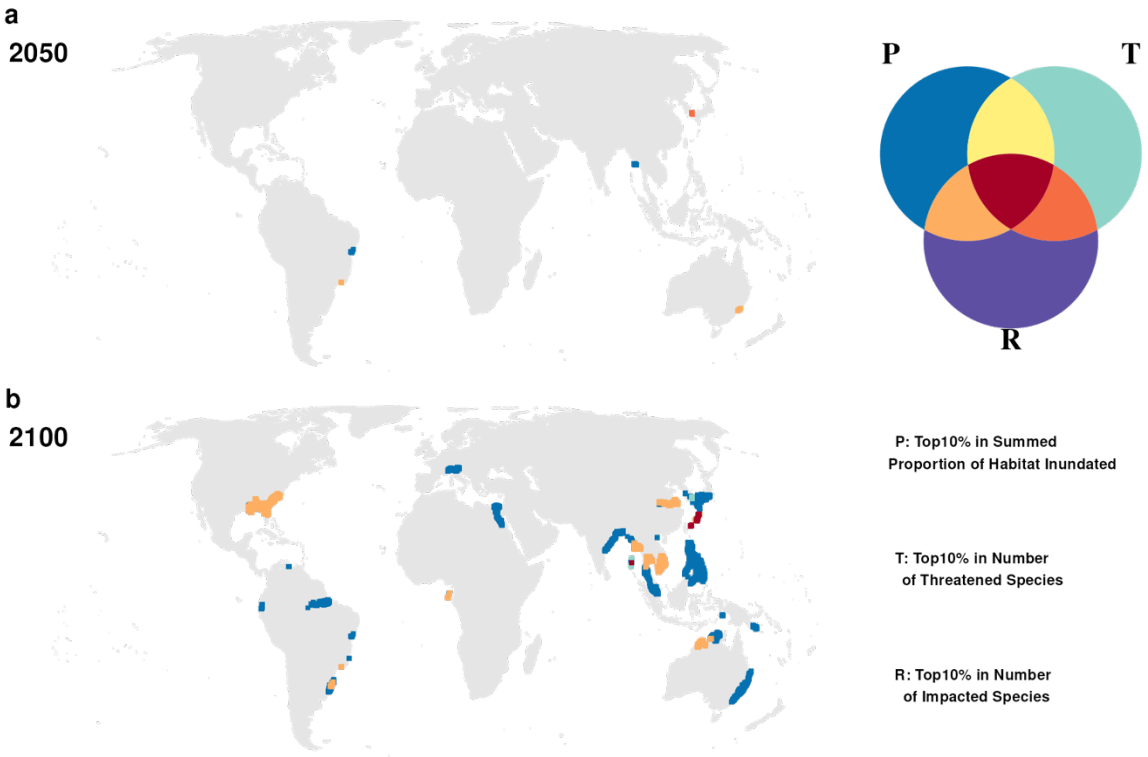

Figure S37 Spatial pattern of global SLR refugia for amphibian. The dark red color indicates the location of SLR refugia identified around the globe by predicted SLR by 2050 (**a**) and by 2100 (**b**). Here SLR refugia refer to the non-inundated areas which rank simultaneously among the top 10% in three metrics: the summed proportion of habitat inundated (denoted as P), the number of threatened species (T), and the number of impacted species (R). The analysis is

performed for all species with at least 1% of AOH lost to SLR. All displayed above is for the medium SLR scenario (SSP245).

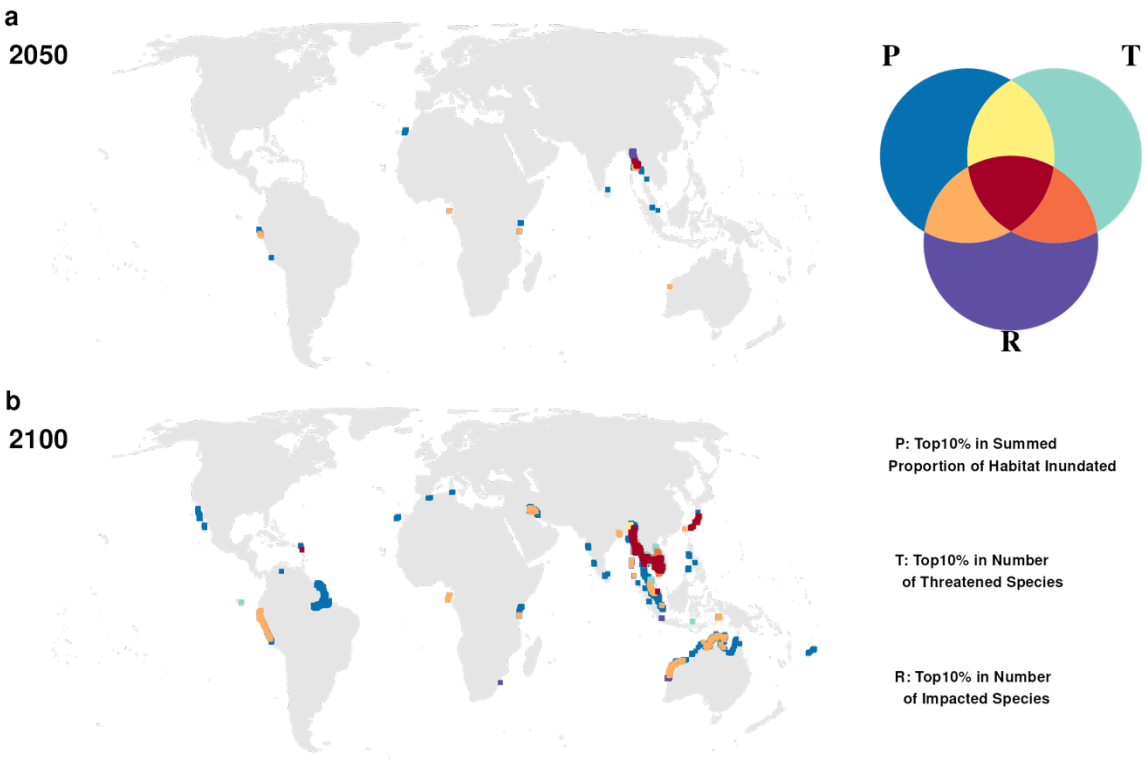

Figure S38 Spatial pattern of global SLR refugia for reptile. The dark red color indicates the location of SLR refugia identified around the globe by predicted SLR by 2050 (**a**) and by 2100 (**b**). Here SLR refugia refer to the non-inundated areas which rank simultaneously among the top 10% in three metrics: the summed proportion of habitat inundated (denoted as P), the number of threatened species (T), and the number of impacted species (R). The analysis is performed for all species with at least 1% of AOH lost to SLR. All displayed above is for the medium SLR scenario (SSP245).

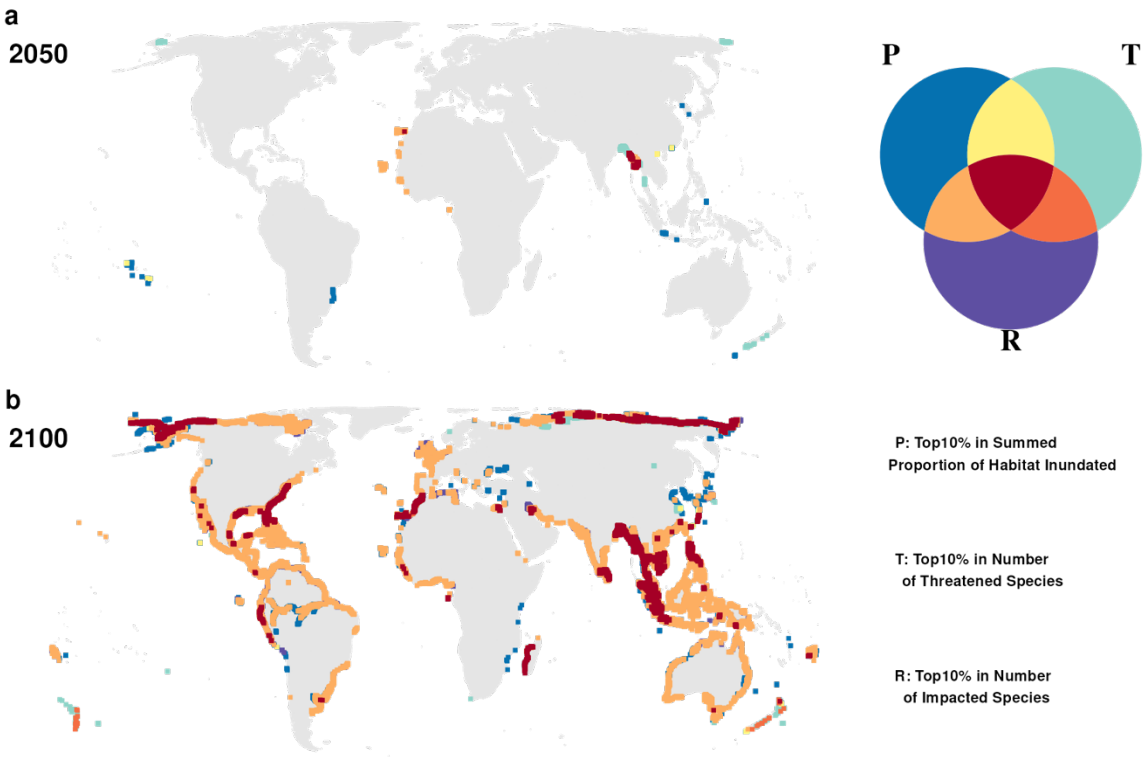

Figure S39 Spatial pattern of global SLR refugia for bird. The dark red color indicates the location of SLR refugia identified around the globe by predicted SLR by 2050 (**a**) and by 2100 (**b**). Here SLR refugia refer to the non-inundated areas which rank simultaneously among the top 10% in three metrics: the summed proportion of habitat inundated (denoted as P), the number of threatened species (T), and the number of impacted species (R). The analysis is performed for all species with at least 1% of AOH lost to SLR. All displayed above is for the medium SLR scenario (SSP245).

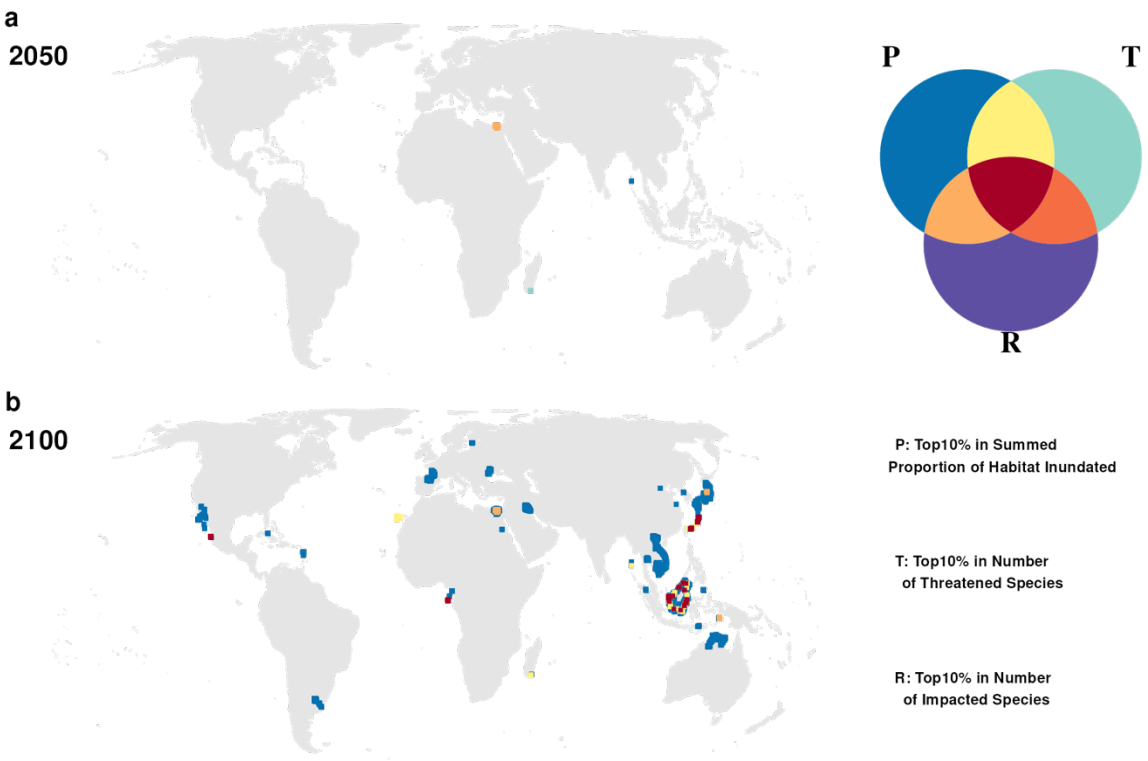

Figure S40 Spatial pattern of global SLR refugia for mammal. The dark red color indicates the location of SLR refugia identified around the globe by predicted SLR by 2050 (**a**) and by 2100 (**b**). Here SLR refugia refer to the non-inundated areas which rank simultaneously among the top 10% in three metrics: the summed proportion of habitat inundated (denoted as P), the number of threatened species (T), and the number of impacted species (R). The analysis is performed for all species with at least 1% of AOH lost to SLR. All displayed above is for the medium SLR scenario (SSP245).

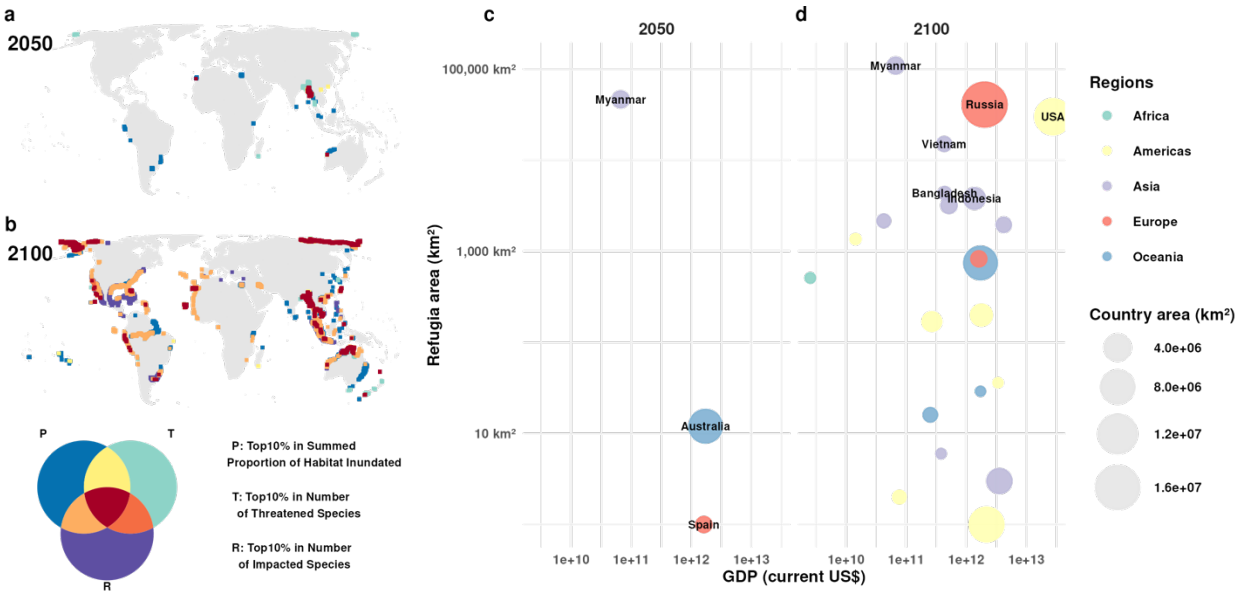

Figure S41 Spatial pattern and country-level information of global SLR refugia. The dark red color indicates the location of SLR refugia identified around the globe by predicted SLR by 2050 (**a**) and by 2100 (**b**). Here SLR refugia refer to the non-inundated areas which rank simultaneously among the top 10% in three metrics: the summed proportion of habitat inundated (denoted as P), the number of threatened species (T), and the number of impacted species (R). The analysis is performed for all species with at least 1% of AOH lost to SLR. Country-level information of SLR refugia is given in **c** (by 2050) and **d** (by 2100), where the area of refugia supported by a nation is plotted against the nation's present-day GDP (current US dollars). We differentiate countries by continents using variable colors and scale the size of a country to its land area. Highlighted with names are countries predicted to host the most expansive SLR refugia among all nations on earth. All displayed above is for the medium SLR scenario (SSP119).

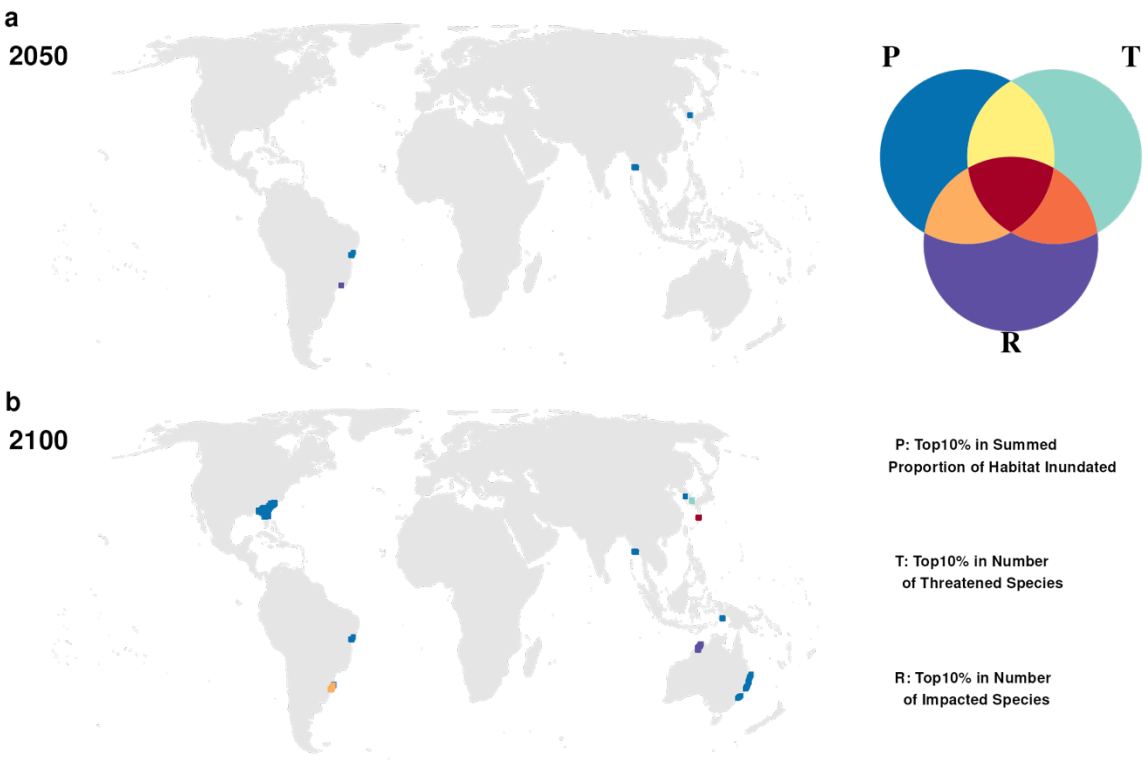

Figure S42 Spatial pattern of global SLR refugia for amphibian. The dark red color indicates the location of SLR refugia identified around the globe by predicted SLR by 2050 (**a**) and by 2100 (**b**). Here SLR refugia refer to the non-inundated areas which rank simultaneously among the top 10% in three metrics: the summed proportion of habitat inundated (denoted as P), the number of threatened species (T), and the number of impacted species (R). The analysis is performed for all species with at least 1% of AOH lost to SLR. All displayed above is for the medium SLR scenario (SSP119).

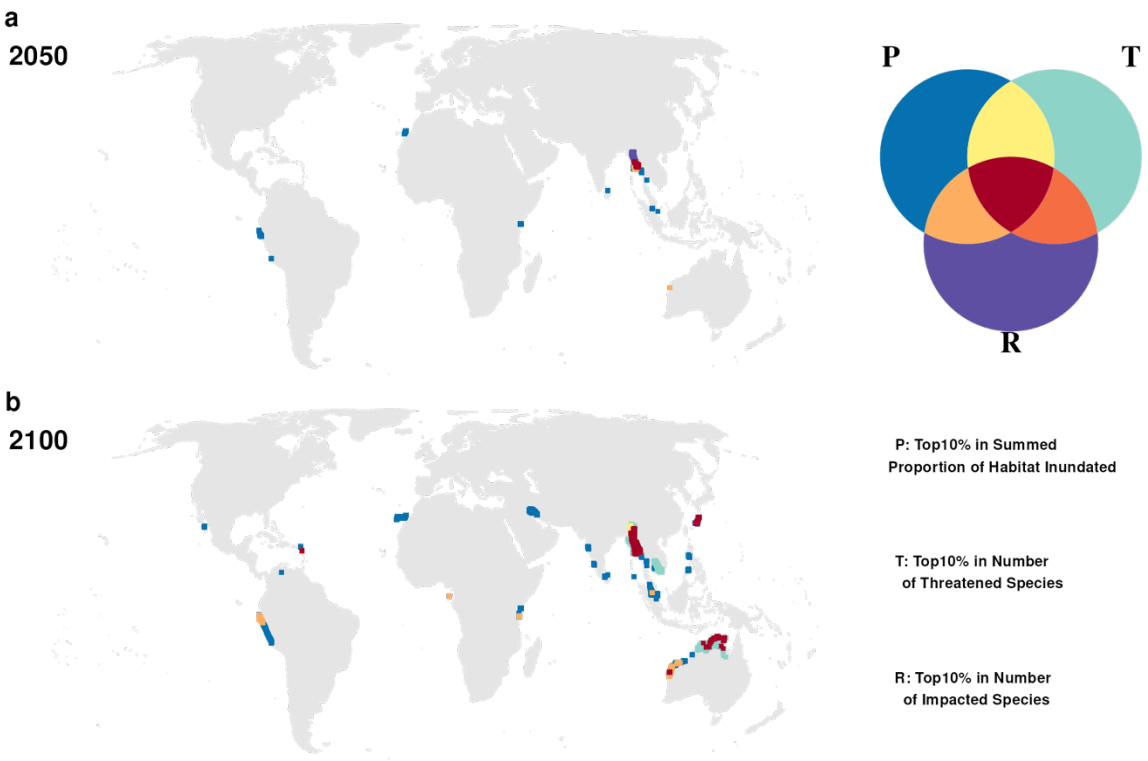

Figure S43 Spatial pattern of global SLR refugia for reptile. The dark red color indicates the location of SLR refugia identified around the globe by predicted SLR by 2050 (**a**) and by 2100 (**b**). Here SLR refugia refer to the non-inundated areas which rank simultaneously among the top 10% in three metrics: the summed proportion of habitat inundated (denoted as P), the number of threatened species (T), and the number of impacted species (R). The analysis is performed for all species with at least 1% of AOH lost to SLR. All displayed above is for the medium SLR scenario (SSP119).

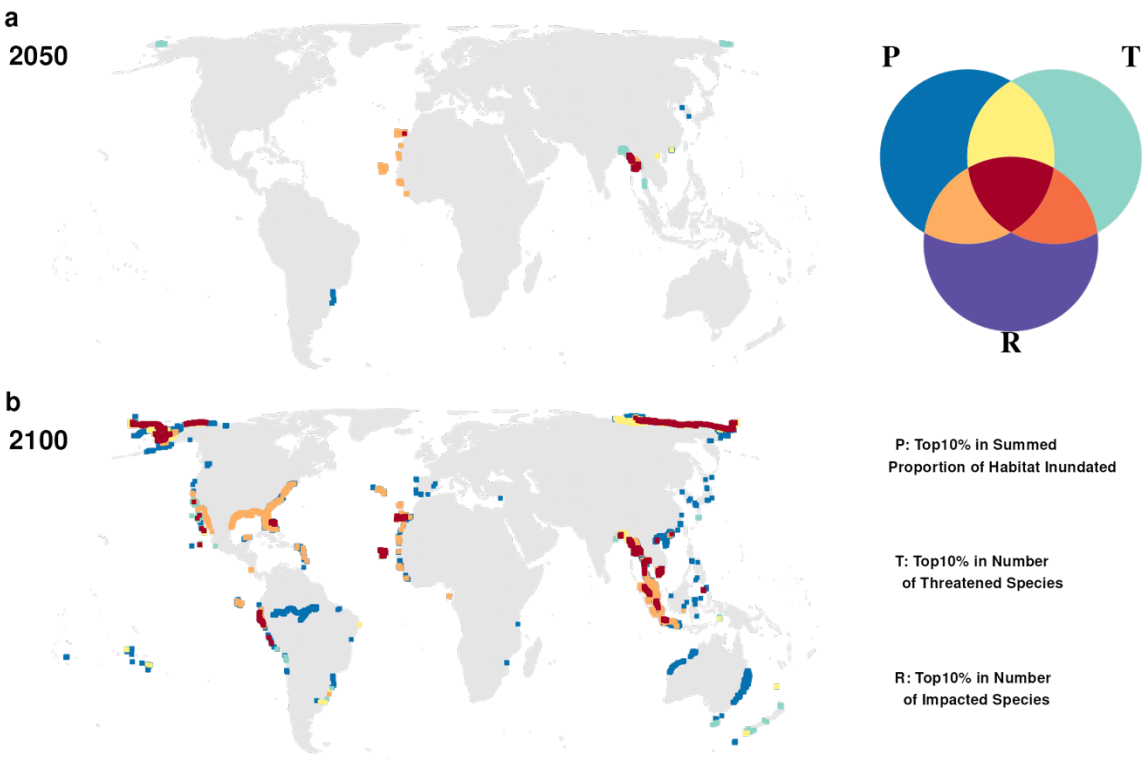

Figure S44 Spatial pattern of global SLR refugia for bird. The dark red color indicates the location of SLR refugia identified around the globe by predicted SLR by 2050 (**a**) and by 2100 (**b**). Here SLR refugia refer to the non-inundated areas which rank simultaneously among the top 10% in three metrics: the summed proportion of habitat inundated (denoted as P), the number of threatened species (T), and the number of impacted species (R). The analysis is performed for all species with at least 1% of AOH lost to SLR. All displayed above is for the medium SLR scenario (SSP119).

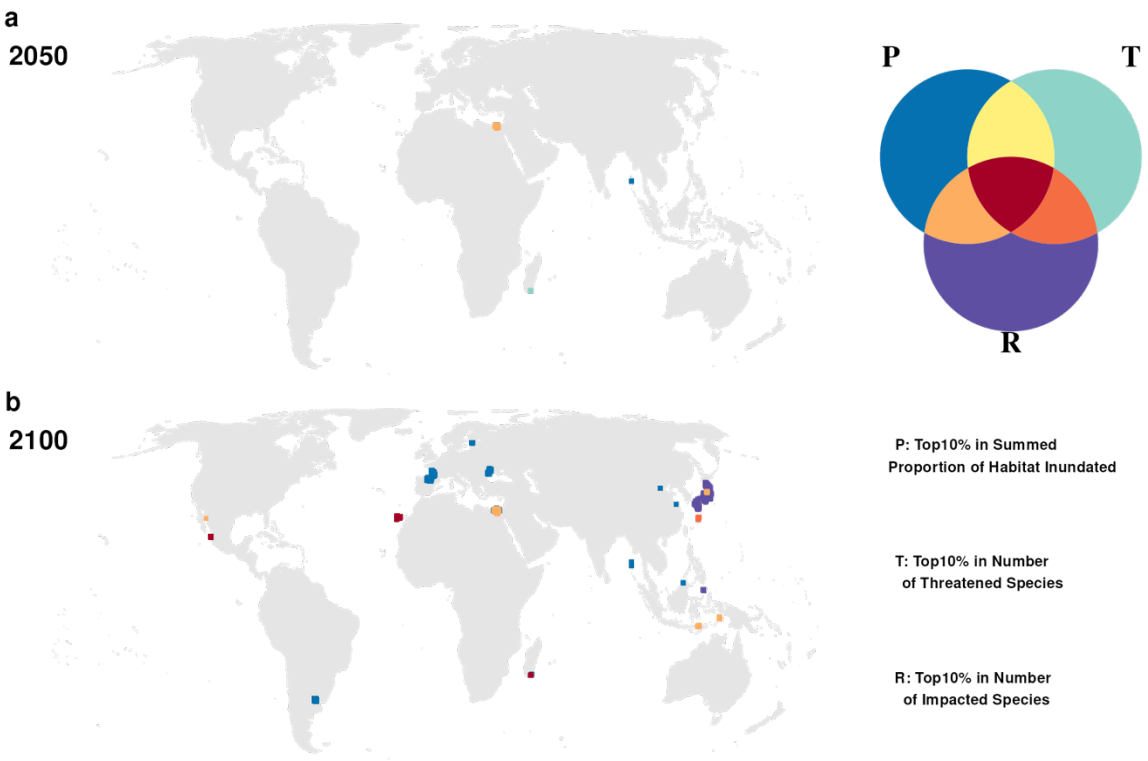

Figure S45 Spatial pattern of global SLR refugia for mammal. The dark red color indicates the location of SLR refugia identified around the globe by predicted SLR by 2050 (**a**) and by 2100 (**b**). Here SLR refugia refer to the non-inundated areas which rank simultaneously among the top 10% in three metrics: the summed proportion of habitat inundated (denoted as P), the number of threatened species (T), and the number of impacted species (R). The analysis is performed for all species with at least 1% of AOH lost to SLR. All displayed above is for the medium SLR scenario (SSP119).

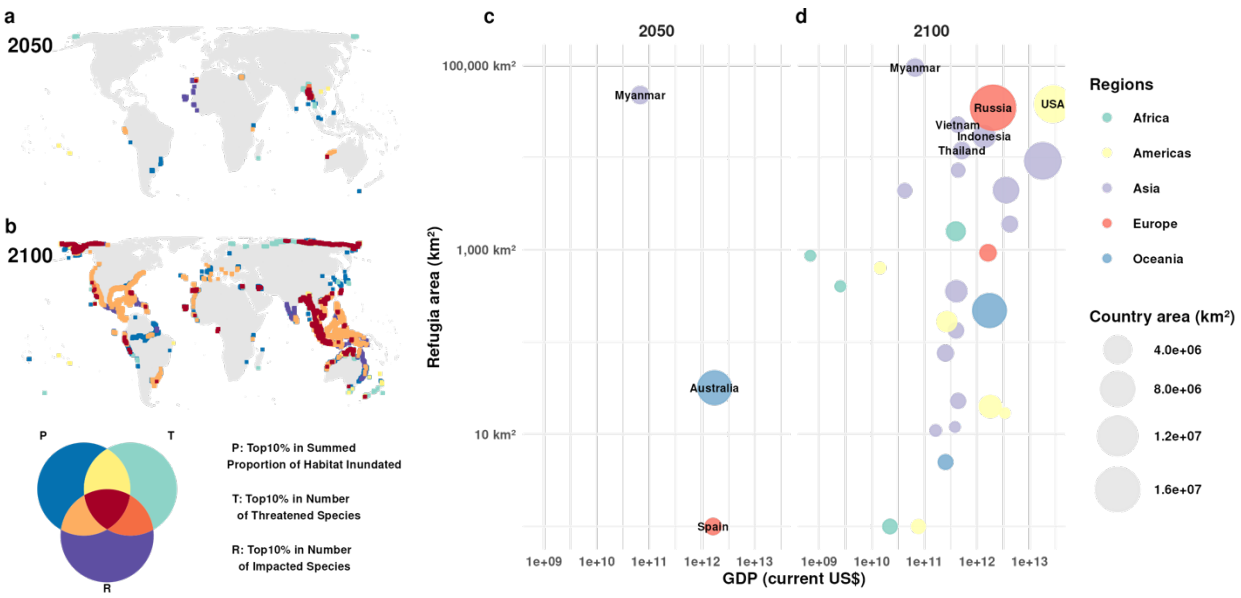

Figure S46 Spatial pattern and country-level information of global SLR refugia. The dark red color indicates the location of SLR refugia identified around the globe by predicted SLR by 2050 (**a**) and by 2100 (**b**). Here SLR refugia refer to the non-inundated areas which rank simultaneously among the top 10% in three metrics: the summed proportion of habitat inundated (denoted as P), the number of threatened species (T), and the number of impacted species (R). The analysis is performed for all species with at least 1% of AOH lost to SLR. Country-level information of SLR refugia is given in **c** (by 2050) and **d** (by 2100), where the area of refugia supported by a nation is plotted against the nation's present-day GDP (current US dollars). We differentiate countries by continents using variable colors and scale the size of a country to its land area. Highlighted with names are countries predicted to host the most expansive SLR refugia among all nations on earth. All displayed above is for the medium SLR scenario (SSP126).

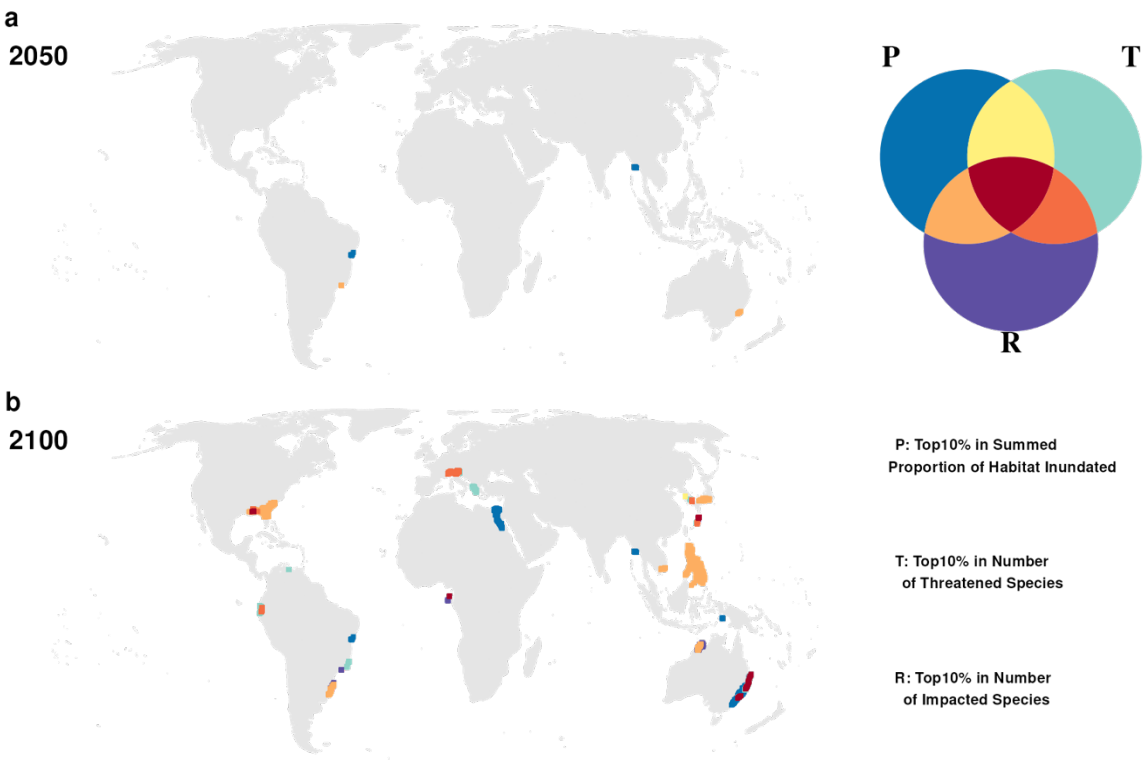

Figure S47 Spatial pattern of global SLR refugia for amphibian. The dark red color indicates the location of SLR refugia identified around the globe by predicted SLR by 2050 (**a**) and by 2100 (**b**). Here SLR refugia refer to the non-inundated areas which rank simultaneously among the top 10% in three metrics: the summed proportion of habitat inundated (denoted as P), the number of threatened species (T), and the number of impacted species (R). The analysis is performed for all species with at least 1% of AOH lost to SLR. All displayed above is for the medium SLR scenario (SSP126).

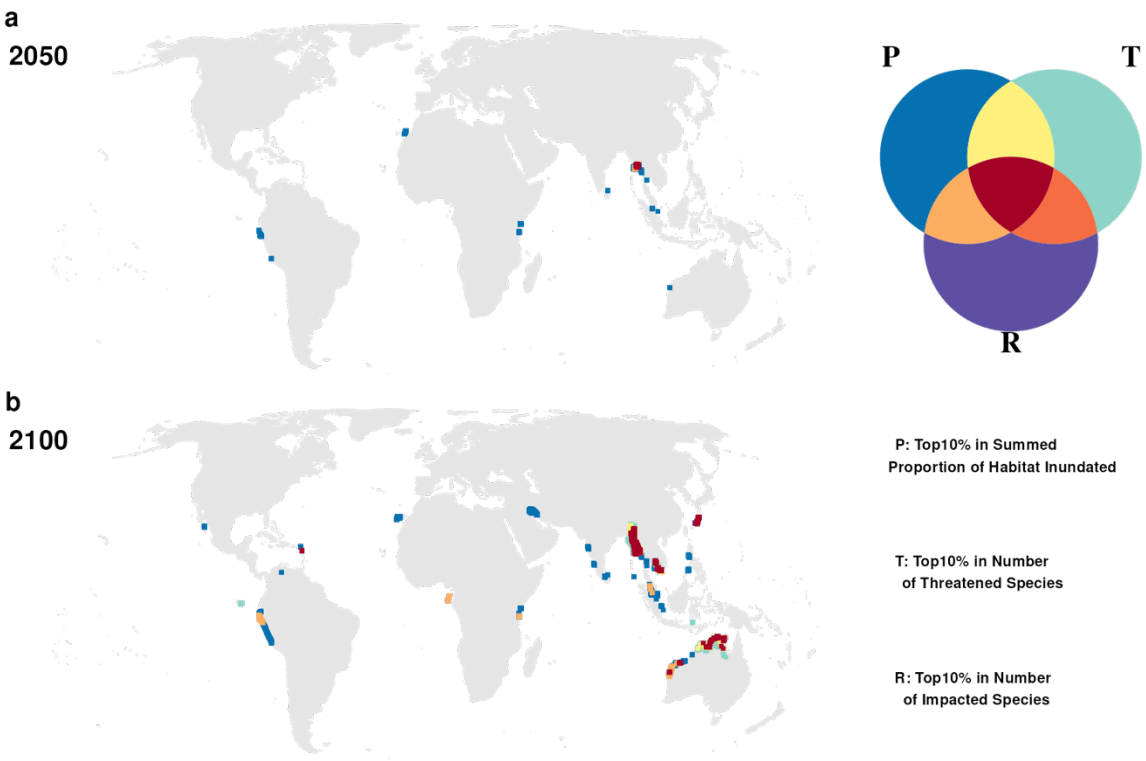

Figure S48 Spatial pattern of global SLR refugia for reptile. The dark red color indicates the location of SLR refugia identified around the globe by predicted SLR by 2050 (**a**) and by 2100 (**b**). Here SLR refugia refer to the non-inundated areas which rank simultaneously among the top 10% in three metrics: the summed proportion of habitat inundated (denoted as P), the number of threatened species (T), and the number of impacted species (R). The analysis is performed for all species with at least 1% of AOH lost to SLR. All displayed above is for the medium SLR scenario (SSP126).

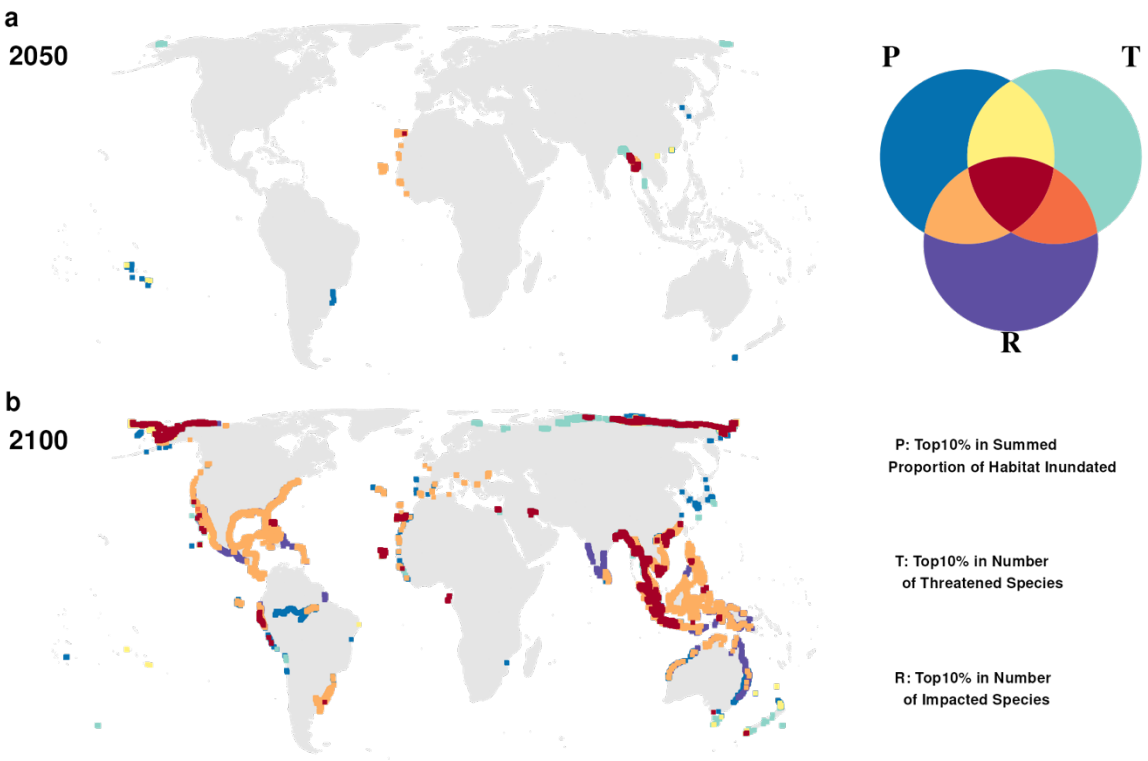

Figure S49 Spatial pattern of global SLR refugia for bird. The dark red color indicates the location of SLR refugia identified around the globe by predicted SLR by 2050 (**a**) and by 2100 (**b**). Here SLR refugia refer to the non-inundated areas which rank simultaneously among the top 10% in three metrics: the summed proportion of habitat inundated (denoted as P), the number of threatened species (T), and the number of impacted species (R). The analysis is performed for all species with at least 1% of AOH lost to SLR. All displayed above is for the medium SLR scenario (SSP126).

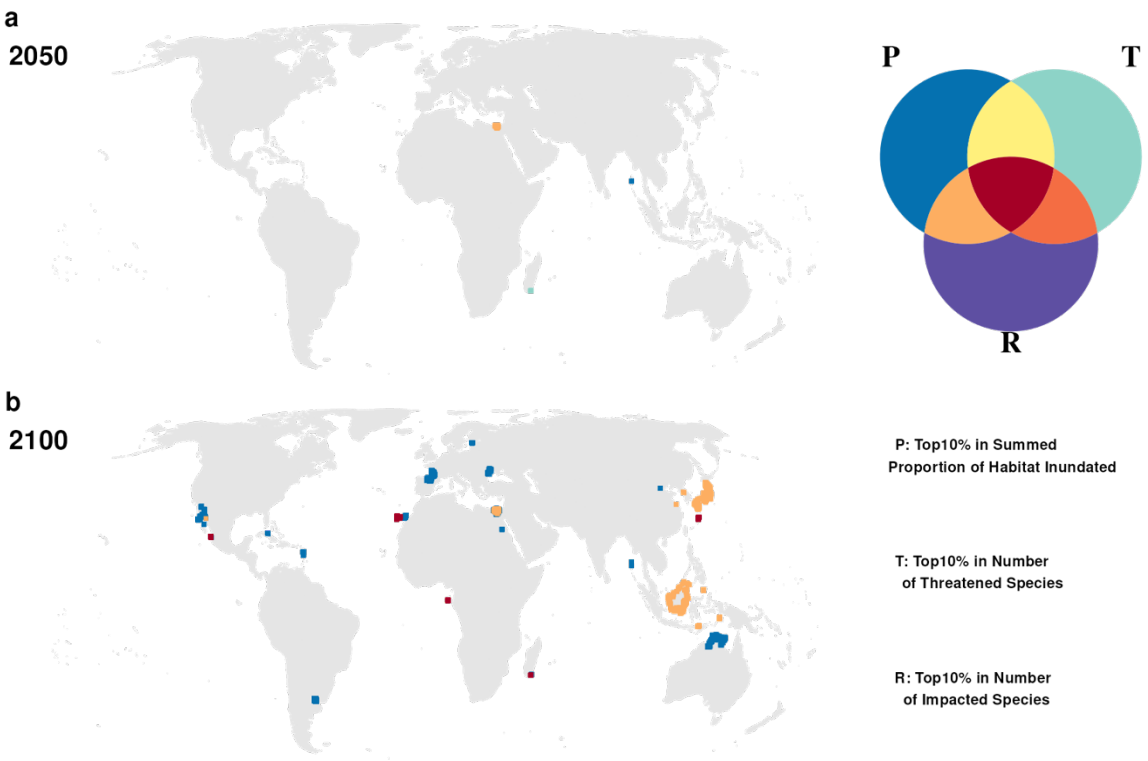

Figure S50 Spatial pattern of global SLR refugia for mammal. The dark red color indicates the location of SLR refugia identified around the globe by predicted SLR by 2050 (**a**) and by 2100 (**b**). Here SLR refugia refer to the non-inundated areas which rank simultaneously among the top 10% in three metrics: the summed proportion of habitat inundated (denoted as P), the number of threatened species (T), and the number of impacted species (R). The analysis is performed for all species with at least 1% of AOH lost to SLR. All displayed above is for the medium SLR scenario (SSP126).

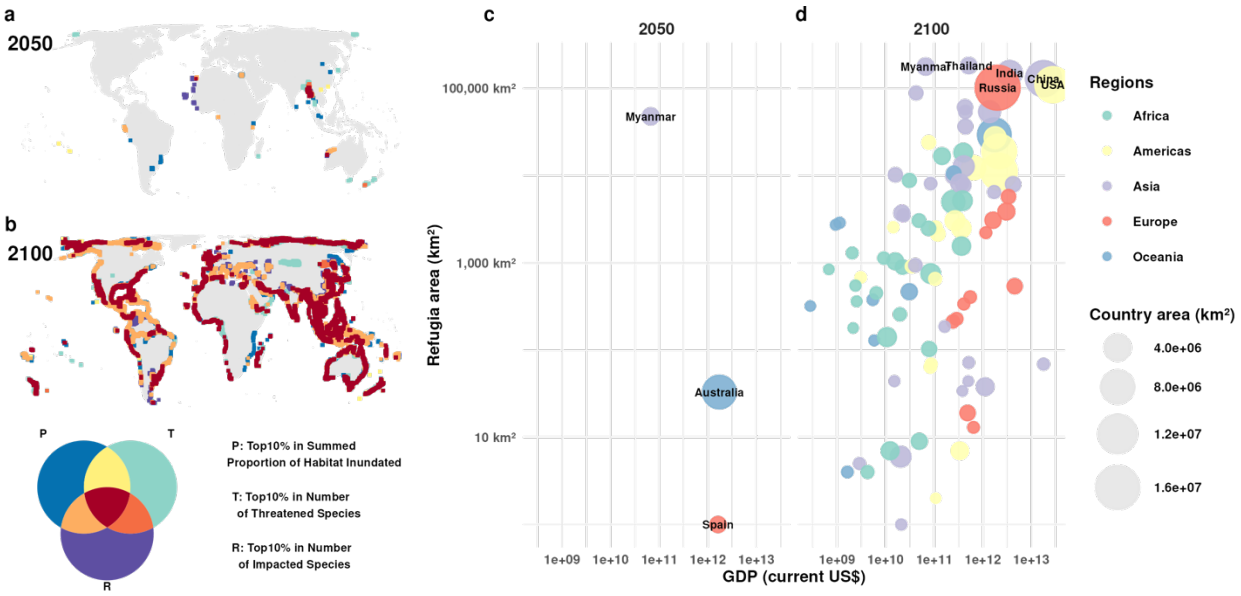

Figure S51 Spatial pattern and country-level information of global SLR refugia. The dark red color indicates the location of SLR refugia identified around the globe by predicted SLR by 2050 (**a**) and by 2100 (**b**). Here SLR refugia refer to the non-inundated areas which rank simultaneously among the top 10% in three metrics: the summed proportion of habitat inundated (denoted as P), the number of threatened species (T), and the number of impacted species (R). The analysis is performed for all species with at least 1% of AOH lost to SLR. Country-level information of SLR refugia is given in **c** (by 2050) and **d** (by 2100), where the area of refugia supported by a nation is plotted against the nation's present-day GDP (current US dollars). We differentiate countries by continents using variable colors and scale the size of a country to its land area. Highlighted with names are countries predicted to host the most expansive SLR refugia among all nations on earth. All displayed above is for the medium SLR scenario (SSP370).

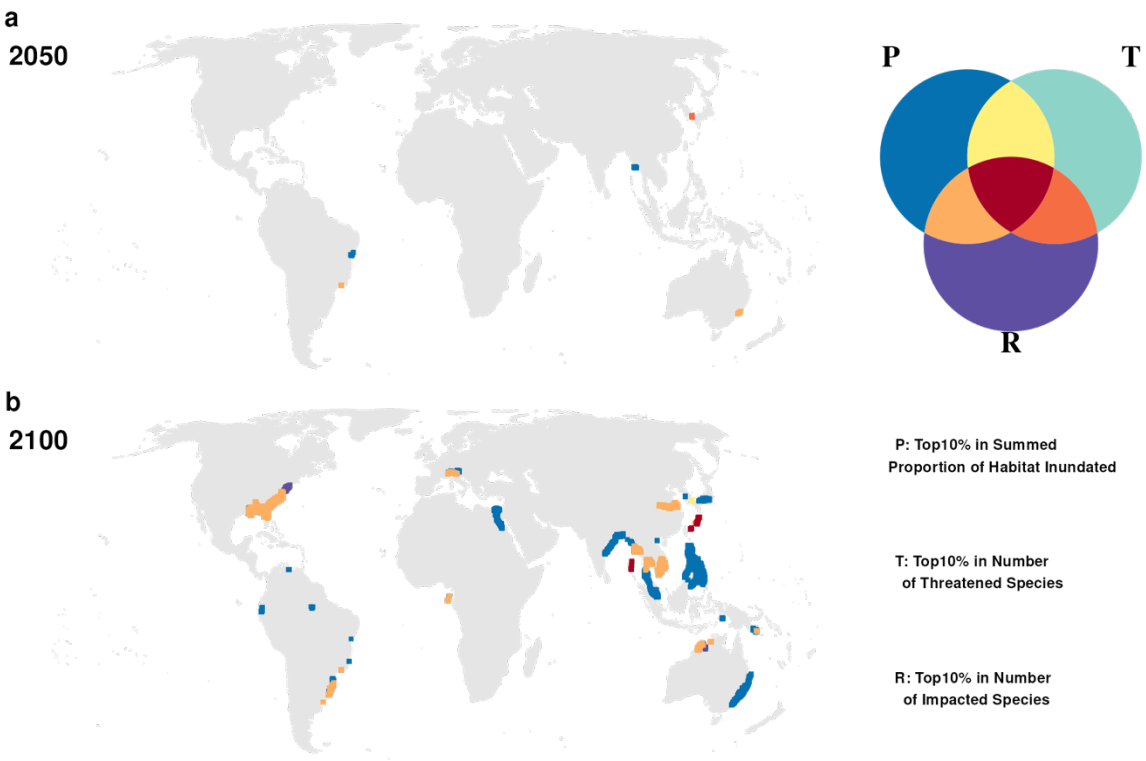

Figure S52 Spatial pattern of global SLR refugia for amphibian. The dark red color indicates the location of SLR refugia identified around the globe by predicted SLR by 2050 (**a**) and by 2100 (**b**). Here SLR refugia refer to the non-inundated areas which rank simultaneously among the top 10% in three metrics: the summed proportion of habitat inundated (denoted as P), the number of threatened species (T), and the number of impacted species (R). The analysis is performed for all species with at least 1% of AOH lost to SLR. All displayed above is for the medium SLR scenario (SSP370).

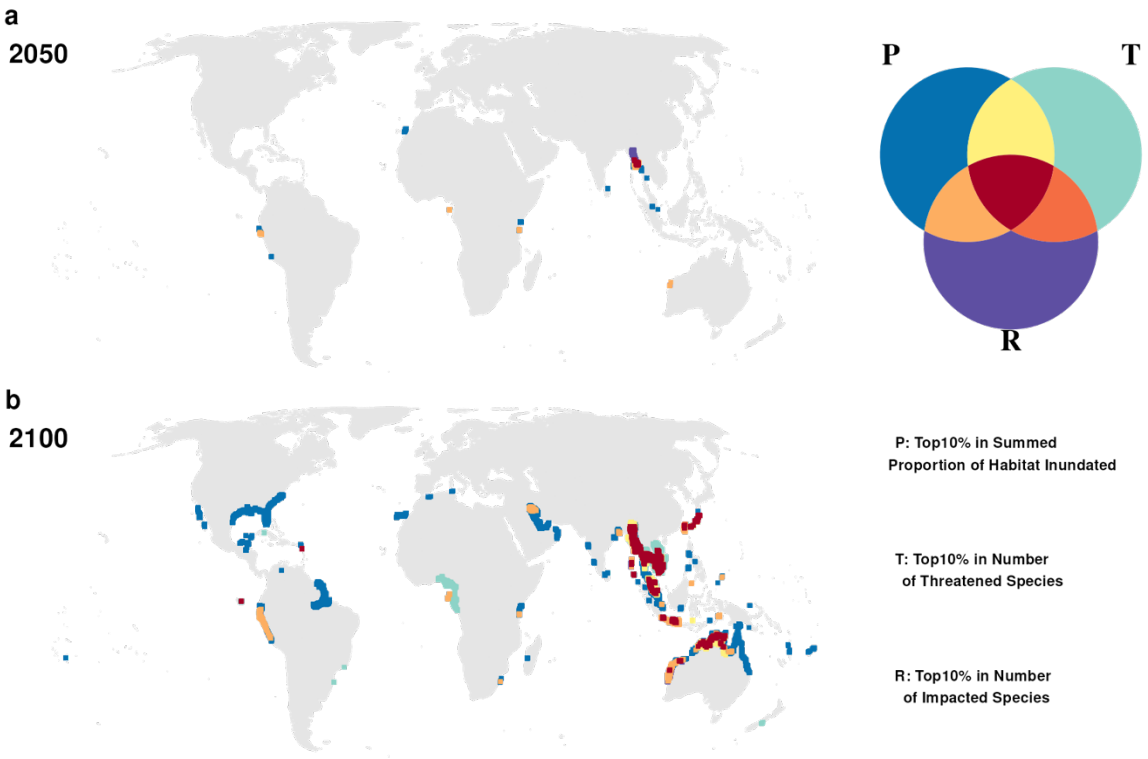

Figure S53 Spatial pattern of global SLR refugia for reptile. The dark red color indicates the location of SLR refugia identified around the globe by predicted SLR by 2050 (**a**) and by 2100 (**b**). Here SLR refugia refer to the non-inundated areas which rank simultaneously among the top 10% in three metrics: the summed proportion of habitat inundated (denoted as P), the number of threatened species (T), and the number of impacted species (R). The analysis is performed for all species with at least 1% of AOH lost to SLR. All displayed above is for the medium SLR scenario (SSP370).

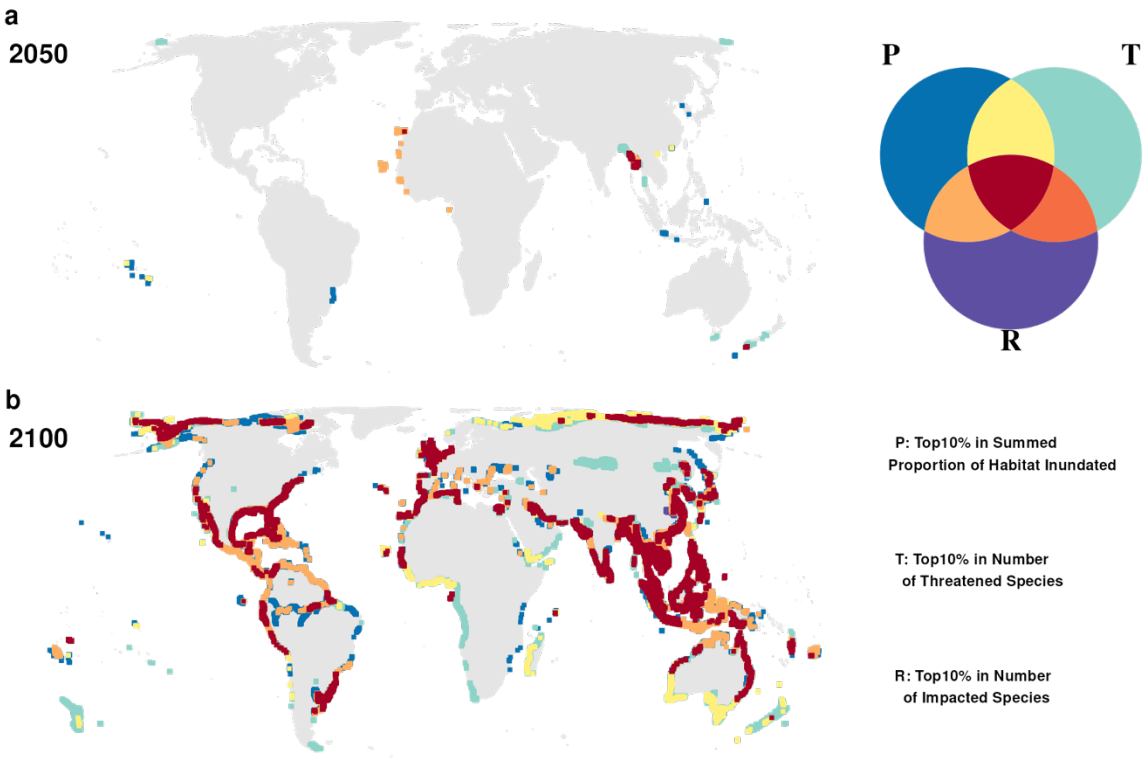

Figure S54 Spatial pattern of global SLR refugia for bird. The dark red color indicates the location of SLR refugia identified around the globe by predicted SLR by 2050 (**a**) and by 2100 (**b**). Here SLR refugia refer to the non-inundated areas which rank simultaneously among the top 10% in three metrics: the summed proportion of habitat inundated (denoted as P), the number of threatened species (T), and the number of impacted species (R). The analysis is performed for all species with at least 1% of AOH lost to SLR. All displayed above is for the medium SLR scenario (SSP370).

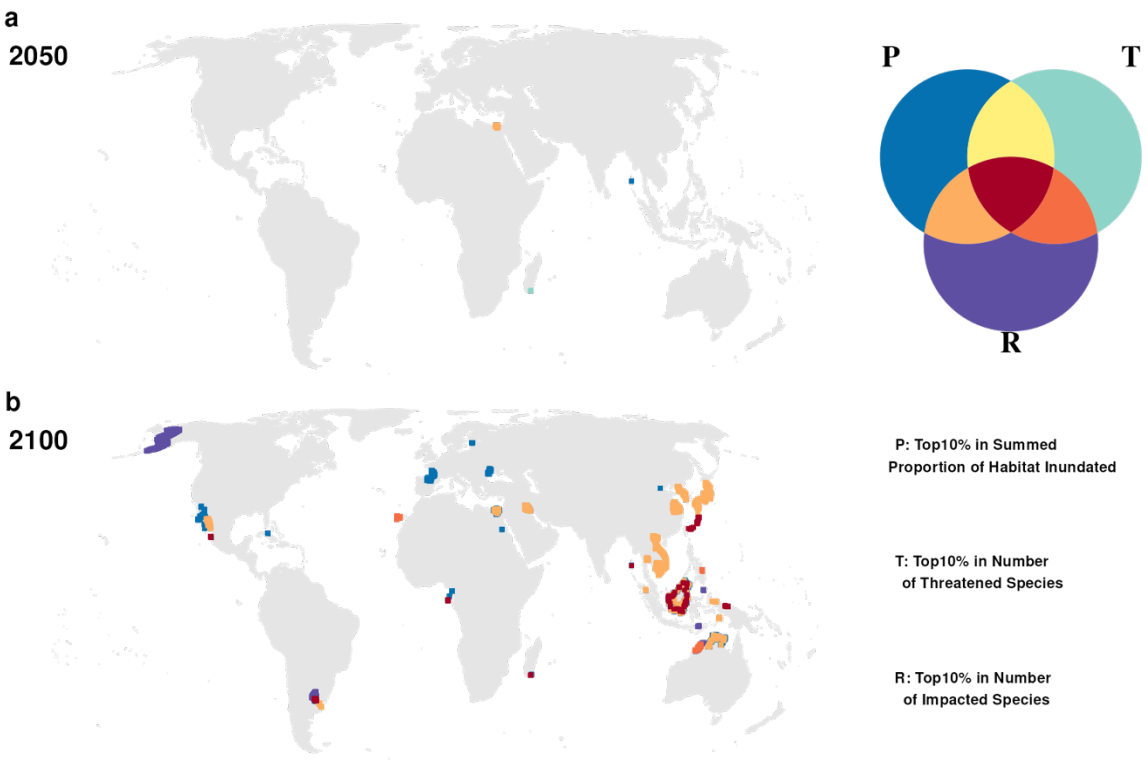

Figure S55 Spatial pattern of global SLR refugia for mammal. The dark red color indicates the location of SLR refugia identified around the globe by predicted SLR by 2050 (**a**) and by 2100 (**b**). Here SLR refugia refer to the non-inundated areas which rank simultaneously among the top 10% in three metrics: the summed proportion of habitat inundated (denoted as P), the number of threatened species (T), and the number of impacted species (R). The analysis is performed for all species with at least 1% of AOH lost to SLR. All displayed above is for the medium SLR scenario (SSP370).

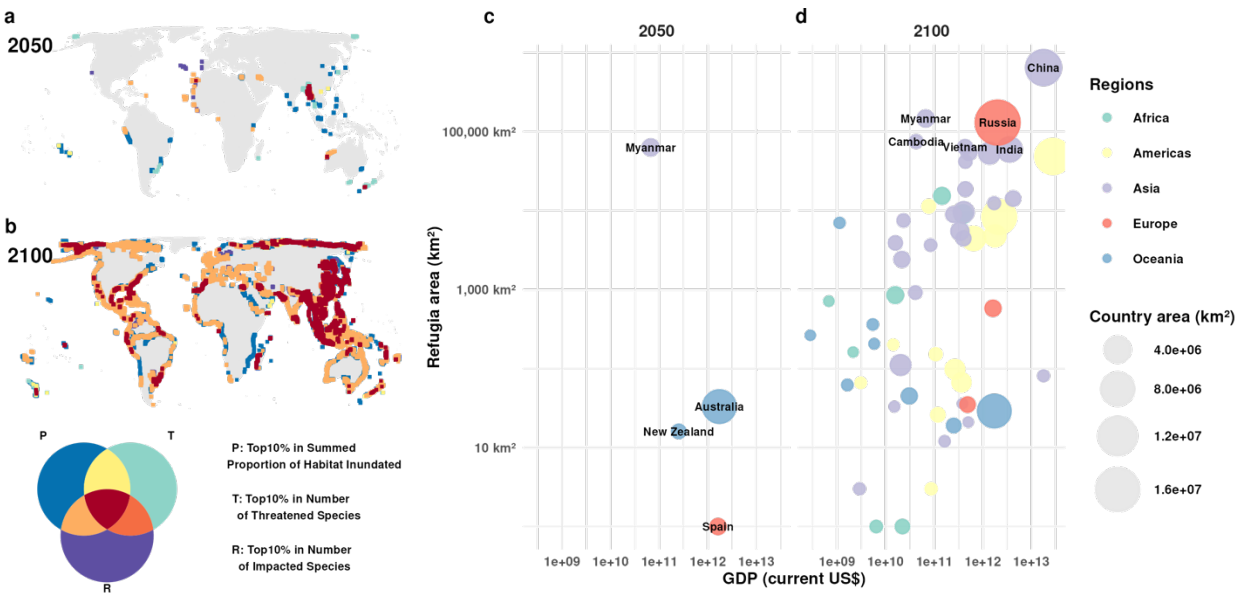

Figure S56 Spatial pattern and country-level information of global SLR refugia. The dark red color indicates the location of SLR refugia identified around the globe by predicted SLR by 2050 (**a**) and by 2100 (**b**). Here SLR refugia refer to the non-inundated areas which rank simultaneously among the top 10% in three metrics: the summed proportion of habitat inundated (denoted as P), the number of threatened species (T), and the number of impacted species (R). The analysis is performed for all species with at least 1% of AOH lost to SLR. Country-level information of SLR refugia is given in **c** (by 2050) and **d** (by 2100), where the area of refugia supported by a nation is plotted against the nation's present-day GDP (current US dollars). We differentiate countries by continents using variable colors and scale the size of a country to its land area. Highlighted with names are countries predicted to host the most expansive SLR refugia among all nations on earth. All displayed above is for the medium SLR scenario (SSP585).

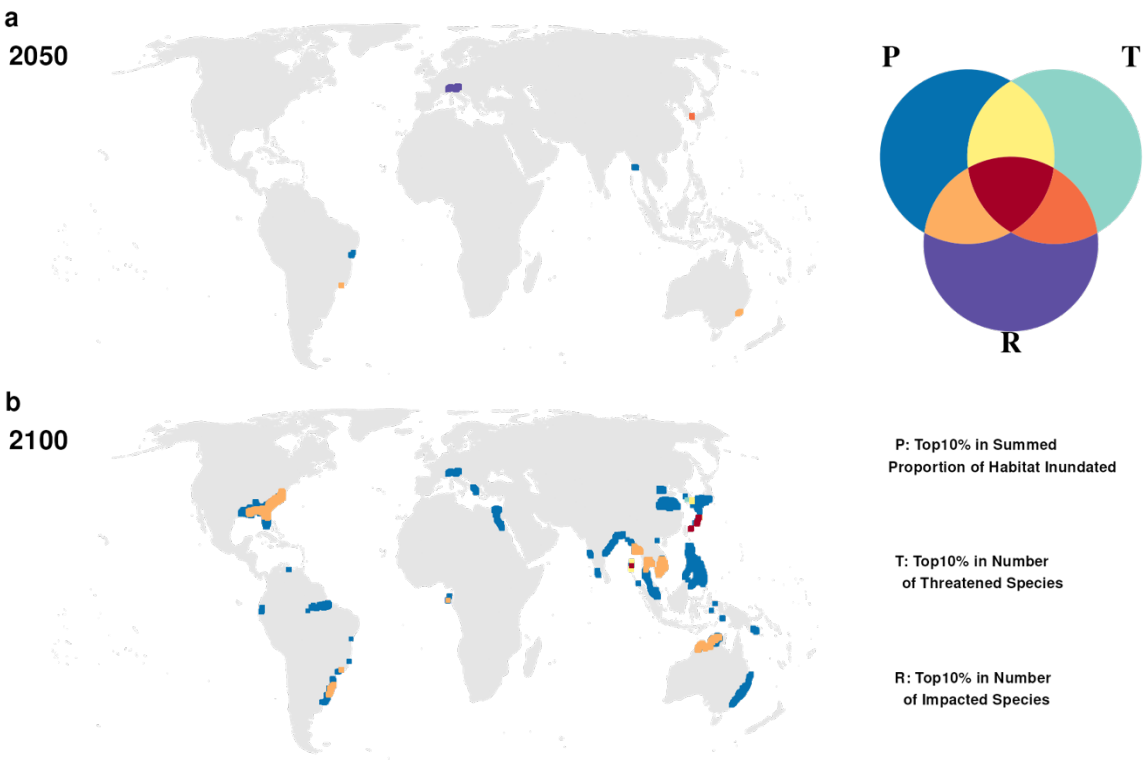

Figure S57 Spatial pattern of global SLR refugia for amphibian. The dark red color indicates the location of SLR refugia identified around the globe by predicted SLR by 2050 (**a**) and by 2100 (**b**). Here SLR refugia refer to the non-inundated areas which rank simultaneously among the top 10% in three metrics: the summed proportion of habitat inundated (denoted as P), the number of threatened species (T), and the number of impacted species (R). The analysis is performed for all species with at least 1% of AOH lost to SLR. All displayed above is for the medium SLR scenario (SSP585).

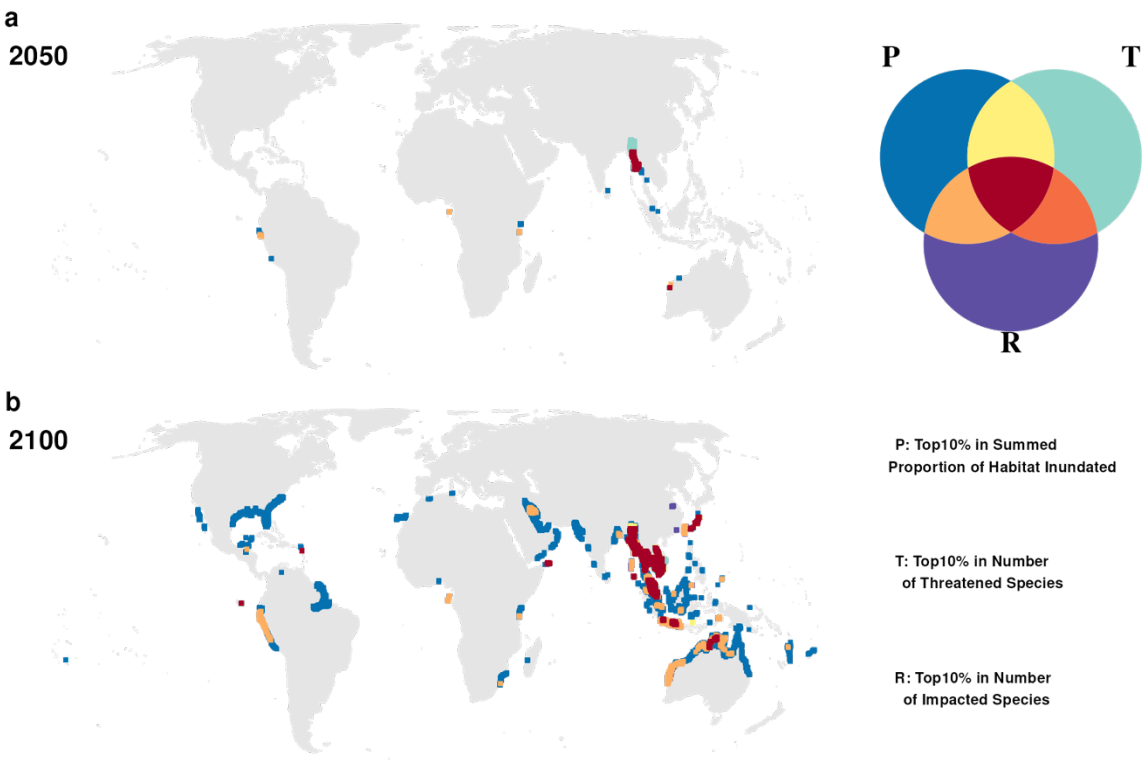

Figure S58 Spatial pattern of global SLR refugia for reptile. The dark red color indicates the location of SLR refugia identified around the globe by predicted SLR by 2050 (**a**) and by 2100 (**b**). Here SLR refugia refer to the non-inundated areas which rank simultaneously among the top 10% in three metrics: the summed proportion of habitat inundated (denoted as P), the number of threatened species (T), and the number of impacted species (R). The analysis is performed for all species with at least 1% of AOH lost to SLR. All displayed above is for the medium SLR scenario (SSP585).

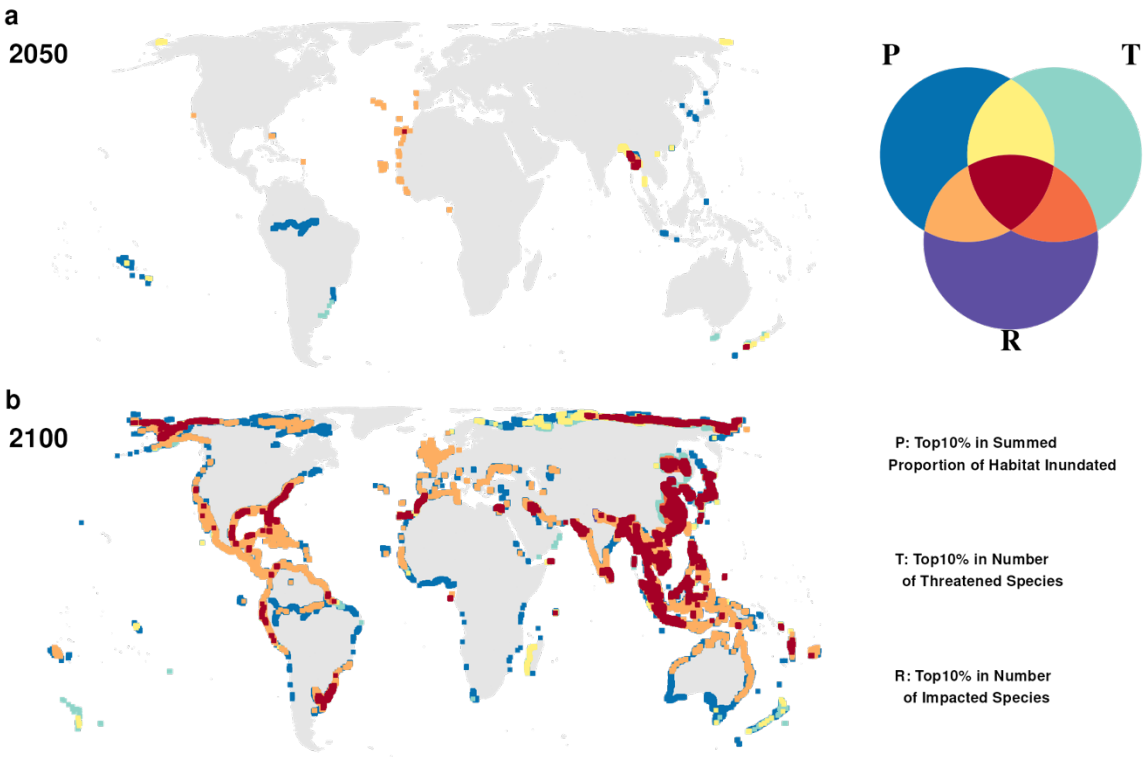

Figure S59 Spatial pattern of global SLR refugia for bird. The dark red color indicates the location of SLR refugia identified around the globe by predicted SLR by 2050 (**a**) and by 2100 (**b**). Here SLR refugia refer to the non-inundated areas which rank simultaneously among the top 10% in three metrics: the summed proportion of habitat inundated (denoted as P), the number of threatened species (T), and the number of impacted species (R). The analysis is performed for all species with at least 1% of AOH lost to SLR. All displayed above is for the medium SLR scenario (SSP585).

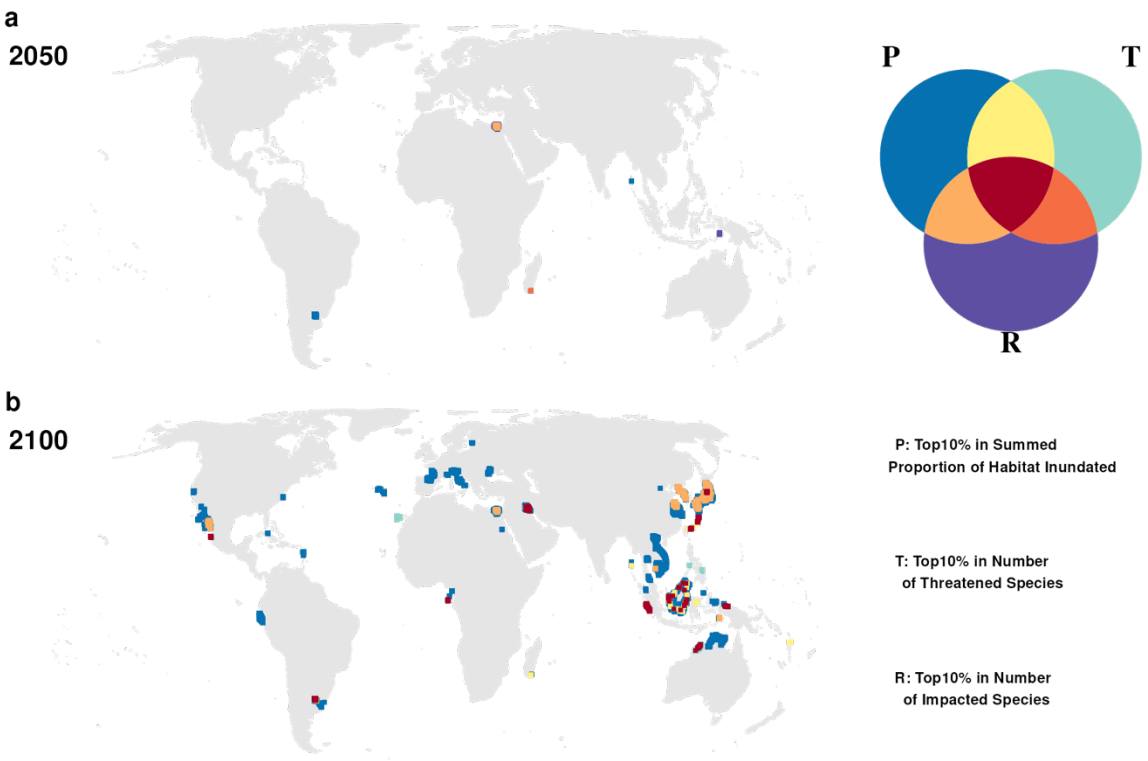

Figure S60 Spatial pattern of global SLR refugia for mammal. The dark red color indicates the location of SLR refugia identified around the globe by predicted SLR by 2050 (**a**) and by 2100 (**b**). Here SLR refugia refer to the non-inundated areas which rank simultaneously among the top 10% in three metrics: the summed proportion of habitat inundated (denoted as P), the number of threatened species (T), and the number of impacted species (R). The analysis is performed for all species with at least 1% of AOH lost to SLR. All displayed above is for the medium SLR scenario (SSP585).