

## CONSERVATION UPDATE

# Records of the Endangered Storm's Stork *Ciconia stormi* in East Kutai, East Kalimantan, Indonesia, and notes on its conservation in Borneo

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Storm's Stork *Ciconia stormi* is the rarest, and perhaps the most narrowly distributed, species of stork in Asia (Hancock *et al.* 1992, Danielsen *et al.* 1997, Berdie 2008). It is confined entirely to the forested lowlands of the Thai-Malay Peninsula, Borneo and Sumatra, and two major satellite islands of Sumatra (i.e. North Pagai, Siberut) (Hancock *et al.* 1992, BirdLife International 2001). Sumatra and Borneo comprise the most important parts of the species' range, from which there is extensive recent documentation (Mann 2008, Brooks *et al.* 2018). BirdLife International (2021) estimate the current population of Storm's Stork to be approximately 260–330 individuals and the species is considered to be Endangered.

On Borneo, Storm's Stork occurs widely in the island's lowlands but the majority of recent records are concentrated in Sabah (Malaysia), probably as a result of the easy access to sites such as the Kinabatangan floodplains (Sheldon *et al.* 2001, Mann 2008, Phillipps & Phillipps 2014). The species also occurs at several peat and freshwater swamp-forests in Indonesian Borneo (Silvius & Verheugt 1989, Danielsen *et al.* 1997, Cheyne *et al.* 2014). There are recent observations from Danau Sentarum in West Kalimantan (Hood 2011), Sebangau and Tanjung Puting National Park and the Mawas conservation area in Central Kalimantan (Posa & Marques 2012, Cheyne *et al.* 2014, Brooks *et al.* 2018), and Gunung Lumut in East Kalimantan (Wielstra & Pieterse 2009).

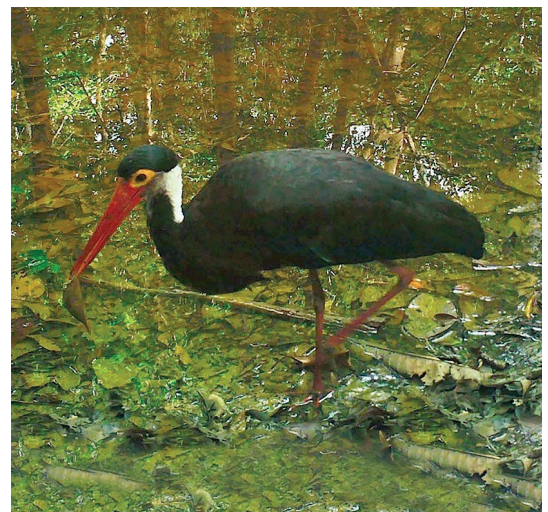
Located in the inland plains of East Kalimantan, Danau Mesangat (0.502°N 116.698°E) spans over 180 km<sup>2</sup> and lies between the Kelinjau and Telen Rivers (both tributaries of the Mahakam) in Long Mesangat and Muara Ancalong districts (Stuebing *et al.* 2015, Staniewicz *et al.* 2018). The low-lying topography of Long Mesangat and Muara Ancalong means that the area is largely waterlogged (Stuebing 2019). Danau Mesangat has been extensively logged and degraded for agriculture, and today constitutes a patchwork landscape of forest remnants in a mosaic of scrub and densely vegetated swamps (Stuebing *et al.* 2015). Although

research work here has principally targeted two threatened crocodile species, surveys have also revealed over 100 bird species (Martin 2019). Our article reports on direct observations and documentation of Storm's Stork from camera traps in Mesangat during 2020 and the first half (to July) of 2021. We then discuss briefly the significance of the Mesangat wetlands for the species, and key conservation actions going forward.

## Observations

Storm's Stork has been reported sporadically from our study sites in Danau Mesangat, with the earliest known records in 2011. Between mid-2020 and 31 May 2021, we recorded the species from camera traps on seven occasions over six dates (in a total of 555 camera trap images) across four camera-trapping localities. Excluding a single record involving one individual in November 2020, all our camera trap documentation occurred at the onset of the dry season (in eastern Borneo) within

**Plate 1.** Camera trap image of Storm's Stork *Ciconia stormi* foraging in inundated swamp forest in Mesangat Hilir, East Kalimantan, Indonesian Borneo, September 2016.



a window from late April to early June, with the latest record on 1 June. Records of the storks typically involved one or two individuals feeding in swampy forest pools (e.g. Plate 1).

Based on observations from the camera traps placed near one forest pool, the storks most actively fed in the afternoon, with a peak of activity from 12:00–13:00, and prior to sunset from 17:00–18:00. From our limited observations, the birds adopted two discernible foraging strategies, somewhat similar to those of the closely related Asian Woollyneck *C. episcopus*. An individual stork either (1) took slow and careful steps from the edge of the pool to stalk prey; or (2) walked rapidly around the pond, actively plunging its head into the pool to pick up prey. We were unable to determine what prey were taken although the small and receding pools (in the dry season) typically hold fish, invertebrates and frogs, all known to be parts of the stork's diet (Danielsen *et al.* 1997).

On several instances, we observed the species during our fieldwork at Mesangat. Single individuals or small groups of Storm's Stork have been seen flying over our research station raft (0.501°N 116.698°E) or were flushed from the wetlands. Most recently, two of the authors (BM, IK) observed the species along the banks of the Sungai Kelinjau, Mesangat Hilir, during a field trip to collect camera traps on 25 July 2021 (Plate 2).

**Plate 2.** Storm's Stork on the muddy banks of the Kelinjau River, Mesangat Hilir, July 2021.



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## Discussion

Our article reports records of the Storm's Stork in the Mesangat landscape and demonstrates that the species occurs regularly here. Storm's Stork is expected to occur throughout this part of eastern Borneo towards the Mahakam floodplains, given the extensive areas of low-lying riverine forest, peat

and freshwater swamp-forests, all known habitats of the bird (Danielsen *et al.* 1997, Cheyne *et al.* 2014). The concentration of our camera trap observations (of fewer than 10 record days over a sampling period spanning 1.5 years) to a small window between April and June indicates that the species either occurs in Mesangat at very low densities and/or ranges widely. Studies such as Cheyne *et al.* (2014) and Posa & Marques (2012) in Central Kalimantan, and others elsewhere, seldom detect the species during visual surveys and have found it only through judicious camera-trapping effort. For instance, Cheyne *et al.* (2014) recorded Storm's Stork on only 22 of 35,129 trap-nights (0.06%) in Sebangau at five sampling locations, while Posa & Marques (2012) recorded the species only three times in more than 3,900 trap-nights at the Tuanan Research Station in the Mawas Conservation Area.

Our observations, consistent with other recent observations (e.g. camera trap photographs in wetland patches in SYB Tepian Estate, Hulu Belayan and Mesangat Hilir), provide evidence that Storm's Stork can use logged and heavily degraded forests (Danielsen *et al.* 1997, Posa & Marques 2012). However, the relative importance of disturbed and undisturbed forest landscapes as habitat for the species remains unclear. It is likely that undisturbed, old-growth forests are relatively more important, given that the only known breeding records (in Peninsular Thailand and Sumatra) are from such forests (Danielsen *et al.* 1997, Cutter *et al.* 2007). Yet, widespread evidence of the species using degraded wetland habitat and disturbed forests, including our observations at Mesangat, suggests that there is considerable value in protecting and restoring logged/degraded areas of swamp-forest for the stork and for co-occurring threatened species such as False Gharial *Tomistoma schlegelii*.

Today, while Storm's Stork maintains a clear stronghold on Borneo, it is gravely threatened by the clearance of lowland dipterocarp and swamp-forests (Wells 1999, Miettinen *et al.* 2011). As with many of Borneo's most charismatic megafauna, such as its hornbills, orangutans and elephants (Phillipps & Phillipps 2014), the protection of large remaining tracts of lowland and swamp-forest habitat is essential for the conservation of Storm's Stork (Berdie 2008, Cheyne *et al.* 2014). Alongside this, there is a need for the retention and conservation management of forested land/wetlands for biodiversity in existing and proposed agricultural concessions. In Mesangat, Storm's Stork has been identified as one of the priority species for conservation by the organisation Yayasan Ulin and planned work aims to better understand its ecological and spatial needs, while leveraging a

critical window of opportunity to engage local people who have traditionally hunted waterbirds here for food, on the wise use of Mesangat's wetlands.

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