

The discovery of Storm's Stork *Ciconia stormi* in Thailand

SEUB NAKHASATHIEN

A nesting pair of Storm's Storks *Ciconia stormi* was found in lowland rainforest at Khlong Mon, a tributary of the Khlong Phra Saeng, Khlong Saeng Wildlife Sanctuary, Surat Thani province. The nest and young are described. The entire lowland area, the last extensive piece of lowland rainforest in Thailand, has since been inundated by the Chiew Larn Reservoir and it is feared that the species, newly discovered for Thailand, could become extinct there. Recommendations for the conservation of the species are made.

Storm's Stork *Ciconia stormi* is known from Borneo (Smythies 1981), Sumatra (White 1974) and peninsular Malaysia, for which Medway and Wells (1976) listed only five records. Since that time, however, probably owing to increased coverage and improved knowledge of the identification features of the species, one or two birds have been recorded in most years from peninsular Malaysia (Wells 1982 and *in litt.*). However, the breeding record from peninsular Thailand described below represents a northward extension of the known breeding range by over 500 km.

Although Chasen (1935) had previously treated *C. stormi* as a distinct species, Kahl (1972) retained it as a subspecies of the Woolly-necked Stork *C. episcopus*. Holmes (1977), however, provided positive evidence for the sympatry of both Storm's and Woolly-necked Storks in Sumatra, indicating that the two forms are distinct species which are ecologically segregated. He found *C. stormi* in dense forests while *C. episcopus* occurred in open swamp, rice paddy, grassland and dry cultivated areas. There are also records of *C. episcopus* for peninsular Thailand: from Phuket (Müller 1882); from Surat Thani province and the island of Ko Samui (Robinson 1915a,b); from Trang, where Riley (1938) lists five specimens, and from Krabi and Yala (Medway and Wells 1976). Both *C. stormi* and *C. episcopus* may, therefore, have co-existed in peninsular Thailand too, though *C. episcopus* appears to have been lost. The report of a colony of *C. episcopus* in Songkhla province (Medway and Wells 1976) is unsubstantiated; certainly the species is not listed for this region by TISTR (1981). Robinson (1915a) indicated that *C. episcopus* frequented rice fields in Bandon (now Surat Thani) province, and this suggests that both *stormi* and *episcopus* were segregated by habitat in peninsular Thailand, as in Sumatra. Moreover, the distinctive plumage and bare part colours of the Storm's Storks observed in Thailand reaffirm its status as a full species.

THE FIND

Since 3 April 1986, I have been engaged on a programme of the Wildlife

Conservation Division, Royal Forest Department, to capture and translocate wildlife trapped by the rising waters of the newly constructed Chiew Larn Reservoir in Surat Thani province, southern Thailand. This reservoir, when full, will flood 165 km² of land below 95 m a.s.l. along the Khlong Phrasaeng and its tributaries, within the contiguous Khlong Saeng Wildlife Sanctuary (1,236 km²) and Khao Sok National Park (645.5 km²). Dam construction was approved in February 1982 following an environmental impact assessment (Anon. 1980). In the four years before inundation of the area commenced in April 1986, forest areas below 100m elevation were logged. This process is still continuing.

In the course of capturing and relocating mammals, birds and reptiles trapped on the 241 islands created by the rising floodwaters, my team and I travelled by motor boat around most of the reservoir basin. On 27 September 1986, I saw a bird which I first thought was a hornbill landing in a tall dipterocarp tree protruding from the floodwaters. After checking the bird with binoculars, I realised that it was a stork with a bright orange bill. The bird jumped along the branch to a major fork and sat down on a large, bulky nest. A second bird, after circling, glided down to another, similarly flooded dipterocarp tree 70 m from the first. After consulting King *et al.* (1975), I identified the bird as *Ciconia (episcopus) stormi* on the basis of its bright orange-fleshy bill and black sides to the neck.

I visited the site again the following day when I found a second, old, unoccupied nest on another dipterocarp, 200 m from the first. Thereafter, I visited the site on 15, 17 and 21 October, each time for less than 15 minutes, in order to avoid causing disturbance. On every occasion, one member of the pair was incubating. Even though the floodwaters were steadily rising, the leaves of the tree remained green and shaded the nest. When I revisited the nest on 24 October (i.e. 27 days after the nest was first located) two small chicks could be seen. These were presumed to have hatched sometime during 21–24 October. I set up a blind on my boat, and moored under the shade of a tree about 100 m from the stork nest. The nest was no more than 15 m above the water surface and, by using a 1200 mm telephoto lens, I was able to take a number of photographs of the chicks and an adult in attendance (see Cover).

I visited the site again on 13 November but was unable to return until 22 November, when I observed that the nest had been destroyed; no storks were to be seen in the vicinity. While I considered that the young might have been eaten by a predator, I thought it more likely that they had been stolen by villagers. Although I had been careful not to draw attention to the nest, many villagers travel around the reservoir by boat and could have seen the nest by chance. Early in the morning of 23 November, a man came to tell me about a Tapir *Tapirus indicus* and a Gaur *Bos gaurus* which had become trapped on islands. I told him about the disappearance of the stork chicks and he promised to make enquiries of the villagers at the Chiew Larn Resettlement Village, near the dam site. He returned that evening, having located the birds. He took us to the house of the deputy village headman who

said he could return the chicks, but requested us not to penalise the man who had taken them. The chicks had been released on a small stream behind a house and, since it was dark, we had to search the dense streamside vegetation for almost one hour with flashlights before we could locate them. One of the birds had evidently sustained a broken mandible during capture from the nest, as the villager had used a 12 m long bamboo pole to dislodge both nest and birds from the tree. Although both birds could walk, using their spread wings to aid balance, they were still very young and we considered that their chances of survival would be poor if we released them back into the forest. That same evening we took the birds to the Nature and Wildlife Educational Center at Khao Tha Phet, Surat Thani. They were placed in a 6 m² aviary and supplied with a flat bamboo basket, lined with sawdust. The birds remained in the basket, standing up and calling when anyone approached the aviary. Both birds could walk in order to take freshwater fish, which had been cut into small pieces, from their keeper. Subsequently they were moved to a larger aviary.

THE NEST

The nest was situated 19 m up in a major fork of the eastern branches of a 27 m tall *Dipterocarpus baudii* Korth., on the bank of the Khlong Mon, a tributary of the Khlong Phra Saeng, at 69 m a.s.l. (9°05'N 98°30'E). When first discovered, the nest was only 15 m above the surface of the water. It consisted of a flat platform, 15 cm deep, with an external horizontal diameter of 50 cm. It was constructed mainly of dry sticks 15–60 cm in length, some of which were recognised as coming from trees of the families Loranthaceae, Dipterocarpaceae and Rubiaceae. The floor of the nest was lined with dry leaves and some down.

The second, unoccupied, nest was similar but situated in the topmost branches of a 30 m tall dipterocarp. These appear to be the first descriptions of the nest of Storm's Stork.

DESCRIPTION OF THE ADULTS

The identification features of Storm's Stork are not well known and in the past ignorance has led to its confusion with the Woolly-necked Stork. Both species show a black body and wings, contrasting with a white belly and undertail-coverts. Storm's Stork differs, however, in having black sides to the neck and foreneck. The only white on the head and neck is restricted to the cheeks and nape and to a very narrow wedge extending down the midline of the foreneck for the upper third of its length. The tail pattern differs in that the outer pairs of tail feathers are black, but this feature is difficult to see except in flight. However, the most distinctive features of the birds I saw

were the bright orange-flesh bill and bright yellow orbital skin. The legs were pale orange and the facial skin dull orange. The sexes are similar.

DEVELOPMENT OF THE YOUNG

The chicks were first seen on 24 October, when believed to be 1–3 days old. Both were covered in white down, but showed a black bill and naked black crown. During 20 minutes' observation, when attended by a single parent, they moved around frequently, but crouched down and remained motionless on the floor of the nest when the loud calls of a Crested Serpent-Eagle *Spilornis cheela* could be heard.

By 13 November, the chicks had roughly doubled in size and black feathers could be seen emerging through the white down on their throats, wings and bodies. A yellow tip to the bill could be seen together with pale yellow facial skin and bright yellow gular skin. Sometimes the birds stood erect and spread their wings. Although unattended by the parents during the period of observation, they still lay flat and motionless on the nest floor in response to unfamiliar sounds. There was a noticeable size difference between the two chicks. By roughly 30 days after hatching the areas of black feathering had greatly increased and both chest and wing coverts were glossed with bronze-red and green. After 45 days, the birds resembled the adults, although they were still very much smaller with shorter bills, some small patches of down were still present, the facial skin was paler yellow and the bill was dull orange-flesh with the distal third being dusky. The birds differed additionally from the adult in that the black feathering on the head extended below the eye to the base of the bill. The legs were dark greyish-flesh initially, but the lower tarsus became dull reddish-orange after about three weeks. When 90 days old, the captive chicks were able to fly for a short distance and the individual which had sustained the damaged bill was able to feed normally. Throughout the period of study, the chicks called with loud, harsh *krack, krack, krack* notes.

ECOLOGY

Prior to the construction of the Chiew Larn Dam, no more than 21 km² of the basin, most of which lay within 100 m of the banks of the main rivers, had previously been cleared and settled by 283 households, and most of the lowland area was still covered by what Whitmore (1975) termed semi-evergreen rainforest. The forest comprised three strata, with many huge trees. These included *Hopea ferrea*, *Cynometra bijuga*, *Dipterocarpus* spp., *Mesua ferrea* and *Ficus* spp. The density of trees having a diameter exceeding 10 cm at breast height was roughly 500–800 trees per hectare and the canopy cover was 80–90% of the total area. The undergrowth consisted

predominantly of rattans and other palms, bamboos, shrubs and climbers (Anon. 1980). The soils were chiefly fertile alluvium. The valley floor was only 13.5 m above sea level in its lowest parts, varying from roughly 5 km in width to less than 100 m on the upper reaches of some tributaries.

The number of Storm's Storks in the area, even before the construction of the dam, must have been very small, with the population having perhaps been slowly reduced by hunting over a period of decades. The deputy village headman, who formerly lived near the nest site, reported that he had once seen four Storm's Storks feeding along a tributary of the Khlong Mon, before he moved out of the area in 1985. The local name, 'nok kra su-um', refers to the birds' way of fishing, by quiet stalking, along the bank of a stream in dense forest. He also mentioned that the species was difficult to shoot because it was extremely shy.

CONSERVATION ASPECTS

After dam construction was approved, there was a great increase in human activity in the area. The villagers were evacuated and resettled outside the area of impoundment; roughly half of the area (72 km²) was clear-cut, of which 40 km² were burnt. Despite this, the remaining areas of selectively logged lowland forest, below 100 m but above the zone of inundation, still supported a great many forest birds during 1986 and 1987. Besides Storm's Stork, many other lowland specialists listed by Wells (1985 and *in litt.*) were recorded, including Crested Fireback *Lophura ignita*, Malaysian Peacock-Pheasant *Polyplectron malacense*, White-fronted Scops Owl *Otus sagittatus*, Black Hornbill *Anthracoceros malayanus* and Ferruginous Babbler *Trichastoma bicolor*, all of which are considered to be threatened in Thailand (Round *in press*).

The impact of the Chiew Larn Dam upon the lowland bird community was never assessed. It was stated (Anon. 1980) that 'in regards to birds . . . including crested fireback pheasant, the adverse effects of the impoundment are likely to be minor, because most birds are mobile and able to flee away in the event of flooding'. The study identified those common and ecologically tolerant species such as Chinese Pond-Heron *Ardeola bacchus* and Black-capped Kingfisher *Halcyon pileata*, which might arguably benefit from the creation of the reservoir, but never mentioned that many resident, lowland forest species might be expected to perish. Even though the reservoir, when full, will flood only a small proportion of the surrounding forest area, estimated by Round (*in press*) as covering over 4,000 km² in 1984, most of this area is steeply mountainous, rising to 1,395 m, with large areas of sheer limestone crags, and is clearly unsuitable for Storm's Stork and other lowland bird species. The impact assessment made no mention of the fact that the dam would inundate the only extensive tract of lowland, valley-bottom rainforest within any protected area in southern Thailand.

Since the beginning of inundation, in April 1986, ease of access by boat into previously remote areas has greatly increased, and many rural people from Surat Thani and neighbouring provinces have entered the reservoir in order to fish and to cut timber and rattans. Of 298 villagers around the reservoir in February 1987 who were interviewed by my team, half had moved to the area from other provinces since inundation. Permits to cut rattans in the reservoir basin have since been granted to 200 more people. In theory, such villagers are only permitted to cut in the concession areas, up to the 100m contour, but in practice, because of the reservoir's long perimeter, this regulation is difficult to enforce and much illegal hunting and collection of forest products are taking place in both Khao Sok National Park and Khlong Saeng Wildlife Sanctuary. Thus, even if Storm's Stork and other vulnerable lowland forest birds are able to utilise the reservoir margins, they face a grave risk from hunters.

Storm's Stork is thought to be at risk throughout its range due to lowland forest destruction (King 1978–1979). The following measures should be urgently implemented in the hope that those parts of the Khlong Saeng Basin outside the inundation zone, and perhaps elsewhere, may continue to support Storm's Stork and other lowland rainforest birds.

1. Access to the site by villagers should be strictly limited and all activities, other than fishing, should be banned. Each fisherman, together with his place of residence, should be recorded.
2. The quality and regularity of surveillance by Forest Department officials should be increased.
3. Storm's Stork should be added to the list of protected wild animals under the Wild Animals Reservation and Protection Act, B.E. 2503.
4. Searches for Storm's Stork and other lowland rainforest birds should be conducted elsewhere in southern Thailand, with a view to extending the boundaries of existing parks and sanctuaries to include additional lowland forest regions, wherever feasible.
5. Measures for the rehabilitation of the two captive Storm's Storks should be considered, although it may not be feasible to reintroduce these birds, which have become very tame, into the wild.

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- Seub Nakhasathien, Technical Section, Wildlife Conservation Division, Royal Forest Department, Pahol Yothin Road, Bangkok, Bangkok 10900, Thailand.