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The red slender loris (Loris tardigradus)

Elusive and nocturnal, the red slender loris is endemic to the wet zone of Sri Lanka. The Loris magazine is named after this goggle-eyed primate to whom our rainforeste is home. (Pic by Saman Gamage)



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Two leopards crossing the road in the evening close to the Sri Pada view- point which is a well- known leopard crossing. The leopards in the photograph are cubs coded Horton Plains Leopard Male 08 & Horton Plains Leopard Female 07 in the Horton Plains Identification Study. (Pic by Sankha Wanniatchi).

Message from sponsor

A decade of ecosystem restoration

Nature, like people, has to recover from the vicissitudes of man. It was in recognition of this that last year, the UN declared the next ten years a decade of restoration and recovery of the world's ecosystems. This will be a time for the global community to throw a lifeline for degraded ecosystems not only to recover but also to preserve those which are still intact. Robust ecosystems and people run on parallel trajectories.

Years of living off nature have depleted the ecosystems that give us succor. Forests, mountains, oceans and freshwater bodies, farmlands and urban ecosystems that generate oxygen for us to breathe, grow food for us to eat and create space for us to live have come under threat. Deforestation has made way for development, varied and intensive agriculture practices have stripped farmlands of their vitality and plastic and chemical pollution have harmed sea creatures like turtles and crabs. Climate change is causing wildfires and damaging coral reefs.

Natural spaces which have been cleared to make way for man- made urban areas that hold more than half of the world's population, spew emissions and waste from industries and homes. To repair nature from the beating it gets as man thrives off it, the world's ecosystems have to be rejuvenated.

According to expert projections, the restoration of 350 million hectares of degraded terrestrial and aquatic ecosystems between now and 2030 could generate US\$9 trillion in ecosystem services. Restoration could also remove 13 to 26 gigatons of greenhouse gases from the atmosphere. The economic benefits of such interventions exceed nine times the cost of investment, whereas inaction is at least three times more costly than ecosystem restoration.

Sri Lanka's contribution to this global effort is her pledge to increase forest cover by two per cent through the restoration of degraded forests and reforestation of abandoned lands under the Paris Agreement in 2015.

This would require restoration or reforestation of approximately 130,000 ha. But already, this pledge is in jeopardy after the decision to shift the management of non-forest lands from under the jurisdiction of the Forest Department to divisional secretaries. This is a move which will result in an overall loss of forest cover by about five per cent above and beyond the baseline level of forest loss of approximately 7.700 ha per annum. Conservationists have warned that not acting to save ecosystems now, will come at a cost to human health, food security and overall human security.

Nations Trust Bank has been happy to assist the WNPS's conservation efforts during the past six years and to be associated with the organization. The Bank and stakeholders are honored to continue supporting the society's initiatives and to fully sponsor the publication of the Loris, Warana, and Vaaranam magazines as well as the Nations Trust WNPS monthly lecture series. These combined efforts encourage raising awareness and offer a venue to connect like-minded individuals and promote productive debate in order to raise citizens' ecological consciousness and literacy.

The Bank believes that this is the right moment for WNPS to move forward with developing a national blueprint, collaborating with state policymakers, and putting a strategic action plan into motion.

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Editorial

Rising from the ashes

The country's economic catastrophe man-made and predictable - has been far reaching and continues to wreak havoc on the lives of its citizens. Nonderogable fundamentals like the right to education, shelter and food are being compromised, with its effects beginning to manifest. Year-onyear inflation is nearing 70 percent and food inflation has soared to 95 percent. The World Food Programme says one-third of Sri Lanka's population is food insecure and eight in ten households are turning to food-based coping strategies such as sacrificing meals, borrowing food, and reducing the number of meals that are eaten. While the impact on people is somewhat measurable, the devastation on the environment is a silent killer. There has been no tangible data of the toll on biodiversity and eco systems. Scant information so far, from media reports and anecdotal accounts, are that officers from the Department of Wildlife Conservation (DWC) have been unable to carry out routine patrolling of wildlife parks because of fuel rationing and a reduction in earnings due to a drop in visitor numbers to national parks.

The debacle with the synthetic fertiliser policy which arguably is among the few root causes for the unprecedented economic crisis, and the resulting drop in domestic agriculture production, will bring man and animal head- to-head as they vie for scarce food resources. The most damage will be with the human-elephant conflict, which has already taken a toll on the country's endangered elephant population. Delisting species such as the giant squirrel, which globally is near threatened, and other potential pest species such as the toque monkey, which is endemic and globally endangered, could have similar ramifications. Issuing guns to farmers to deal with pests is being considered without analysing the long-term fall-out of such a move which may include increased hunting pressure as there is no way to monitor the use of these weapons. Worse still, is

that such a move could create a gun culture in Sri Lanka.

The country's wildlife has been vulnerable to the bush meat trade with the demand for it coming mostly from domestic tourism because it is considered a delicacy. But this is an area where the realities of the economic downturn can exacerbate the safety and security of wildlife. The loss of livelihoods and food insecurity will drive people to the bush meat trade as a source of income generation and also animal protein. The propensity for endangered animals like leopards not only being by-catch, it is suspected that this is the main reason for their deaths by snaring, but targeted killings could also raise its head and make it a double jeopardy for them.

Octavia Butler, in the Parable of Talents, said that in order to rise from its own ashes, a phoenix must first burn. Like the phoenix which symbolizes renewal after a calamity, now is the watershed moment for Sri Lanka to rise from the ashes. As a part of the systemic changes the citizenry has been crying out for, it is time to evolve out of the old ways of doing things and step out of comfort zones to think out of the box.

The imperative for data collation of the damage to the environment becomes urgent in view of the need for remedial measures to be put in place, for which the DWC must take the initiative. Unfortunately, doing too little, too late is something which resonates with the DWC which is mandated to look after the welfare of the country's flora and fauna. The DWC is also expected to complement the government's efforts at sustainable tourism, mainly through wildlife tourism. Sri Lanka has at least 26 national parks, although only a handful remain popular. They attract a high number of visitors and parallelly, put undue stress on the animals and pollute the park. Channeling tourists to the less visited parks, where their experience will be no less, will be one way at

sustainable income generation and tourism. Looking for alternative protein sources will help navigate pitfalls. For instance, Sri Lanka has more than 1600 km of coastline and responsible aquaculture, including the harvesting of fish, will be a step in the right direction. The World Bank highlights that fish make up about 50 percent of the country's animal protein intake, a ratio which is three times the global average. It says the fisheries sector supports close to one million fishers, workers, and their families. The potential to improve inland fisheries must be tapped while remaining mindful of some serious threats to protected areas, especially in the north, from new aquaculture proposals. One such example is Vidathalathivu nature reserve.

The Sri Lankan government is encouraging citizens to go overseas to work and remit currency to beat the forex crunch. Sri Lankans themselves have been leaving in droves of their own volition. in search of greener pastures. But not all of them necessarily hit the jackpot and cases of destitution have been reported with jobseekers who are unable to find employment, getting stranded. If this lesson learnt is to be related to the environment, it will be the need for the government to do what is right by the environment with future development projects and to respect the need for EIAs to avoid white elephants that have contributed to the economy's critical state of affairs. This becomes pertinent in light of the government still trving to push unsustainable projects to overcome the economic crisis under the guise that we need them. Unless carefully planned, they will fail to provide the desired economic benefits and end up as environmental disasters while increasing the country's debt burden and pushing it into a deeper crisis. The lack of innovative approaches by the government which is going on the tried, tested, and failed pathway while expecting a different result, will not instill confidence in its ability to pull the country out of the quagmire.



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The Editor invites members of the WNPS and the public to write articles to the Loris on matters related to biodiversity, natural history and nature conservation. All articles will be fact- checked by the Loris editorial team. The writing style and aesthetics of the magazine will be the prerogative of the Editor, who will make the final decision on the publication of an article.

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Front cover : A male leopard cub, about eight months old when the photograph was taken, near Mahaeliya in the Horton Plains National Park. 'He was quite inquisitive. He decided to walk towards me and was sitting right in front of me when I caught him on camera. We coded him Horton Plains Leopard Male 08 in our Leopards of Horton Plains Identification Study'. Pic by Sankha Wanniatchi.

Pahaius bicolor in Knuckles. Pic by A. Aravinthan

Bamboo orchid in Knuckles. Pic by A. Aravinthan **CONSERVATION**

A silent cry from Kirala Kele Sanctuary

A paradise on earth is under serious threat

By W.P.S.N. Wijeweera and B.G.P.T. Saranga Pics by Iroshan Rupasinghe and Thusitha Weerasinghe



 Appendix

Woodlands



Marshlands



Irrigation canals

Figure 1: Habitat diversity of Kirala Kele Sanctuary

Location

Kirala Kele or Nandugala marsh was declared a sanctuary on 08th September 2003. It is a marshy wetland system located about three km from Matara town in the southern province of Sri Lanka (Seneviratne, 2005; Department of Wildlife, 2012). The sanctuary covers an area of 310 ha, with a proposed area extending up to 1800 ha (Department of Wildlife, 2012). It is considered the southernmost wetland habitat in Sri Lanka.

Land usage

Kirala Kele is rich in habitat diversity with marshlands, paddy fields, mangrove areas, irrigation canals, and woodlands.

Local people utilize these different habitats for various purposes. They utilize marshland and irrigation canals for fishing, water supply for crops, and harvesting of lotus stems and flowers for commercial purposes (Seneviratne, 2005). Farmers utilize the land for purposes of agriculture, especially for paddy cultivation. Abandoned paddy fields are used as cattle grazing areas. Dry land is used to cultivate coconut, banana, vegetables, and herd cattle. People use the sanctuary for recreational activities such as picnicking, jogging, and exercising. Naturalists frequently visit the land for photography and bird watching. It is also used as a center for research and education for school and university students.

Functions and attributes

Kirala Kele acts as a massive sponge which absorbs water during the rainy season and prevents flooding in the Matara town area. Mangroves prevent saline water intrusion and regulate the salinity level of the soil in the adjacent regions. Marshlands trap the sediments and retain the fertile soil. They improve the water quality of the area by controlling surface runoff. The sanctuary acts as an efficient sieve to trap inorganic waste and suspended solids. It also degrades organic waste before the water reaches to main streams (US EPA, 2021). Wetland acts as a great carbon sink and purifies the atmosphere in the region. The mangroves and other flora within the habitat act as a wind barrier while keeping a cooler environment. Both flora and fauna contribute to the rich biodiversity of the area.







Crimson-fronted barbet



















Figure 2: Endemic and endangered avifauna in Kirala Kele Sanctuary









Biodiversity

Kirala Kele provides a habitat for a large number of fauna including insects, snails, fish, reptiles, mammals, and birds. It is a home mainly for hundreds of migratory and resident birds (Dayasiri, et al., 2014). A study conducted in 2013 found that 83 bird species used the habitat as a feeding, breeding and a roosting ground. Similarly, a study conducted in 2015, showed that 103 birds inhabited the land. Among them, 48 species were waders and commonly included the lesser whistling ducks, Asian openbill, purple swamphen, purple heron and pheasanttailed jacana (De Silva., 2015). At the same time, it supports rare migratory birds including grey-headed lapwing, oriental turtle dove, comb duck, and greater-spotted eagle (Rodrigo., 2017). According to our observations, eleven endemic birds have been recorded in Kirala Kele including the brown-capped babbler, Sri Lanka grey hornbill, red-backed flameback, Sri Lanka hangingparrot, Sri Lanka swallow, Sri Lanka green pigeon, crimsonfronted barbet, Sri Lanka woodshrike, black-capped bulbul, Sri Lanka junglefowl and Sri Lanka spurfowl (Fig. 2). Kirala Kele is also a habitat for eleven species of non-endemic, near threatened birds namely Alexandrine parakeet, black-headed ibis, spot-billed pelican, black-tailed godwit, pallid harrier, oriental darter, greyheaded fish-eagle, painted stork, woolly-necked stork, curlew sandpiper and the malabar pied hornbill. The greater spotted eagle is the only vulnerable species while the great knot (Fig. 2) is the only endangered avian species recorded in Kirala Kele.

Seven species of snails including two endemic snails were recorded from the Kirala Kele Sanctuary (Dayasiri, et al., 2014). It is an ideal habitat for 28 species of odonates and their abundance varied greatly according to its microhabitat within the sanctuary (Chandana, et al., 2012). Further, it is rich in biodiversity by having 83 plants species, 25 fish species, and 13 mammal species including an endemic mammal; purple-faced leaf monkey (Rodrigo., 2017) as well as fishing cats and freshwater otters (Department of Wildlife, 2012).

Threats

Garbage dumping is a major threat to Kirala Kele. After the declaration of Kirala Kele as a sanctuary, garbage dumping was discouraged to a certain extent. However, it has not stopped completely. Clearance of land for agriculture purposes leads to habitat loss and habitat degradation (Seneviratne, 2005). Recently, farmers have started using mesh to fence their agriculture land (Fig 3). Unfortunately, many birds get entangled in these nets and die. Similarly, birds get entangled in nylon threads that are used to fly kites. These threads get entangled in trees or electricity lines with or without the kites. Birds are unable to detect the thread and it is a deadly trap for them (Fig 3). In addition, birds perching on powerlines lead to their death due to electric shock (Fig. 3).



The application of pesticides and weedicides to crops has a negative impact on the flora and fauna of the sanctuary. Additionally, overgrazing causes soil erosion, destruction of native flora, and the spread of invasive weeds within the marshland. According to Wijesundara, 2010, the sanctuary is invaded by invasive plants. We observed several invasive plants including Acacia spp. (Fig. 3), Salvinia molesta, Eichhornia crassipes (water hyacinth), and Lantana camera. Domestic pigs (feral pigs) were released into the wild and now their population has increased (Fig. 3). They destroy the undergrowth vegetation and topsoil layer. Stray dogs and domestic cats hunt birds and their nests. Red - eared turtle and suckermouth catfish populations that have been introduced keep increasing and successfully competing with native aquatic species. It leads to a decline in the native fish population while unbalancing the ecosystem.

Animal poaching is another threat to the sanctuary. Personal observations revealed that porcupine, wild hare, wild boar, gray-headed swamphen, and a few duck species are hunted for human consumption. Similarly, excessive freshwater fishing has led to a decrease in fish density within the sanctuary.

During the last two decades, Kirala Kele Sanctuary was exposed to several development projects. These development projects include the expansion of the town towards the sanctuary, highway construction through the sanctuary, road system expansion within the sanctuary, and the establishment of a flood control system with irrigation canals (Seneviratne, 2005). The highway construction blocked the flying routes of birds and regular routes of other animals. Personal experience reveals the deaths of peacocks, pigeons, doves, mynas and waterhen due to collisions with highway vehicles. In addition, vehicle smoke and noise have a bad influence on fauna. The expansion of the road system within the sanctuary led to road-kills of endangered fishing cats, shrew-rats, certain birds and slow-moving reptiles (Fig. 3).

Intermittent canal cleaning by the Irrigation Department has led to drastic changes in the salinity of marshland. Backhoe digging and removal of mud and aquatic plants allow the intrusion of seawater into marshland. As a result, the death of hundreds of fish over months (until salinity level stabilizes) is common in the sanctuary (Fig. 3). In addition, aquatic flora, eggs of fish, mature/ immature stages of aquatic invertebrate fauna are negatively impacted due to changes in salinity levels.

Conservation

So far, there is no proper conservation program to conserve the biodiversity of the Kirala Kele Sanctuary. Therefore, through this note, we are highlighting the necessity for an active conservation plan and biodiversity monitory to save Kirala Kele for the next generations.

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Conserving the Elusive Loris

Text and pics by Chaminda Jayasekera

he elusive, nocturnal namesake of this much-loved magazine, the slender loris, is a mammalian inhabitant of the forests and woodlands of Sri Lanka. Despite its presence being relatively widespread across the island – the landscape being shared by two distinct

species and several subspecies – the loris is rarely seen and studied even less. However, in the north-central plains of Sri Lanka, at Jetwing Vil Uyana, a thriving wild population has established itself and can be spotted reliably and frequently because of extensive conservation and rewilding efforts.

Lorises, despite their strange, otherworldly appearance, belong to the primate family and are in fact referred to as primitive primates or prosimians. Taxonomically, they are placed under the order Primates and contained within the suborder Strepsirrhini which includes the lemurs of Madagascar, the galagos and pottos of Africa, and the lorises of southeast Asia. As mentioned above, two species of slender lorises are recorded from Sri Lanka – the grey slender loris and the endemic red slender loris- with at least four subspecies reported across the two. The northern grey slender loris (*Loris lydekkerianusnordicus*) can be found within the forests and woodlands of the area. The loris story began in 2010 when an individual loris was spotted by naturalist - Chaminda Jayasekera during a routine night walk. The hotel was an ambitious project, conceived as a man-made wetland. It was built utilizing the irrigation techniques of ancient Sri Lankan monarchs, tying into the local cascade system to ensure a natural fit with the environment of Rangirigama. Pre-construction faunal and floral surveys of the land revealed poor biodiversity. A few bird and mammal species were recorded with near-negligible amphibian and reptile numbers. Once the property was built and the forests, woodlands and wetlands began their gradual establishment, wildlife moved in to occupy the new habitat niches and it is most likely that it was with this influx of biodiversity that the slender lorises started to show up.

With the population of lorises establishing and flourishing, an area was demarcated for their conservation. An area of the woodland where the first loris was sighted was earmarked as a loris conservation site. Expansion plans which included building additional dwellings in the forest patch were shelved. A trail which was established within the woodland allowed visitors the opportunity to join guided night tours to observe the elusive creature in the wild. A portion of the proceeds from the tour was set aside as a Loris Conservation Fund to be used to fund further research and conservation efforts of the area's loris population.





What began with a solitary sighting, today the site is home to over 25 individual specimen and supports a healthy, breeding population. The twelve years of consistent, intimate research done by Chaminda has revealed a number of hitherto unknown facts about this incredible nocturnal primate.

Although the conservation efforts began with the slender loris as it focal point, it has since become an umbrella species with the initiatives and projects aimed at protecting the prosimian also contributing to the habitat conservation of a number of other wildlife species. They include civets, jungle cats (*Felis chaus*), and rusty-spotted cats (*Prionailurus rubiginosus*). While the creation of a wetland habitat and the associated waterways and canals have supported the woodlands and forests needed by the loris, it is also home to an increasing population of fishing cats (*Prionailurusviverrinus*)as well as Eurasian otters (*Lutralutra*) – both of whom are regularly seen within the hotel premises. The Loris Conservation Fund has played a major role in loris conservation efforts. It also contributes to raising awareness and research on fishing cats and otters among other wildlife. The fund has also facilitated the publication of loris and fishing cat information guides and field guides and the purchase of trail cameras and other research equipment, highlighting the ripple effect of the conservation of a species.

The site, with its man-made habitat which has been left to the natural succession of nature and the creatures that come and go with it, stands as a prime example of how corporates and businesses can play a critical role in biodiversity conservation and the shared benefits for the organization, the environment and the locality.

INTERVIEW

A NECESSARY TRADE-OFF BETWEEN CONSERVATION AND FAMINE

Rohan Pethiyagoda

A biodiversity scientist, author, public-policy advocate, and author of some 60 research papers and six books. In 1991 Rohan founded the Wildlife Heritage Trust (WHT) to explore Sri Lanka's fauna and flora. This work led to the discovery of more than 150 new species. He is the only Sri Lankan to have been appointed (as deputy chair) to the IUCN Species Survival Commission and presently serves as Freshwater Fish editor of the journal Zootaxa. Rohan has served two terms as environment advisor to the government and also headed state entities such as the Tea Board and Water Resources Board. His work has been recognized by the Rolex Awards for Enterprise and, more recently, the award of the Linnaean Medal. He is one of two living civilian recipients of the Vadamarachchi Medal, for his service to the armed forces during the civil war. Rohan is modest about his achievements: 'I don't want to be remembered for anything', he says. 'It is all about the present.' His advice to conservationists? Talk less, do more. Rohan is proud to have been a life member of WNPS for more than 40 years, during which he served a two-year stint as editor of Loris.



Pics by Sarath Perera

01 You left government service to start research on freshwater fish. Why?

Ever since I got to care for our first aquarium when I was six, I've been fascinated by fish. But I didn't have an interest in the native fish fauna until I met Rodney Jonklaas in 1986. He got me started on exploring Sri Lanka's fish fauna and introduced me to people like Maurice Kottelat, who helped me immensely. I left government service because I needed a change. I had become Director of Biomedical Engineering Services in the Ministry of Health at 26, perhaps the youngest director ever in government service. But after seven wonderful years there, I found I had no prospects of promotion: all the senior posts are filled by doctors. I didn't want to stagnate, and a change of tack was necessary. Taking a gap year to mess with fish was a temptation I couldn't resist.

02 How rich and diverse is Sri Lanka's freshwater species count?

It all depends how you define 'freshwater fish', but if we take fishes that obligatorily spend at least part of their life in freshwater, then there are about a hundred species. About half of those are endemic.

03 Sri Lanka's biodiversity is under threat. What should be done?

I guess this is where I differ with the mantra of most of my fellow conservationists. My view is that rapid economic development is the key. Development has the effect of luring people away from agriculture into manufacturing or service jobs in towns and cities. After 70 years of free education, the aspiration of young people is not to be a peasant-farmer, eking out a living from cultivating 40 perches of land encroached from a forest. They aspire to work in a factory, a hotel, a supermarket, a bank... or even drive a tuk. But after the economy tanked earlier this year, those aspirations are only fantasies. Now, as unemployment and food shortages worsen, ever more people will be driven to encroach into forests not just for farming, but to extract firewood for fuel. Remember that even before this crisis. Sri Lanka derived 37% of its national energy demand from biomass. Now, that percentage will rise dramatically. Biodiversity, in consequence, is on the ropes. There's no point in prosecuting people whose children are on the edge of starvation.

How can the country's freshwater resources be used responsibly to generate an export income and meet the country's predicted food crisis in the near future?

Well, we already derive a third of our national electricity demand from hydroelectricity, and this costs only about 15% as much as oil-powered electricity. Despite environmentalists having objected to most of the 24 major hydroelectric projects as well as the mini-hydro plants, the present crisis highlights the value of those investments.

Given the desperately urgent need to nourish the rural population that is being driven into destitution by the collapse of agriculture, maximizing food production, and especially protein output, is our most urgent need. Here, our 260,000 ha of inland waters present a unique opportunity. We have thousands of village tanks, mostly in the dry zone, where poverty and undernutrition are highest. Yet, we stock less than 8% of these waters, producing some 60,000 mt of freshwater fish annually. As much as I detest alien species such as tilapia, I would like to see that 8% increased to 40%, producing 300,000 mt of affordable fish. We have to face the fact that conservation objectives have to be compromised if we are to avoid famine in the coming decade.





05 Is biopiracy a real threat to this country and what are the drawbacks of being stringent about it?

Frankly, I think the idea that biopiracy is a threat is pure illusion. The 1992 Convention on Biological Diversity promised biodiversity-rich countries like ours, billions of dollars in profits from trading the genetic resources in our forests for the development of new medicines through benefit-sharing agreements. The past 30 years have shown this to be a false promise not just in Sri Lanka but worldwide.

But what we have seen increasing in the past years is 'scientific bio-theft', where foreigners illegally collect and smuggle biological specimens out of Sri Lanka for research or hobby purposes. In 2020, wildlife officers arrested three Russian 'scientists', with 529 illegally collected specimens in their possession. They were detained in Sri Lanka for two years and eventually fined Rs 8.6 million.

I found 15 scientific papers published since 2018, which referenced some 3500 specimens illegally collected in and smuggled out of Sri Lanka. While I don't think that any of this poses an actual threat to our biodiversity, it is nevertheless illegal. Everyone must act within the law.

Describe the key takeaways from one of your most recent collaborations -'The Ecology and Biogeography of Sri Lanka'.

It was a thoroughly enjoyable book to research and write. I benefitted enormously from my collaboration with Hiranya Sudasinghe, an outstanding young scientist still in his twenties, who is reading for a genomics PhD in Switzerland. Hiranya introduced me to many colleagues in his generation, such as Himesh Jayasinghe, whom I think of as Sri Lanka's new Trimen. I think the key takeaway I had from writing that book over six years was meeting so many incredibly talented and dedicated young scientists, many of whom generously provided hard-toget photos for the book. It has given me huge confidence about the future of biodiversity science in Sri Lanka.

> In 2016 you said most environmentalists in Sri Lanka - 'just talk. They are a talk shop'. Why ? Have things changed since?

No, I don't think they have changed much, not just here but worldwide. My comment stems from the fact that while most environmentalists object to development projects, they don't often propose pragmatic alternatives. When the Norochcholai power station was first proposed in the early 1990s, for example, it was supposed to be a state-of-the art plant built with aid from Japan. But the objections were so vicious and strenuous that the Japanese withdrew, and we fell into the clutches of the Chinese, who gave us the filthy, substandard coal-fired plant we have now.

When I coordinated a USD 23 million debt swap in 2004, to establish a national institute for biodiversity research, together with a USD 15 million endowment to meet its costs in perpetuity, environmentalists including the WNPS united to oppose it and claimed that I was trying to sell Sinharaja to the Americans. What happened? The donors withdrew and the money went to India. Did those opponents establish a biodiversity institute? No, they just crept back into the woodwork. If the government tries to implement the inland fisheries expansion I just suggested, I'm pretty sure some environmentalists will object. But what is their proposal for getting more protein into the stomachs of malnourished rural children? So yes, I do have a certain degree of impatience with the environmental movement.

08 During your acceptance speech of the Zoological Medal you mentioned the collaborations in the old days between the Linnean Society and Sri Lankan scientists. How can they be revived?

Such collaborations became increasingly difficult since the Biodiversity Convention and especially its Nagoya Protocol in 2014, which Sri Lanka, thankfully, did not sign. The pendulum has swung away from the idea that conservation should be driven by science. When the covid-19 pandemic was at its peak, we shunned science and advocated the Dhammika Peniya. Well, the story for biodiversity has been little different. Even when it comes to elephant management, the lessons learned from research done by world-renowned conservation biologists such as Prithiviraj Fernando are hardly mentioned. I've never understood why we Sri Lankans are so suspicious of science. Perhaps we see it as some kind of colonial hangover or western conspiracy. But we forget that science is what makes your cellphone work, what makes planes fly.

09 Please outline five ideas you think are relevant that can be developed.

- 1. Implement a debt-for-nature swap to set up a perpetual endowment of USD 25 million for conservation research and action.
- 2. The shortage of cooking gas will go on for years. People are changing to charcoal and firewood, mostly extracted from forests. The Forest and Wildlife departments have 80,000 hectares of plantation forestry: teak mahogany, eucalyptus etc. We should harvest the most mature 40,000 ha immediately and plant these with fast-growing trees such as black wattle (*Acacia decurrens*) in the highlands and ipil-ipil (*Leucaena leucocephala*) lower down. These can produce up to 100 cubic metres

of firewood per hectare annually. While I oppose introducing new plants to Sri Lanka, these species are already here, and both fix nitrogen too. And despite rumours, I've seen no evidence that Acacia harms bees.

- 3. Expand freshwater fisheries from its present 7.6% of the 262,000 ha of inland waters to at least 40%.
- 4. Accelerate research into chronic kidney disease of unknown etiology (CKDU is an environmental problem!).
- 5. Parliamentary composition? Pooh, who cares? It makes little difference. I disagree with those who want to bring so-called professionals and intellectuals into politics. Most of those who have come into politics, from Colvin R de Silva to GL Peiris, have been dismal failures. A good MP needs only two attributes: common sense and decency. Never forget that our present crisis stems from the ideas of two prominent, highly qualified professional intellectuals: the president of the GMOA and the governor of the Central Bank.

10 Is nature random?

Yes, it is, meaning that it has no direction.

11 Why is nature destructive - floods/ tsunami /drought?

Well, 'destructive' is a human concept, isn't it? After all, humans probably would not have even evolved had not an asteroid collided with Earth 65 million years ago, destroying most life, and especially the dinosaurs. Nature is not all cuddly pandas and koalas: it is infinitely cruel and capricious. Wild animals don't die in their beds, sedated with morphine. They end their lives being cruelly killed and eaten by other animals. Nature has no morality. We must never forget that and should make the most of this brief and shining moment in our planet's 4.5-billion-year history, in which we humans flourish. It will not last forever.

12 Politics and conservation are linked. What is your message to politicians? What is your message to conservationists?

Politicians don't listen; there's little point in talking to the deaf.

Conservationists? Do more. Talk less.

13 What would you want to be remembered for?

Actually, I don't 'want' to be remembered at all. For me, it is all about the present.

A Journey Into The Wild With The Horton Plains Leopard

Text and pics by Sankha Wanniatchi

I have been travelling frequently to Horton Plains National Park since I was a small child. My father used to take my family and I to Horton Plains every other month and we used to stay at Ginihiriya Bungalow which was called Anderson Lodge at the time. As a result of these frequent visits, I grew a strong connection to the place which I call my second home and was drawn inherently to its mystical paradise. As I grew into teenhood, my love for Horton Plains grew stronger. Countless are the times my friends and I took the train from Colombo to Ohiya, and trekked by foot all the way to the National Park through the winding roads to camp at our favorite campsite - Campsite One. Fast-forward to the present, I make it a point to visit the National Park every month, if time permits. As a child I recall being fascinated by the sight of leopard scat on the roadside, a clear marking that these elusive animals are active during the night. My very first leopard sighting was when I was just six years old and it was in Horton Plains. I sighted this glorious feline on the plains just before the Ginihiriya Bungalow for a good two minutes or so! I consider myself extremely lucky that my interest in leopards kickstarted with an amazing sighting which I reminisce about to this very day. I have spotted leopards multiple times but I was never able to photograph one until I reached my late twenties. It was partly because my passion for photography began at the age of 24 and partly because leopards are extremely elusive creatures that run away for the slightest of sounds or at the sight of vehicles even from a considerable distance. Thus, its safe to say that I was



indeed incredibly lucky to sight leopards in Horton Plains multiple times even before I started my journey to track and photograph them in Horton Plains.

So far, I have had the opportunity of capturing over 64 leopard sightings. I have also missed the golden opportunity to seize the moment of 10 to 15 sightings to my utmost dismay because of the subjects' elusive nature. Just visualize the ecstatic moment when you spot a leopard, but you take your eyes away for a millisecond to grab your camera to make it a timeless visual memory, and in that very moment, just like that, you look out to find the fellow has vanished! Though elusive by nature, through the careful study of its behavior, one can notice a clear pattern in their movement within the boundaries of the park. Leopards are territorial and thus roam around its territory to ensure no other leopards attempt to cross its boundaries. Due to this reason, it is a behavioral necessity for leopards to continue its scent marking to avoid confrontations with other leopards. My curiosity and passion to track and capture leopards of Horton Plains led to my ongoing study of its presence and behavior in the park. Whilst its an extremely difficult task which requires a lot of patience and a magnitude of perseverance, it's a very rewarding exercise. Through my visits I've learned to understand the behavior and movement of a few selected leopards that I've spotted multiple times. Especially, the areas they roam around in, and the common locations they use to cross roads.



I have managed to identify 13 different leopards and three other unidentified leopards in Horton Plains. (I've tabled three as unidentified as I do not have sufficient images to confirm their gender). Out of the ten leopards, six are female and four are male. One may question how one can distinguish one leopard from another. Although it is not an entirely easy task, leopards have a unique rosette exclusive to oneself, much like the unique fingerprint of a human. This is the best way you can differentiate one leopard from another.

The inconsistent weather patterns of Horton Plains throughout the year makes it very difficult to spot a leopard. It is mostly either drizzling, raining, or covered in mist. Contrary to the popular belief that felines detest water, leopards in Horton Plains have adapted to this ever-changing weather pattern and are oblivious to rain. They will continue to move on with their day-to-day activities ignoring the heavy rains and extreme cold conditions. I have witnessed leopards move into hunt in the mist, which allows them to get closer to its prey. One particular late evening I was watching a leopard at a distance, poised on the grassland, calculating its next move for the hunt. In close proximity were a few oblivious sambar who had not sensed the leopard planning its next move on them. Suddenly, the whole area got covered in mist and my vision was compromised. I assumed the leopard would be in its same location until the mist cleared away, but I was wrong. Within that short span of time the leopard had moved in closer, and the sambars were yet completely unaware of the predator right next to them. Disappointingly so, I was unable to witness the next course of action as I had to head back to the bungalow to meet the 6:00 p.m. cut-off time.



The Horton Plains leopards that are spotted closer to the main road are getting habituated and the number of sightings have increased over time. But their preference to come out when its darker rather than in broad daylight is evident. The evenings from mid-October to February get darker much faster, so leopards tend to come out as early as 4:30 p.m. to continue their roaming activities on a daily basis. As such, it is somewhat easier to spot and photograph one if you have the right equipment. But the only challenge during these months could be the unpredictable weather which might cover the whole place with mist in seconds.

I started my journey of tracking the leopards of Horton Plains for the purpose of pursuing my passion for wildlife photography, and for the love of this park. The harder you work to spot a leopard the greater you feel when you finally do! My observations and findings of behavioural patterns of the Horton Plains leopards are by no means a research, paid or otherwise, but done with a pure conscience to document these elusive felines to better understand their behavioural patterns, enabling like-minded individuals to see the beauty of Horton Plains that I see.

More than a fistful of magnificent peaks

By Enoka Corea

The Knuckles landscape. Pic by Chami Senewiratne



he Knuckles massif, lying on the north-north-east of the central highlands and separated from it by the Dumbara Valley (Matale Valley on the west and the Mahaweli Ganga valley on the south), is one of the most scenic areas in Sri Lanka. Administratively, it straddles the Matale and Kandy districts. P.G. Cooray states, "Nowhere else in Sri Lanka, in an area of comparable size, does one find such a collection of

magnificent peaks..." He lists at least 35 peaks rising to more than 1000 m (with 20 over 1500 m) within the Knuckles massif¹. The peaks are wreathed in mist for most of the year, which is why the local people gave them the evocative name of Dumbara Kanduvetiya (dumbara="heavy with cloud / mist"). A British surveyor, noting the resemblance of a chain of prominent peaks visible from a distance to the knuckles of a clenched fist, termed this chain as "The Knuckles" and this term was later expanded to encompass the whole range and the entire hill mass. The Knuckles massif stretches about 20 km in the northwest to southeast directions and covers an area of about 160 sq.k³. The high peaks stretching along the Knuckles "range" are Kirigalpoththa (1538 m), Gombaniya (1904 m), Knuckles (1863 m), Kobonilagala (1554 m) and Dothalugala (1574 m), with three northeast trending offshoots¹.

The Knuckles was once one of the most inaccessible regions of the country. However, the area was 'opened up' by the British planters who carved out tea estates on its western slopes. There are four main entry points to the Knuckles. To enter the north part of the Knuckles range (Riverston, Manigala peak, Pitawala Pathana, Sera Ella waterfall, Bambarakiri Ella, Duwili Ella etc) you have to use the Matale-Rattota road up to Riverston. To enter the western part of the Knuckles range (Bambarella, Gombaniya peak, Kirigalpoththa peak, Knuckles peak and waterfalls such as Saree Ella, Jodu Ella, Hulu Ganga Ella, Lebanon Estate falls) you have to use the Kandy-Watttegama - Panwila-Huluganga-Bambarella road. To enter the southern part of the Knuckles range (Knuckles peak, Alugal lena rock cave, Kota Ganga waterfall, Burnside natural pool) you have to use the Kandy-Theldeniya-Rangala-Thangappuwa road. To enter the eastern part of the Knuckles range (Dumbanagala peak, Kobonilagala peak, Dotalugala peak, Sphinx rock, Deanstone mini world's end, Corbett's Gap, Yahangala peak, Kehelpothdoruwegala peak, Meemure) you have to use the Kandy-Hunnasgiriya-Loolwatte road, up to Meemure.

Sixteen members and guests of WNPS, accompanied by Ashan and our guide Dhanushka Liyanage of Paradise Island Safari, travelled up the southwestern slopes of the Knuckles to Thangappuwa, via Rangala. We passed through a number of neglected tea estates to our destination Wild Glamping by Theme Resorts and Spas, set against the looming backdrop of Aliyawetunagala. After checking into our luxurious and well-appointed tents and a delicious rice and curry lunch, we kitted up for our first trek. Hiking gear ranged from sarong and slippers, to hiking boots and leech socks.

Due to its northwest to southeast orientation, the Knuckles massif receives rainfall from both the southwest and the northeast monsoon and is an important watershed for the Mahaweli Ganga. The Maha Oya-Heen Ganga complex and Hasalaka Oya in the eastern zone, Kaluganga and Thelgamu Oya (via the Amban Ganga) in the northern zone and Hulu Ganga and Galmal Oya in the western zone (via the Victoria reservoir) flow into the Mahaweli, providing 30% of its water. The Knuckles is crisscrossed by innumerable little streams that give



The Hill Country of Ceylon (Elsie Cook, 1931)



The Knuckles Massif (Gerald Cooray, 1998)





rise to pools, cascades and waterfalls. Our first destination was to one such pool. the Burnside natural pool.

The track to the Burnside natural pool afforded us varied scenery from tea estates to forest patches and rocky streams. The hike was a suitable introduction to the Knuckles terrain and included patches of bog, lots of climbing up and down uneven rocky paths, some sliding



Dhanushka informed us that the Knuckles provides a microcosm of the entire variety of climatic conditions in Sri Lanka from extreme wet to nearly arid. Highland forest areas are extremely wet with an average annual rainfall of 5000 mm, while lowland areas are much drier with less than 2500 mm average annual rainfall. At least five types of vegetation are observed in the Knuckles³.

- (i) The lowland tropical semievergreen forests (with species such as milla and mora)
- (ii) Sub-montane tropical wet-semievergreen forest (with species such as kududaula and mihiriya)
- (iii) Montane tropical wet evergreen forests (with species such as keena and damba)
- (iv) Montane *patana* and savannah grasslands (with species such as illuk and maana)

 (v) Pigmy forests (forest of keena and damba, stunted due to the shallow eroded soil and gale force winds)³

We were fortunate to hike through all these vegetation types (except the montane or 'cloud' forest) during our second day's hike to the Kota Ganga waterfall. The montane forest above us was hidden by a thick layer of clouds, as expected at this time of the year. Dhanushka explained the important role of these cloud forests in capturing atmospheric moisture via 'fog interception'⁴. "*Tropical cloud* forests exist everywhere in the tropical region, where mountains are high enough. The Knuckles mountain range is one such place. The hot air of the lowland rises during the morning hours and condenses, creating huge clouds, which often become so heavy that they result in afternoon rain. The altitude at which the cloud build up takes place is mostly above 1500 m, but it starts on ridges as low as 800 m. When clouds cover a mountain and come into contact with its surface, they form fog. Frequent diurnal fog is one of the reasons for the formation of





Hike to Kotaganga waterfall. Pic by Chami Senewiratne.



Rocky stream. Pic by Chami Senewiratne

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masses of moss, lichens and other plants associated with cool and moist habitats." This was very clear when we walked through a short sector of pygmy forest that was hung with mosses and lichens dripping with moisture and adorned with ferns and orchids. The trail was lined with an assortment of wild flowers, foliage and a few ground orchids.

According to Dhanushka, a total of 1033 flowering plant species belonging to 141 families have been recorded from the Knuckles, among them 288 woody plant species with 15 % being endemic. Interesting plants that we saw along our hike were the endemic bovitiya, the orchid *Pahaius bicolor* and the parasitic flower, *Christisonia lawii*, that was found on the forest floor parasitizing the roots of the nelu (*Strobilanthes* spp).

The Dumbara range provides shelter to a multitude of birds, mammals, reptiles, amphibians, butterflies, dragonflies, land snails, freshwater fish and crabs, a large number of which are endemic⁴. Of the bird species recorded from Dumbara range, many are endemic ranging



from the black eagle that we saw soaring overhead to the pale billed flower pecker. The birds that were spotted by various members of the group included the Sri Lanka white-eye (endemic), velvet- fronted nuthatch, grey-headed canary flycatcher, southern hill myna, darkfronted babbler, zitting cisiticola, black bulbul, yellow-eared bulbul (endemic) and the Sri Lanka grey hornbill (endemic). We were fortunate to spot four raptors i.e. crested serpent eagle, black eagle, crested hawk eagle and the oriental honey buzzard.



Due to its separation from the main central highlands, the Knuckles is also home to many point endemics. One of the highlights of the trip was a close sighting of the leafnose lizard (Dumbara angkatussa, *Ceratophora tennenti*) which is endemic to the Knuckles.



The hike was not for the fainthearted. with steep climbs, slippery descents, intermittent showers and uneven terrain for most of the 14 km long trail. However, the spectacular views, fascinating variation in vegetation, striking wild flowers, fast flowing streams and breathtaking waterfalls more than compensated for our efforts. A tree scratched by the sharp claws of a leopard marking his territory to warn trespassers to keep out, brought us home to the fact that we were walking through a wilderness. We appreciated the offerings of food and flowers placed by the villagers on a rock just outside the jungle to propitiate the gods and ensure a safe journey. A packed lunch was enjoyed sitting in whatever dry spot we could find on the Kota Ganga stream bed in the midst of a light drizzle. Kota Ganga gives rise to seven separate waterfalls as it flows down the mountain and we were able to view three of these cascades on the return hike. We were grateful for the much needed shower, clean clothes and hot meal that awaited us back at camp.





The Dumbara region has many legends associated with it including the belief that King Ravana had his main city Lankapura, in this region. The people of the area worship some Yaksha deities and believe they are descended from the ancestral Yaksha clans⁴. It has also played an important role in history. Elsie Cook describes the ancient route from Dambulla to Alutnuwara (Mawanella) as passing through this region². John Davy visited the area in 1817 and describes a "kadawatha" or gateway to the Kandyan king's domain in the forest, proving that there were well frequented paths through the region at that time¹. There are many ancient villages dotted around the Knuckles with a unique culture centered on growing paddy on terraces, chena cultivation and grazing of buffaloes on the pattana grasslands. Excess produce was transported to the surrounding towns for sale using cattle-drawn carts in a caravan (*tawalama*). This lifestyle is now in decline but we were fortunate to spend the third and final day of our trip at Heel Oya village. This picturesque village of terraced paddy fields, vegetable and pepper cultivation and stone walls has one of the last examples of a Wariga Sabhawa, a place where the village headman would mediate village disputes. The hike ended at a cottage where we were treated to a home-cooked (and home grown) rice and curry meal.

Reluctant to tear ourselves away from this wild and beautiful countryside, we headed back to 'civilization' armed with memories, photographs and bottles of pure kitul treacle.

WNPS trip report to the Knuckles -8th to 10th July 2022

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In the olden days, the Wariga Sabhawa was used for dispute resolution. Pic by Chami Senewiratne



The ancient village of Heel Oya. Pic by Channi Senewiratne

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RESEARCH

THE SECRET LIVES OF ASIAN KOELS

By Charinda Dissanayake

As I sit at my desk, which stands right next to the window, a startling noise tears apart the otherwise relative peace and quiet of the surrounding neighbourhood. I instantly recognize it as the call of the Asian koel (*Eudynamys scolopaceus*). Though I cannot see the culprit, I can tell from where the calls are coming that it is perched somewhere on the gigantic mango tree which looms in front of me. For a moment, my attention is drawn away from the sweltering heat to thoughts of "Avurudu" (Sinhala and Tamil new year).

In Sri Lanka, the call of the koel has special cultural significance because it is believed to herald the new year which falls in April each year. This is a case of correlation rather than the causation we are led to believe as kids, because April is within the koel's breeding season which begins around March (Begum et al, 2011; Begum et al, 2011, Phillips 1948). During this time, these birds are particularly vociferous, and one is treated to the (let's be honest) abrasive calls of the male koels throughout the day (Khan & Qureshi, 2020).

Besides serving as a harbinger of the new year festivities, Asian koels have somewhat of a sinister but extremely interesting nature to them, particularly with respect to their parental care, or rather, the lack of it. But before diving into this, let us take a step back and look at the bird itself.





There are currently seven subspecies of the Asian koel identified across its range, which stretches across south and southeast Asia. The nominate subspecies is found in Sri Lanka, India, Pakistan, Bangladesh and a few other southeast Asian countries (Nahid, 2021; Payne, 2019; Begum et al, 2011). Like its call, the appearance of the Asian koel is also quite striking, showing heavy sexual dimorphism. The male looks similar to a crow with bluish-black feathers but with a yellowish bill and bright red irises. The female on the other hand, has a distinctly hawk-like appearance with dark brown uppers covered with white splotches and heavily streaked whitish underparts.

HOUSEKEEPING

As mentioned before, the most interesting part of the Asian koel's ecology is its breeding habits. But before we get onto that, let's take a small detour from the Asian koel and talk about a few terms that will be used extensively throughout the rest of this article.

First, brood parasitism. This is a practice that is widespread within the animal kingdom, where the parents place their brood in the care of others, thereby relieving themselves of all or some of their parental responsibilities (Soler, 2018; Roldan & Soler, 2011).

Brood parasitism can be conspecific, where the parents place their offspring in the nests of other individuals of the same species – it occurs in insects, fish, amphibians and birds (Soler, 2018; Valpine & Eadie, 2008) or it can be interspecific where the offspring are placed in the care of parents from another species – it has been recorded in mammals in addition to the groups that show conspecific brood parasitism (Soler, 2018).



Male Asian koel. Pic by Sayuru Imesh



Female Asian koel. Pic by Hirushini Dematagoda

Furthermore, conspecific or interspecific brood parasitism can be facultative or obligate. The former is a strategy where the parasitic females rear some of their offspring, but also place some in the care of other females, while with obligate brood parasitism, the parasitic parents provide no parental care at all to any of their offspring (Soler, 2018).

BROOD PARASITISM IN ASIAN KOELS

Brood parasitism, in any and all of its forms has been best studied in birds (Soler, 2018; Valpine & Eadie, 2008). Asian koels, the subject of this writing are interspecific obligate brood parasites, and therefore, from here onwards, the term 'brood parasitism' will refer to this type except where otherwise specified.

Interspecific obligate brood parasitism has evolved several times during avian phylogeny amongst various groups of birds (Davies, 2011; Croston et al, 2010; Rober & Sorci, 2001). Even so, at present, it is a relatively rare avian breeding strategy, occurring in only 109 out of a recorded circa 10,000 species (Soler, 2018; Davies, 2011). It is especially prevalent amongst cuckoos (*Cuculidae*) – the Family to which the Asian koel belongs to, where 57 species are known to exhibit obligate brood parasitism (Davies, 2011).

To increase their chances of successful parasitism, parasitic parents indulge in various acts of trickery (Soler, 2018). Cuckoos, one of the more widely studied groups of obligate brood parasites, have evolved several different strategies to gain access to host nests, to evade the rejection of their eggs and to ensure the parasite's chicks are well looked after by the host parents (Davies, 2011). As one might have already surmised, brood parasitism greatly reduces the host species' reproductive success (Soler, 2018). Therefore, hosts species have evolved different ways to thwart the tricks of the parasites (Davies, 2011; Croston et al, 2010).

At this point, it is important to know that different parasitic species may exploit a variety of hosts. In the case of Asian koels, studies from Bangladesh have found them to prefer the foster care services of house crows (Corvus splendens), common mynahs (Acridotheres tristis) and more recently, long-tailed shrikes (Lanius schach) (Begum et al, 2011). However, this is not to say that they only exploit these hosts in Bangladesh and elsewhere (Praveen & Lowther, 2020). In Sri Lanka, the koel primarily parasitizes the house crow, although the jungle crow (*Corvus macrorhynchos*) may also be used (Phillips, 1948). Anecdotal evidence suggests that Asian koel populations in urban areas in Sri Lanka are higher than in other areas of the country, which could potentially be due to increased waste generation around urban centres attracting greater numbers of crows. Although other species may be parasitized in Sri Lanka, little to no published records of this exist.

To delve into the 'arms race' between parasites and their hosts would constitute several articles and would take away from the Asian koel which is the subject of this piece of writing. Therefore, let us focus on those tricks utilized by the Asian koel to increase the success of its parasitic efforts and the counter evolutions of its hosts.

BREAKING AND ENTERING

Before the koel can lay its eggs in the host's nest, it must first gain access to it. Female Asian koels, as well as females of other parasitic cuckoos, spend a significant portion of their time watching the nests of their hosts to identify their targets and time parasitism effectively (Soler, 2018; Davies, 2011; Begum et al, 2011). Timing is important. If the koel lays its eggs in the crow's nest before the crow has begun to lay its own eggs, the parasitism is obvious and its eggs will likely be rejected (Davies, 2011; Langmore et al, 2003). Likewise, if the egg is laid too late, it may not receive adequate incubation or chicks might hatch too late and be outcompeted by their nest mates for access to food (Davies, 2011). Studies show that the first koel egg is usually laid after the host has laid a few eggs of its own, which in the case of house crows may be up to three (Begum et al, 2011; Lamba, 1966; Phillips 1948).

Hosts try to deny access to the koel through different approaches, which include nesting further away from potential koel perches, such as the mango tree outside my window, through colonial nesting and by all-out mobbing of parasites (Soler, 2018; Davies, 2011; Begum et al, 2011).

Parasitic cuckoos try and counter these defensive strategies by being highly secretive in their behaviour and rapid egg-laying (Davies, 2011). Furthermore, the cryptic plumage of female Asian koels is similar to that of hawks. This may offer a two-pronged counter to host defenses with the crypsis making the koel difficult to detect while the hawk-like appearance discourages the hosts from attacking them (Soler, 2018; Davies, 2011). Furthermore, the Asian koel may sometimes work in pairs to gain access to the host's nest - the male distracts the crows while the female steals in to lay its eggs (Raju, 1968; Dewar; 1907; but see Ryall, 2001). It is this sort of koel tactic that can be avoided by colonial nesting. To further demonstrate the extent of the back-and-forth co-evolution between parasite and host, some hosts such as the common mynah are known to completely desert their nest if they detect that it was parasitized (Begum et al. 2011).

EGG MIMICRY

The eggs of the Asian koel are a greenish-blue and covered with brown splotches. To the human eye, this is quite similar to those of the house crow. Egg mimicry is another key strategy used by parasitic birds to ensure that the host does not reject their eggs or abandon the nest (Davies, 2011; Begum et al, 2011; Croston et al, 2010).

However, with many brood parasites exploiting several hosts, it is impossible to mimic all the different types of eggs. This maybe the reason, why some parasites prefer one host and primarily mimic their eggs, such as how the Asian koel appears to prefer the house crow (Davies, 2011; Begum et al, 2011). But at the same time, the Asian koel also successfully parasitizes the nests of the common mynah and the long-tailed shrike in Bangladesh, despite not laying mimetic eggs. In fact, during studies by Begum et al, 2011, none of the mynahs or shrikes that were parasitized by the Asian koel rejected the koel's eggs. This shows that there is clearly a great deal more at play than simply how similar the eggs look. In fact, recent studies have shown that due to differences between human and avian vision, what we believe is a mimetic egg, may not actually be that way to a bird (Nahid et al, 2021). Other theories include parasites laying darker rather than mimetic eggs in dimly-lit, closed nests making them difficult to detect, hosts accepting parasite eggs because the costs associated with ejecting the wrong egg or abandoning the nest maybe too high, or even some hosts not yet having evolved the ability to accurately discriminate parasitic eggs (Davies, 2011).

Asian koels also resort to less complex strategies to increase their reproductive success. Instead of laying just one egg, they may lay several (Begum et al, 2011; Phillips, 1948). There are reports of house crow nests found with thirteen Asian koel eggs (Phillips, 1948)! Though the latter could well be a case of the same nest being parasitized by multiple female koels.

FORCEFUL FOSTER CARE

An important consideration for parasites is the ability of the host to provide adequate parental care to parasitic chicks (Soler, 2018; Davies, 2011). To ensure that the host's ability to take care of the fledglings is not exceeded, Asian koels, as well as some other brood parasites remove host eggs before laying their own (Begum et al, 2012; Mariyam, 2020). The chicks of many brood parasites may do something similar, ejecting their nest mates before they hatch (Davies, 2011). However, Asian koels differ in this regard in that the chicks do not eject their nest mates and are instead reared by the host parents along with their own chicks (Davies, 2011; Begum, 2011; Phillips, 1948).

DEEP UNDERCOVER

At this point the Asian koel has successfully evaded the defenses of the host and laid its eggs in the latter's nest. The host has accepted the parasitic eggs and has incubated them to the point of hatching. The next obvious question is how do the koel chicks manage to get the host parents to take care of them? After all, sneaking an egg into a nest is one thing, but surely, once the egg hatches and some random chick emerges, it is only a matter of time till the jig is up.

The answer to this question is still not very clear. There are several hypotheses that have been proposed to explain the host-parasite relationship when it comes to chick discrimination and/or rejection (Grim, 2006). However, recorded evidence of chick discrimination or rejection in cuckoos is quite rare (Grim, 2006; Langmore et al, 2003). From the side of the parasite, chicks have been seen to mimic the begging cries of host chicks and also mimic the intricate gape patterns of host chicks (Grim, 2006; Langmore et al, 2003). As for our Asian koel, both those strategies appear to be used (Ryall, 2001). However, what is really interesting is that host chick mimicry may also be used by adult Asian koels to escape attacking crows

or trick their way into crow nests to lay their eggs by pretending to be crow chicks (Ryall, 2001 & references therein).

The lack of chick discrimination or rejection in cuckoos. mentioned before, might suggest that these parasitic strategies are highly successful. However, the whole story is a little more complex. For example, why evolve chick discrimination if parasitism can be detected at the egg stage itself? Furthermore, similar to the egg discrimination mentioned before, mistakenly rejecting their own chicks might dissuade hosts from discriminating any of the chicks in the nest. It is also worth considering the possibility, that high enough parasitism rates do not occur to strongly select for chick discrimination (this could apply to egg discrimination as well). Therefore, it could well be that chick discrimination will evolve only when parasitism rates are high enough, parasites fully evade host defenses at the egg stage and the costs of parasitism are greater than the costs incurred due to erroneous chick rejection (Langmore et al, 2003).

IDENTITY CRISIS

The final conundrum in this epic battle between parasite and host is one of a crisis of identity. How does an Asian koel chick know it is an Asian koel? With parasite nestlings not coming into contact with conspecifics, how do they identify others of their own species? Once again, the answer to that question is not known for sure for all brood parasites. Rather than learning the characteristics of their species from their parents and their nestmates as most species do, there appears to be another mechanism that is used for this purpose (Davies, 2011; Croston et al, 2010). For one brood parasite, the brown-headed cowbird (*Molothrus ater*), this is through a password, a specific vocal cue that triggers brown-headed cowbird chicks to focus their learning efforts on members of their own species (Davies, 2011; Croston et al, 2010). It is important to realise that such a system would be very difficult to evolve and is likely something that is innate to brood parasites (Croston et al, 2010). How do Asian koels manage this? The answer, unfortunately, is one we have not found yet.

CONCLUDING REMARKS

If you have made it this far, well done to you. It might seem like a lot, but the truth is, this article has only scraped the surface of research into brood parasitism, and research into brood parasitism has only scraped the surface of what is really going on. The fact of the matter is, there is a lot we do not know. This article has alluded to a few unknowns, but there are many more to which it has not. Furthermore, it has to be kept in mind that this article heavily focuses on the parasite, and that too on the Asian koel. There are many other brood parasites around the world of which we know more or less about. Additionally, the study of how host species attempt to evade getting parasitized is itself a fascinating area of study. So, if this article has left you with more questions than you started off with, do not be disheartened. This is the state of affairs in the field of research into brood parasitism itself. It is important to remember that the relationship between brood parasites and their hosts is constantly evolving. It is a cornerstone of research on co-evolution (Wang et al, 2020). One side comes up with a particular strategy, thus forcing the other to positively select for strategies that might help them overcome it. It is an arm's race. And we will continue our efforts to try understand how it all works.

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NATURE

THE INDIAN CUCKOO'S BROOD PARASITISM ON BLACK-HEADED ORIOLES

Text and pics by Paul Patrick Cullen



On 24th January 2022 at the end of a beautiful day as the light was disappearing close to the Pidurangala rock just north of Sigiriya, I heard the insistent begging call of a bird which flew above me and into the trees of a private garden. When it landed I recognised through the camera lens that it was a cuckoo (but which one?) puffing itself up and begging! I have been lucky enough to have seen a juvenile Eurasian cuckoo (*Cuculus canorus*) back home calling its reed warbler (Acrocephalus scirpaceus) hosts, so this behaviour looked familiar! The bird moved on almost immediately onto another tree and at that moment it seemed that a black- hooded oriole entered the same tree.....but alas out of sight! As I tried to get closer there was the fluttering of wings and the birds were gone! And so was the light!

I retired to my budget lodge "Sigiriya Queens Rest" which was just around the corner where I had a delightful treehouse room four meters above the ground. The middle of the canopy was also full of birds. Intrigued by this cuckoo, I got on the wifi to re-read an article that I had read recently on avian brood parasitism in South Asia. Black-hooded orioles can be chosen as hosts by the Indian cuckoo! Bingo!

















On the following day, the 25th of January, I was up bright and early to see if I could find these birds again! I walked for hours both in the morning and evening but to no avail. (I did see plenty of other birds though. The surroundings of Sigirya have wonderful birding opportunities). Indian cuckoos could be heard calling too but there was no sign of the juvenile. The morning of the 26th was another cuckooless expedition.....

On the 26th afternoon to my delight and surprise the bird turned up again close to my lodgings! Its frenzied calls quickly brought not one but two black-hooded orioles to feed it! The drama was not static. The cuckoo chased after the adults from tree to tree and I did my best to follow...through water logged ditches, over barbed wire and onto private property where a less than friendly dog came barking furiously not enamoured by the trespasser. At that point I had to withdraw and give up the chase but not before I had got a few shots of the participants!





On the 27th morning and afternoon the action continued and I was well entertained with the cuckoo and its hosts being very active in and around my residence! Most of the feeding took place where I couldn't follow or see but on a few occasions I was lucky and managed to both see and photograph.

But that was the end of it. The next day, the 28th, and the following day the 29th, there was neither sight nor sound of the cuckoo or its hosts. An unforgettable encounter.

Saving Colombo's conspicuous inhabitants

A study on the breeding of spot-billed pelicans (*Pelecanus philippensis*) in the city of Colombo.

By Sachitra Jayawardena and Devaka K Weerakoon*

Pics by Sachitra Jayawardena

INTRODUCTION

Most urban centers around the world are located near water bodies such as oceans, rivers, estuaries, coastal areas, or lakes. The city of Colombo, the largest city and commercial capital of Sri Lanka, can also be classified as a coastal urban center. The Colombo city and its immediate suburbs have been subjected to intense development activities over the past few decades. However, Colombo and its immediate suburbs still carry many man-modified habitats such as parks, tree-lined roads, lakes, home gardens, cemeteries, and wetlands that function as refuges for a variety of animals and plants.

One of the most conspicuous inhabitants of Colombo is the spot-billed pelican (*Pelecanus philippensis*). The bird was earlier common across much of Asia but suffered a widespread decline, causing it to be listed as a threatened species. However, owing to protection measures taken and increased knowledge about the species, its estimated global population has been revised from 5,500-10,000 in 2002 to 13,000-18,000 in 2006. Therefore, in 2007, its conservation status has been down listed to a near threatened species. The spot-billed pelican is the only breeding resident pelican species found in Sri Lanka. They are widely distributed throughout the dry zone wherever suitable habitat exists. They show a wide distribution in lowland areas, spanning many districts such as Hambantota, Anuradhapura, Polonnaruwa, Batticaloa, Puttalam, Kandy and Colombo. However, the sub populations seen in Kandy and Colombo are presumed to have come from captive stock (U. Ekanayake pers. com.). The total population of pelicans in Sri Lanka is estimated to be around 5000 individuals, which makes up nearly 40% of the global population (BirdLife International, 2001). Therefore, survival of the Sri Lankan sub population is vital for the long-term survival of this species.

The population that inhabits Colombo district was introduced to Colombo in the 1960s. It has become a resident in Colombo, inhabiting a number of wetland habitats in and around the city. The main locations where they can be found within the Colombo area include the National Zoological Garden, Beira Lake, Bellanwila-Aththidiya Sanctuary, Muthurajawela area and the marshes in and around Kotte. Therefore, this sub population is of special interest as it occupies a highly urbanized area with a great deal of environment stress. Several roosting sites of spot-billed pelicans have been identified in and around Colombo. Out of these, some are also used as breeding places. One of the breeding sites is in Vauxhall Street, Slave Island, close to the Beira Lake. Since the breeding success is one of the major contributing factors that determines the population size, it is important to monitor such breeding sites to predict long term trends in population. This study has been carried out to document the status of the breeding colony located at Vauxhall Street with respect to roosting and breeding behaviour of pelicans that occupy this site.

METHODOLOGICAL APPROACH

The study was conducted from July 2005 to June 2006. Initially, a tree survey was conducted around the Beira Lake, the main feeding area of the pelicans, to determine the types of trees available for roosting and breeding of pelicans, as well as to determine the ecological conditions that favour tree selection for their roosting and breeding. The trees which have a GBH (Girth at Breast Height) value of 150 cm, or more were identified and recorded. The location of the trees was recorded on a map along with the height and diameter of the canopy, as well as the shape of the canopy. A large *Ficus benghalensis* tree [banyan (E) nuga (S)] located on Vauxhall Street adjacent to the CWE headquarters was chosen for the detailed study, as the highest number of birds were observed to use this tree as a roosting/breeding site. This tree is about 24 m (80 feet) in height and has a crown that is 12 – 15 m (40-50 feet) in diameter.

Initially, daily observations were carried out from 7.00 a.m. to 6.00 p.m. for a period of one week to identify roosting patterns. Thereafter, observations were carried out once a week from 9.00 a.m. to 5.00 p.m. Most of the observations were done from the 8th floor of the CWE headquarters building. From this observation point, three fourths of the tree canopy could be seen at a distance of about 3 m. First, the main types of roosting behaviours displayed by pelicans were documented. This was done during the non-breeding season to avoid breeding behaviours. The sequence of roosting behaviours was documented using the focal animal sampling method. Each individual was observed for a period of 45 minutes. This was repeated for 30 randomly selected individuals. In addition, opportunistic observations were also recorded with respect to behaviors displayed during roosting.

Documentation of breeding behaviour started from the day the first nest was built at the roost. Date and place where the first set of nests were built were noted. Types of material used for nest building were observed with the aid of a binocular. When possible, the places from where the birds collected nest material were also observed using the binocular. Frequency of bringing the nest material to the site was also recorded. A sketch of the breeding tree was drawn, and nests were marked and numbered according to the order they were constructed. The time taken for completing a nest, the average time taken for nest building, the contribution by the members of a pair to the construction of the nest and rough sizes of the nests were recorded. The total number of nests and breeding pairs were counted every day. Incomplete or abandoned nests were also noted. In addition, various morphological changes, and behavioural patterns of the breeding adults, such as colour changes, development of special structures, displays, calls, frequency of feeding, roosting time, roosting pattern, pairing, time taken for courtship and the time between the initiation of nest building and laying eggs, were also recorded.

The number of eggs laid in each nest was recorded using a spotting scope and the average clutch size was determined. Further, the approximate size of the egg and the colour were also noted. Then, the time taken for hatching and the number of eggs hatched were determined for each of the nests under observation. The number of hatchlings was counted, and the morphological characters recorded. The number of hatchlings present in each nest was counted weekly. Further, morphological changes of the hatchlings, such as time taken for the development of feathers and wing buds, and behavioral changes, such as time taken to start moving along branches, identifying parents, identifying food, etc., were also noted. The level of parental care shown was determined by gathering information on the nursing of the hatchlings. Whether both parents participate in feeding their young, types of food, frequency of feeding, for how long parental care was extended to the young, whether parental care was shown to other juveniles and whether parents feed their young equally, were some of the other information recorded.

TREE SELECTION BY PELICANS FOR ROOSTING AND BREEDING

A total of 113 trees with a GBH of more than 150 cm belonging to 23 species were recorded in the area surveyed. Most of these trees (14 out of the 23 species recorded) were introduced species to Sri Lanka. The most abundant tree species were Ficus religiosa (bo) and Ficus benghalensis accounting for 36% of the trees recorded. Pelicans used seven trees for breeding/roosting of which five were banyan trees indicating that the pelicans have a greater preference towards this tree species. The remaining two were Terminalia catappa (Indian almond, kottamba) trees. The main roost was located in front of the CWE building, while the other six were located close to the main site. There was one on Vauxhall Street (approximately 100 m from the main site), another on Dawson Street and the fourth, a *Terminalia catappa* tree on the bank of the east lake of the Beira towards D.R. Wijewardena Mawatha and the remaining three (two *Ficus benghalensis* and one *Terminalia catappa*) near the south-west lake of the Beira. In the roosting site. There was closer to the main site, there were a maximum of 25 individuals and 8-12 nests. A maximum of 20 individuals were counted in the roosting site on the bank of the east lake towards D.R. Wijewardena Mawatha. In the three trees near the Beira Lake (south-west lake) there were a maximum of 50 pelicans.

Even though 20 large F. benghalensis trees were present in the area surveyed, pelicans were observed to roost only in five of these trees and breed only in three of them. The two banyan trees that were used by pelicans only for roosting were located on the banks of the Beira Lake. Out of the three banyan trees used for breeding, two were located approximately 100 m from the east lake of the Beira, while the third one (the main breeding site) was located 200 m from the east lake and 450 m from the south-west lake (shortest direct distances). All three trees were partially covered by buildings on one side (CWE building, Millers building and a temple). However, some branches of the tree on Dawson Street were cut down on 06.03.2006 with nests and hatchlings, and thereafter, the birds redistributed among the remaining two breeding sites.

ROOSTING BEHAVIOUR OF PELICANS

During the non-breeding season (July to December) most of the adults left the roosting site before 9.00 a.m. On average, 16 adults were observed at the roost at this time. Thereafter, the pelicans returned to the roost gradually and by 1.00 p.m., nearly half of the roosting population had returned to the roost. The maximum number of roosting adults was found after 5.00 p.m. that is about 76 adults. In addition, a juvenile population of around 10 individuals were found at the roost at this time.

During the breeding season (January to June) most of the adults remained on site during the entire day. Rookery was occupied by more than 100 adults at each count. The maximum number observed was 168 at 4.00 p.m. and the minimum was 107 at 10.00 a.m. The juvenile count again remained at a constant value as was observed during the non-breeding season. The average number observed was 31.5.

There was a significant difference in the average population size between the non-breeding season and the breeding season (t = 21.94 df = 30). The maximum number recorded was 199 which comprised 168 adults and 31 juveniles. The maximum number of pelicans at the breeding site was recorded during the month of March. In the months of November and December, there was a remarkable drop in numbers of both adults and juveniles. Only two juveniles were observed at the roost in November and three adults were observed in December. The lowest number of juveniles was recorded in the month of January. Thereafter, the numbers increased gradually, reaching a maximum during the month of May (Fig. 1).



Figure 1: The maximum number of adults and juveniles recorded at the roosting site during each month.



Figure 2: Black spots appear on the pouch during the breeding season while the inside of the pouch turns completely black due to the appearence of heavy spotting.

Pelicans showed a preference for the canopy layer for roosting purposes, especially the branches towards the roadside and at a height between 15-24 m (50-80 ft) from the ground. They preferred forked branches. In the non-breeding season, they roost solitarily and did not tolerate the arrival of another individual at proximity, whereas during the breeding season they roost in groups of 6-10 individuals. They did not always occupy the same roosting location and were observed to be changing their roosting places from time to time after a nap or when another bird arrived at the same place. After landing, they spent a few minutes grooming their feathers, then another few minutes for thermoregulation (fluttering their throat pouches) and sleep for nearly ½ an hour. After they woke up, they groomed themselves for a few minutes before flying away. Juveniles did not land on the tree directly. They first fly across the tree before coming back to land. Juveniles once again do not have any specific resting locations and appear to choose roosting places randomly.

Roosting time per individual increased during the breeding period. During the breeding season, the roost was occupied primarily by breeding adults while only a few juveniles and non-breeding adults were observed, and they also occupied the roost only for a few minutes. During the rainy periods and in bad weather conditions, arrivals and departures were limited and they tend to roost for longer periods. Apart from pelicans, the roost was regularly used by other bird species such as *Corvus splendens* (house crow), *Acridotheres tristis* (common mynah), *Passer domesticus* (house sparrow), *Orthotomus sutorius* (common tailor bird), *Merops philippinus* (blue-tailed bee eater), *Megalaima zeylanica* (brown-headed barbet) and *Nectarinia zeylonica* (purple-rumped

sun bird). In addition, *Ardea cinerea* (grey heron) and *Egretta garzetta* (little egret) were also observed at the site occasionally. All these birds came for roosting except crows that use the site for roosting as well as breeding. During the breeding period of pelicans, two nests of crows were observed on lower branches. Crows were observed stealing twigs from the pelican nests. Other bird species were seen less frequently during the breeding season of pelicans.

MORPHOLOGICAL CHANGES OBSERVED IN PELICANS DURING THE BREEDING PERIOD

During the breeding season, the feathers of pelicans appeard bright white while the pouch developed black spots. The inside of the pouch appeared almost completely black due to the appearence of heavy spotting and pouches were tinted with a luminous blue and a more reddish colour near the tip (Fig. 2). Under wings and rump became brownish pink. The bare skin around the eye became more prominent with an orangish yellow colour. During the latter part of the breeding season, colouration around the eyes became paler. The males and females cannot be differentiated even during this period except during their copulation attempts.

BEHAVIOURAL CHANGES OBSERVED IN PELICANS DURING THE BREEDING PERIOD

During the breeding season, pelicans tend to roost in groups of 5-12 members, as opposed to roosting singly during the non-breeding season. Further, they tend to be very noisy, clapping their upper and lower jaws together frequently during the breeding season compared to the non-breeding period. They also tend to call more aggressively and fight with their neighbours frequently using their bills during this period. Some of them suffered wounds due to fighting as bleeding was observed from their bills and near the eyes. They also tend to wag their partially uplifted wings together with the tail feathers. During the breeding season, they slept very little. Males perched close to the females and herded females closer by using their bills. Some birds even kept the female under their wing-cover. During copulation the male held the female by the neck using its bill and mounted the female while holding its neck (Fig. 3). Copulation lasts a few minutes (1-2 minutes). Males were also observed grooming the females frequently.

NEST BUILDING

Nest building started in the first week of January and continued until mid-June. The number of nests added to the rookery increased gradually, reaching a peak in mid-March, and culminating by end-March. Males brought twigs from trees located a few meters from the site and offered those twigs to the female to place in the nest or helped the female to place it. Females held the twigs with their feet once it was placed in the



Figure 3: During copulation, the male holds the female by the neck using its bill and mounts the female while holding its neck.

nest. The twigs were brought to the nest at 15-30 minute intervals. They used mainly twigs of *Ficus religiosa* (bo), *Ficus benghalensis* (banyan, nuga), *Leucaena leucocephala* (ipil ipil) and wet grasses as nesting materials. The nests are shallow and can be described as a mesh of twigs. The size of the nest was approximately 12-18 inches in diameter and was just enough for a single adult to sit on. They built nests in a series along the branch and a single series consisted of 2-6 nests.



Figure 4: The progression of the nest building activity by pelicans during the breeding period.



Figure 5: Pelicans incubating eggs which turned brown after a few days.

Altogether 76 nests were constructed during the breeding period which lasted from January to June, 67 (91%) were constructed during the first three months while the remaining 9 (9%) were built during the last three months (Fig. 4). The longest time taken to complete a nest was 36 days, while the shortest duration taken was eight days. The mean duration taken for constructing the nest was 15 days (SD 11). Further, toward the latter part of the nesting period, the mean completion time came down to 10 days (SD 4.8). Out of the 76 nests that were observed in this breeding site during the study period, 54 nests were built to completion giving a success rate of 71%. Out of the 76 nests, four nests were abandoned midway, of which two were later reconstructed. Out of these two reconstructed nests, one failed again, while the other was used for egg laying. Furthermore, 20 nests were destroyed during the study period. Out of the 20 nests destroyed, 17 were destroyed after the eggs were laid. One of the destroyed nests was reconstructed and eggs were laid and a fledgling was raised successfully.

EGG LAYING AND INCUBATION

The eggs of the spot-billed pelican are slightly larger than a hen's egg (approximately 5-7 cm in diameter), white in colour with a red coloured volk. Egg colouration changes with time from white to light brown (Fig. 5). They laid 1-3 eggs per nest, averaging 2.3 eggs per nest (SD 0.66). Egg laying started during the last week of January and continued till the middle of June. The total number of eggs counted was 147. The maximum number of eggs was laid during the last week of February. Thereafter, the number of eggs laid declined gradually. By the end of March, the egg laying had reached a plateau. Only 11 eggs were laid during the late nesting period spanning May to June.

Out of the 147 eggs laid, 65 (44.2 %) hatched. Eggs were incubated by both males and females. They took turns at incubation, changing turns twice during the daytime. The one who was incubating flew away about 10 minutes after the arrival of the other partner. During incubation, the eggs were covered with their webbed feet. Some of them were seen stealing sticks from other nests even while they were incubating, which sometimes led to fights between birds that were nesting adjacent to each other. Some eggs fell from the nests during the incubation

period and crows were seen feeding on such fallen eggs. Females laid a fresh clutch of eggs if all the eggs were lost. During the study period, five such incidences were observed. Rarely, some adults abandoned the nests after some time and those nests were eventually destroyed after a few days. The incubation period varied between 21-28 days (mean 25.2, SD 7.6). Egg laying continued throughout the breeding season, especially by the late nesting birds and fresh eggs were observed even in June.

HATCHLINGS

The hatchlings came out after three-four weeks of incubation. A total of 65 hatchlings were recorded. The number of hatchlings per nest varied between one and three, with the mean number of hatchlings per nest being 1.6 (SD 0.6). Hatchlings were slightly larger than the egg and were fully naked at first. At the time of hatching, their body was scarlet in colour and with a grey colour around the eve. Within about a week. they took on a light pink colour. The hatchlings have a short beak (2 cm) with a yellowish-grey pouch. Their eyes were open at the time of hatching. The hatchlings were observed sleeping on their parents webbed feet. Both parents took turns to rear the hatchlings, taking turns once or twice at four-hour intervals during the daytime. After two weeks, their bodies were covered by white coloured down feathers. By this time, the hatchlings were very active and fed frequently. It was also observed that hatchlings of the same age did not develop at the same rate; some showed slow growth and were less active than others.



Figure 6: One week old hatchlings being groomed by the parents.

Hatchlings at three weeks+ of age were fully covered with white down feathers and by this time, flight (contour) feathers had also started to emerge in their wings. They also started walking on branches under the guidance of the parent who was looking after them. Even at three +weeks, parental care was observed, but the parents now roosted outside the nest while keeping a watchful eye on their babies. At any given time, at least one of the parents remained with the hatchlings when the other went back for feeding. About four weeks after hatching, the body of the hatchlings were covered with black colour flight feathers. The feathers on the back also began to develop. Their beak had grown to about 7.5 cm in length and started taking a yellowish pink colour. The bare skin around the eye remained grevish while the pouch, feet and webs were yellowish-pink in colour.

About five weeks after hatching, the feathers turned brown in colour. At this time, either the parents were roosting beside them or sometimes left them to go fishing. By the time the hatchlings reached the age of three-five weeks, they could hold the tree with their webbed feet. Hence, their nests were partially dismantled. By the time the hatchlings reached seven-eight weeks of age the parents started leaving the hatchlings alone in the nest. The beak, pouch and the feet were now pink, and the hatchlings were fully covered with brown feathers. The frequency of providing food for the hatchlings had also gradually declined by this time. At this stage, the hatchlings were beginning to practice flight, flying from one branch to another nearby branch and by the time they reached 12 weeks the hatchlings were capable of independent flight.



Figure 7: A twelve-week-old fledgling fully covered with brown feathers and capable of independent flight.

FEEDING OF HATCHLINGS

Newly hatched young were fed on the cud regurgitated to the nest by parents. On average, parents regurgitated about three semi-digested small fish (10 cm long tilapia) into the nest. Hatchlings pulled out small particles from the fish and swallowed it. The parents were observed swallowing those fish again and regurgitating. This was repeated two-four times during a feeding bout. By the time the hatchlings reached the age of two weeks, they were capable of pulling the cud from the parent's gullet. During feeding, the juvenile inserted the whole beak inside its parent's beak and after collecting all the food from the parent's gullet it pulled its beak out and swallowed the collected food. On average, each feeding lasted about two minutes and they were fed twice or three times a day. As the parent reached the nest, the juvenile raised its beak and opened the bill several times. However, other juveniles nearby did not behave like this indicating that the parents and juveniles could identify each other. Further, the parents fed only the young belonging to them and both parents took turns to feed the young. Most of the time, only a single hatchling was observed in the nest except for one of the nests where two equal sized juveniles were observed. Generally, they are fed with tilapia (Oreochromis niloticus). However, a tank cleaner (Pterygoplychthys multiradiatus) about 28 cm long was once observed fallen underneath a nest.

FLEDGLINGS

When hatchlings were about 10 weeks old, they started training to fly. They flapped their wings for a long time and flew from branch to branch. When they were 12 weeks old, they were fully capable of flying independently (Fig. 7). Hatchlings were fledged when they became 12 -14 weeks old (mean 12.3, SD 1). During the study period, between 20-30 hatchlings had fledged, which was about 30.7- 46.2% of the total number of hatchlings or 13.6-20.4 % of the total number of eggs laid.

THREATS OBSERVED TO THE EGGS AND HATCHLINGS

A number of threats were identified during the study. Once, the workers at the CWE tied a rope to the banyan tree and started shaking the tree to prevent the pelicans roosting. A few eggs had fallen from the nest due to fighting between neighbouring birds or due to the shallowness of the nest. Another threat was with hatchlings falling from the nests. During the study period, eight such dead bodies of hatchlings -from a few days to about six weeks old- were recovered. Rarely, some adults were reported to eat their own young. One such case was observed at this breeding site where an adult swallowed a newly hatched young and vomited the dead body to feed the other hatchling that was left in the nest. It flew away and returned 20 minutes later and discarded the remaining dead body parts.

CONSERVATION NEEDS FOR PELICANS IN COLOMBO

In recent times, a global decline of the spot-billed pelican populations has been reported. This has been attributed mainly to the loss of safe and undisturbed breeding sites (BirdLife International, 2001). Disturbance to pelican colonies causes a reduction in breeding success and even colony abandonment. Therefore, to ensure the long-term survival of this species. breeding sites must be managed so that disturbance is minimized (Crivelli and Schreiber 1984). However, the nesting sites of the pelicans inhabiting Colombo are in highly urban settings and therefore, preventing disturbance is a challenging prospect. The pelicans were introduced to the Zoological Gardens in Colombo during the 1960s. Initially, a nesting site was established near the Dehiwala/Wellawatte bridge, but they were driven away from this site by the locals as they were considered a nuisance species due to the foul smell generated around the nesting site. They established a second nesting site in Ratmalana near the Soysa flats from where they were driven away for the same reasons (Pers. Comm. Kotagama S W). Vauxhall Street is the third known location where they are facing similar issues, as the local community as well as those who work in the CWE building consider them a nuisance. As indicated in this paper, some of the nesting trees have been cut down to prevent them from breeding and this nesting site has been disturbed by the workers of the CWE. Thus, the possibility of establishing a safe breeding site in one of the few protected areas scattered around Colombo (Jayawardenepura-Kotte Sanctuary or Muthurajawela Sanctuary) should be explored.

Further, a broader survey should be carried out, focusing on the greater Colombo area to identify other roosting/ breeding sites used by pelicans and to earmark a viable location to establish a safer breeding site. It has been demonstrated that pelicans can be successfully induced to breed in artificial platforms (Subramanya & Manu, 1996). Therefore, erection of artificial nest platforms could be tried out in a more protected location to entice them to establish a breeding site at such a location. Until such an alternate breeding site can be established, the existing breeding site at Vauxhall Street must be continuously monitored to assess the breeding status of pelicans using the findings of this study as a baseline. Also, it is necessary to take steps to create awareness among the local community to increase their tolerance towards the bird as well as explore possible solutions that can help reduce the nuisance caused by pelicans to local communities, mainly due to their faecal matter.

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Rescued from hands that robbed you of a mother And the furry warmth of siblings You came into my eager care. We named you Poppaea After the Roman empress of antiquity Rumoured to keep your kind for pomp and pageantry.

But with incipient instincts of maternity Seeing your need, and stricken with pity I held you close, let you crawl My body, held in thrall While regretting that we could not save Your mother from return to an empty cave. That empathy foreshadowed emptiness. Robbed now of all sibling warmth, and childless Parallels and ironies commingle in reflecting, Till self-pity is pierced by positive thinking. The past has its pages, each one fraught, With bitter-sweet complexities of thought.

Bonding with this wild creature Sharpened my affinity with the world of Nature A saving grace at this surreal time When one's soul seeks solace in the sublime Life, whether long or of short duration Is empowered with experience which rewards exploration.



- Dianne Lockhart -



Accelerating biodiversity conservation through private land stewardship

By Sriyan de Silva Wijeyeratne*

n August 2020, through a visionary move, the WNPS established a land Trust called PLANT (PRESERVING LAND AND NATURE (GUARANTEE) LIMITED) to operate under its auspices. This was set up with the aim of acquiring or overlooking privately owned lands for the purpose of conservation, and to collect funds through the Trust and the WNPS to purchase lands for the purpose of conservation. PLANT hopes to protect lands in their existing natural states, extend protected areas by converting more private land to conservation areas where possible, and focusing scientific rehabilitation efforts on any degraded land brought into the Trust. The proposal was envisioned and later adopted by the General Committee in December 2018, after which the formalities were put in motion. This is the most ambitious initiative that the WNPS has undertaken in decades, and if reasonably successful, will help redefine how biodiversity conservation is seen within the country, and the role of private sector players in furthering conservation and specie protection. The likes of Dr. Rohan Pethiyagoda and Dr. Ranil Senanayake

among others have shown through different prototype projects, just how impactful some of these smaller property restoration efforts could become. I hope PLANT can add to that body of experience in the coming years.

The significance is best understood when looking at the massive land grabs and forest destruction taking place. Sri Lanka is a global biodiversity hotspot and has a high rate of endemism - about 27% of the country's plants are endemic, and 22% of its amphibians, birds, mammals, and reptiles too. Sadly, Sri Lanka has one of the highest recorded rates of primary forest destruction. From 2002 to 2021, Sri Lanka lost 10.5 kha of humid primary forest and in 2021 it lost 13.3 kha of natural forest, while between 1990 and 2010, the country lost 20.9% of its forest cover². Primary forest cover has fallen from 84% in 1881 to less than 17% today as per some environmentalists³. Habitat loss is the greatest threat to Sri Lanka's native ecosystems and species. The state and its leaders and policy makers show little signs of enlightenment in the recent decision making, which is not helping to stem the tide. One such controversial decision was to recently release all the lands



within protected areas or designated for protection, for the purpose of increasing cultivation.

Nearly half of Sri Lanka's land area (45.4% in 2018) is already utilized for different forms of agriculture, and agricultural extent has increased at a rate of 43% between 2000 and 2018. The country's Protected Area (PA) network, which covers 26.5% of the total area. is the major landuse class that contains intact forest ecosystems and harbours the local wildlife. This limited vegetation cover is mostly distributed in patchy forms in the wet zone and as relatively large, contiguous areas in the dry zone. The PA network, together with the remaining forest areas, provide a wealth of ecosystem services and goods that are vital for the

sustenance of humans and animals alike. Fragmenting and destroying these forests and handing over these Other State Forests to regional local authorities is bound to further heighten a plethora of issues, while clearly the provision of more land for agriculture has not brought solutions to the Lankan food crisis.

Under Dilshan Hettiarachchi's chairmanship, PLANT's initial fundraising and structuring activities gathered momentum and we conceived the idea of working with landowners through a MOU structure (providing them with the comfort of retained ownership), and signed up a few locations, while approaching several individual and other donors. An important turning point of the PLANT journey was also the Emerald Trails concept. The thought process I presented was fine-tuned and enhanced with help from Professor Sampath Seneviratne and Zaineb Akbarally, and edits from Pavithra Attanayake. The outcome in July 2021, essentially provided PLANT with a greater focused approach, while bringing a structured response to the issue above. Through Zainab's mutual link, we had just been introduced to Rainforest Trust and RESOLVE in the USA, and we were just working on our plans for a funding proposal for land acquisition through them. There was also tremendous support for the PLANT concept from President's Jehan and Spencer, and from the Committees, and, many general members were also quite complimentary about the initiative.

In Sri Lanka, 30 species of mammals, 14 species of birds, 13 species of reptiles, 75 species of amphibians, 121 species of fish and 298 species of plants are listed as Threatened (IUCN Red List version 2020). The biggest threat to Sri Lanka's forests and wildlife habitats are human activities such as urbanization. agricultural expansion and illadvised development projects. The southwestern quarter of the island is the only home for perhumid rainforests in the south Asian region and has a highly unique biodiversity. Around 6% of this landmass is home to around 90% of our species. and with the high endemism in Sri Lanka, naturally many point endemic species with limited ranges are becoming extinct at a rapid pace. This area also has the highest development activity within the country, where nearly 50% of the island's human population live. An urgent action plan to preserve them was a crying need (Fig.1).

One such solution

The Emerald Trails initiative hopes to help create almost uninterrupted or reasonably connected corridors of protected natural spaces and forest ecosystems within the southwestern quarter of the island. To secure and ensure this region's genetic and ecological integrity, the linkage of forest patches with larger geographies of conserved land blocks is an urgent priority to ensure continued movement and linkage for animals across different larger geographies of protected land blocks. The idea of corridors is not new nor something which can be done by any single entity. PLANT seeks to work with other likeminded corporates, individuals, government and conservation entities towards this mission. The need for land conservation would arise within the single line marked spaces in this map. Within that, the project envisioned at least TWO EMERALD TRAIL CORRIDORS of connectivity (Fig.2).



- The first would be from the western side of the island to link up with the broader Sinharaja
 Forest. It could commence just east of the southern highway (Welipenna towards Moragala/ Kalugala and link to Neluwa- 35 km), and that can then move continually eastwards to link with Sinharaja.
- The second would be from the southern side of the island commencing on one side from Nagoda to Udugama to Kanneliya Forest and onwards through Neluwa to Sinharaja (approx. 35 km straight line) and on the other, moving from Morawaka through Deniyaya to link up with Sinharaja (approx 20 km). The links continue into the Peak Wilderness and Knuckles.



Figure 2

 Each corridor is envisioned to be within a broad 2-3 km width on a map. Thus the Emerald Trail might be around 100 km of green carpet linking some important ecological parts of Sri Lanka, in our highest biodiversity regions.

Broad strategic approach

PLANT does not envision owning massive chunks of land to cover this plan but rather. to play an orchestrator role through a combination of approaches. As part of that, we would raise funds and approach donors to help us own some blocks of property directly. Funds would be obtained to make purchases directly or committed and generous donors could directly transfer land blocks to PLANT with a view to sustaining those as conservation areas into the perpetual future. During the past year, we have been doing several presentations to high-net worth individuals and likeminded businesses and partners. Supported by the head office team, we have also been submitting several proposals for international funding, despite the high rejection rates after much effort.

A second approach is to enter into light MOU's with individual land and estate owners who will committ to keep sections of their property in a forested state for 10-20 years. PLANT will support the enhancement of those properties through biodiversity studies and funded reforestation work. Corporates including large estates can also come to an agreement to create forest corridors within their lands or reforest sections of their properties as part of their sustainability initiatives. A third would be to lease out state land for longer durations and jointly do reforestation work with corporates. We are also exploring the notion of paying individual landowners who have "sensitive land blocks" and are keen to monetize their property, to "rent" the land to PLANT in return for a monthly payment, where we do reforestation work of limited scale. The owner in turn would desist from both selling or cutting the forest to replace the same with agricultural crops for a defined period.

Naturally all of these will require a lot of field work, strategic land mapping and land hunting as well. Outside of this. we would try to influence more corporates and partners to do their respective work and reforestation efforts also within these corridors as complimentary initiatives. The state authorities also have plans for corridor creation and enhancements which we will study and understand, although some of those wheels turn at different paces when it comes to execution. We do not see any need to duplicate but rather want to complement each other's efforts for this cause. PLANT will be happy to accept any donated lands in most parts of the country but we proactively want to invest and engage within the Emerald Trails corridors as much as possible.

Progress so far

Startup phases are tough, and it has required major commitment from many of the team who all volunteer their time for the cause. But we are excited that the coverage has already reached over 200 acres through direct ownership and indirect MOU's. PLANT has begun to undertake biodiversity studies and other work in these locations and is evolving its structures at present for scale, while leveraging the strong WNPS network of resources. The current blocks include locations in the regions of Bolgoda-Kalutara, Pannila near Matugama, Deniyaya, Uda Walawe region and Gallpallewatta in the Ratnapura district.

In May 2022, our year long efforts joyously came to fruition when PLANT completed the acquisition of three parcels of adjoining land in the ecologically sensitive Peak Wilderness area off Erathna. The three properties ensure around forty-four acres of refuge to a very diverse range of species. PLANT is very proud to have obtained funding for the purchase from the Preventing Extinction Fund through two globally strong conservation partners from USA, namely Rainforest Trust, and The Quick Response Fund for Nature.





Since 1988 the Rainforest Trust has been safeguarding imperilled tropical habitats and saving endangered species by establishing protected areas in partnership with local organisations and communities. With its partners, Rainforest Trust has safeguarded more than 37 million acres of vital habitat across Latin America, Africa, Asia and the Pacific. The Quick Response Fund for Nature is a philanthropic collaboration focused on protecting some of the world's most critical sites for endangered species.

This combine block, viewed from across the opposite hill in this picture, (Fig.3), has two streams on either side of the property and some samll waterfalls. The location benefitted from some previous studies done (thanks to Mendis Wickramasinghe and team), which showed that the property is home to an astonishing 145 endemic specie count within its small confines. The location is adjacent to a tea plantation and forest clearing for cinnamon and thus provides critical connectivity for specie movement along streams and ridges, plus important undisturbed breeding grounds for many of them.



These purchased properties help us provide conserved spaces to species like the fishing cat which is the second largest endangered wild cat inhabiting hill country wet zone and dry zone forests, the highly trafficked Indian pangolin (high EDGE and ED species), the Serendib scops owl, one of the highest EDGE species among birds, and a highly range restricted endemic Erdelein's horned lizard, which is an example member of a group of four endemic CR and EN horned lizards found exclusively in these forests. Plants like *Dipterocarpus hispidus* which is a very large rainforest endemic and a member of the ancient Gondwanan Dipterocarps community, and a species in the emergence layer of the tropical rainforests also benefit. These are merely a few examples of the many species which benefit from the above initiatives. PLANT properties have also established first time proof of resident breeding for some very rare bird species, and the team hopes to share such discoveries in the coming periods.













Our last visit was amidst a week of massive torrential rain, (pictured above) but that did not deter the team from inspecting the location and planning our next steps. Unfortunately, the current economic crisis, and lack of fuel have severely curtailed some of the early aspirations for progressing our work. I am sure everyone will be back in full action in the near future.

The need for partners and donors

I am often asked how folks can help. We are counting on the goodwill of Sri Lankans to help address this crucial issue. A few individuals have already donated land blocks to PLANT, provided funding for purchasing land, or entered into MOU's to manage forested land while retaining their ownership. PLANT aspires to oversee over a thousand acres during the coming ten-year period. We are very keen to get more corporate partners to work with us. Many corporates already have their own sustainability and ESG programmes under which reforestation initiatives are undertaken. We encourage them to execute those initiatives within the Emerald Trails corridors and/ or donate land blocks to PLANT for preservation.

Over 100 acres through Sarvodaya partnership



In March 2022, PLANT signed a landmark MOU with Sarvodaya, where along with WNPS, the three parties will work closely on several conservation initiatives and efforts. The partnership brought in over 100 acres of land under PLANT coverage and these efforts include working together to protect and further develop the forest eco system and biodiversity, carry out research, assess progress, publish findings and conduct training programmes to educate communities from Sarvodaya and neighboring villages to ensure sustainability, among other areas.

The Climate & Conservation Consortium: A much needed technical strategic partnership



Formerly known as the Carbon Consulting Company (CCC) with sustainability at the heart of everything they do, they have a team of several in-house specialists and partner with an external pool of sustainability consultants and industry experts to provide management and technical expertise. Their advisory services encompass all aspects of integrated sustainability solutions to leading companies across the globe. The team has agreed to support PLANT with specialist inputs in some of these areas, which is a much-needed value addition for our work, while also acting as an ambassador for PLANT by channeling efforts of international and local partners who seek credible sustainability initiatives to fund and endorse.

We are in discussion with several other corporate partners who are also keen to support us, and some of that work will be nearing public disclosure in the coming weeks.

Operating structure and way forward

PLANT has a seven-member board of directors, whose appointment is through the WNPS. The board members include leading academics and conservation practitioners who have been picked for their wideranging experience and expertise in these areas. A leadership team

consisting of a subset of some board members and non-board members, will play the operational roles for PLANT. There are nine lead roles identified under this structure. A general committee will cover areas like property management, oversight and security, reforestation efforts and community outreach, plant nurseries etc and these are all to be managed through a geographic approach, covered by regional conservation leaders. Volunteers for this team have been identified and this structure will be rolled out soon as the footprint evolves. PLANT is supported by the WNPS administrative structure through Bhagya and Yoshitha and headquartered at the WNPS office. Building a sustainable structure akin to the WNPS will be critical for the future, but I am hopeful that we will put in a solid foundation for this long journey ahead.

Individuals and companies who are keen and serious about conservation can support us in many ways. Please contact either of us if you have land which can be used for conservation purposes, either through donation to the Trust, or via a MOU to conserve it (email: sriyanw@live.com or yoshitha@wnpssl.org). Folks can provide funding for us to procure more land to accelerate this journey or procure a land in partnership with us. Others could also donate suitable land through a "last will" which ensures that land will be used for conservation for the benefit of future generations. With us, corporate partners can launch customised, impactful reforestation engagements which move beyond the basic "tree planting" activities into more scientific conservation. Partners who can also bring scientific, monetary, and other value to PLANT are also encouraged to engage with us. Finally, donating any small sums of money (standing orders or oneoff), will help with maintenance and reforestation costs. Members could help find environmentally sensitive lands for us which need protection and can be acquired or even

volunteer to work with us if you are serious about committing some of your time towards hands-on conservation work.

PLANT is breaking new ground within the Lankan conservation framework, and there is nothing as exciting as being part of the birth and early journey of a new idea. Along with the team, I am hopeful that future generations will have at least something to thank our generation for!!

*Chairman, PLANT

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WNPS activities January-July 2022 Youth Wing

Back to school with the Youth Wing: continuing with promoting environmental education across the island

The past couple of months were quite exciting for the Youth Wing. We have successfully restarted our 'Education for Conservation' programme despite the current situation and have continued to inspire the next generation of environmental custodians of our country. We conducted programs in four schools in Wasgamuwa on the 21st and 22nd of April, engaging with more than 300 students.

To celebrate World Environment Day and World Ocean Day, we conducted a week-long school awareness series of programmes at Anawilundawa from the 6th to the 10th of June. We selected 10 schools in proximity to the Anawilundawa International Ramsar Wetland Sanctuary for this series of programmes. Curating our programmes to highlight the importance of protecting our mangrove and wetland ecosystems, we also spotlighted the ongoing mangrove restoration work carried out by the WNPS Marine Subcommittee. This week-long programme series allowed us to connect with more than 1000 students from the area. So far in 2022, we educated more than 2000 students across the island on the importance of protecting our ecosystems, fauna, and flora. We would like to thank Nations Development Bank for their continuous support in this venture.

More school programmes will be taking place after the 15th of June, broadening the school community we work with. We plan to conduct these programmes in Matara and Mannar in the coming months. Endorsed by the Ministry of Education, the Youth Wing's 'Education for Conservation' programme has worked with nearly 80 schools around the country and has reached more than 10,000 students.

Congratulations are in order to our immediate past Chair Ms. Zaineb Akbarally who is one of the newly appointed Vice President's of the society. Her guidance led the Youth Wing to grow as one of the most successful youth led initiatives in the country which was working towards environmental conservation. We would also like to congratulate and welcome our new Chairperson, Mr. Keshan Perera, who we believe has the passion and enthusiasm to make the future of the Youth Wing even brighter.

We are excited about the coming months. The Youth Wing has more programmess, events and social media campaigns planned and we invite you to follow our journey through our social media.





Wild Kids

Wild Kids go out to the wetlands again

The air was crisp, the ground was soft and the wetland was lush after the rains from the night before. It was a perfect day for over 60 wetland warriors to explore, study and immerse in this amazingly diverse ecosystem on a guided wetland walk with the Wild Kids of WNPS.

On Sunday, the 13th of February 2022, Diyasaru Park was a flurry of activity as children between 5 - 12 years gathered in their wetland best for the WNPS's annual wetland walk to celebrate World Wetland Day which fell on the 2nd of February 2022. After registration was completed, the children, parents, and members of the WNPS gathered at the information center for a briefing by zoologists from the University of Colombo who were going to lead the walks, for a quick introduction to 'What makes a Wetland' and the essential set of do's and dont's while trailing through Diya Suru Park. Armed with their sheets of wetland sightings and tons of enthusiasm, it was time to start walking!

The WNPS is thankful to Seylan Bank for their partnership in making the 2022 wetland walk a success, the young zoologists from the University of Colombo for their guidance and expertise to inspire young minds on the importance of acting for the wetlands and all the parents and volunteers of WNPS's Wild Kids for their time and effort.

Wild Kids colourful

Our WNPS Wild Kids along with Fox Resorts Jaffna conducted an art competition and workshop titled "Nature Through Art" for 25 school children in the Jaffna region. The Fox Resort-Jaffna provided the resources for the event. The kids were provided with a morning snack on arrival and taken on a tour around the hotel and given an opportunity to see some valuable replicas of renowned artists of yesteryear. Thereafter they were hosted to a scrumptious meal at the premises.

Seylan Tikiri, the main sponsor for Wild Kids, generously provided exciting gifts to be distributed among the participants. The Regional Manager Mr. Nirmalan and Assistant Branch Manager Mr. Kamalanathan represented Seylan Bank at this event. WNPS Vavuniya and Jaffna District Representatives Mr. Keethanaram Thanabalasingam and Mrs. Piratheepa Sivakumar helped us immensely to organize the event.

The event was facilitated by a local student group called Sirakukal. Shakthi TV provided media coverage and the clip was telecast on Shakthi TV news. This event was significant because it was the first time one of our kids' events was organised in the northern region. We hope to carry out similar events in other parts of the country in the future.

New visitors at Green Isle



In January, a floral audit was conducted by a team led by Dr. Iroja Kaldera from the Department of Plant Sciences, University of Colombo. Plant species on the site were identified and growth measurement of previously planted saplings was recorded to be catalogued for comparison. In celebration of World Wetlands' Day, a site cleanup was carried out on the 12th of February with the aid of the Young Zoologists Association, Ranger's Office of the Department of Wildlife Conservation (DWC), members of the Youth wing of the WNPS, students from the University of Sabaragamuwa and members of the Animal Rehabilitation Center of the DWC. We are grateful to CleanTech of Abans for the removal of the collected plastic, glass, and other materials.

Water quality plays a huge role in the quality of riparian vegetation and aquatic life. March was mostly dedicated for testing the water quality of the canal and the experimental planting of mangrove palms. The enthusiastic scouts of Nalanda College, Colombo planted etamba, atha, heraliya, jambu, gadu guda and rambutan.

The routine tree planting was on hold for a few months and recommenced after the rains in May. Forty-nine types of plant species including jack, kiripalu, anoda (sour sap), uguressa, dam and madatiya were planted during this month. Sixty-nine species of saplings were added to the nursery and will be cared for until they reach more than 2 ft in height, to make it healthy and suitable to be introduced to the ground. Slowly but surely, the invasive species are being replaced with native vegetation.

Wild Cat update

WNPS partners LOLC to establish a multi-regional monitoring system for the conservation of the Sri Lankan leopard

The Sri Lankan leopard (Panthera pardus kotiya) is the largest of the four wild cat species found in Sri Lanka, and the apex mammalian predator on the island. The subspecies of this charismatic animal is endemic to Sri Lanka and widely distributed across the island's dry zones and low country wet zones with habitats ranging from the cloud forests of the highest elevations in the hill country. It is believed that there are less than 1000 leopards in the wild in the island. Further, the leopard is threatened globally by habitat loss and illegal wildlife trade. while in the human-dominated landuse areas in Sri Lanka, the impacts of habitat loss prevail critically. To initiate and sustain a science-based conservation strategy it is imperative to further understand the distribution and ecology of the Sri Lankan leopard, especially in under-studied areas nationwide.

To address this knowledge gap, the WNPS will partner with LOLC Holdings PLC, Sri Lanka's leading and largest diversified conglomerate, to establish a network of specialised leopard conservation locations and research centers across identified geographically important areas within Sri Lanka. These research centers will focus on understanding, at a regional level, the species function in populations or metapopulations that exist at much larger scales than individual management units. The WNPS hopes this initiative will create a common knowledge and data-sharing platform to drive a research-based island-wide leopard monitoring programme. Through the establishment of these research centers nationwide, smaller monitoring efforts will be easily integrated into larger programs and databases. It will give scientists and conservationists access to deeper and wider sets of data to understand local leopard populations, regionally and countrywide.

In the initial phase, six research stations will be set up in identified locations across Okanda or Panama, Morningside, Killinochchi, Belihulova, Maskeliya or Nallathaniya, Sigiriya or Ritigala. The project will monitor the presence of leopards in selected geographical areas, using camera traps and surveys. The research centers will liaise with local wildlife and forest officers, and also serve as educational hubs to generate awareness among the local communities, including knowledge dissemination and generating research-based human-leopard conflict mitigation measures. This will be timely and critical to address the increasing number of leopard deaths in Sri Lanka, predominantly through snares set up in a humandominated landscape.

The project will provide a critical context for the management and conservation of the Sri Lankan leopard, currently listed as Vulnerable on the IUCN Red List. Recent research has shown that leopard habitat suitability in Sri Lanka is heavily influenced by forest cover, patch size, connectivity, and the level of protection of the landscape, a critical requirement to conserve the island's biodiversity.

Leopard awareness programmes through Wild Cat

The leopard awareness and education program is organized by the Rainforest Alliance under the Unilever Fund and conducted by the WNPS.

About 300 people attended the first round of awareness programmes which were held on June 15th and 16th at the estates of Rogbill, Ingestree, Battalgala, Invery, Annfield, and Fordyce of Kelani Valley Plantations. The second set of programmes, conducted on 21st and 22nd of June, included about 200 participants from Alton, Fairlawn, Gouravila, Tilcourty, Eildonhold, Mahanelu and Stockholm estates under the Horana Plantations. The third set of programmes were conducted on 29th and 30th of June and included about 150 participants from Calsay, Clarendon and Dessford under Thalawakelle Plantations. In June 2022, a total of 16 estates were covered.

Helping hand with Hemas to protect endemics

Public awareness through sign boards

In collaboration with the Galle Conservation Society, we are planning to put up two sign boards to inform the public about our endemic species which live in this region or in a particular location

The first sign board on Poppy's Shrub Frog (*Pseudophilautus poppiae*), which is an endemic frog species under the family *Rhacophoridae*, will be placed in eastern Sinharaja. This species is threatened by habitat loss.

The second sign board on the Jonklaas's loach or the spotted loach (*Lepidocephalichthys jonklaasi*), which is an endemic freshwater species, will be placed in the Kottawa area. This species is restricted to the wet zone of the country.

Clean-up program in Kurukkulmadam Bird Sanctuary

We conducted a clean-up program in Kurukkulmadam Bird Sanctuary located in Manmunai region of the Batticaloa district. This bird sanctuary has a lot of bird life in and around the area and there are a few endemic bird species that used to live in the east coast, namely the Sri Lanka wood shrike (*Tephrodornis affinis*), which we focused on. Through this project, we wanted to enhance their nesting and breeding areas not only for this particular bird species but also other bird species.

We have collaborated with Manmunai South Eruvil Pattu Pradeshiya Sabha which has promised to take responsibility to manage the garbage collected at the end of the project.

Tree planting to preserve 'Rath/Ran Dothalu' – an endangered and endemic plant species in Sri Lanka

We will take steps to increase the population of 'Ran Dothalu' (*Loxococcus rupicola*) plant species which is an endangered plant species according to the last Red List data and is protected by the Flora and Fauna Protection Ordnance. We have already started plant nurseries in Sooriyakanda, Baduraliya, Manikyawatta and Kalugala areas and recently, started planting the saplings in the field.

Tree planting to enhance the habitat of the red slender loris, hump-nosed lizard and the cherry barb

These three projects are being planned in collaboration with 'Runakanda Rainforest Conservation Center'. The main objective is to enhance their habitat by building a continuous canopy for the red slender loris (*Loris tardigradus*), ensuring sufficient forest density for the hump-nosed lizard (*Lyriocephalus scutatus*) and providing a shady environment for the cherry barb (*Puntius titteya*). These days we are working on removing invasive plant species like bamboo, alastonia and katakalu bowitiya from the field and gathering saplings of endemic plant species like hora, thelen, kekuna, wal-del, atamba, hadawaka, bata-domba, alu-bo, walu-keena and dombakeena to plant in the field. We will also be planting 'diya-na' along the nearby water stream to provide a shady environment for freshwater species.

Canopy bridge over the Sigiriya-Inamaluwa main road to support one aspect of protecting the purple-faced leaf monkey

The aim of the project is to protect the purple-faced leaf monkey (*Semnopithecus vetulus*) from becoming roadkill. It was finalized with the help of the DWC in Sigiriya. The structure was established very close to the range office after considering their recommendations to find the most suitable location to set it up. Our Matale District Representative, Mr. Thusitha Weerasinghe organized this programme.



Community awareness pogram to protect the ivory ornamental tarantula

The awareness programme to protect the ivory ornamental tarantula (*Poecilotheria subfusca*) from people was conducted in Gannoruwa-Kandy. Not knowing that this harmless creature is not a danger to them, people react to its scary appearance and tend to harm or even kill them. Mr. Pradeep Samarawickrama, an environmentalist from the area, did a presentation about this spider species to the villagers. Our Kandy District Representative, Ms. Chathurika Senanayake organized this event.

Taking care of marine habitats



Regenerating mangroves

Work on the Accelerated Natural Mangrove Regeneration Project in Anawilundawa continues to progress under the guidance of Professor Sevvandi Jayakody, Head of the National Mangrove Expert Committee and member of the Mangrove Task Force Expert Committee. The project is funded by Hema's Manufacturing PLC, Lanka Environment Find (LEF) and Hayley's Advantis. A wellplanned hydrology network is a critical requirement to ensure the right quantity of water from the main water body, the Dutch Canal, on the western perimeter of the site, is fed to each plot. The amount of water is determined by the type of mangrove species in a particular block.

The Sri Lanka Navy's hydrology unit headed by Captain Bandera and his team spent over a month at the site, surveying and mapping the contours of plots and the depths of the waterways. This detailed contour map, which will be used as a guide for the planning of the hydrology of the project, was presented to the DWC and other main stakeholders- the WNPS, Ministry of Forests and the University of Wayamba- by the Sri Lanka Navy's Chief Hydrographer and Chief of Staff of the Sri Lanka Navy Rear Admiral Y. N. Jayarathna. We are grateful to the Sri Lanka Navy for coming forward to carry out this critical activity for the project. The scientific work at the site, which is headed by Thilina Kumarasiri of the WNPS and ably assisted by Piyal Bhuddika Upananda, Assistant Ranger DWC and Ashan Jayathilaka of the University of Wayamba, has shown excellent progress. A nursery for 5000 Rhizophora mucronata plants was successfully maintained and behavioral changes of the plants observed and recorded. An experiment was conducted to establish a proper germination process for the species Aegiceras corniculatum. This yielded successful results.



Mangrove regeneration in Anawilundawa. Pics by the hydrography unit of the Sri Lanka Navy

In another key development, new additions were made to the mangrove map. The species *Nipa fruticans* and *Scyphiphora hydroplyllacea* which were not recorded earlier, were added to the list of true mangrove species recorded at Anawilanduwa. Work has also begun on setting up the site research and development laboratory after completion of the design by the WNPS and Hayley's Advantis teams. Hayley's Advantis has provided the pre- fabricated structure to house the laboratory and the office on the site.

The WNPS is looking for sponsors and generous donors for the lab and office furniture. The Lanka Environmental Fund sponsored the purchase of critical equipment, two multi parameters and two soil thermometers which will be used to measure all critical soil and water quality parameters in the restoration area

Mt. Lavinia rocky shore

The study to document the recolonization of the rocky shore by biota following the burial of the rocks by sand during the Beach Nourishment Project of the Coast Conservation Department in 2020 continues under the able guidance of Dr. Malik Fernando. A team of undergraduate students mentored by Medisha Gunawardena, (senior lecturer at Horizon Campus) also participated in the very interesting work. The goals of this study are as follows:

- Document algae colonisation with respect to species and abundance with time and monsoon activity.
- Document mollusc recolonisation with respect to species and abundance with time and monsoon activity.
- Document re-colonisation by other biota (e. g. crabs, chitons, sea anemones, barnacles etc.) with respect to species and abundance with time and monsoon activity.

It is unfortunate that the current events have prevented the team from visiting the site as often as was planned.

Dr. Jagath Gunawardena commenced a study on the behavioral patterns of migratory birds in the rocky shore which also drew much interest from the students.

Responding to the X-Press Pearl disaster

Contributing to the task of assessing the damage to the marine ecosystem by the X- Press Pearl disaster, the WNPS Marine Committee successfully concluded a citizen science project to assess nurdle distribution washed ashore post-incident. It was done through a study to determine the impact of marine debris and plastic pollution which was conducted by Thilini Dilrukshi of the University of Wayamba in collaboration with the WNPS, under the guidance of Prof. Sevvandi Jayakody. We are happy to note that an abstract of the paper has been accepted at the 7th International Marine Debris Conference organized by an executive committee comprising the Ministry of Oceans and Fisheries of the Republic of Korea (MOF) and the United Nations Environment Programme (UNEP), with the organizational support of the Korea Marine Environment Management Corporation (KOEM), and the technical support of the U.S. National Oceanic and Atmospheric Administration (NOAA).

Human Elephant Conflict-Light Repel System update



The first quarter of 2022 has been a busy period for the Human Elephant Conflict (HEC) team working on the rollout of the Light Repel System (LRS). New sites were setup in Wilachchiya (2) and Thammannama as well as our first site in the eastern province at Chenkaladi. The data gathering portion of the study has now commenced at these new sites as well.

Data gathered so far continues to be positive with the number of breakins reducing significantly when the LRS is powered on and operating as it should. The figures have been compared with the results gathered from control sites in the area. Encouragingly, elephants have been seen at our locations through most of this period and have stayed outside the properties that are protected by the LRS.

Our challenge continues to be the very people whose properties and livelihoods we are trying to protect. Despite the LRS showing encouraging results, it is a challenge to get the farmers to be proactive in maintaining the system. We are trying to improve this by keeping them engaged via constant contact. Each site is visited at least once a month and the team is in contact with each site twice a week via telephone. The Galgamuwa site is still the best maintained and results we have seen are a testament to the maintenance work carried out by the farmer.

We are currently in the process of preparing to install the LRS at new sites in the Bibile area. The price of the individual components has increased due to the current exchange rates but we are trying to tweak the system to make it more efficient from a price and power consumption perspective.

We are also offering interested sponsors the opportunity to send their representatives to the field to work with the team and set up the LRS at a site. This will give us the opportunity to educate the team on the human elephant conflict and give them hands on experience in the fight to mitigate it. If this is something you will be interested in taking up, please contact us via admin@ wnpssl.org

THE ENVIRONMENTAL MESSENGER

The society, in partnership with the Morning newspaper, launched the weekly column titled "The Environmental Messenger" addressing multiple environmental issues with contributions from a pool of experts. Below are some of the recent articles:

- Crowding out the wildlife: controlling visitation in Yala
 Rohan Wijesinha https://bit. ly/3zS6doi
- A glaring loophole in the laws of conservation - Rohan Wijesinha https://bit.ly/3rvEVjF
- Ethical wildlife photography
 Vihangi de Mel https://bit. ly/3fTDAOj
- Beach cleaning: does it reduce ocean pollution? - Dr Malik Fernando https://bit.ly/3IUCgqV
- To keep the pink flush of Mannar Sanctuary alive - Professor Sampath Seneviratne https://bit. ly/3uE9qaA
- A plea for the conservation of unregulated spaces - Anura Gunasekera https://bit.ly/3p0iXF8
- The garbage dumps of Sri Lanka: the best places to see wild elephants? - Rohan Wijesinha https://bit.ly/3s7WIiw
- Yala was a scary place. It should have stayed that way - Surein de S. Wijeyeratne https://bit. ly/3K8Ffg9
- Conservation and science: why our youth should know the truth -Ashinsa de Silva Wijeyeratne
- Blah blah blah. Youth, the last hope for the planet? - Zaineb Akberally https://bit.ly/3Jgn8og
- Understanding leopards living in human dominated landscapes -Rukshan Jayewardene https://bit. ly/3tIQmXE
- Sri Lankan wildlife- a brand proposition? - Srilal Miththapala https://bit.ly/3uUnQlt
- Plantation monoculture and biodiversity history, impact, and consequences – Anura Gunasekera https://bit. ly/3NSFbDN


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Empowering Positive Biodiversity Action Through Awareness



This publication is presented to you with the intention of revealing greater insights to Sri Lanka's rich biodiversity. Our earnest wish is that you may gain an even greater appreciation of the value of our biological resources and understand the role you could play in conserving and protecting this rich biodiversity.

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