Opinion

Modified advertising masts as high-visibility flight-path blockers: a possible mitigation of powerline collision risk for bustards

The Great Indian Bustard *Ardeotis nigriceps* ('GIB') has been in a strong, steady decline towards extinction over the past half-century, as a consequence of many different threats and pressures which, in a detailed account of the species, BirdLife International (2001) grouped under four generic headings: (1) habitat loss, (2) human exploitation, (3) predation and disturbance, and (4) mismanagement of habitat/inadequate protection. It is striking to read that text now, a quarter of a century later, and realise that it contains no mention of powerlines. This is all the more remarkable when one reflects that probably the single most serious driver of the bird's continuing decline—indeed, quite probably the proximate cause of its total extinction (Uddin et al. 2021; Dutta et al. 2023)—is now collision with powerlines. At the start of this decade an expert extrapolation using all relevant evidence suggested that GIBs were dying on powerlines at a rate of 16 individuals per year from a population of only some 128 (Wildlife Institute of India 2020). There is no other bird species on the planet whose main threat to its existence is judged to be energy infrastructure.

A comprehensive review (Silva et al. 2023) of the problem of bustards and powerlines in all parts of the family's range, including India, recently concluded that static and dynamic bird flight diverters (BFDs)—devices intended to be more visible than the powerlines to which they are fitted—cannot be trusted to perform well enough to be recommended as the solution. They have sometimes been reported to 'reduce' mortality, which is clearly inadequate; thus, the only truly dependable answer is 'undergrounding'. More recently still, an issue of *Buceros* 28 (2&3) was dedicated to the general problem of bird mortalities on powerlines and wind turbines, but with a particular emphasis on the GIB. However, the papers that make up the volume offer scant encouragement. A global overview (Girkar et al. 2024) itemises recent technological developments that slow rates of avian mortality at powerlines, but cites the same evidence (Shaw et al. 2021) used by Silva et al. (2023) that BFDs commonly fail to alleviate collision rates by bustards despite working moderately well with other bird species; see photographs in Narwade et al. (2024): 55–67 showing a GIB lying dead beneath a line marked with BFDs. A national review (Maxima & Selvaraj 2024) depressingly highlights Rajasthan, last home and hope of the GIB, as India's top state for number of powerline bird fatalities, but recommends nothing more detailed or practical for the GIB than 'immediate actions… to avoid further collisions' and 'underground cables… in [its] prime habitats'. By contrast, a bustard-specific review focusing on Rajasthan (Narwade et al. 2024) issues some strong, specific demands, including making the Pokhran area (seemingly some 1,600 km^2) a 'no infrastructure zone' and burying 13 stretches of high-tension transmission lines totalling 183 km. Sadly, however, there is no indication that those with real power in this situation take such recommendations seriously. Indeed, quite the opposite is the case according to the journal's editorial, in which BNHS director Kishor Rithe announces that, just as the issue went to press, 'the honourable Supreme Court ordered to free the grassland habitats to set up solar plants and transmission lines as they cannot hold up the development in the entire landscape for Great Indian Bustard'.

Despite the immense damage that powerlines do to bird populations, companies and governments routinely refuse to bury them, citing either significant additional cost or plain infeasibility; this was true in India when the Supreme Court previously ruled in favour of undergrounding. Routes may be modified to take account of sensitive areas, but otherwise there is little compromise. The only mitigations construction companies are willing to consider are offsets or BFDs. However, both of these responses commonly fall far short of truly compensating for the damage done, not least because the damage is permanent whereas the mitigation either fails genuinely to compensate or, typically, misfunctions over time (for BFDs see, e.g., Dashnyam et al. 2016). In any case, major lending banks with reputations to guard only require the mitigation to last 30 years at most; which is of course as absurd as creating a national park to last 30 years and expecting nature to take care of itself thereafter.

Meanwhile, the disappointing research results concerning the efficacy of BFDs in respect of bustards only deepen the conservationists' already acute dilemma over the GIB. On the one hand, conscience obliges them to grasp any opportunity to obtain better long-term management of habitat within its two tiny remaining areas south and east of Jaisalmer. On the other, it equally obliges them to accept that if BFDs reduce mortalities in some cases, it must be better for the species to deploy them than not to (see Dutta et al. 2023). Yet in both these situations the risk is that, if the benefit of the mitigation merely slows the mortality rate, the conservationists' support for such measures renders them complicit in the process by which the species becomes extinct.

With captive breeding programmes now underway for both the GIB and the Lesser Florican *Sypheotides indicus* (also in huge trouble, with powerlines partly to blame: see Narwade et al. 2024), it may be that some conservationists are pinning all their hope on the possibilities that in 30–40 years' time *ex situ* populations of both species will still exist, the problems of energy transmission will be solved, and well-restored habitat will allow reintroductions to proceed. However, the danger of this alluring vision is that it weakens the urgency and resolution to do the utmost to save the birds in the wild *now*. Alas, there is no guarantee that *ex situ* management will continue to work for the length of time it takes to sort out the environmental and infrastructural conundrums of Rajasthan. Even if it does, generations of captive breeding are very likely to result in genetic and phenotypic changes to the species that compromise their ability to survive in natural conditions (see, e. g., Dolman et al. 2021). So, the mission to save both species in the wild cannot be allowed to falter; it must be resumed with redoubled energy and intent—and perhaps some lateral thinking.

Free-standing flight-path blockers

On a visit to Rajasthan in February 2019, I spent several days malevolently contemplating the long chains of pylons and great swathes of powerlines that cut across the landscapes near Desert National Park. On the same visit, however, I encountered what could perhaps be the model for a gigantic 'bird flight diverter' about which I had sometimes idly speculated—some kind of tall structure bearing so obvious an object, so clear an obstruction, that no bird, however lateral its vision, could fail to

see and avoid it. On all my car journeys through the state I was repeatedly impressed by the very tall metal masts, topped with a placard bearing the provider's name and logo, that advertised almost every petrol station I passed **[72, 73]**. So ubiquitous were these structures, called pylon signs in the USA, that I had to assume that they cannot be very costly to install. Moreover, being unconnected to any wires, if used to divert bustards from approaching danger they would also be far cheaper and more straightforward to maintain and upgrade. Could India's petrol station advertising masts, widely touted for sale on the internet, be modified to provide (or simply be a model for) a new kind of free-standing BFD that might actually work for bustards?

72. A sample of an advertising mast. Source: https://www.indiamart.com/proddetail/petrol-pump-signage-23334821797.html

Several obvious questions arise before this overarching question can be answered. How tall would the mast need to be to reach a height sufficient to ensure approaching birds fly higher than the highest wires? What would the object replacing the advertising placard atop the mast consist of in order to maximise its effect—what size, shape, materials, colours, patterns, moving parts, illuminated features and even klaxons would be most appropriate? Would one mast be enough to protect the span of wires between two pylon towers? Would another be needed on the other side of the wires? What measures should be taken to ensure the safety of both the mast and the line? And what would be the difference in long-term costs between producing, installing and servicing one of these free-standing flight-path blockers ('FPBs') and purchasing, installing and long-term servicing dozens of dynamic BFDs on the multiple lines that span between one tower and another?

Two items of evidence drive a modest degree of optimism

73. Another sample of an advertising mast. Source: https://www.indiamart.com/proddetail/signage-high-mast-pole-for-petrol-pump-2850558485030.html

that such blockers might be both valuable and feasible. First, work in Africa has found that 87% of bird collisions occur in or near the middle sections of a span, resulting in the suggestion that parallel powerlines with staggered pylons (so that each pylon is next to the mid-span of the adjacent line) can produce a visual obstacle that in theory should cut bird mortalities by two-thirds (Pallett et al. 2022). The blocker would, therefore, simply replicate the role of a staggered pylon (Fig. 3A). Second, it is apparent from the photograph in Girkar et al. (2024): 21 that free-standing masts supporting artificial nesting platforms have been deployed elsewhere (for White Storks *Ciconia ciconia*), very close to powerline pylons. Operators of the lines may therefore be comfortable with the safety of this kind of measure.

Clearly such blockers, whether one per span or, if affordable, two, put on either side of the wires and somewhat staggered for even greater theoretical deterrence (Figure 3B), are not going to add to the aesthetics of the landscape; but the powerlines themselves have already ruined the view. Moreover, I would assume they would not necessarily be used on every span of a powerline, but targeted at those stretches where the danger is clearly highest. These, at least, would be the places to start, always accepting that we know too little about how birds move over the course of a year—and indeed over a lifetime—to be fully confident of identifying the areas of greatest risk. Nevertheless, the potential for doing good for the species is just too significant to ignore (including the opportunity to provide well-illuminated features that would show up strongly at night and in low light, when many bustard collisions with lines are thought by experts to occur). I therefore appeal to all conservationists in India concerned with the fate of the GIB,

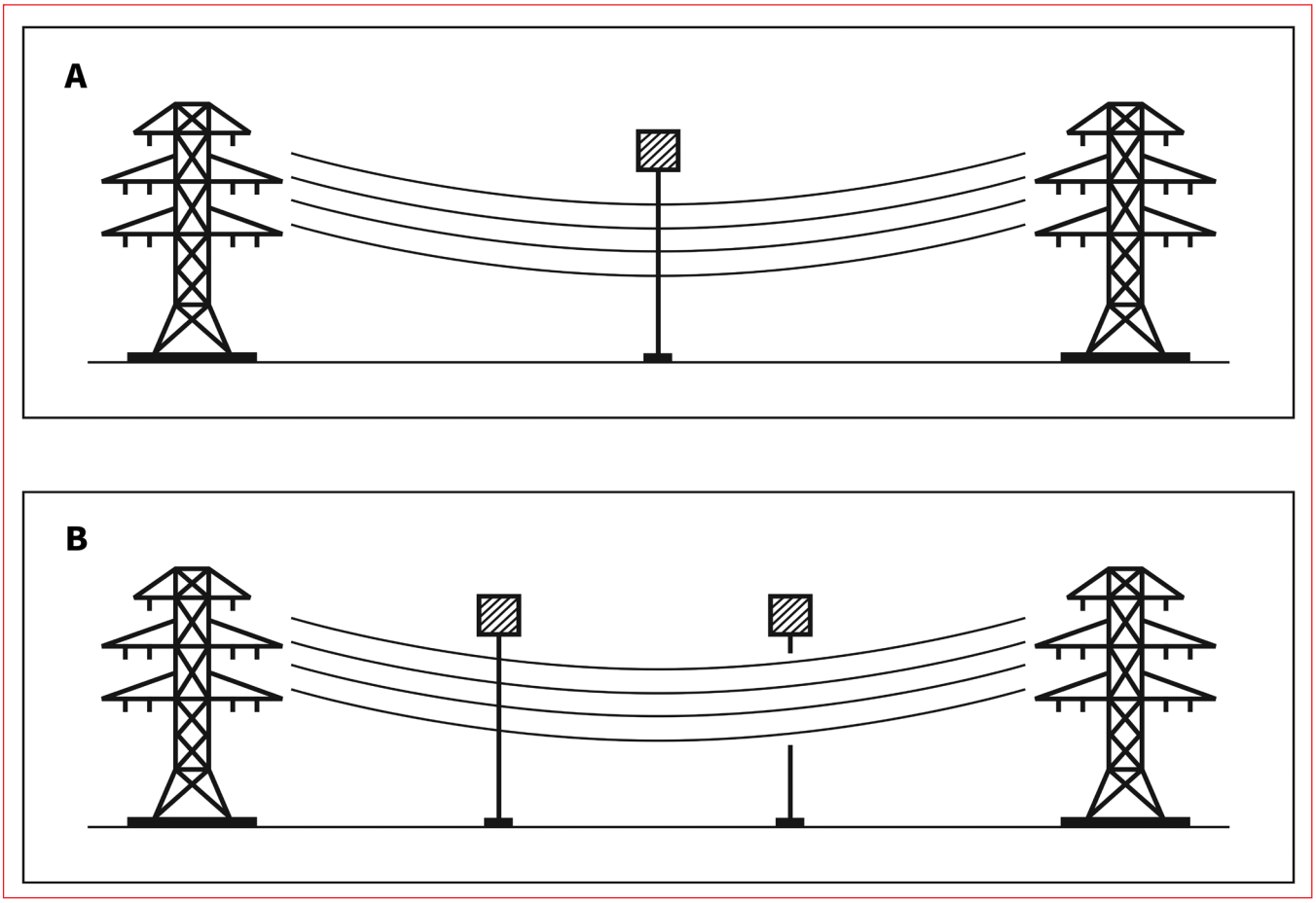

Fig. 3. Schematic view of a powerline between pylons with (A) a modified advertising mast serving as a flight-path blocker (FPB) at mid-span, and (B) two staggered FPBs either side of the powerline, aiming for maximum deterrence against collisions by flying bustards. Note that the squares atop the poles are simply one option and are not intended to suggest the only size and shape that might prove to be most effective.

the Lesser Florican and indeed all large birds that suffer the terrible (and sometimes lingering) death that striking a cable in flight brings, to investigate the costs and feasibility of these proposed flight-path blockers, as well as the optimal designs and functionality that the mast-top structures might have in order to maximise their effectiveness.

I am most grateful to Mimi Kessler, co-chair of the IUCN Bustard Specialist Group, for her comments on a first draft, to John Yayen for making Figure 3, and to a referee for helpful comments that reshaped the contribution. I offer it in memory of Radheshyam Bishnoi, who led the Godawan Community Conservation project in Rajasthan.

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