



Ecosystems supported by Lake Balkhash in Kazakhstan are in jeopardy as desertification increases.

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## Save Kazakhstan's shrinking Lake Balkhash

Kazakhstan is home to Lake Balkhash, one of the largest inland drainless lakes in the world. Estimated to be more than 35,000 years old (1), this lake has cultural, historical, and ecological value. However, since 1970, a substantial decrease in the Ili river runoff has led to a drawdown of water reaching the lake [(2), p. 18], leading to a decrease in water depth. Out of the original 16 lake systems around Lake Balkhash, only 5 remain (1). Preserving this lake ecosystem is crucial to halting the desertification process, which has already claimed a third of the lake and will have devastating effects on the diverse flora and fauna that depend on it.

Lake Balkhash's varying degrees of water mineralization support a wide variety of species; the western basin is freshwater, whereas the eastern basin is salty (3). The lake serves as a habitat for 20 species of fish, 6 of which live only in this lake (3), and 60 species of plants that don't grow anywhere else [(4), pp. 304–310]. More than 120 bird species rely on the lake [(2), pp. 24–26], 12 of which are listed in Kazakhstan's Red Book of endangered species [(4), p. 305]. Because the lake is located in a desert area, without runoff and with a dry continental climate and very little precipitation, these species

will have nowhere else to go if their water source disappears.

To protect Lake Balkhash, local legislation that regulates industrial exploitation of the lake water area should be updated and enforced. The media should actively promote environmental awareness among the population of Kazakhstan. Designating Lake Balkhash a national treasure would increase the social significance of the lake in Kazakhstan as well as abroad. Kazakhstan should monitor the lake and provide public access to up-to-date data on its parameters (especially the current volume of water). The country should also clearly define areas of responsibility among the states that are responsible for water resources management. Given rising water security risks in Kazakhstan, Lake Balkhash needs an international collaboration to provide urgent and effective protection. It is crucial that local and national policy-makers, law enforcement authorities, scientists, the public sector, socially responsible businesses, and the world community work together to protect this ancient lake.

Aizhan Ussenaliyeva

Save Lake Balkhash Project, Almaty, Kazakhstan.  
Email: aizhanussenaliyeva@gmail.com

### REFERENCES AND NOTES

1. D. K. Nourgaliev et al., *Geophys. Res. Lett.* **30**, 1914 (2003).
2. V. N. Abrosov, *Lake Balkhash* (Nauka, 1973) [in Russian].
3. "Lake Balkhash," *Encyclopaedia Britannica* (2020); [www.britannica.com/place/Lake-Balkhash#ref189927](http://www.britannica.com/place/Lake-Balkhash#ref189927).
4. D. V. Sevastyanov, E. D. Mamedov, V. A. Rumyanzev, *The History of the Lakes Sevan, Issyk-Kul, Balkhash, Zai-san, and Aral* (Nauka, 1991) [in Russian].

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## Airborne transmission of SARS-CoV-2

There is overwhelming evidence that inhalation of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) represents a major transmission route for coronavirus disease 2019 (COVID-19). There is an urgent need to harmonize discussions about modes of virus transmission across disciplines to ensure the most effective control strategies and provide clear and consistent guidance to the public. To do so, we must clarify the terminology to distinguish between aerosols and droplets using a size threshold of 100  $\mu\text{m}$ , not the historical 5  $\mu\text{m}$  (1). This size more effectively separates their aerodynamic behavior, ability to be inhaled, and efficacy of interventions.

Viruses in droplets (larger than 100  $\mu\text{m}$ ) typically fall to the ground in seconds within 2 m of the source and can be sprayed like tiny cannonballs onto nearby individuals. Because of their limited travel range, physical distancing reduces exposure to these droplets. Viruses in aerosols (smaller than 100  $\mu\text{m}$ ) can remain suspended in the air for many seconds to hours, like smoke, and be inhaled. They are highly concentrated near an infected person, so they can infect people most easily in close proximity. But aerosols containing infectious virus (2) can also travel more than 2 m and accumulate in poorly ventilated indoor air, leading to superspreading events (3).

Individuals with COVID-19, many of

whom have no symptoms, release thousands of virus-laden aerosols and far fewer droplets when breathing and talking (4–6). Thus, one is far more likely to inhale aerosols than be sprayed by a droplet (7), and so the balance of attention must be shifted to protecting against airborne transmission. In addition to existing mandates of mask-wearing, social distancing, and hygiene efforts, we urge public health officials to add clear guidance about the importance of moving activities outdoors, improving indoor air using ventilation and filtration, and improving protection for high-risk workers (8).

Kimberly A. Prather<sup>1\*</sup>, Linsey C. Marr<sup>2\*</sup>, Robert T. Schooley<sup>3</sup>, Melissa A. McDiarmid<sup>4</sup>, Mary E. Wilson<sup>5,6</sup>, Donald K. Milton<sup>7</sup>

<sup>1</sup>Scripps Institution of Oceanography, University of California San Diego, La Jolla, CA 92037, USA.

<sup>2</sup>Civil and Environmental Engineering, Virginia Tech, Blacksburg, VA 24061, USA. <sup>3</sup>Department of Medicine, University of California San Diego, La Jolla, CA 92093, USA. <sup>4</sup>Division of Occupational & Environmental Medicine, University of Maryland School of Medicine, Baltimore, MD 21201, USA.

<sup>5</sup>School of Medicine, University of California, San Francisco, CA 94143, USA. <sup>6</sup>Harvard T.H. Chan School of Public Health, Boston, MA 02115, USA. <sup>7</sup>Institute for Applied Environmental Health, University of Maryland, College Park, MD 20742, USA.

\*Corresponding author. Email: kprather@ucsd.edu (K.A.P.); lmarr@vt.edu (L.C.M.)

#### REFERENCES AND NOTES

1. The National Academies of Sciences, Engineering, and Medicine, "Video 31—CQ1 reflection and syntheses: Identifying opportunities and gaps on the path ahead by Kim Prather" (Airborne Transmission of SARS-CoV-2: A Virtual Workshop, 26 to 27 August 2020); [www.nationalacademies.org/event/08-26-2020/airborne-transmission-of-sars-cov-2-a-virtual-workshop](http://www.nationalacademies.org/event/08-26-2020/airborne-transmission-of-sars-cov-2-a-virtual-workshop).
2. J. A. Lednický et al., *Int. J. Infect. Dis.*, 10.1016/j.ijid.2020.09.025 (2020).
3. S. L. Miller et al., *Indoor Air*, 10.1111/ina.12751 (2020).
4. K. A. Prather, C. C. Wang, R. T. Schooley, *Science* **368**, 1422 (2020).
5. V. Stadnytskyi, C. E. Bax, A. Bax, P. Anfinrud, *Proc. Natl. Acad. Sci. U.S.A.* **117**, 11875 (2020).
6. J. Ma et al., *Clin. Infect. Dis.*, 10.1093/cid/ciaa1283 (2020).
7. W. Chen et al., *Build. Environ.* **176**, 106859 (2020).
8. L. Morawska et al., *Environ. Int.* **142**, 105832 (2020).

#### COMPETING INTERESTS

K.A.P. is Director of the National Science Foundation Center for Aerosol Impacts on Chemistry of the Environment. L.C.M.

is a member of the Science Advisory Board and holds stock options for Phylagen and is a paid reviewer for the Alfred P. Sloan Foundation. R.T.S. is a member of the Gilead Sciences Scientific Advisory Board and chairs Data Safety and Monitoring Boards for VIR, Gilead, and Merck. Honoraria for these activities are paid to the Regents of the University of California. R.T.S. has served as a scientific consultant to Pfizer and to AbbVie. M.A.M. is the unpaid Chair of the National Academy of Medicine Committee on Personal Protective Equipment for Workplace Safety and Health.

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## Deliberate poisoning of Africa's vultures

Between September 2019 and March 2020, more than 2000 Critically Endangered (1) hooded vultures (*Necrosyrtes monachus*) were killed across eastern Guinea-Bissau. Investigations revealed that the vultures were intentionally poisoned to collect their heads for belief-based use. Locals sighted bait placed where vultures died and reported a demand for vulture heads in Senegal (2, 3). Toxicological analysis of carcasses confirmed poisoning with methiocarb (3), a carbamate pesticide banned in Europe (4) but still used in Guinea-Bissau. If unchecked, these poisonings are likely to continue, leading to further declines in the population of this imperiled species.

Old World vultures are among the most threatened groups of birds worldwide (5). In Africa, the illicit trade in vulture parts accounts for 29% of reported vulture deaths (6). In West Africa, up to 61 and 70% (inside and outside parks, respectively) of vultures disappeared in just 30 years (7). Hundreds of hooded vultures are traded yearly for belief-based use, and their heads are considered good luck charms (8). Prices are rising as they become more rare (8, 9). Guinea-Bissau is home to about 22% of the world's 197,000 hooded vultures (10, 11).

This blow to vulture conservation requires urgent action. Local stakeholders need to be made aware of the loss of critical ecosystem functions, such as waste removal and the likely control of disease (5, 12). African governments should raise awareness about existing anti-poisoning legislation among residents, authorities, and police and invest the human and financial resources required to effectively enforce these laws. In addition, the governments should curb cross-border and local trade. International partners must help West African countries develop and implement national action plans to conserve vultures and avoid their looming extinction.

Mohamed Henriques<sup>1\*</sup>, Ralph Buij<sup>2,3</sup>, Hamilton Monteiro<sup>4,5</sup>, Joãozinho Sá<sup>4,6</sup>, Francisco Wambar<sup>4</sup>, José Pedro Tavares<sup>7</sup>, Andre Botha<sup>8</sup>, Geoffroy Citegeet<sup>9</sup>, Miguel Lecoq<sup>10</sup>, Paulo Catry<sup>11</sup>, Darcy Ogada<sup>2,12</sup>

<sup>1</sup>Centro de Estudos do Ambiente e do Mar (CESAM), Departamento de Biologia Animal, Faculdade de Ciências da Universidade de Lisboa, Lisboa, Portugal.

<sup>2</sup>The Peregrine Fund, Boise, ID 83709, USA.

<sup>3</sup>Wageningen University & Research, 6708 PB Wageningen, Netherlands. <sup>4</sup>Organização para a Defesa e Desenvolvimento das Zonas Húmidas (ODZH), Bairro de Belém, Bissau, Guinea-Bissau.

<sup>5</sup>Instituto da Biodiversidade e Áreas Protegidas, Bissau, Guinea-Bissau. <sup>6</sup>Gabinete de Planificação Costeira (GPC), Bairro de Belém, Bissau, Guinea-Bissau. <sup>7</sup>Vulture Conservation Foundation, CH-8003 Zürich, Switzerland. <sup>8</sup>Endangered Wildlife Trust, Modderfontein, 1645, South Africa. <sup>9</sup>BirdLife International, Conservation of Migratory Birds Project, Dakar, Senegal. <sup>10</sup>Lisbon, 1900-087, Portugal. <sup>11</sup>Marine and Environmental Sciences Centre, ISPA - Instituto Universitário de Ciências Psicológicas Sociais e da Vida, Lisbon, Portugal.

<sup>12</sup>National Museums of Kenya, Nairobi, Kenya.

\*Corresponding author.

Email: mhenriquesbalde@gmail.com

#### REFERENCES AND NOTES

1. BirdLife International, "Necrosyrtes monachus (amended version of 2017 assessment)" (The IUCN Red List of Threatened Species, 2017).
2. L. Kihumba, "Investigating the mystery behind Guinea-Bissau's mass vulture deaths" (BirdLife International, 2020).
3. "Lethal poisoning of 2000+ Critically Endangered vultures in Guinea-Bissau—Update on the toxicology results and criminal investigation" (Vulture Conservation Foundation, 2020).
4. Regulation (EU) 2019/1606 (2019); [http://data.europa.eu/eli/reg\\_impl/2019/1606/oj](http://data.europa.eu/eli/reg_impl/2019/1606/oj).
5. E. R. Buechley, C. H. Şekercioğlu, *Biol. Conserv.* **198**, 220 (2016).
6. D. Ogada et al., *Conserv. Lett.* **9**, 89 (2015).
7. J.-M. Thiollay, *Ostrich* **78**, 405 (2007).
8. G. Nikolaus, *Malimbus* **23**, 45 (2001).
9. G. Nikolaus, *Vulture News* **55**, 65 (2006).
10. M. Henriques et al., *PLOS One* **13**, e0190594 (2018).
11. D. L. Ogada, R. Buij, *Ostrich* **82**, 101 (2011).
12. P. I. Plaza, G. Blanco, S. A. Lambertucci, *Ibis*, 10.1111/ibi.12865 (2020).

#### COMPETING INTERESTS

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Hooded vultures (*Necrosyrtes monachus*) in Guinea-Bissau could be driven to extinction.

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