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LETTERS



Marshlands in Senegal's Djoudj National Bird Sanctuary have benefited from conservation efforts.

Edited by Jennifer Sills

Fossil fuels threaten northwest Africa

The lower Senegal River Basin in Mauritania and Senegal is a unique network of water basins, floodplains, and sand dunes. The fossil fuel industry, including the company BP, established a presence in the region after major offshore gas fields were found (1). BP originally planned only an offshore liquefied natural gas (LNG) terminal, but the development of the much larger BirAllah gas field in Mauritania's coastal basin prompted plans for an additional onshore LNG facility (2). Although any gas extraction poses environmental risks, the onshore facility directly threatens the region's vast biodiversity and protected areas. Despite the fact that neither Mauritania nor Senegal sufficiently regulates the gas industry, the companies should live up to their promises to "take action to restore, maintain, and enhance nature" (3).

The lower Senegal River Basin hosts exceptional biodiversity. The region endured harsh droughts in the 1970s and 1980s (4), displacing rural communities to cities. To manage water supply for the food production that the growing urban populations required, dams were constructed: The Diama Dam completed in 1985 and the Manantali Dam in 1989 (5). The dams prevented saltwater from flowing upstream but had adverse effects on the environment. Wetlands dried up and turned into salt deserts downstream, and aquatic weeds infested waters upstream (5).

Despite the degradation caused by the dams' construction and use, the Senegalese and Mauritanian governments managed to restore a mosaic of wetland habitats (5). Djoudj National Bird Sanctuary, the

World Heritage site, was designated in 1981; Diawling National Park was established in 1991; and Chott Boul Reserve was recognized around 2000—all are Ramsar sites (5, 6). The region received a United Nations Educational, Scientific and Cultural Organization (UNESCO) designation of Man and Biosphere reserve in 2012 (7), recognizing sustainable practices.

The planned infrastructure—especially the onshore facility, the proposed location of which is within the Man and Biosphere reserve—will put this region's hard-won environmental successes at risk. The fossil fuel industry should instead uphold its commitment to sustainable development as proposed in, for example, the International Finance Corporation Performance Standard 6 (8). Moreover, the authorities in both Mauritania and Senegal should hold the industry accountable, given that both countries have committed to the Food and Agriculture Organization's (FAO's) Canary Current Large Marine Ecosystem project (9), which aims to reverse further ecological degradation of the area and to safeguard natural resources and fisheries. The fossil fuel industry should avoid construction on the UNESCO Reserve and take action to enhance biodiversity conservation, onshore and offshore.

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FAIR data would alleviate large carnivore conflict

The nature directives of the European Union have contributed to the recovery of large carnivore populations, which were decimated after centuries of persecution. However, in September, the European Commission claimed that wolves pose a danger to livestock and requested that anyone with any type of related data submit it as part of a review of the wolf's conservation status (1). Requesting unvetted data instead of relying on the scientifically sound data on species conservation status regularly provided by each member state (2) upends established legal procedures. The EU must facilitate the collection of data on the livestock sector and associated losses that adheres to FAIR guidelines: The data should be findable, accessible, interoperable (integrated with other data), and reusable (3). With reliable data, the Commission can properly assess the impact of large carnivores

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and implement evidence-backed solutions.

Losses due to large carnivore damage are not a threat to the livestock industry. Between 2012 and 2016, less than 0.06% of the over-wintering sheep stock on mainland Europe was lost annually as a result of predation (4). Besides economic compensation for predated extensive livestock, European farmers receive substantial subsidies, including specific funds for farming under difficult conditions (5). Yet economic losses from predation by large carnivores have been used to justify culling by hunting and lethal population management (1, 6), strategies that are ineffective at preventing livestock losses and can lead to increased damage (6, 7).

Current EU legislation includes lethal control as a potential management tool under certain conditions, but the Commission seems to be inviting data that could justify more permissive guidelines. The consequences of disregarding scientific evidence and using unreliable data could be severe. Increased culling of large carnivores could hinder the connectivity needed to recover genetic variability of some isolated populations, compromising their long-term viability (8). In turn, the population reduction could compromise the role of these species in maintaining biodiversity and ecosystem functioning (9), including the control of disease dynamics of prey populations; the regulation of herbivore densities, seed dispersal processes, landscape configuration, and stream morphology; and the fertilization of aquatic and terrestrial ecosystems [e.g., (10)]. Large carnivores also mitigate damage to silviculture and agriculture caused by herbivores, reduce wildlife-vehicle collisions by changing prey density and behavior, and inspire wildlife-based tourism and nature-based education [e.g., (11)].

There is an urgent need to promote coexistence between large carnivores and humans. Unlike culling, preventive measures, such as shepherds, guarding dogs, and enclosures, and effective compensation systems, such as conditioning payment to farmers to prevention, have been shown to reduce damage and economic losses (6, 12). Reliably assessing damage and mitigation strategies requires implementing a coordinated European database with quality-controlled FAIR livestock predation data.

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Australia's carbon plan disregards evidence

Australia's commitment to climate change abatement lies partly in the reduction of grazing to increase above-ground woody biomass (1, 2). However, this strategy is not supported by scientific evidence, which shows that increasing—not decreasing—grazing leads to more trees and shrubs. Australia should replace efforts to reduce grazing with effective methods of sequestering carbon.

The Human-Induced Regeneration Scheme, a frequently used program under the Australian Carbon Credit Unit Scheme (7), claims that reduced grazing pressure from livestock and/or feral animals will regenerate even-aged native forest that grows to taller than 2 m. However, reducing or removing grazing on arid and semiarid rangelands does not result in an increase in woody biomass or an increase in the size of trees and shrubs taller than 2 m over the next 15 years (3–6). On the contrary, increasing grazing pressure

reduces grasses, which liberates water resources and enhances woody plants. This phenomenon, known as woody encroachment or woody thickening (3–6), leads to a dominance of woody plants at the expense of herbaceous species. Increased rainfall and carbon dioxide, along with reduced frequency and magnitude of fires, further increase woody plant growth in rangelands (3).

The Human-Induced Regeneration Scheme is also inconsistent with the current understanding of the location of carbon pools in arid ecosystems. Ecological theory and empirical evidence reveal that the bulk of ecosystem carbon in drylands is stored in the soil (7)—from 7 to 100 times more than in the vegetation (8). Therefore, a focus on above-ground carbon—i.e., increasing woody biomass—is unlikely to have a major impact on Australia's carbon budget (9).

Instead of the Human-Induced Regeneration Scheme, Australia should implement a system that rewards pastoralists and landowners for restoring native vegetation on naturally degraded and previously cleared land that was originally dominated by either woody plants or grasses (10). Restoration practices should be tailored to specific regions and the type of degradation. For example, active restoration of logged tropical forests has been shown to result in greater carbon accumulation than naturally regenerating forest (11). As articulated in the recent session of the United Nations General Assembly (12), science must inform the strategies put in place to address environmental challenges.

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