Birds such as this red kite (*Milvus milvus*) are put at risk by the proliferation of Spanish wind farms.

Edited by **Jennifer Sills**

Renewables in Spain threaten biodiversity

Reducing greenhouse gas emissions is a global priority. To meet this goal, the Spanish government is planning 89 GW of wind and solar photovoltaic energy in the draft of the National Integrated Energy and Climate Plan (PNIEC) for 2021–2030 (*1*). Despite the Spanish government's efforts to prevent a speculative bubble in the secondary market, there are already grid access permits for projects representing 121 GW that will be added to the 36 GW of renewables already installed (*2*), almost doubling the goals of the PNIEC. The new projects will affect hundreds of thousands of hectares, and there is no way to offset the huge quantity of valuable habitats that could be lost. Spain should adopt a more cautious approach to prevent a scenario in which energy goals are met at the expense of biodiversity.

Many renewables projects are planned in low-cost marginal soils of high ecological value, such as extensive cereal farmlands and wild mountain ranges harboring steppe birds and raptors that have in Spain their largest European or world populations. Photovoltaic energy needs huge amounts of land and will mostly affect declining species of steppe birds, which are poorly represented in the Spanish Natura 2000 network (*3*). Globally threatened large scavengers and other unique and scarce soaring birds are already paying a heavy toll due to the approximately 20,000 existing turbines, with demographic consequences for some threatened populations (*4*, *5*). Bat-killing figures are even higher, with a minimum of 200,000 deaths per year according to estimated mortality rates (*6*).

Studies forecasting mortality have shown scarce predictive power (*7*), and when mortality hotspots are detected, conflictive turbines are virtually never stopped to reduce bat and bird casualties as recommended (*8*). As a large-scale approach, the best way to reduce impacts is by choosing adequate locations (*9*). However, updated field information necessary to achieve this goal is often not available, and projects are authorized in areas with under-protected species because their status within regional and state listings is frequently outdated.

Studies designed to predict and monitor the incidence of renewable infrastructures are funded by energy companies (*10*), often with little supervision by governments, which precludes independence. The problem is exacerbated by the fragmentation of large projects (yielding reports of the smaller impacts associated with each part rather than a comprehensive assessment of the full project), the absence of an in-depth assessment of cumulative and synergistic environmental impacts, and decentralized administrative authority divided among the central state, regions, and municipalities.

We welcome renewables, but we urge Spanish authorities to correct these deficiencies and implement rigorous comprehensive planning based on the most updated ecological knowledge. We also call for a stronger commitment to more distributed and energy-saving policies that would reduce direct environmental impacts on biodiversity, such as energy efficiency, self-consumption, and improved energy performance in buildings.

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Small Aral Sea brings hope for Lake Balkhash

In the recent Letter "Save Kazakhstan's shrinking Lake Balkhash" (16 October, p. 303), A. Ussenaliyeva calls for international attention to the ecological crisis now facing Lake Balkhash. Similar problems face other water bodies without effluents, such as the Great Salt Lake (*1*) and Lake Urmia in Iran (*2*). A parallel crisis severely damaged the Aral Sea (*2*, *3*), located between Kazakhstan and Uzbekistan. The action taken in response could provide a model for lakes suffering from desiccation.

Starting around 1960, diversion of inflowing water for irrigation purposes caused an accelerating regression and salinization of the Aral Sea (*3*). By 1990, the remaining waters sustained only organisms able to thrive in polyhaline conditions, and commercial fisheries, formerly of prime importance, had vanished (*4*). The desiccation also caused multiple severe health problems due to airborne dust (*5*). In 1992, a primitive dam was constructed across the Berg Strait to retain water in the northern Small Aral Sea, demonstrating a cost-effective way to maintain a low level of salinity. With financial help from the World Bank, the structure was later replaced by a stronger dam (*3*, *6*), which succeeded in rapidly restoring the Small Aral.

With increasing water volume and decreasing salinity, species that had become extinct during the regression crisis repopulated the sea by natural means from refugia in the affluent Syr Darya river system (*7*). Commercial fisheries that depend on the lake are thriving again (*7*, *8*). The Aral Sea crisis foreshadows what may face Lake Balkhash if no timely action is taken. It also shows that a relatively small financial effort can yield substantial results. The Aral Sea is surrounded by several countries that should, jointly with the international community, take renewed action to preserve even more of this system. This coalition should also lend its expertise to determine how attention and investment can best prevent a similar ecological crisis at Lake Balkhash and the Great Salt Lake.

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Brazil's areas of not-so-permanent preservation

Recently, the National Council for the Environment in Brazil (CONAMA) repealed CONAMA Resolution 303/2002 (*1*), which has, for nearly two decades, set the rules for nation-wide Areas of Permanent Preservation (APPs). Unlike the Protected Areas officially set aside for conservation by the government or private property owners (*2*), APPs in Brazil require no governmental intervention to remain protected. Those who favor this repeal argue that CONAMA 303/2002 and its rules for APPs have been overwritten by the Forest Act approved in 2012 as Federal Law 12.651 (*3*, *4*). Although the Forest Act does cover the protection of some important ecosystems, such as mangroves (*3*), there are crucial environmental safeguards at risk should the repeal of CONAMA 303/2002 go into effect.

Under the Forest Act alone, coastal vegetation is an APP only if it acts to stabilize sand dunes, whereas CONAMA 303/2002 considers as APP all the coastal vegetation within 300 meters of the maximum height reached by a rising tide. Conversely, sand dunes will lose their protection as APPs unless they are stabilized by coastal vegetation. In addition, areas used for reproduction of migratory birds will no longer be classified as APPs. With the repeal of CONAMA 303/2002, habitat areas for threatened species will retain their categorization as APPs only if officially declared by the government, which rarely occurs.

After weeks under criticism (*5*), the repeal of CONAMA 303/2002 was temporarily suspended until the ultimate decision by the Supreme Federal Court in Brazil (*6*). We urge the Court to recognize the importance of these environmental safeguards remaining in place. In times of rapid climate change (*7*), sea level rise (*8*), and extinction crisis (*9*), the repeal of CONAMA 303/2002 will only jeopardize coastal management efforts and increase threats to species of conservation concern.

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PHOTO: SANCHEZ/ALAMY STOCK PHOTO

The sand dunes of Joaquina Beach in southern Brazil could soon lose their protected status.

These views are the authors' and do not necessarily reflect those of the government of Santa Catarina.

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TECHNICAL COMMENT ABSTRACTS

Comment on "Forest microclimate dynamics drive plant responses to warming"

Peter Schall and Steffi Heinrichs

Zellweger *et al.* (Reports, 15 May 2020, p. 772) claimed that a microclimatic debt, mainly controlled by canopy buffering, evolved in European forest understories. However, their analysis is based on circularity, as they explained the sum of three components by one of these components. The response of the understory to the thermal environment is generally weak.

Full text: dx.doi.org/10.1126/science.abd9920

Response to Comment on "Forest microclimate dynamics drive plant responses to warming"

Florian Zellweger, Pieter De Frenne, Jonathan Lenoir, Pieter Vangansbeke, Kris Verheyen, Markus Bernhardt-Römermann, Lander Baeten, Radim Hédl, Imre Berki, Jörg Brunet, Hans Van Calster, Markéta Chudomelová, Guillaume Decocq, Thomas Dirnböck, Tomasz Durak, Thilo Heinken, Bogdan Jaroszewicz, Martin Kopecký, František Máliš, Martin Macek, Marek Malicki, Tobias Naaf, Thomas A. Nagel, Adrienne Ortmann-Ajkai, Petr Petřík, Remigiusz Pielech, Kamila Reczyńska, Wolfgang Schmidt, Tibor Standovár, Krzysztof Świerkosz, Balázs Teleki, Ondřej Vild, Monika Wulf, David Coomes

Schall and Heinrichs question our interpretation that the climatic debt in understory plant communities is locally modulated by canopy buffering. However, our results clearly show that the discrepancy between microclimate warming rates and thermophilization rates is highest in forests where canopy cover was reduced, which suggests that the need for communities to respond to warming is highest in those forests.

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Renewables in Spain threaten biodiversity

David Serrano, Antoni Margalida, Juan M. Pérez-García, Javier Juste, Juan Traba, Francisco Valera, Martina Carrete, Joxerra Aihartza, Joan Real, Santi Mañosa, Carles Flaquer, Inazio Garin, Manuel B. Morales, J. Tomás Alcalde, Beatriz Arroyo, José A. Sánchez-Zapata, Guillermo Blanco, Juan J. Negro, José L. Tella, Carlos Ibañez, José L. Tellería, Fernando Hiraldo and José A. Donázar

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