

Waterbirds of the Southern Kapuas Swamplands, West Kalimantan (Kalimantan Barat), Indonesia

Project Final Report



Centre for International
Migration and Development
a joint operation of GIZ and the
German Federal Employment Agency



Submitted by
Peter Widmann, Lifforina Nababan, Muhammad Firdaus & Irfan Cayadi
Faculty of Forestry, Tanjungpura University,
Pontianak, Indonesia
August 2011

Introduction

The Southern Kapuas Swamplands (SKS) belong to the most important wetlands in the Indonesian province of West Kalimantan. The area is the type locality for the globally threatened Storm's Stork *Ciconia stormi* (Blasius 1896) which previously to this study was recorded until the end of the last century (Holmes 1997). Overall, the estuary of the Kapuas Indonesia received little ornithological attendance and systematic bird records were not available so far.

Through a grant of WildWings facilitated by the Oriental Bird Club, members of the newly founded Kalimantan Birding Club conducted surveys on waterbirds from July 2010 to August 2011 in three sites of SKS.

Main objectives of the project were:

1. Increasing capacities of students in waterbird identification and monitoring, as well as conservation.
2. Compiling information on occurrence and abundance of waterbird species as listed by the Asian Waterbird Census.
3. Increasing awareness towards stork conservation among communities living in or adjacent to important wetlands.

Methods

Members of the Kalimantan Birding Club practised waterbird identification in classroom sessions using slides, starting with painted illustrations from field guides, followed by photographs, including digiscoped ones from the region. Theoretical identification exercises were put into practice in the Southern Kapuas Swamplands (SKS). Estimation of flock sizes was done in the field.

Waterbirds were searched on foot and by boat within the northern SKS between July 2010 and August 2011. Some earlier and additional species records, mostly from southern Pontianak were included in this report as well in case these provide additional records. We used MacKinnon & Phillipps (1993; Bahasa Indonesia and English versions), Phillipps & Phillipps (2009) and Myers (2009) for bird identification. Main sources for status and distribution of birds were Smythies (1999) and Mann (2008), as well as Wetlands International (1997) for waterbirds of the coastal areas of West Kalimantan and van Balen & Dennis (2000) for bird records from Danau Sentarum in the province's interior.

The campaign for waterbird conservation followed roughly the methods of a RARE campaign. We conducted a pre-campaign survey, using a questionnaire to quantify the target populations knowledge of, and attitude towards waterbirds. The education campaign mainly was done in focus group discussions with the two resident storks as target species. Knowledge and attitude changes were measured in the post-campaign survey using the same questionnaire. A control group in the area also was interviewed, without being included in the campaign itself.

Site Description

The Southern Kapuas Swamplands (SKS) consist of the extensive estuary of the Kapuas River and cover around 1.5 million hectares. Due to presence of the globally endangered Storm's Stork *Ciconia stormi* the area qualifies as Ramsar site and is listed as Important Bird Area (ID 048; Holmes et al. 2001).

SKS are characterised by extensive peat accumulations which developed after the last glaciation, starting around 12,000 years ago and still continuing under undisturbed conditions. These peat formations are a result of rising seawater levels which hampered drainage of rainwater, which in turn led to waterlogged soils depleted of oxygen, with imperfect decomposition of organic material. Originally the region was covered mainly by peat swamp forest. Coastal areas are still dominated by extensive mangrove, one of the largest in Borneo.

Areas which are periodically flooded by the Kapuas are originally stocked with freshwater swamp forests.

The estuary is one of the most densely settled regions in Borneo; the southern portion of the provincial capital Pontianak is situated within SKS. Most of the original peat swamp forest consequently was cut and burned for infrastructure development and agriculture, including extensive areas for oil palm plantations in recent time. Degraded peat areas are annually subject to intensive burning during the dry season. Mangroves and freshwater swamp forest in the estuary core area are successively cleared for aquaculture ponds, wetland rice cultivation or plantations, despite some of them are conservation forests (hutan lindung).

Surveys took place in the following three locations (Fig.1):

- Sei Nyamuk Delta: the central delta area of SKS covers about 21,000 ha (Wetlands International 1997). River channels and adjacent tidal areas are dominated by *Nipa Nypa fruticans* and mangrove (mostly *Avicennia* spp.). Beach ridges are formed in the seaward portions of five larger islands. Exposed beaches consist mainly of sand and silt. Between November to January thick peat layers are seasonally deposited due to the winter monsoon, which pushes water into the estuary, decreasing overall drainage and causing extensive flooding, even within Pontianak town proper. These temporary peat deposits can be up to half a meter in thickness and are virtually sterile. Dryer portions of the estuary are cultivated with coconut and rainfed rice. Landward areas originally were covered with peat swamp forest, but are now heavily degraded or transformed into coconut, rice paddies or ponds for aquaculture. River channels are heavily utilised for fisheries; permanent fish traps and gill nets are the most important techniques applied. Water in the estuary is brackish; however, there is an area of about 15 ha where intrusion of freshwater creates suitable conditions for lush freshwater macrophytes (*Nymphaea* sp., *Hydrilla verticillata*).

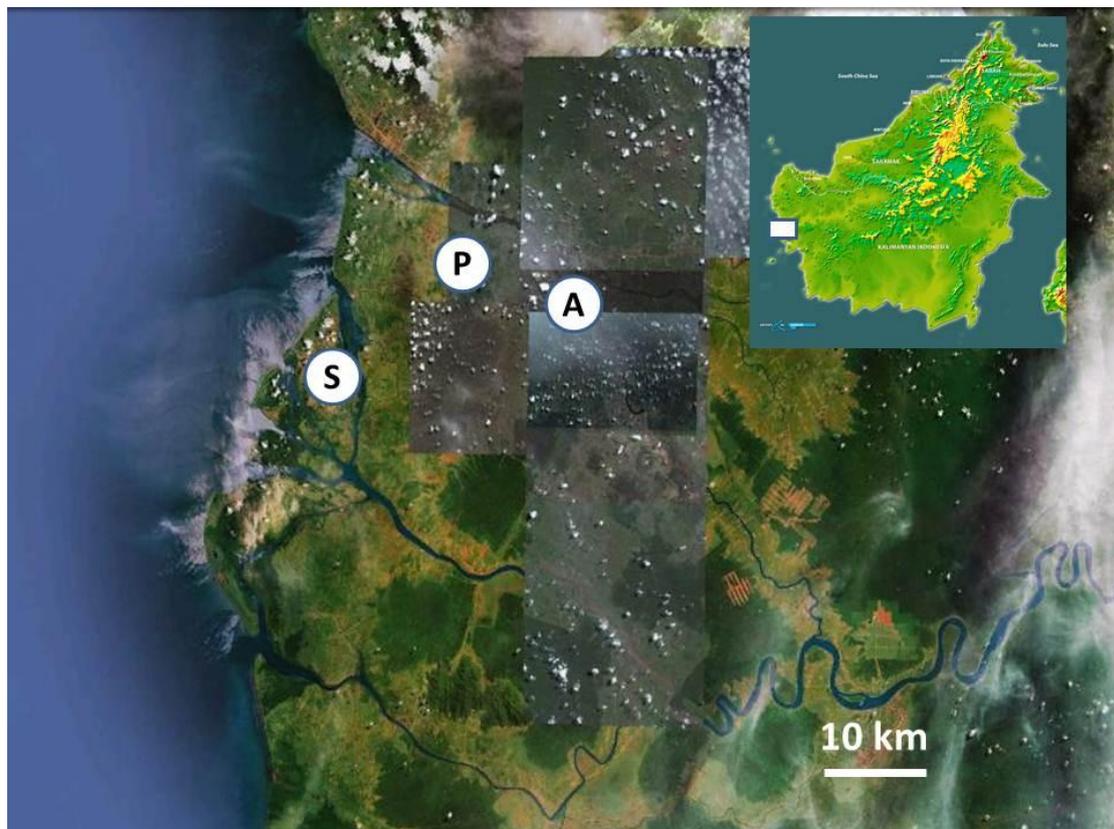


Figure 1. Map of Southern Kapuas Swamplands, West Kalimantan, Indonesia, including survey sites (S: Sei Nyamuk Delta; P: Pontianak [South]; A: area around Pontianak Airport. Map source: Google Earth). Inset: Location of Southern Kapuas Swamplands within Borneo (Map source: WWF).

- Pontianak [South]: open areas adjacent to Pontianak’s suburbs and Tanjungpura University campus. Barren areas are extensively covered by sedges and ferns. *Acacia mangium* is an invasive tree species which in parts initiates a secondary succession to woodlands. Agriculture is the main form of land use, with pineapple, rainfed rice and corn being the most common crops. The area is drained by a network of channels. The northernmost arm of the Kapuas River forms the northern boundary of SKS. Its waters are eutrophic and moderately polluted because of sewage and other run-off originating from Pontianak. Surface water of tributaries is highly acidic, and the only true aquatic macrophyte is the carnivorous *Utricularia* sp. Airgun hunting for waterbirds, as well as trapping of water- and songbirds is widespread in the area.
- Area around Pontianak Airport: Apparently this area was among the earliest to be cleared for larger scale agriculture in the vicinity of Pontianak. The vicinity of the single runway consists of extensive grasslands, which are regularly cut. Few cattle pastures exist. Most of the remaining area is under cultivation (rainfed and irrigated rice fields, corn, pineapple, coconut, sago, *Aloe vera*). Patches of degraded peatswamp forest are continuously converted for agricultural use.



Figure 2. Nipa swamp and water lily patch in Kuala Taiminyak, Sei Nyamuk Delta (left); beach with peat deposits on Tanjung Saleh, Sei Nyamuk Delta (right).

Results

Objective 1: Increasing capacities of students in waterbird identification and monitoring, as well as conservation

The core research group consisted of eight student members. Additional members of the Kalimantan Birding Club joined surveys occasionally. Improvement of identification skills was correlated with the frequency this group was encountered during fieldwork, and higher for common groups and lower for rarer ones (Tab.1). *Calidris* waders were encountered only occasionally, terns, herons and plovers frequently. A limiting factor was the availability of the newer field guides for birds of Borneo in English only, so that species descriptions were of little use for team members with limited language skills.

Table1. Improvement of identification skills among core team members of selected waterbird groups before and towards the end of the project (+: lowest score; +++++: highest score)

Waterbird taxon	ID skills at project start	ID skills at project end
Rallidae	++++	++++
<i>Calidris</i>	+	+++
<i>Charadrius</i>	+	++++
<i>Chlidonias, Sterna</i>	+	++++
Ardeidae	+++	++++



Figure 3. Core team during waterbird survey in Sei Nyamuk Delta

Objective 2: Compiling information on occurrence and abundance of waterbird species as listed by the Asian Waterbird Census

We recorded 175 bird species in SKS of which 55 species were waterbirds as defined for the Asian Waterbird Census (AWC; Li 2009). The team participated in the AWC of 2011 and submitted a completed data sheet to the country coordinator.

In the following we present new or otherwise remarkable waterbird records from three locations within SKS. We consider species for which no specific dates are given for West Kalimantan in Mann (2008) as potentially new records for this province. We checked van Balen & Dennis (2000) which covers the Danau Sentarum area in the interior of the province, and Wetlands International (1997) covering coastal wetlands of West Kalimantan for additional records, since these two publications are not cited by Mann (2008).

LESSER WHISTLING-DUCK *Dendrocygna javanica*

Five were seen feeding in dense waterplant vegetation in Sei Nyamuk Delta on 12.12.2010. Whistling ducks were frequently heard flying over Pontianak during night time, but this species could not be separated from the likewise recorded Wandering Whistling-duck *Dendrocygna arcuata* by vocalisation alone. Mann (2008) does not mention specific records for West Kalimantan.

BUFF-BANDED RAIL *Gallirallus philippensis*

One individual was digiscope by MF in a rice padi near Pontianak Airport on 26.03.2011. This likely represents the first record for West Kalimantan. There is one previous record of the species from Sabah and one unconfirmed record from Kalimantan Timur (Mann 2008).

SLATY-BREASTED RAIL *Gallirallus striatus*

On 30.03.2007 PW observed two birds on a grassy trail near a rice paddy in southern Pontianak. The species is known from all political units of Borneo, but under-recorded due to its cryptic behaviour (Mann 2008).

COMMON SNIPE *Gallinago gallinago*

One bird with white trailing edges on wings clearly visible was flushed from a pineapple field South of Pontianak on 21.03.2010. This likely represents the first record for West Kalimantan.

BAR-TAILED GODWIT *Limosa lapponica*

A flock of 31 birds were observed roosting on a mudbank in Sei Myamuk Delta on 23.01.2011. Mann (2008) does not give specific dates for this species for West Kalimantan.

EASTERN CURLEW *Numenius madagascariensis*

We recorded nine birds on mudflats in Kuala Karang in Sei Nyamuk Delta on 23.01.2011. Mann (2008) notes three previous records from Kalimantan Timur as first ones for Kalimantan. This may be the first record for the species in West Kalimantan.

COMMON REDSHANK *Tringa totanus*

Three birds were observed by PW on 27.10.2009 in a flooded rice padi in southern Pontianak. Mann (2008) describes it as a widespread winter visitor and passage migrant on Borneo, but does not cite observations for West Kalimantan.

COMMON GREENSHANK *Tringa nebularia*

One bird was flushed from a pond on the campus of Tanjungpura University in southern Pontianak on 03.01.2011. No specific records are given for this species for West Kalimantan in Mann (2008).

GREEN SANDPIPER *Tringa ochropus*

One individual was observed by PW on 10.04.2009 in a flooded rice padi in southern Pontianak. The species was previously recorded from the Mahakam Lakes and estuary (Mann 2008).

TEREK SANDPIPER *Xenus cinerea*

Eight birds were observed feeding on a muddy tidal flat near *Avicennia* in Kuala Bunga, Sei Nyamuk Delta on 22.4.2011. Mann (2008) lists records only from Kalimantan Timur within Kalimantan. One record exists from Kendawangan Nature Reserve, West Kalimantan (Wetlands International 1997).

GREY-TAILED TATTLER *Heteroscelis brevipes*

One individual was observed foraging on a sandy tidal flat near Sungai Kakap, Sei Nyamuk Delta on 07.05.2011. No dates are given for the species for West Kalimantan in Mann (2008)

RUDDY TURNSTONE *Arenaria interpres*

We observed 14 individuals feeding on a sandbank in Kuala Karang in Sei Nyamuk Delta on 23.01.2011. No specific dates for this species are given by Mann (2008) for West Kalimantan.

RED-NECKED STINT *Calidris ruficollis*

Ten individuals were roosting on a sandbank in Kuala Karang in Sei Nyamuk Delta on 23.01.2011. The only other records for Kalimantan are from the Mahakam in Kalimantan Timur (Mann 2008).

CURLEW SANDPIPER *Calidris ferruginea*

Four birds were roosting on a sandbank in Kuala Karang in Sei Nyamuk Delta on 23.01.2011 together with the previous species. Occasionally occurring in Kalimantan (Mann 2008), but previously no dates for West Kalimantan were available.

PACIFIC GOLDEN PLOVER *Pluvialis fulva*

One and six birds were observed foraging at a sandy beach in Tanjung Saleh in Sei Nyamuk Delta on 24.10.2010 and 15.01.2011 respectively. Twenty-three birds were observed on a mudflat in Kuala Karang in central Sei Nyamuk Delta on 23.01.2011. Very common passage migrant and winter visitor according to Mann (2008), but no dates for West Kalimantan given there, nor in Wetlands International (1997).

LESSER SAND PLOVER *Charadrius mongolus*

Two birds foraged on a mudflat near Sungai Kakap in Sei Nyamuk Delta on 06.09.2009 (PW). Thirty-six birds were foraging on a mudflat in Kuala Karang in central Sei Nyamuk

Delta on 23.01.2011. Mann (2008) lists the species from the northern part of Borneo and the Mahakam in Kalimantan Timur. Possibly this is the first record for West Kalimantan.

GREATER SAND PLOVER *Charadrius leschenaultii*

We observed one bird each feeding on a sandy beach in Tanjung Saleh, Sei Nyamuk Delta on 20.11.2010 and 15.01.2011 respectively. On 23.01.2011 we recorded 28 birds on a mudflat in Kuala Karang in central Sei Nyamuk. Mann (2008) considers the species common winter visitor and passage migrant in coastal Borneo, but does not cite observations from West Kalimantan. Within the province the species was recorded also from Kendawangan Nature Reserve in Ketapang District (Wetlands International 1997).

ORIENTAL PRATINCOLE *Glareola maldivarum*

PW observed two birds flying overhead on 18.03.2009 in open peatland in southern Pontianak. Scarce and local, but widespread winter and passage migrant according to Mann (2008), with no specific dates for West Kalimantan.

BLACK-HEADED GULL *Larus ridibundus*

We observed three birds perched on wooden pillars in the port area of Sungai Kakap in northern Sei Nyamuk Delta on 15.01.2011. Two individuals were still present on 23.01.2011. According to Mann (2008) this is a very scarce winter visitor in northern Borneo. This represents the first record for Kalimantan.

WHISKERED TERN *Chlidonias hybridus*

Present year-round in SKS, by mid of April few birds in breeding plumage could be observed regularly in Sei Nyamuk Delta and in Pontianak Port. Highest numbers were recorded on 15.01.2011 with at least 234 birds in Kuala Taik Minyak, and 433 birds in Kuala Karang, Sei Nyamuk Delta, on 23.01.2011. *C. leucopterus* was also present on both dates, and 120 terns could not be identified to species level on the former and 320 during the latter date.

WHITE-WINGED TERN *Chlidonias leucopterus*

This species was frequently observed in Sei Nyamuk Delta from October to March. At least six birds were seen on 29.12.2010 and 15.01.2011 mixing with *C. hybridus*. We recorded 236 individuals on 23.01.2011 in the same location, which suggests that this tern may be wintering in SKS. According to Mann (2008) the species is a passage migrant and possible winter visitor in Borneo.

CHINESE EGRET *Egretta eulophotes*

One individual of this globally 'Vulnerable' species (IUCN 2011) was observed in a tidal flat in Sei Nyamuk Delta on 24.10.2010. There is one previous record from Danau Sentarum within West Kalimantan (van Balen & Dennis 2000).

PACIFIC REEF EGRET *Egretta sacra*

One bird in dark phase observed in the estuary of the northernmost branch of Kapuas on 06.08.2011. No dates given for West Kalimantan given by Mann (2008), but one was record in Kendawangan Nature Reserve (Wetlands International 1997).

GREY HERON *Ardea cinerea*

One individual was observed on the river bank adjacent to nipa swamp in Sungai Kakap in Sei Nyamuk Delta on 06.09.2009. No dates are given for West Kalimantan in Mann (2008).

CHINESE POND HERON *Ardeola bachus*

Feliciano photographed one individual in breeding plumage perching on a tree near Pontianak airport on 13.04.2011. A winter visitor to northern Borneo (Mann 2008). This likely represents the first record for Kalimantan. There is a previous but unconfirmed observation from Danau Sentarum (van Balen & Dennis 2000).

YELLOW BITTERN *Ixobrychus sinensis*

One bird was seen on 24.04.2009 at the edge of a sedge marsh in southern Pontianak. No dates for the species are given in Mann (2008) for West Kalimantan.

STORM'S STORK *Ciconia stormi*

We observed one bird on 12.12.2010 perching on top of a tall tree in Telok Keramat, Sei Nyamuk Delta. One individual was seen flying over *Avicennia* mangrove in Tanjung Bunga, Sei Nyamuk Delta on 22.4.2011. SKS is the type locality of the species (Blasius 1896); it was recorded again in late 1992 and on 09.07.1997 near S. Kubu in the southern portion of the Sei Nyamuk Delta (Holmes 1997). There are several recent records of Storm's Stork from Ketapang District, south of SKS (Widmann et al. 2010). The species is listed as 'Endangered' by IUCN (2011).

LESSER ADJUTANT *Leptoptilos javanicus*

The species was first recorded in SKS with four individuals on 06.09.2009 during reconnaissance for this project in the Sei Nyamuk Delta and since frequently in this location, and occasionally in southern Pontianak. The highest daily count was 33 individuals on 29.07.2011. The highest simultaneous count was 26 individuals circling in thermals near Tanjung Bunga, Sei Nyamuk Delta on 12.12.2010. The species is listed as 'Vulnerable' by IUCN (2011). It is remarkable that this more conspicuous species was also only relatively recently recorded in Danau Sentarum National Park, long after the much more secretive Storm's Stork (van Balen & Dennis 2000).



Figure 4. Chinese Pond Heron *Ardeola bacchus* in breeding plumage, 13.04.11, near Airport Pontianak (left); Lesser Adjutant *Leptoptilos javanicus*, 29.12.10 in Sei Nyamuk Delta (right)

Objective 3: Increasing awareness towards stork conservation among communities living in or adjacent to important wetlands

The team interviewed 72 respondents of the target population in Sei Nyamuk Delta before conducting the awareness campaign (pre-campaign) and 69 respondents after the campaign. In this community it was not possible to conduct individual interviews, but answers to the questionnaire were given based on consent of the group present. A control group of 40 persons in a suburb of Pontianak were interviewed individually during roughly the same time periods, without being exposed to the awareness campaign.

Knowledge of waterbird species in the latter group was considerably lower than in the former. Answers given in the two interview schedules within the control group did not differ significantly from each other.

The campaign used focus group discussions during which the team explained status and distribution of the two stork species present in the area. Particularly the facts that Storm's Stork was scientifically described from a specimen originating from the area around Pontianak and that possibly only around one thousand birds are left in the wild, created considerable interest among participants of the campaign. Posters were distributed after the



Figure 5. Team members during interviews in Tanjung Saleh, Sei Nyamuk Delta

pre-campaign interviews depicting the two stork species and explaining threats leading to the decline of the species. During the pre-campaign interviews only six respondents (8.3%) recognised the Storm's Stork and were able to give locations where they have previously observed the species. After the campaign, 55 respondents (79.7%) were able to identify the species.

Waterbird identification skills were generally low; storks and herons were usually well known, waders and terns were not differentiated further. Cormorants and ibises were unknown in the area.

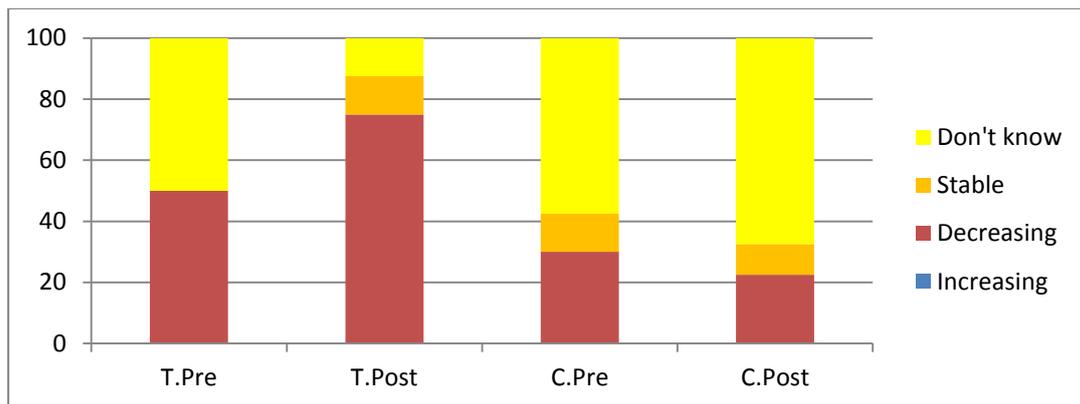


Figure 6. Percentage of responses of target population (T) and control group (C) before (Pre) and after (Post) the campaign being asked if waterbird populations over the past years were increasing, decreasing or stayed the same.

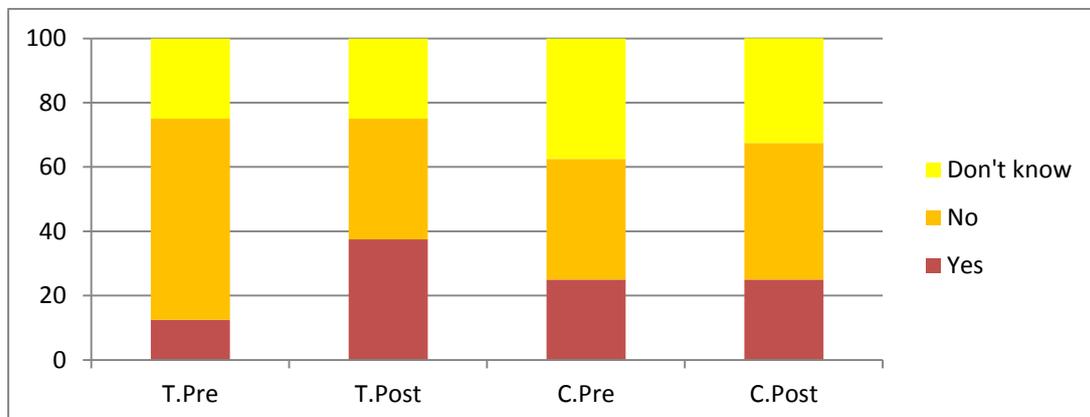


Figure 7. Percentage of responses of target population (T) and control group (C) before (Pre) and after (Post) the campaign being asked if they would be interested to be involved in waterbird conservation in the future

Remarkably, none of the respondents claimed that waterbirds were increasing in recent years (Fig. 6). Sole reason given for waterbird decline before the campaign was direct persecution. Percentage of respondents who thought that water birds were declining increased significantly after the campaign and reasons given included hunting and habitat destruction. Respondents who stated they would be interested in waterbird conservation activities in the future increased from 12.5% before the campaign to 37.5% after the campaign (Fig.7).

Discussion and Recommendations

Since many centuries the Kapuas has been a gateway to the interior of Borneo. Enigmatic bird species of Sundaland, such as Storm's Stork or Borneo Ground Cuckoo *Carpococcyx radiatus* have their type locality near the coastal provincial capital of Pontianak. However, SKS has received little avifaunistic attention in the recent past, and a comprehensive account of birds of the SKS has never been attempted. Most original peatswamp forests have disappeared in the meantime; the remaining vegetation is heavily fragmented and degraded. It is very likely that local extinctions have occurred, but difficult to document. Among the waterbirds, the Darter *Anhinga melanogaster* is either extinct or very rare. According to Mann (2008) the species was still common in coastal areas of Borneo until the 1930s. Only few and mostly older fishermen stated to be familiar with this bird during our interviews.

Waterbird assemblages remain relatively diverse, and SKS plays a role as stepping stone during migration. SKS may be a locally important wintering ground for White-winged and Whiskered Terns, however internationally important thresholds numbers were not reached for any waterbird species during our survey.

The Kapuas estuary seems to be less suitable as wintering ground for waders, which were recorded in a number of species, but in relatively low numbers. One reason could be that during the winter months tidal flats are often covered by thick layers of peat. The monsoon winds push seawater into the estuary during this time of the year, resulting in high water levels and reduced overall water currents which allow deposition of lighter material. Very few invertebrates were found in these deposits, indicating that they are of no use for foraging waterbirds.

SKS plays a regionally important role for stork conservation, with the Lesser Adjutant recorded for the first time from the area during this study.

Local knowledge and awareness of waterbirds is decreasing, but interest increases if it can be demonstrated, how unique the area is for the conservation, particularly for the stork species. Members of the Kalimantan Birding Club want to take advantage of this momentum by continuing waterbird monitoring activities in SKS, involving local communities, particularly those involved in fishing.

The local government of the newly-created Kubu Raya District is interested in the development of ecotourism activities in the area. There is a fair chance to encounter Proboscis Monkeys *Nasalis larvatus* in Sei Nyamuk Delta, and birdwatching is regarded as attractive option as well. Currently, Kalimantan Birding Club explores how it can contribute to these efforts. It is hoped that longer-term assessment and monitoring of birds in SKS can be achieved with support from the local government, eventually resulting in better protection of the area.

Acknowledgments

We are grateful to WildWings for supporting this project. We thank the Oriental Bird Club, for selecting this project; we are particularly indebted to Nick Brickle for his efforts. We thank Agustinus Irmawan, Martin Feliciano, Radius Willy, Agus Efensius, Raihan Hafiz, for their efforts and motivation in the classroom and field. We also thank the people of Tanjung Saleh for their hospitality and for sharing their knowledge with us.

The Faculty of Forestry of Tanjungpura University kindly provided space for classroom sessions and field equipment; we are particularly indebted to its dekan, Prof. Dr. Ir. H. Abdurrani Muin, MS. WWF Indonesia, Kantor Pontianak, provided valuable logistic support and facilitated contact to the local government of Kubu Raya.

PW is indebted to the Centre for International Migration and Development (CIM), particularly Mrs. Nadine Rabe, and WWF Germany, particularly Mr. Markus Radday, as well as Dr. Stephan Goetz & Stefan Sanktjohanser, goetzpartners for the continued support.

References

- van Balen, S, Dennis, RH 2000. Birds of the Danau Sentarum National Park. Borneo Research Bulletin.
- Blasius W 1896. Vögel von Pontianak (West-Borneo) und anderen Gegenden des indomalayischen Gebietes gesammelt von Herrn Kapitän H. Storm für das Naturhistorische Museum zu Lübeck. Mitt. Geogr. Ges. Naturhist. Museum Lübeck 1896: 90-145.
- Holmes DA 1997. Kalimantan bird report - 2. Kukila 9: 141-169.
- Holmes DA, Rombang WM, Octaviani D 2001. Daerah penting bagi burung - Kalimantan. (Important Bird Areas - Kalimantan). PKA/ BirdLife International Indonesia Programme, Bogor, Indonesia.
- IUCN 2011. The IUCN 2011 Red List of Threatened Species. Downloaded on April 19, 2011.
- Li ZWD, Bloem A, Delany S, Mardakis G, Quintero JO 2009. Status of waterbirds in Asia – Results of the Asian Waterbird Census: 1987-2007. Wetlands International, Kuala Lumpur, Malaysia.
- MacKinnon J, Phillipps K 1993. A Field Guide to the Birds of Borneo, Sumatra, Java and Bali. Oxford University Press, UK.
- Mann, CF 2008. The Birds of Borneo – An annotated Checklist. BOU Checklist No 23. British Ornithologists' Club, Peterborough, UK.
- Myers, S 2009. A Field Guide to the Birds of Borneo. New Holland Publishers, London, UK.
- Phillipps, Q, Phillipps, K 2009. Phillipps' Field Guide to the Birds of Borneo. Beaufoy Books, Oxford, UK.
- Smythies, BE 1999. The Birds of Borneo. 4th edition. Natural History Publications, Kota Kinabalu, Malaysia.
- Wetlands International 1997. Environmental profile of wetlands in West Kalimantan province. Wetlands International – Indonesia Programme, Bogor, Indonesia.
- Widmann, P, Tjiu, A., Prayogo, H. 2010. Storchenschutz in West-Kalimantan, Indonesien. ZGAP Mitteilungen 26: 7-11.

Annex 1: Systematic list of birds recorded from Southern Kapuas Swamplands. Locations: S: Sei Nyamuk Delta; P: Pontianak [South]; A: area around Pontianak Airport.

Scientific name	Common name	Location	Historical records from SKS
<i>Dendrocygna arcuata</i>	Wandering Whistling-duck	S,P	Pontianak (Holmes 1997)
<i>Dendrocygna javanica</i>	Lesser Whistling-duck	S	
<i>Gallirallus philippensis</i>	Buff-banded Rail	A	
<i>Gallirallus striatus</i>	Slaty-breasted Rail	P	
<i>Amaurornis phoenicurus</i>	White-breasted Waterhen	S, P, A	
<i>Porzana cinerea</i>	White-browed Crake	P, A	
<i>Gallicrex cinerea</i>	Watercock		"Pontianak side" , i.e. West Kalimantan (Smythies 1999)
<i>Porphyrio porphyrio</i>	Purple Swamphen	A	Pontianak (Holmes 1997)
<i>Gallinago sp.</i>	Snipe	P, A	
<i>Gallinago gallinago</i>	Common Snipe	P	
<i>Limosa limosa</i>	Black-tailed Godwit	S	Pontianak (Smythies 1999, Mann 2008)
<i>Limosa lapponica</i>	Bar-tailed Godwit	S	
<i>Numenius phaeopus</i>	Whimbrel	S	
<i>Numenius arquata</i>	Eurasian Curlew	S	
<i>Numenius madagascariensis</i>	Eastern Curlew	S	
<i>Tringa totanus</i>	Common Redshank	P	
<i>Tringa stagnatilis</i>	Marsh Sandpiper	S	Pontianak (Smythies 1957 in Mann 2008)
<i>Tringa nebularia</i>	Common Greenshank	S, P	
<i>Tringa ochropus</i>	Green Sandpiper	P, A	
<i>Tringa glareola</i>	Wood Sandpiper	P	
<i>Xenus cinereus</i>	Terek Sandpiper	S	
<i>Actitis hypoleucos</i>	Common Sandpiper	S, P, A	
<i>Heteroscelus brevipes</i>	Grey-tailed Tattler	S	
<i>Arenaria interpres</i>	Ruddy Turnstone	S	
<i>Limnodromus semipalmatus</i>	Asian Dowitcher		Pontianak (Smythies 1999)
<i>Calidris ruficollis</i>	Red-necked Stint	S	
<i>Calidris subminuta</i>	Long-toed Stint	S	
<i>Calidris ferruginea</i>	Curlew Sandpiper	S	
<i>Pluvialis fulva</i>	Pacific Golden Plover	S	
<i>Pluvialis squatarola</i>	Grey Plover	S	
<i>Charadrius alexandrinus</i>	Kentish Plover	S	
<i>Charadrius mongolus</i>	Lesser Sand Plover	S	
<i>Charadrius leschenaultii</i>	Greater Sand Plover	S	
<i>Glareola maldivarum</i>	Oriental Pratincole	P, A	
<i>Larus ridibundus</i>	Black-headed Gull	S	
<i>Sterna bergii</i>	Great Crested Tern	S	
<i>Sterna sumatrana</i>	Black-naped Tern	S	
<i>Sterna albifrons</i>	Little Tern	S	
<i>Sterna anaethetus</i>	Bridled Tern		SW of Pontianak (Mann 2008)
<i>Chlidonias hybridus</i>	Whiskered Tern	S, P, A	
<i>Chlidonias leucopterus</i>	White-winged Tern	S, P	
<i>Tachybaptus ruficollis</i>	Little Grebe		Pontianak (Holmes 1997)
<i>Anhinga melanogaster</i>	Darter		coast and tideways of rivers until 1930s (Mann 2008)
<i>Egretta garzetta</i>	Little Egret	S, P, A	
<i>Egretta eulophotes</i>	Chinese Egret	S	
<i>Egretta sacra</i>	Pacific Reef Egret	S	
<i>Ardea cinerea</i>	Grey Heron	S	
<i>Ardea sumatrana</i>	Great-billed Heron	S	
<i>Ardea purpurea</i>	Purple Heron	S	
<i>Casmerodius albus</i>	Great Egret	S	Pontianak (Smythies 1999)
<i>Mesophoyx intermedia</i>	Intermediate Egret	S, A	
<i>Bubulcus ibis</i>	Cattle Egret	S, P, A	
<i>Ardeola bachus</i>	Chinese Pond Heron	A	
<i>Butorides striatus</i>	Little Heron	S	

<i>Nycticorax nycticorax</i>	Black-crowned Night Heron	S, P	
<i>Ixobrychus sinensis</i>	Yellow Bittern	S, P	
<i>Ixobrychus cinnamomeus</i>	Cinnamon Bittern	S, P, A	
<i>Dupetor flavicollis</i>	Black Bittern	S	
<i>Ciconia stormi</i>	Storm's Stork	S	Pontianak (Blasius 1896), S. Kubu (Holmes 1997)
<i>Leptoptilos javanicus</i>	Lesser Adjutant	S, P	

Annex 2: Pre- and Post-campaign Questionnaire

Kuisiner Wawancara Burung Air

Nama _____ **Umur** _____ **O Laki-laki; O Perempuan**
Tanggal _____
Tinggal di _____ **Jumlah anggota keluarga** _____

1. Apakah Anda berpikir bahwa burung air di tempat dalam jangka waktu 5 tahun terakhir ini meningkat, menurun, atau tetap sama/stabil?

Meningkatkan Menurun Tetap sama/stabil Tidak tahu

2. Jenis-jenis burung air mana saja di tempat dalam jangka waktu 5 tahun terakhir ini meningkat, menurun, atau tetap sama?

Pecuk ular (<i>Anhinga melanogaster</i>)	<input type="radio"/> Meningkatkan	<input type="radio"/> Menurun	<input type="radio"/> Tetap sama/stabil	<input type="radio"/> Tidak tahu
Pecuk Padi (Cormorants)	<input type="radio"/> Meningkatkan	<input type="radio"/> Menurun	<input type="radio"/> Tetap sama/stabil	<input type="radio"/> Tidak tahu
Bangau Storm (<i>Ciconia stormi</i>)	<input type="radio"/> Meningkatkan	<input type="radio"/> Menurun	<input type="radio"/> Tetap sama/stabil	<input type="radio"/> Tidak tahu
Burung kambing (<i>Leptoptilus javanicus</i>)	<input type="radio"/> Meningkatkan	<input type="radio"/> Menurun	<input type="radio"/> Tetap sama/stabil	<input type="radio"/> Tidak tahu
Cangak (<i>Ardea</i> spp, Herons)	<input type="radio"/> Meningkatkan	<input type="radio"/> Menurun	<input type="radio"/> Tetap sama/stabil	<input type="radio"/> Tidak tahu
Cattle egret (<i>Bubulcus ibis</i>)	<input type="radio"/> Meningkatkan	<input type="radio"/> Menurun	<input type="radio"/> Tetap sama/stabil	<input type="radio"/> Tidak tahu
Bangau, Kuntul (<i>Egretta</i> spp, White egrets)	<input type="radio"/> Meningkatkan	<input type="radio"/> Menurun	<input type="radio"/> Tetap sama/stabil	<input type="radio"/> Tidak tahu
Kowak malam-kelabu (Black-crowned night heron)	<input type="radio"/> Meningkatkan	<input type="radio"/> Menurun	<input type="radio"/> Tetap sama/stabil	<input type="radio"/> Tidak tahu
Kowak Melayu (Malayan night heron)	<input type="radio"/> Meningkatkan	<input type="radio"/> Menurun	<input type="radio"/> Tetap sama/stabil	<input type="radio"/> Tidak tahu
Blekok (Pond herons)	<input type="radio"/> Meningkatkan	<input type="radio"/> Menurun	<input type="radio"/> Tetap sama/stabil	<input type="radio"/> Tidak tahu
Kokokan (Bitterns)	<input type="radio"/> Meningkatkan	<input type="radio"/> Menurun	<input type="radio"/> Tetap sama/stabil	<input type="radio"/> Tidak tahu
Ibis cucuk-besi	<input type="radio"/> Meningkatkan	<input type="radio"/> Menurun	<input type="radio"/> Tetap sama/stabil	<input type="radio"/> Tidak tahu

(Black-headed ibis)

Ibis rokoroko Meningkat Menurun Tetap sama/stabil Tidak tahu
(Glossy ibis)

Ibis Karau Meningkat Menurun Tetap sama/stabil Tidak tahu
(White-shouldered ibis)

..... Meningkat Menurun Tetap sama/stabil Tidak tahu

..... Meningkat Menurun Tetap sama/stabil Tidak tahu

3. Apakah Anda tahu bahwa bangau Storm masih dapat ditemukan di wilayah Anda?
 Ya ; Lokasi: _____ Tidak

4. Kapan terakhir kalinya Anda melihat bangau Storm?
 Tahun ini Dalam 2 tahun terakhir ini Dlm 5 th terakhir ini Dalam 10 tahun terakhir ini Lebih dari 10 th yang lalu Tidak pernah melihat
 Tidak tahu

5. Jika Anda merasa bahwa bangau danau besar menurun jumlahnya, apakah yang Anda pikir sebagai alasan penurunannya? (Lebih dari satu alasan dapat dipilih)
 Perburuan (menembak) Polusi/pencemaran air Sedimentasi air (misal. dari deforestasi) Pengurangan kawasan berhutan Gangguan
 Lainnya _____ Tidak tahu

6. Apakah Anda berpikir bahwa hukum adat akan menolong untuk melindungi populasi/jumlah bangau danau besar ini?
 Ya Tidak Tidak tahu

7. Apakah sudah ada aturan yang selama ini diterapkan untuk perlindungan bangau danau besar?
 Ya, _____, Tidak Tidak tahu

8. Apakah Anda berpikir bahwa bangau danau besar dan jenis burung air lainnya penting untuk ekosistem?
 Ya, _____, Tidak Tidak tahu

9. Apakah Anda berpikir bahwa pemantauan/monitoring bangau danau besar akan membantu melindungi jenis ini dari kepunahan?
 Ya Tidak Tidak tahu

10. Apakah Anda tertarik untuk mempelajari bagaimana untuk melindungi bangau danau besar dan jenis-jenis burung air lainnya di wilayah Anda dan bagaimana menerapkan metode ini?
 Ya Tidak Tidak tahu

Kalimantan Birding Club TERIMA KASIH!