French islands under threat from rising sea levels

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By the year 2100, global warming will have caused sea levels to rise by 1 to 3 meters. This will strongly affect islands, their flora, fauna and inhabitants. A team of researchers from the Ecologie, systématique et évolution (CNRS/Université Paris-Sud) laboratory studied the impact of rising sea levels on 1,269 French islands throughout the world. Their model shows that between 5% and 12% of these islands could be totally submerged in the future. On a worldwide scale, they predict that about 300 endemic island species are at risk of extinction, while the habitat of thousands of others will be drastically reduced. This research has been published in the journals *Global Ecology and Biogeography* (August 2013) and *Nature Conservation* (September 2013).

The most recent predictions of global warming show that sea levels will rise by between 1 and 3 meters before the end of the century. In some scenarios involving a catastrophic breaking-up of Greenland ice, sea levels are expected to rise by 6 meters. Any such increase will have serious consequences for the populations, flora and fauna of the coastal strip.

The researchers at the Ecologie, systématique et évolution laboratory first concentrated on the effects rising sea levels would have on French islands. Throughout the world, 2,050 French islands of more than a hectare are likely to have animal and plant communities.

The scientists compared the terrain contours of 1,269 of these islands with sea level models, taking into account the fact that sea levels will not

rise evenly over the Earth's surface because the sea is not flat: some areas of the ocean will rise higher than others. Results showed that, even if sea levels only rose by one meter, France would lose 6% of its islands (12% in the case of a 3-meter rise). French Polynesia and New Caledonia would be the worst affected: two thirds of the islands that would be submerged are in these archipelagos. There are French islands in all of the world's oceans, at all latitudes and with many different types of geology and ecology. Extrapolating their results to the 180,000 islands in the world, the scientists believe that the Earth could lose 10,000 to 20,000 islands before 2100.

The researchers went on to look at the biodiversity loss that could result from sea-level rise, notably in certain biodiversity hotspots such as the Mediterranean, the Philippines and New Caledonia. Twenty percent of the world's biodiversity is found on islands, including a very large proportion of endemic species.

The Philippines, Indonesia and the Caribbean are the most vulnerable areas: at least 300 endemic species, mostly plants, are seriously threatened by rising sea levels. Yet even this figure is a conservative estimate, as the researchers only considered species whose distribution areas would be totally submerged by 2100. They did not include the species that would lose 70%, 80% or even 90% of their natural range, nor additional factors such as lateral erosion or centennial tides, which can make large expanses of the coastal strip inhospitable for many species. Neither did they include natural disasters like cyclones.

This work shows how much of a threat rising sea levels pose to the biodiversity of island ecosystems, highlighting the necessity to take account of the consequences of this unstoppable process in designing policies for the conservation and protection of endangered species.

More information: Bellard, C. et al. Impact of sea level rise on French

islands worldwide, *Nature Conservation*, September 2013. max2.ese.u-psud.fr/epc/conservation/PDFs/SLRfr.pdf

Bellard, C. et al. Impact of sea level rise on the 10 insular biodiversity hotspots, *Global Ecology and Biogeography*, 9 August 2013. max2.ese.u-psud.fr/epc/conserv … tion/PDFs/SLRhot.pdf

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