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ASSESS TO PLAN: CONSERVATION ACTION PLANNING FOR THE SNAKES AND LIZARDS OF SRI LANKA

Report from the IUCN Red List Assessment, Key
Biodiversity Areas and Assess to Plan workshop

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Wattegama, Sri Lanka



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Implementation of the actions recommended within this report are being managed by a working group, established by participants of the workshop. For further details, please contact Ansem de Silva kalds@sltnet.lk and Suranjan Karunarathna dmsameera@gmail.com, who are coordinating this working group.

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EXECUTIVE SUMMARY

In September 2019, the IUCN/CI Biodiversity Assessment Unit held a workshop to complete IUCN Red List assessments for 169 species of snakes and lizards of the 230 currently (September 2019) described reptile species known from Sri Lanka, as part of the Global Reptile Assessment. Additionally, a preliminary Key Biodiversity Area (KBA) assessment was conducted and the IUCN SSC Conservation Planning Specialist Group facilitated the Assess to Plan (A2P) process to identify the next steps towards conservation action for all species assessed as threatened.

Of the 169 species assessed during the workshop, 102 (60%) were categorised as threatened (Critically Endangered, Endangered or Vulnerable), with 100 (98%) of these being endemic to Sri Lanka. Additionally, 17 species (10%) were assessed as Data Deficient, all of which are Sri Lankan endemics.

The main overarching threats to Sri Lankan snakes and lizards identified during the workshop were habitat loss, fragmentation, alteration and degradation. The principal underlying causes included forest clearance for plantation agriculture, tourism and urban development. Collection of animals for the international pet trade and persecution of snakes were also recognised as significant threats to certain species. Additionally, road traffic mortality, pollution, invasive species and predation from an increasing number of domestic animals including cats and poultry were identified as contributing to the threatened status of species. Droughts attributed to climate change and forest die-back (the cause of which remains poorly understood but has been linked to lead pollution (Ranasinghe *et al.*, 2009), were also considered current or potential threats to reptile species that are found in affected forest habitats.

During the workshop, 114 species were preliminary identified as Key Biodiversity Area trigger species, 101 of which were assessed as threatened. Additionally, three Near Threatened and three Data Deficient species also qualified as KBA trigger species because of their restricted ranges (<10,000 km²). A total of 33 KBA sites were either adopted (from existing KBAs) or newly delineated for 102 of the trigger species. Adequate information was available for 96 of the threatened trigger species, which were included in one or more of the KBA sites.

The Assess to Plan (A2P) process carried out by participants during the workshop determined that site-based conservation action planning was considered necessary for all 102 threatened species. KBA sites identified during the workshop were used as the focal sites for multi-species conservation planning bundles and next steps were mapped out for 10 of the 33 KBA sites. Habitat-based conservation action planning was identified as a requirement for 41 species dependant on and/or restricted to a specific habitat type (the specific habitat type could occur at multiple sites). Key habitats for which conservation action planning was recommended included montane tropical / sub-tropical forest characterised by numerous mid height (up to 8m) canopy trees, lowland rainforest, dry evergreen forest, sand dunes and coastal scrubland and also specific areas that have quality, thick leaf litter and humus layer on which a number of threatened fossorial species depend. Threat-based conservation action planning was recommended for 26 species. Threat bundles included species impacted by collection for the international pet trade, persecution and predation. Intensive care conservation action planning was recommended as one of the planning priorities for two species, in conjunction with site and habitat planning. Details of the A2P conservation action planning sessions and next steps are presented in this report, along with multi-species conservation action planning summary tables.

1. INTRODUCTION

1.1 Reptile diversity of Sri Lanka

The island of Sri Lanka lies between 5° 55' and 9° 51' North latitude and 79° 41' and 81° 54' East longitude. It is a moderate-sized continental island (listed as the 25th largest island in the World), with an area of approximately 65,610 km² and a coastline of 1,620 km long (Calder, 2009).

Sri Lanka is ranked as one of the World's herpetological hotspots, with 233 reptile species currently recorded (62.6 % endemic). However, recent studies indicate that the diversity is vastly underestimated and that several new species of geckoes, skinks and snakes are remaining to be formally described. Thus, this diversity is exceptional for an island of its size.

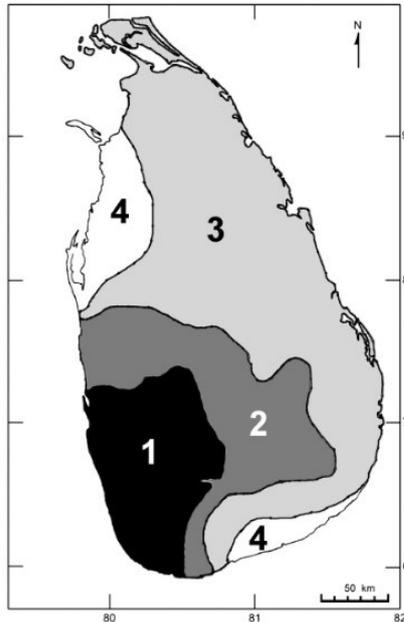
Sri Lanka's reptile diversity includes nine chelonian species in six families (five marine turtles, three freshwater terrapins and one land tortoise). Of these, one species (red ear slider, *Trachemys scripta*) has been introduced through the pet trade. Two species of crocodiles are also present in the country, of which the highest wild mugger (*Crocodylus palustris*) population in the world is found in Sri Lanka. One hundred and seventeen lizard species in 10 families (Agamidae, Chameleonidae, Gekkonidae, Lacertidae, Lygosomidae, Mabuyidae, Ristellidae, Scincidae, Sphenomorphidae and Varanidae) are found in the country. Of these, 94 species are endemic to Sri Lanka. Of the 21 agamid species, 19 are endemic to the island, genera *Ceratophora*, *Cophotis* and *Lyriocephalus* are endemic to Sri Lanka and represent some of the most spectacular agamids in the world. Of the 58 gecko species, the genus *Cnemaspis* has increased from earlier known diversity of four to 36 species, all of which are endemic to the country. Thirty-three species of skinks in seven genera are known from Sri Lanka. They are classified in the families Lygosomidae, Mabuyidae, Ristellidae, Scincidae and Sphenomorphidae. Twenty-six species are restricted to the island, and the genera *Chalcidoseps*, *Lankascincus* and *Nessia* are endemic to Sri Lanka. Finally, Sri Lanka is home to 105 snake species in 11 families: Acrochordidae, Boidae, Colubridae, Cyllindrophiiidae, Elapidae, Gerrhopilidae, Homalopsidae, Pythonidae, Typhlopidae, Uropeltidae and Viperidae. Fifty-one species are endemic to the country, including the genus, *Aspidura*.

1.2 The climatic, altitudinal and ecological zones of Sri Lanka

Geological evidence suggests that Sri Lanka has been in existence for nearly three billion years and remained part of the Gondwana super-continent (Katupotha, 2013). The physiography of Sri Lanka consists of a central mass known as the Central Highlands. Three distinct peneplains, or erosion levels, are recognized according to elevation and slope features. The lowest, or first, peneplain (sea level to 270 m) is the largest and extends inland from the coast. The second peneplain, or the uplands, extends from 270 m to about 910 m, and occupies nearly three-tenths of the island. The highlands, or third peneplain, lie at elevations of 910–2,524 m.

Climatologically, Sri Lanka is a warm, tropical, humid country, which is under the influence of monsoon winds that blow during two distinct periods of the year and seasonally producing large quantities of rain. The south-western region of the island mainly receives rain from the south-western monsoon in June–September. From November–February, the whole island receives rain from the north-eastern monsoon. Most activities of reptiles in these areas are synchronized with rainfall, especially reproduction, when there is abundant food supply for the young.

Figure 1. Distribution of the four major ecological zones of Sri Lanka



- 1 = Wet zone
- 2 = Intermediate zone
- 3 = Dry zone
- 4 = Semi-arid zone

There are four major ecological zones based on rainfall in Sri Lanka: 1) wet zone, 2) intermediate zone, 3) dry zone and 4) the semi-arid zone (Figure 1). The semi-arid zone receives an annual rainfall of less than 1,250 mm per year, while the dry zone receives an annual rainfall of 1,250–1,900 mm. Together, the semi-arid and dry zones occupy nearly 60% of the island. About 19% of the island is covered by the wet zone, and it receives an annual rainfall of 2,500–5,000 mm per year. The humidity in the wet zone ranges between 75 and 85%. Sri Lanka’s wet zone has a higher proportion of endemic reptiles than the other climatic zones of the island. The intermediate zone consists of intermediate climatic conditions between the dry and wet zones and covers approximately 22% of the island. The average annual precipitation of the intermediate zone ranges between 1,900 and 2,500 mm.

The vegetation and natural ecosystems of the island are influenced by its geography and climate. The natural ecosystems include forests, grassland, coral reefs, sand dunes, wetlands and mangroves. As a result of the distinct conditions in different ecological zones, different forest types are seen in each of the zones. For example, the lowland wet zone harbours lowland rainforests, while the highland wet zone comprises sub-montane and montane forests. The vast lowland dry zone is home to dry mixed evergreen forests, while the lowland intermediate zone

has moist semi-evergreen forests and the semi-arid zone has thorn forests or scrubland. Much of the natural forests of Sri Lanka have been lost during the last 150 years due to human activities such as agriculture, urbanization, building dams and highway construction. This has resulted in the loss of natural habitat for many forest-dwelling species, making them more vulnerable to predators, though several reptiles have managed to carve out niches in some of these altered habitats.

1.3 Scope of the workshop

In September 2019, the IUCN-Conservation International Biodiversity Assessment Unit (IUCN-CI BAU) held an IUCN Red List Assessment, Key Biodiversity Areas (KBA) and Assess to Plan (A2P) workshop for Sri Lankan reptiles. The workshop was carried out as part of the Global Reptile Assessment (GRA), which is being led by the IUCN-CI BAU. Of the approximate 230 reptile species found in Sri Lanka, 169 (73%) species (described by September 2019) were assessed using the IUCN Red List Categories and Criteria, and subsequently considered for the Key Biodiversity Area, and Assess to Plan processes during the workshop. The focus of the workshop was for terrestrial snakes and lizard species endemic to Sri Lanka. It excluded all species of Chelonia, Crocodylia, 15 sea snakes, plus *Chamaeleo zeylanicus*, native to Sri Lanka and southern India. IUCN Red List assessments for these species are either being carried out or have already been assessed and published by their respective IUCN SSC taxonomic Specialist Groups. Additionally, freshwater snakes belonging to the family Homalopsidae were also not assessed during the workshop, as they were included within the sea snake assessment. Finally, 27 of the remaining species have a much wider distribution outside of Sri Lanka. Assessments for these

groups of species are being completed at one or more alternative GRA workshops, in range countries that include more significant proportions of their global populations. The 169 species assessed comprised 97 lizard species and 72 species of snakes. A list of the 169 species assessed during the workshop is presented in Appendix I.

2. WORKSHOP PROCESS

The workshop took place over a total of six days, involving 26 participants, four Red List and KBA facilitators and two Assess to Plan facilitators. A full list of workshop participants is provided in Appendix II.

2.1 IUCN Red List assessments

The first four days of the workshop were dedicated to assessing species for the IUCN Red List of Threatened Species™ (IUCN Red List).

The IUCN Red List is a critical indicator of the health of the world's biodiversity. It is widely recognised as the most comprehensive, scientifically based source of information on the global status of plant and animal species. IUCN Red List Categories and Criteria are applied to individual species assessments (which detail information about species' range, population size and trend, habitats and ecology, use and/or trade, threats, and conservation actions – in place and needed), to determine their relative risk of extinction. Threatened species are listed as Critically Endangered (CR), Endangered (EN) or Vulnerable (VU). Classification of species into the threatened categories applies a set of five quantitative criteria based on biological factors related to extinction risk, including rate of population decline, population size, area of geographic distribution and degree of population and distribution fragmentation.

Taxa that are either close to meeting the threatened thresholds or would be threatened were it not for ongoing conservation programmes are classified as Near Threatened (NT). Taxa evaluated as having a low risk of extinction are classified as Least Concern (LC). Also highlighted within the IUCN Red List are taxa that cannot be evaluated due to inadequate information to make a direct or indirect assessment of risk of extinction based on distribution and/or population status and are therefore assessed as Data Deficient (DD). This category does not necessarily mean that a species is *not* threatened, only that the risk of extinction cannot be assessed with the information available (IUCN 2012).

During the workshop, the 169 reptile species to be assessed were arranged into taxonomic-based working sets (Table 1). Workshop participants divided into four working groups (each group with an IUCN Red List facilitator) based on their expertise, to complete draft global Red List assessments for every species. Experts contributed their data, information and knowledge on individual species and the Red List facilitator compiled the draft assessment documentation. All experts in a working group worked together and debated the information compiled on each species. They then reviewed the assessment documentation against the IUCN Red List Categories and Criteria and agreed the most appropriate category to apply, by group consensus. Experts were able to move between working groups if required for species being assessed in another group, for which they had specific expertise to contribute to the assessment. Post workshop, all draft assessments were reviewed by the IUCN-CI Biodiversity Assessment Unit team, with final pre-submission review carried out by the Red List

Authority Coordinator for snakes and lizards. Any outstanding queries were followed up with experts for resolution, prior to submission for publication on the IUCN Red List.

Table 1. Taxonomic working sets for Red Listing the snakes and lizards of Sri Lanka

Working set	Number of species
1. Agamidae	20
2. Colubridae	23
3. Gekkonidae	47
4. Natricidae	13
5. Scincidae	28
6. Tylophidae, Gerrhopilidae & Uropeltidae	24
7. Other groups (Boidae, Cyllindrophiidae, Elapidae, Lacertidae and Viperidae)	14
Total number of species	169

2.2 Key Biodiversity Area (KBA) assessments

Over the last two days of the workshop, and after the provisional IUCN Red List assessment was completed, a preliminary identification of KBAs was conducted following the Guidelines for using the Global Standard for the Identification of Key Biodiversity Areas v 1.0 (KBA Standard and Appeals Committee 2019). All potential KBA trigger species (i.e. those meeting the KBA standards for threatened species (A1) and geographically restricted species (B1-2) (IUCN 2016), were identified during the Red List assessment process. The spatial distribution of trigger species was then overlaid with the layers of existing KBAs and existing Protected Areas (PAs) to see if they fall wholly within or overlap with their boundaries. Whenever trigger species fell wholly within or overlapped with existing KBAs, they were included within these KBAs, provided they met the corresponding KBA criteria, sub-criteria and thresholds. If trigger species fell wholly within or overlapped existing PAs that were not already identified as KBAs, the boundaries of these PAs were designated as new KBAs, provided the trigger species met the corresponding KBA criteria, sub-criteria and thresholds. Finally, if the trigger species distribution did not overlap with any existing KBA or PA, a new KBA site was delineated. In all cases, the experts attending the workshop were consulted to ascertain the presence of the trigger species within a site, provide information and data to support the compliance with the KBA criteria and meeting the relevant thresholds, and help with the delineation of practical KBA boundaries. During this process, all KBA sites were evaluated for their ecological significance and manageability, according to the Guidelines (for detailed information about the process, see KBA Standard and Appeals Committee 2019).

2.3 Assess to Plan (A2P) process

IUCN's Species Survival Commission adopted an 'Assess-Plan-Act cycle' and a goal that "every species that needs conservation attention is covered by an effective plan of action". However, with more than a quarter of all species on the IUCN Red List being assessed as threatened with extinction, there are too many species to address with single-species conservation planning.

As the planning arm of the IUCN SSC, the Conservation Planning Specialist Group (CPSG) is committed to enabling the rapid progression of threatened species from assessing, through conservation planning, and into effective action.

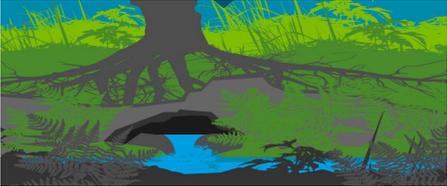
The Assess to Plan (A2P) process has been formulated as an intermediate step to link single-species status assessment through to stakeholder-inclusive multi-species conservation action planning. A2P is

designed to be integrated into an IUCN Red List workshop, where optimal use of the data collected during the assessment process can be made, and species can be propelled into action, through planning. The A2P process groups taxa that house species expected to respond positively to the same set of conservation actions *and* whose conservation can be addressed by the same constituency of conservation actors or agencies and then connecting those multi-species bundles to those willing and able to act.

The A2P process began during the four days of Red Listing, where workshop participants assigned all species assessed as threatened to one (or more) of five A2P “buckets” (site, habitat, threat, single species and intensive care), depending on their most critical conservation action planning needs.

The five A2P conservation planning buckets for threatened species and a summary description for each are presented in Table 2.

Table 2. Summary of the five A2P conservation planning buckets for threatened species.

A2P conservation planning bucket	Description
<p>Site directed action planning</p> 	<ul style="list-style-type: none"> species inhabiting a defined area and subject to multiple localised threats linked to that area (e.g. species affected by disturbance, pollution and other impacts from specific development projects at a particular site).
<p>Habitat directed action planning</p> 	<ul style="list-style-type: none"> species dependent on the same, specific habitat type which is subject to a common threat or set of threats (the specific habitat type could occur at multiple sites).
<p>Threat directed action planning</p> 	<ul style="list-style-type: none"> groups of species targeted by a common threat that is not anchored to a site or sites, but which travels with the species (e.g. species targeted for traditional medicine or illegal international trade, species affected by a disease pandemic).
<p>Single species recovery action planning</p> 	<ul style="list-style-type: none"> outlier species whose conservation needs do not overlap significantly with those of other species and need a unique combination of actions, across the multiple A2P buckets for their effective conservation.

A2P conservation planning bucket	Description
<p>Intensive care action planning</p> 	<ul style="list-style-type: none"> species for which <i>in situ</i> conservation alone is considered unlikely to prevent extinction within the time available and planning for potential intensive species management of some form may also be required (could include actions such as small population management and translocation feasibility, gene banking, intensive management in the wild, <i>ex situ</i> management feasibility assessment etc).

Additionally, during the Red List assessment workshop participants also assigned species assessed as Data Deficient (DD) to “DD A2P buckets”. The aim of this was to identify the core reasons we don’t currently have enough information to assess these species beyond Data Deficient and group them according to these reasons, to inform co-ordinating and prioritising subsequent next steps to fill knowledge gaps and move these species out of the Data Deficient category. The seven Data Deficient A2P buckets are summarised in Table 3.

Table 3. Summary of the seven A2P conservation planning buckets for Data Deficient species. Buckets ‘1’ and ‘2’ have sub-categories within their overarching explanation for a DD Red List category.

Data Deficient A2P buckets	
1. Hard to survey for	a. Difficult habitats to access, e.g. arboreal / fossorial b. Remote location – logistically difficult to get to
2. Very recently described	a. Only very recently discovered b. Newly described from old specimens c. Taxonomic re-classification
3. Hard to identify	
4. Known only from historic specimen(s)	
5. Area hasn’t been re-surveyed / needs targeted surveys	
6. Area(s) surveyed extensively, but species not found	
7. Poor museum curation (specimens in bad condition)	

Once the Red List assessment component of the workshop had been completed and all threatened and DD species had been provisionally allocated to A2P buckets, “*species bundles*” were then identified within the buckets.

Species bundles group species that share conservation actions needed that can be addressed by the same conservation agencies. For example, 25 species could be allocated to the A2P ‘site’ bucket. Within that, 17 of the 25 species occur at ‘Site A’ and eight occur at ‘Site B’. Conservation planning for multi-species can be co-ordinated at this site level, however conservation planning actions and relevant stakeholders are likely to differ *between* sites A and B. Hence in this example, there are two species bundles within the A2P ‘site’ bucket. Similarly, 12 species could be allocated to the A2P ‘threat’ bucket. Five of these species could require conservation planning around international trade as the major threat, whereas seven of these species could require conservation planning around a specific

disease as the major threat. Therefore, there are also two species bundles within this A2P ‘threat’ bucket (Figure 2).

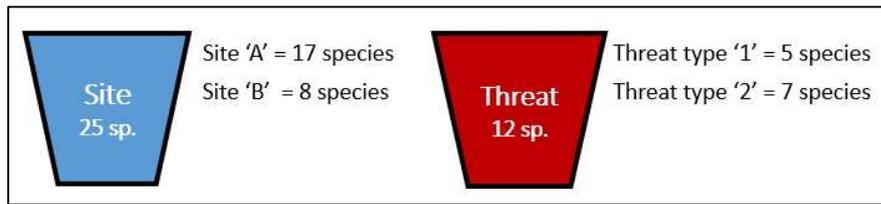


Figure 2. Example of species bundles housed within A2P threatened species buckets. Species bundles house species expected to respond positively to the same set of conservation actions *and* whose conservation can be addressed by the same constituency of conservation actors or agencies.

A2P conservation planning sessions were held for each of the threatened species bundles identified during the workshop. Discussions were held with species experts to identify the required planning conservation actions and the potential key collaborators and stakeholders involved in taking the next steps for each bundle. The A2P process is significantly more subjective than the Red List process, which is objective and governed by universal standards. Through attaching A2P to the Red List assessment process, A2P can utilise the best, science-based information available on the status of species (collated through the completion of Red List assessments) to then, with the species assessors, move in to more creative discussion, focusing on people (i.e. the potential stakeholders and collaborators for moving the identified conservation planning needs and actions forward), and what is realistically possible given the political, economic and social contexts of each situation.

The aim of A2P discussions was that, by the end of the workshop, all species considered during the A2P process would be assigned to at least one multi-species bundle, with each bundle having recommended conservation planning actions and a workshop participant who would lead on taking these actions forward, post workshop.

3. WORKSHOP RESULTS

3.1. IUCN Red List assessment provisional results

The Red List workshop resulted in 102 of the 169 species assessed being provisionally categorised as threatened (CR, EN VU). These comprised 67 out of 97 (69%) lizard species and 36 out of 72 (50%) snake species. Seventeen species (7 lizards and 10 snake species) were assessed as Data Deficient. Provisional Red List categories assigned to species during the workshop are provided in the table in Appendix I. It should be noted that all assessments are subject to review post-workshop and the IUCN Red List website should always be consulted for the final species assessment category and documentation, once assessments have been accepted and published.

3.2 Summary of major threats to Sri Lankan reptiles

During the assessment process, experts identified the main overarching threats to Sri Lanka’s lizards and snakes to be habitat loss, fragmentation, alteration and degradation attributed to multiple human activities. Major drivers include forest clearance for agriculture (particularly tea, coffee and rubber plantations), tourism development and expansion of facilities (particularly related to pilgrimages), encroachment of settlements, dam construction, granite mining gem mining and logging (with these extraction activities often being illegal). Processes associated to these drivers create another tier of threats to species, including the impact of agrochemicals, increased amounts of domestic waste and

pollution, expanding distribution of invasive / predatory species, road construction (and an increase in road traffic mortality), soil erosion and landslides.

Forest dieback was identified as a potential threat to some forest species. This has been ongoing since at least the 1990s, although forests dying are known as far back as the 1940's (de Rasayro, 1946), particularly in the Horton Plains National Park (Perera, 1978). The causes of forest dieback currently remain poorly understood (Ranasinghe *et al.*, 2009). There are no signs of natural forest recovery in affected areas, where invasive shrubs such as *Eupatorium riparium*, *Eupatorium inulifolium* and *Cestrum aurantiacum*) now often replace natural vegetation. In many parts of Horton Plains National Park, a bamboo (*Sinarundinaria*) species and a cuscuta species have been observed (during long-term research investigations) to be spreading in the understory as well as in open gaps in the forest and in some places, is thick and impenetrable. Climate change was also identified as a significant actual or potential threat to high elevation species, through the increased intensity and duration of drought. Other threats included collection of species for the international pet trade and persecution, particularly of snakes.

Species were most often assessed as threatened due to the cumulative effect of numerous factors impacting their populations and/or fragmenting or reducing their distributional range.

3.3 Key Biodiversity Areas

During the workshop, 114 species were preliminary identified as Key Biodiversity Area (KBA) trigger species. Of these, 101 species had been assessed as threatened during the Red List assessment process and 13 were range-restricted species (geographic ranges $\leq 10,000$ km²). Thirty-three KBAs were identified, (21 of which were newly delineated and 12 were existing KBAs) for the proposed addition of 102 of the 114 trigger species, including 96 of the 101 threatened species (for which adequate information was available, as required by the KBA process), plus three Near Threatened and three Data Deficient species. The table in Appendix III provides information on the 33 KBA sites identified during the workshop and the reptile species occurring within each of them.

Fifty-six of the 96 threatened species occur within just one of the 33 KBA sites. Nineteen species occur within 2 KBA sites; 12 species occur within three sites, two species occur within four sites; two species occur within five sites; three species occur at six sites; one species occurs at eight sites and one species occurs within 11 out of the 33 KBA sites identified.

3.4 Assessing to Plan

3.4.1 Allocation of threatened species to A2P conservation planning buckets

During the Red List assessment process, experts allocated all species provisionally assessed as threatened (Critically Endangered, Endangered or Vulnerable) to one or more of the five A2P conservation planning buckets (refer to Table 2, section 2.3 above, for the five A2P bucket definitions), according to the conservation planning direction(s) considered most needed for each of these species.

Table 4 below provides a summary of the number of species allocated to each of the five A2P conservation planning buckets for threatened species and the table in Appendix IV provides full details on which of the five A2P buckets each of the 102 threatened species were allocated to.

Table 4. Number of threatened species allocated to each of the A2P conservation planning buckets (n=102).

No. of species	Site-based conservation planning	Habitat-based conservation planning	Specific threat-based conservation planning	Intensive care conservation planning	Single species recovery planning
	102 species	41 species	26 species	2 species	0 species

Site-based conservation planning was recommended for all 102 species provisionally assessed as threatened. Additionally, habitat-based conservation planning was recommended for 41 species; conservation planning around specific threats was recommended for 26 species; and two species were identified as needing conservation planning to investigate the feasibility for intensive care. No species were identified as needing single species recovery planning.

Eight of the 102 threatened species were allocated to three A2P conservation planning buckets. Of these, seven species were identified as needing site, habitat and specific threat-based conservation planning and one species was identified as needing planning for potential intensive care, alongside site and habitat-based conservation planning. Fifty-three of the 102 threatened species were allocated to two of the five A2P conservation planning buckets. Of these, 33 species were identified as needing site and habitat-based conservation planning; site and specific-threat based planning was recommended for 19 species and one species was identified as needing planning for potential intensive care, alongside site-based conservation planning. Forty-one of the 102 threatened species were allocated to just one of the five A2P conservation planning buckets; all of which were identified as needing site-based conservation planning.

3.4.2 Allocation of Data Deficient species to A2P conservation planning buckets

Of the 169 species assessed, a total of 17 species across five families were categorised as Data Deficient (Appendix I). During the Red List assessment process, experts allocated all species provisionally assessed as Data Deficient to one or more of the A2P conservation planning buckets (refer to Table 3, section 2.3 above, for the A2P bucket definitions for Data Deficient species), according to the underlying reasons that describe why we are unable to gather adequate information on species to assess their conservation status.

Table 5 below shows how the 17 Data Deficient species were allocated to the A2P buckets and provides a summary explanation. Three of the 17 species were allocated to two A2P DD buckets (highlighted in the table with 'i.' and 'ii.' adjacent to the species name).

Due to time limitations during the workshop, no further A2P conservation planning actions were carried out for Data Deficient species. However, the categorisation of species into the A2P DD buckets may be useful in planning and/or prioritising future work and/or research on these species.

Table 5. Allocation of Data Deficient species to each of the A2P DD conservation planning buckets (n=17).

Data Deficient A2P buckets		Family	Species name	Notes
Hard to survey for	Difficult habitats to access, e.g. arboreal / fossorial	-	-	-
	Remote location – difficult to get to	-	-	-
Very recently described	Only recently discovered	GEKKONIDAE	<i>i. Cnemaspis kandambyi</i>	This species has not been recorded since its original description in 2017, although targeted surveys have been conducted
	Newly described from old specimens	-	-	-
	Taxonomic re-classification	-	-	-
Hard to identify	UROPELTIDAE	<i>i. Rhinophis melanogaster</i>		
		<i>Rhinophis oxyrhynchus</i>		
	SCINCIDAE	<i>Eutropis floweri</i>	Difficult to distinguish morphologically no genetic work done	
		<i>Eutropis austini</i>	Difficult to distinguish morphologically, no genetic work done	
		<i>Eutropis greeri</i>	Difficult to distinguish morphologically, no genetic work done	
Known only from historic specimen(s)	UROPELTIDAE	<i>Rhinophis punctatus</i>	Known only from the description. Type lost. Type locality incorrect.	
		<i>Rhinophis zigzag</i>	Known only from single type specimen (2011). No locality data.	
	SCINCIDAE	<i>Lygosoma singha</i>	Known only from the type described in 1950s. Found in the north area, which has opened in the last 10yrs, following the conflict, but this species hasn't been seen.	
		<i>Nessia deraniyagalai</i>	Known only from type specimen (1950). Not	

Data Deficient A2P buckets	Family	Species name	Notes
			located in subsequent searches, species could be invalid.
	COLUBRIDAE	<i>Dendrelaphis oliveri</i>	Recorded in 1950. May not even be from Sri Lanka
		<i>Lycodon gracilis</i>	The only confirmed record from Sri Lanka is a specimen collected in 1888 in Haly, Jaffna.
	GEKKONIDAE	<i>i. Cnemaspis amith</i>	Described in 2007 from museum specimens collected prior to 1852.
Area hasn't been re-surveyed / needs more extensive surveying	UROPELTIDAE	<i>Rhinophis lineatus</i>	
		<i>ii. Rhinophis melanogaster</i>	
Surveyed extensively, but not found	TYPHLOPIDAE	<i>Indotyphlops tenebrarum</i>	
		<i>Indotyphlops veddae</i>	
		<i>Indotyphlops violaceus</i>	
	GEKKONIDAE	<i>ii. Cnemaspis amith</i>	Type locality unknown (description provided: 'Ceylon'). Extensive surveys have been carried out across Sri Lanka for <i>Cnemaspis</i> species, but this species has not been found.
		<i>ii. Cnemaspis kandambyi</i>	This species has not been recorded since its original description in 2017, although targeted surveys have been conducted
Poor museum curation (bad specimens)	-	-	-

3.4.3 Identifying multi-species bundles within the A2P threatened species buckets.

The table in Appendix V provides summary details of the A2P conservation planning buckets and multi-species bundles for all 102 threatened species of Sri Lankan snakes and lizards.

SITE-BASED CONSERVATION PLANNING

Site-based conservation planning was recommended for all 102 species provisionally assessed as threatened (Appendix IV). Ninety-six of the 102 threatened species were included within one or more of the 33 Key Biodiversity Areas identified during the KBA process (Appendix III). These KBA sites were used as the focus for creating multi-species bundles, within the 'Site bucket'. During the workshop, conservation planning and 'next steps for action' were discussed in A2P sessions for 10 of these 33 KBA sites, covering a total of 68 of the 102 threatened species (Appendix V). Multi-species bundle sizes across these 10 KBAs ranged from 3-24 species. Detailed outcomes of the multi-species conservation planning for these 10 KBA sites are presented in Section 4 of this report.

Fifty-eight of the 102 threatened species occurred within the 23 KBA sites, for which A2P conservation planning discussions were not held. Multi-species bundle sizes across these 23 sites range from 1-13 species (Appendix III and Appendix V). Of these 58 species, 30 species also occurred in one of the 10 KBA sites for which A2P sessions were held to identify the next conservation planning actions for these sites. Twenty-eight species only occurred in one or more of the 23 non-A2P KBA sites. Six of the 28 species in non-A2P KBA sites were not in any other A2P conservation planning buckets. These species are *Cnemaspis hitihamii*, *Cnemaspis rajakarunai*, *Cnemaspis kumarasinghei*, *Cyrtodactylus ramboda*, *Nessia didactyla* and *Nessia monodactyla*. Additionally, a further six threatened species were allocated to the A2P Site-based planning bucket but were not trigger species for any of the KBAs. These species are *Hemidactylus scabriceps*, *Sitana devakai*, *Cnemaspis latha*, *Cnemaspis menikay*, *Cyrtodactylus yakhuna* and *Dasia haliana*. Three of these species (*Sitana devakai*, *Cyrtodactylus yakhuna* and *Dasia haliana*) were also allocated to other A2P conservation planning buckets (Appendix V).

HABITAT-BASED CONSERVATION PLANNING

Habitat-based conservation planning was recommended for 41 of the species provisionally assessed as threatened (Appendix IV and V). These 41 species are all dependent on specific habitat types, or requirements and either do not survive in, or are not known from, other habitat types. Nine specific habitat types were identified across the 41 species requiring specific habitat-based conservation planning. Table 6 below provides information on these nine multi-species habitat bundles and the numbers and names of species allocated to them. Due to time restraints during the workshop, A2P sessions were not held for these multi-species habitat bundles. However, site-based conservation planning was also recommended for these 41 species, therefore it is recommended that their specific habitat requirements are considered during site-based conservation planning for the relevant KBA sites in which these species occur (Appendix V).

Table 6. Habitat based multi-species planning bundles.

Habitat type	No. of species	Species names	Rationale
Sub-tropical / tropical moist montane forest	2	<i>Ceratophora erdeleni</i> , <i>Ceratophora karu</i>	These species seem to be tropical moist montane forest obligates and are not, or rarely found outside of this forest type.
Semi-fossorial species in sub-tropical / tropical moist montane forest	4	<i>Aspidura deraniyagalae</i> , <i>Aspidura ravanai</i> , <i>Aspidura desilvai</i> , <i>Calliophis haematoetron</i>	Semi-fossorial species that require deep humus layer /dense leaf litter within moist, montane forests. These species are not found outside of this habitat type, where the specific combination of soil microhabitat conditions that are critical to the survival of these species.
Sub-tropical / tropical moist lowland forest	6	<i>Ceratophora aspera</i> , <i>Dendrelaphis sinharajensis</i> , <i>Lycodon carinatus</i> , <i>Oligodon calamarius</i> , <i>Hemidactylus pieresii</i> , <i>Lankascincus greeri</i>	These species seem to be tropical moist lowland forest obligates and are not, or rarely found outside of this forest type.
Fossorial species in sub-tropical / tropical moist lowland forest	2	<i>Indotyphlops leucomelas</i> , <i>Rhinophis tricoloratus</i>	Fossorial lowland forest obligate species. These species are not found outside of this habitat type, where the specific combination of soil microhabitat conditions that are critical to the survival of these species.
Coastal habitats	2	<i>Sitana devakaj</i> , <i>Sitana bahiri</i>	These species specifically require coastal habitats such as dry coastal shrublands and sand dunes. They do not occur in heavily modified habitats, where sandy substrates and vegetation do not remain, and they will not persist in developed areas.
Fossorial species - dry forest habitat	3	<i>Nessia hickanala</i> <i>Rhinophis porrectus</i> <i>Rhinophis dorsimaculatus</i>	Sandy soils of sub-tropical / tropical dry forests, at depths of 10-30cm. Sub-tropical / tropical dry forests with sandy substrates / sand dunes Lowland dry areas, particularly dry zone evergreen forest

Habitat type	No. of species	Species names	Rationale
Large mature trees	6	<i>Cophotis dumbara</i> , <i>Cnemaspis phillipsi</i> , <i>Cnemaspis scalpensis</i> , <i>Cnemaspis molligodai</i> , <i>Cnemaspis podihuna</i> , <i>Dasia haliana</i>	These arboreal species are only associated with mature forest habitats, with large trees and associated high canopy cover.
Granite caves / rocky outcrops	15	<i>Cnemaspis butewai</i> , <i>Cnemaspis gotaimbarai</i> , <i>Cnemaspis ingerorum</i> , <i>Cnemaspis kohukumburai</i> , <i>Cnemaspis kivulegedarai</i> , <i>Cnemaspis nandimithrai</i> , <i>Cnemaspis nilgala</i> , <i>Cnemaspis rammalensis</i> , <i>Cnemaspis samanalensis</i> , <i>Cnemaspis tropidogaster</i> , <i>Cnemaspis alwisi</i> , <i>Cnemaspis punctata</i> , <i>Hemidactylus hunae</i> , <i>Calodactylodes illingworthorum</i> , <i>Cnemaspis upendrai</i>	Usually undisturbed areas in specific forest habitats (e.g. tropical lowland rainforest, wet evergreen tropical forest and moist dry semi-evergreen forest). The rock cave / rock conditions and their specific microhabitats are important to these species. Cool, shady, moist and often mossy conditions are required.
Streams and wetlands	1	<i>Rhabdophis ceylonensis</i>	Typically associated with streams in rainforests within the wet zone of Sri Lanka

THREAT-BASED CONSERVATION PLANNING

Threat-based conservation planning with regards to a specific threat was recommended for a total of 26 species provisionally assessed as threatened (Appendix IV and V). Multi-species bundles were created, based on five specific threats identified during the Red List assessment process. Table 7 below provides information on these five multi-species threat bundles and the numbers and names of species allocated to each of them.

During the workshop, conservation planning and ‘next steps for action’ were discussed in A2P sessions for two of these multi-species bundles: ‘snake persecution’ and ‘pet trade’. Detailed outcomes of the multi-species conservation planning around these two threats are presented in Section 5. Due to time restraints during the workshop, A2P sessions were not held for remaining multi-species bundles on predation or lizard persecution. It is recommended that these specific threats to species are considered during the site-based conservation planning, for the KBA sites applicable to these species.

Table 7. Threat based multi-species planning bundles.

Threat type	No. of species	Species names
Pet trade	11	<i>Ceratophora aspera</i> , <i>Ceratophora karu</i> , <i>Ceratophora stoddartii</i> , <i>Cophotis dumbara</i> , <i>Cnemaspis rammalensis</i> , <i>Calotes liocephalus</i> , <i>Calotes pethiyagodai</i> , <i>Ceratophora tennentii</i> , <i>Cophotis ceylanica</i> , <i>Lyriocephalus scutatus</i> , <i>Cyrtodactylus yakhuna</i>

Threat type		No. of species	Species names
Snake persecution		6	<i>Hypnale nepa</i> , <i>Boiga barnesii</i> , <i>Dendrelaphis caudolineolatus</i> , <i>Dendrelaphis schokari</i> , <i>Oligodon sublineatus</i> , <i>Cylindrophis maculatus</i>
Predation	by domestic / feral cats and dogs	5	<i>Cnemaspis scalpensis</i> , <i>Ceratophora stoddartii</i> , <i>Lyriocephalus scutatus</i> , <i>Cyrtodactylus soba</i> , <i>Dasia haliana</i>
	by native species - jungle crow	4	<i>Cnemaspis scalpensis</i> , <i>Calotes nigrilabris</i> , <i>Ceratophora stoddartii</i> , <i>Cophotis ceylanica</i>
	by poultry	4	<i>Gerrhopilus mirus</i> , <i>Cyrtodactylus fraenatus</i> , <i>Gerrhopilus ceylonicus</i> , <i>Rhinophis homolepis</i>
Lizard Persecution		2	<i>Lyriocephalus scutatus</i> , <i>Calodactylodes illingworthorum</i>

INTENSIVE CARE CONSERVATION PLANNING

Two species (*Aspidura ravanai* and *Nessia layardi*) were allocated to the intensive care A2P conservation planning bucket, as it was recommended that the feasibility of an *ex-situ* management component should be considered as part of the effective conservation of these species. Detailed outcomes of the multi-species conservation planning around intensive care conservation planning for these two species are presented in Section 6.

Site-based and habitat-based conservation planning was also recommended for *Aspidura ravanai*. This species is one of the 23 species that occurs in the Peak Wilderness Sanctuary Complex, which was one of the 10 KBA sites discussed during A2P conservation planning sessions (presented in section 4 of this report, below). *Aspidura ravanai* is a semi-fossorial species (which can be found up to 30cm below ground level). It appears to be a forest obligate species associated with montane cloud forests. Habitat requirements specifically for this species should be taken into consideration during conservation planning activities for the Peak Wilderness Sanctuary complex.

Site-based conservation planning was also recommended for *Nessia layardi*. This species was one of two trigger species for the newly delineated KBA site 'Horagolla National Park'. Due to time limitations, A2P conservation planning discussions were not carried out for this site, however it is recommended that this site is considered during comprehensive conservation planning for this species.

Project reports for the 14 A2P sessions held are presented in sections 4, 5 and 6 of this report.

4. Site-based conservation action planning



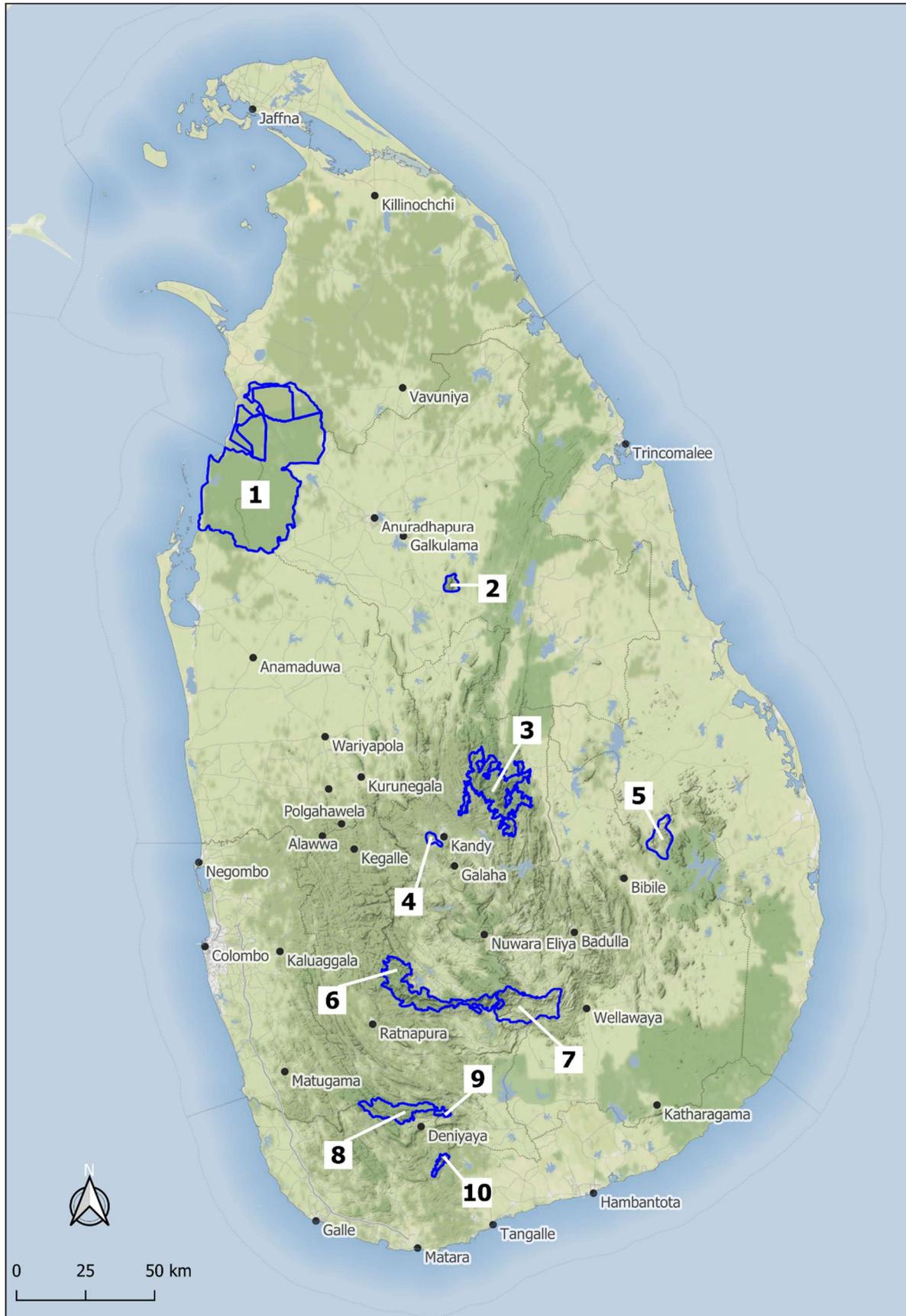
During the workshop, conservation planning and next steps for action were discussed in A2P sessions for 10 of the 33 Key Biodiversity Area sites, covering a total of 70 of the 102 threatened species (Table 8).

Site	KBA site name	Area km ²	No. of species
1	Wilpattu complex*	1721.00	4
2	Ritigala Strict Nature Reserve*	25.43	6
3	Knuckles National Conservation Forest	313.17	20
4	Gannoruwa Forest Reserve	15.12	10
5	Nilgala Complex*	79.93	4
6	Peak Wilderness Sanctuary Complex	239.85	23
7	Kalupahana (Uva Province)	214.37	7
8	Morningside and Handapan Ella Plains (Sinharaja IBA)	120.07	24
9	Enasalwatta*	11.08	9
10	Rammalekanda Forest Reserve	17.32	3

Table 8. Names, area in km² and numbers of threatened species included for each of the ten A2P Key Biodiversity Area sites, as shown on the map in Figure 3. The sites flagged with an asterisk (*) indicate newly delineated proposed KBA sites, triggered by threatened reptile species. Non-flagged sites are existing KBAs, for which the inclusion of threatened reptile species has been proposed.

The map in Figure 3 shows the location of the 10 KBA sites for which A2P conservation planning discussions were held during the workshop and the outputs of the discussions for these 10 individual sites are provided 4 below.

Figure 3. Map of Sri Lanka showing the location of the ten A2P Key Biodiversity Area sites.



Wilpattu Complex (1 in Figure 3)

A2P PROJECT LEADS

Suraj Goonewardene, Kanishka Ukuwela, Anslem de Silva Naalin Perera, Suranjan Karunarathna, Majintha Madawala, Mendis Wickramasinghe

SITE INFORMATION

Wilpattu complex is a newly delineated KBA, located on the north-western coast of Sri Lanka with an area of 1721.00 km². This KBA has been proposed based on the inclusion of four threatened (three Endangered and one Vulnerable) reptile trigger species within the site: *Rhinophis dorsimaculatus*, *Rhinophis porrectus*, *Nessia hickanala* and *Cylindrophis maculatus*.

The area has been sparsely populated since people were displaced during the war between government forces and terrorists, which occurred between 1983 and 2009. Following this period, there has been a move to resettle people into the area and there is increasing potential for tourism. However, the area has become a hub for illegal practices such as cutting trees, sand mining and poaching. Biofuel has accumulated within the park and there is the risk of a fire burning through it, as the region has become drier with climate change. The levels of agrochemicals being used are above the recommended amount for human health and have been linked to the prevalence of chronic kidney disease. Agrochemical use is also a threat to the fossorial species that occur in the area. Wilpattu is an IBA and RAMSAR site and is of archaeological importance. It also contains the unique 'Villu' habitat. An area inside of the Wilpattu National Park is likely to be impacted by the expansion of a church that is expected to gather as many as 700,000 people over a few days, every year. There is a potential issue in the National Park resulting from the increasing numbers of [tourist] vehicles and associated vehicle damage to natural areas, plus issues with pollutants seeping into soil, which is contributing to the overall degradation of fossorial and unique Villu habitats. A major road is planned that will cross the park and will likely have a further impact on natural habitat. Furthermore, there has been a proposal to degazette the park and open it for development, which will be detrimental to species already threatened with extinction. Currently people do not value Wilpattu, as it is not considered as highly diverse in terms of wildlife compared to other sites such as Singharaja.

CONSERVATION NEEDS IDENTIFIED DURING A2P DISCUSSIONS

Increase community level of knowledge and awareness of the unique value (wildlife + habitats + archaeological significance) of Wilpattu:

- Create a package of promotional materials (videos, advertisements, brochures, posters, stickers, roadside billboards etc) to raise awareness and empathy for the more 'hidden', valuable and threatened wildlife of Wilpattu: to 'make fossorial species sexy!'
- Translate promotional materials for people of the northern sector.
- To enhance the perceived value of Wilpattu through an integrated, multi-targeted education and awareness campaign drive (local villagers, schools, tourists, wildlife and forestry departments, tourism operators etc).

Educate and increase awareness of off-road vehicle drivers, so they can become guardians of Wilpattu:

- Educate safari drivers, foresters, wildlife department about important fossorial / villu habitats and the importance of obeying road regulations, not to drive off road etc.
- Train safari guides and off-road vehicle drivers to empower them to promote the significance of Wilpattu and educate tourists.
- Create and implement a strategic road planning and traffic management plan, to avoid further pollution and degradation of highly sensitive habitats.

Implement and enforce effective policy, governance and regulation regarding acceptable use of agrochemicals to reduce the threat to reptiles and other wildlife.	
A2P IMMEDIATE NEXT STEPS	ACTION LEAD
<ul style="list-style-type: none"> - Organise a working group to develop a plan for an education and awareness campaign. - Organise a committee who can hold training workshops for jeep drivers / safari guides. - Seek potential sources of funding (e.g. Mohammed bin Zayed Species Conservation Fund, Chicago Zoological Society's CBOT Endangered Species Fund) for these two projects once full concept documents / proposals have been prepared. 	<p>Suraj Goonewardene, Kanishka Ukuwela, Anslem de Silva, Naalin Perera, Suranjan Karunarithna, Majintha Madawala, Mendis Wickramasinghe</p>
POTENTIAL EXTERNAL COLLABORATORS AND STAKEHOLDERS	
<p>UNDP (project on livelihoods) IUCN Sri Lanka Regional Office Local Schools Forestry Dept. Wildlife Dept. Wilpattu National Park Jeep Safaris Local hotel and tourism operators Local government Local police Local religious institutions International zoos (for assistance with developing targeted educational / campaign materials) Young Zoologist Association of Sri Lanka</p>	

Ritigala Strict Nature Reserve (2 in Figure 3)

A2P PROJECT LEADS

Dulan Vidanapathirana, Suranjan Karunarathna, Mendis Wickramasinghe, Anslem de Silva, Dinesh Gabadage and Kanishka Ukuwela

SITE INFORMATION

Ritigala Strict Nature Reserve, is a newly delineated KBA, located in the northern-central part of Sri Lanka, with an area of 25.43 km². This KBA has been proposed based on the inclusion of six threatened (one Critically Endangered, one Endangered and four Vulnerable) reptile trigger species within the site: *Cnemaspis ritigalensis*, *Nessia bipes*, *Aspidura brachyorrhos*, *Cylindrophis maculatus*, *Nessia sarasinorum* and *Oligodon sublineatus*.

Ritigala is a Strict Nature Reserve, which is the highest level of area protection in Sri Lanka. The area is of significant archeological importance, due to the existence of an ancient Buddhist monastery at the site and the management of the area is divided between the Government's Forest and Archaeology Departments. The management boundaries are somewhat ambiguous however, which can have consequences regarding effective joint management of the entire area, resulting in illegal activities such as logging being overlooked. There are also issues with encroachment by farmers, villages and pressure from the expanding tourism industry. Threats to wildlife in the area include habitat degradation and fragmentation due to conversion to and intensification of agriculture (e.g. tea plantations), agrochemical use (pesticides), illegal logging (particularly for ebony, which is of high economic value), urbanisation, road construction and ongoing soil erosion. Temple Authority expansion and an increasing number of visitors to Ritigala (primarily pilgrims) to the historic site is having an impact on the quantity and quality of suitable habitat for the threatened species of reptiles that are found here. Additionally, extreme drought with low rainfall has been experienced in this area over the last 3-4 years and climate change is considered a threat to some of the species occurring here. Species are also at risk due to forest fires that occur in the area and managing forest fires to ensure they do not extend to higher elevations during periods of drought in the dry season is needed.

CONSERVATION NEEDS IDENTIFIED DURING A2P DISCUSSIONS

- The status of Strict Nature Reserve needs better enforcement, to reduce the impacts of multiple activities that are causing habitat destruction and degradation and threatening wildlife in the area.
- The Forest Department and Archaeology Department need to coordinate and align their management practices for the areas they respectively manage, in order to reduce/eliminate the potential for illegal activities (such as logging) to be carried out.
- There needs to be an increased awareness of the biological diversity importance of the site (as well as the cultural and historic importance) an appropriate code of conduct ('dos and don'ts') for eco-friendly tourism needs to be established in coordination with the Temple.
- Ritigala Wildlife Museum needs to be promoted more widely as a destination for tourists to visit to learn about the significant, threatened reptiles (and other wildlife) of the area. The museum should be supported to grow in capacity and develop in this role and become established as a leading centre for conservation education.

A2P IMMEDIATE NEXT STEPS

- Initiate discussions with the Forest Department and Archaeology Department to request that they declare their management boundaries and install checkpoints between their areas to increase the detection and prohibition of illegal activities occurring in the area.

ACTION LEAD

Mendis Wickramasingh and Suranjan Karunarathna

<ul style="list-style-type: none"> - Initiate dialogue with Temple Authority monks to discuss the potential development of a code of conduct for tourists. - Initiate discussions with Temple Authorities with regards to protecting the boundaries of the Strict Nature Reserve that occur within temple sites. - Initiate discussions with the Ritigala Wildlife Museum, which is managed by the Wildlife Department, regarding the potential for increasing capacity and developing the venue as a conservation education centre with regards to the wildlife of the area. - Initiate discussions with local communities on developing a coordinated education programme (through a meeting with village leaders, in the first instance), focussing on increasing the awareness of threatened reptiles in the area and what practical actions villagers can do for their conservation. 	<p>Dulan Vidanapathirana</p> <p>Suranjan Karunarathna and Dulan Vidanapathirana</p> <p>Mendis Wickramasinghe and Dulan Vidanapathirana</p> <p>Suranjan Karunarathna, Dulan Vidanapathirana and Mendis Wickramasinghe</p>
POTENTIAL EXTERNAL COLLABORATORS AND STAKEHOLDERS	
<ul style="list-style-type: none"> - Forest Department - Archaeology Department - Wildlife Department - Temple Authorities – to protect the boundaries of the Strict Nature Reserve within temple sites - Local Communities – to prevent forest fires and encroachment via village leaders. - Ritigala Wildlife Museum - Young Zoologist Association of Sri Lanka 	

Knuckles National Conservation Forest (3 in Figure 3)

A2P PROJECT LEADS

Sampath Goonatilake, Naalin Perera, Dulan Jayasekara, Kanishka Ukuwela, Mendis Wickramasinghe, Ansem de Silva, Madhava Botejue, Dinesh Gabadage, Suneth Kannishka

SITE INFORMATION

Knuckles National Conservation Forest is an existing KBA, located in the central region of Sri Lanka, with an area of 313.17 km². A total of 19 reptile species assessed as threatened during the workshop (two Critically Endangered, nine Endangered and eight Vulnerable), plus one species assessed as Near Threatened occur within the area: *Aspidura desilvai*, *Cophotis dumbara*, *Ceratophora tennentii*, *Calotes pethiyagodai*, *Calotes manamendrai*, *Calliophis haematoetron*, *Nessia bipes*, *Hypnale nepa*, *Cnemaspis phillipsi*, *Cnemaspis punctata*, *Chalcidoseps thwaitesi*, *Aspidura ceylonensis*, *Aspidura brachyrrhos*, *Nessia sarasinorum*, *Lankascincus taylori*, *Dendrelaphis schokari*, *Cyrtodactylus soba*, *Dendrelaphis caudolineolatus*, *Lyriocephalus scutatus*, and *Cnemaspis kallima*.



Cnemaspis kallima © Nayana Wijayathilaka

Knuckles National Conservation Forest is a biodiversity hotspot, which is partially managed by the Wildlife Department and partially by the Forest Department. Threats to wildlife in the area include habitat loss, alteration, degradation and fragmentation resulting from several human activities, including illegal logging, illegal collection of reptiles, commercial development, unsustainable tourist activity levels, particularly around pilgrimages, plantation agriculture and the use of insecticides and agrochemicals, man-made forest fires and forest dieback. Furthermore, areas of the Conservation Forest are being degazetted for private sale, most likely for agricultural expansion.

CONSERVATION NEEDS IDENTIFIED DURING A2P DISCUSSIONS

- Propose that the protection status of Knuckles National Conservation Forest is elevated to the highest Protected Area conservation priority and that the areas under management by the Forest Department are moved to management by the Wildlife Department.
- Increase awareness of reptile diversity in area, particularly for forest rangers, foresters and the tourism development industry, and develop and implement appropriate regulations around activities.
- Local NGO's should be empowered to participate in providing conservation advice and recommendations.
- UNDP programme on sustainable use should be extended to the Knuckles National Conservation Forest.
- Research and population monitoring regarding the impact of climate change and forest dieback is needed.

A2P IMMEDIATE NEXT STEPS

- Present this finalised Sri Lanka snakes and lizards Red List, KBA and A2P workshop report to the Government Secretary and meet with Government Officials to

ACTION LEAD

Ansem De Silva

<p>discuss the results and the proposal to elevate the protected area status of the Knuckles national Conservation Forest.</p> <ul style="list-style-type: none"> - Co-ordinate an associated international press release to raise awareness, globally. - Link with forest rangers, foresters and community based organisations to initiate discussions on developing a coordinated education programme to increase awareness of threatened reptiles in the area and what can be done for their conservation. - Subsequently, plan and develop a ‘train the trainer’ programme, to build capacity of forest rangers so they can provide education and awareness to tourists, local communities etc. - Explore and report back to workshop participants the possibility of extending the UNDP programme on sustainable to the Knuckles National Conservation Forest. - Link with existing Sri Lankan parliament research agenda and universities to initiate the idea of planning an integrated research and population monitoring plan regarding the impact of climate change and forest dieback. - WildLanka Symposium and UNDP small grant proposal. 	<p>IUCN SSC, IUCN CPSG, IUCN-CI BAU, IUCN Sri Lanka, Sri Lanka reptile workshop participants</p> <p>Madhava Botejue and Dinesh Gabadage</p> <p>Madhava Botejue, Dinesh Gabadage, Anslem de Silva, Sampath Goonatilake and Naalin Perera</p> <p>Sampath Goonatilake and Naalin Perera</p> <p>Sampath Goonatilake, Naalin Perera, Dulan Jayasekara, Kanishka Ukuwela, Mendis Wickramasinghe, Anslem de Silva</p> <p>Mendis Wickramasinghe</p>
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POTENTIAL EXTERNAL COLLABORATORS AND STAKEHOLDERS

- Forest Department
- Wildlife Department
- National Government
- Environment Ministry
- IUCN
- Tourist board / ministry
- Biodiversity Conservation Society, Sri Lanka
- Institute of Biology
- Universities, such as Colombo University, Rajarata University of Sri Lanka, Sabaragamuwa University of Sri Lanka, University of Sri Jayewardenepura
- The National Science Foundation
- The National Research Council
- Young Zoologist Association of Sri Lanka, Young Biologists Association of Sri Lanka

Gannoruwa Forest Reserve (4 in Figure 3)

A2P PROJECT LEADS

Kanishka Ukuwela, Pradeep Samarawickrama, Suranjan Karunarathna, Anslem de Silva, Dinesh Gabadage, Madhava Botejue

SITE INFORMATION

Gannoruwa Forest Reserve is an existing KBA with an area of 15.12 km² located in the central region of Sri Lanka. A total of 10 reptile species assessed as threatened during the workshop (two Critically Endangered, three Endangered and five Vulnerable) occur within the area: *Cnemaspis scalpensis*, *Lankascincus deignani*, *Cyrtodactylus fraenatus*, *Gerrhopilus ceylonicus*, *Hemidactylus pieresii*, *Aspidura brachyorrhos*, *Aspidura ceylonensis*, *Boiga barnesii*, *Lankascincus taylori* and *Lyriocephalus scutatus*.

Gannoruwa Forest Reserve is considered an important area for reptile speciation. The forest is managed by the Forest Department and is surrounded by private land. Within the Gannoruwa Forest Reserve, there is heavy encroachment and associated habitat loss, degradation and fragmentation. Contributing factors include residential settlement and related infrastructure development, agricultural expansion, road expansion (through remaining natural habitats) fires, and removal of large trees through logging. Additional pressures on forest habitat in the area include small metal quarries and landslides associated to changes in land use. Reptiles are predated by both native and domestic animals, which are more abundant in the vicinity of human settlements. Furthermore, traditional Kandian home gardens (in which several of the threatened reptile species can survive) are being converted to tea, housing or smaller, more heavily cultivated gardens, which lack large trees.

CONSERVATION NEEDS IDENTIFIED DURING A2P DISCUSSIONS

- A management plan is needed for the Gannoruwa Forest Reserve.
- Raising awareness within the local communities on the importance of the area for 10 threatened species of reptiles, endemic to Sri Lanka.
- Re-introduce Kandian Home Garden culture and give incentives / awards.
- Employ more sustainable agriculture practices.

A2P IMMEDIATE NEXT STEPS

- Scope and develop a proposal for a workshop to create a management plan for Gannoruwa Forest Reserve.
- Co-ordinate and arrange a local community meeting to discuss awareness-raising and re-introducing Kandian home gardens.
- Arrange a meeting with GARC and Peradeniya University to discuss adopting more sustainable agriculture practices.

ACTION LEAD

Kanishka Ukuwela, Pradeep Samarawickrama

POTENTIAL EXTERNAL COLLABORATORS AND STAKEHOLDERS

- Local communities
- Forest Department
- Gannoruwa Agricultural Research Centre (GARC): Agri department
- Peradeniya University
- Private landowners (small to big)
- Young Zoologist Association of Sri Lanka

Nilgala complex (5 in Figure 3)

A2P PROJECT LEADS

Dinal Samarasinghe, Madhava Botejue and Suranjan Karunarathna, Ansem de Silva

SITE INFORMATION

Nilgala complex is a newly delineated KBA, located in central - south eastern Sri Lanka, with an area of 79.93 km². This KBA has been proposed based on the inclusion of four threatened (one Critically Endangered, one Endangered and two Vulnerable) reptile trigger species within the site: *Cnemaspis nilgala*, *Hemidactylus hunae*, *Nessia sarasinorum* and *Aspidura brachyrrhos*.

Nilgala complex comprises mainly three vegetation types: savannah grassland, lowland tropical dry mixed evergreen forest and scrubland. The area is considered an important location in terms of herpetofauna diversity, as well as a hotspot for multiple species of birds, butterflies and megafauna such as elephants and leopards are also found here. The savanna and rock outcrop habitats have been heavily impacted and modified by deforestation, man-made fires, invasive species, illegal forest encroachment, timber felling, unplanned farming activities such as rubber cultivation and slash-and-burn agriculture, extensive use of broad-spectrum pesticides, granite quarrying, and road construction. Mining of granite for highway construction has degraded habitat within the forest area, leading to both loss of effective habitat areas and fragmentation of already limited habitats for several species of geckos (Karunarathna *et al.*, 2019). Additionally, human-elephant conflict contributes to the destruction of forest habitat, as does hunting activities and poaching (for leopards). Collection of reptiles for the pet trade also occurs in the area, potentially further increasing the pressure on threatened species and their habitats.

Nilgala complex is jointly managed by the Forest and Wildlife Departments. Portions of the Nilgala savannah forest are under various forms of protection, but the statutory status of these is unclear (Karunarathna *et al.*, 2019).

CONSERVATION NEEDS IDENTIFIED DURING A2P DISCUSSIONS

- Chenna cultivation should be done on existing land without further encroachment into the remaining forest being permitted to go ahead.
- Raise awareness within local communities and cultivators on the importance of Nilgala for unique and threatened Sri Lankan wildlife. This should include Forest Department and Wildlife Department range officers, the police environment unit, development authorities, the Archaeological department and the National physical planning department.
- The proposed corridor from Galoya to Maduruoya should be enacted.
- Strict law enforcement.
- Raise awareness within local communities and cultivators on the impact of using agrochemicals, encourage and/or incentivize the use of traditional / improved agriculture methods without, or with minimum use of, agrochemicals.
- Establish a nursery for native species, with a focus on medicinal plants.

A2P IMMEDIATE NEXT STEPS

- Instigate a series of local community awareness programmes (see Goonewardene *et al.*, 2004 for info).
- Promote reptiles and conservation in tourism by training local guides and communities.

ACTION LEAD

Dinal Samarasinghe, Madhava Botejue,
Suranjan Karunarathna

Suranjan Karunarathna

Peak Wilderness Sanctuary complex (6 in Figure 3)

A2P PROJECT LEADS

Dulan Vidanapathirana, Mendis Wickramasinghe, Anslem de Silva, Suranjan Karunarathna, Sampath Goonatilake and Naalin Perera

SITE INFORMATION

Peak Wilderness Sanctuary Complex is an existing KBA, located in the central-southern region of Sri Lanka, with an area of 239.85 km². A total of 22 reptile species assessed as threatened during the workshop (two Critically Endangered, 13 Endangered and 7 Vulnerable), plus one species assessed as Near Threatened occur within the area: *Aspidura ravanai*, *Cnemaspis samanalensis*, *Aspidura copei*, *Aspidura trachyprocta*, *Calotes liocephalus*, *Calotes nigrilabris*, *Ceratophora aspera*, *Ceratophora stoddartii*, *Cophotis ceylanica*, *Hypnale nepa*, *Lankascincus taprobanensis*, *Rhabdophis ceylonensis*, *Rhinophis blythii*, *Lyriocephalus scutatus*, *Lankascincus sripadensis*, *Aspidura brachyorrhos*, *Aspidura ceylonensis*, *Aspidura guentheri*, *Cnemaspis anslemi*, *Cylindrophis maculatus*, *Dendrelaphis caudolineolatus*, *Dendrelaphis schokari* and *Nessia burtonii*.

Peak Wilderness Sanctuary is one of Sri Lanka's most important conservation areas. The sanctuary also holds a spiritual and cultural value, as all the footpaths to Sri Pada lead through the Peak Wilderness forests. The journey to Sri Pada is one of the most revered pilgrimages in Sri Lanka, which now attracts over one million pilgrims and tourists within a six-month period each year. However, the Peak Wilderness Sanctuary is not adequately set up for coping with such large volumes of visitors and the considerable number of pressures on the environment are causing habitat loss, degradation and fragmentation. Pollution is a major issue in the area. There has been an increase in the development of shops to cater for tourists, and an associated increase in dumping of rubbish produced by both shop owners, pilgrims and tourists. A lack of sanitary facilities means human waste is also a problem and the vast numbers of people bathing in streams and rivers is causing pollution and erosion of aquatic habitats. Furthermore, the increasing amount of surface rubbish is attracting a growing number of feral dogs and jungle crows that opportunistically predate on reptiles and amphibians, which is contributing to population decline of some species. Light and sound pollution is also an issue for six month of the year, during pilgrimage season.

As well as tourism-related pressures, the area is also subject to illegal gem mining in some areas, illegal logging and hunting, habitat encroachment at lower elevations, unsustainable harvesting of forest resources, expansion of road networks, and the increasing use of agrochemicals associated with tea plantations in some areas. Forest die back is an issue at higher elevations and the impacts of drought associated with climate change is a long-term problem. Finally, lizard smuggling is also an issue in the area. The area is open access (to all locations) for everyone, there are no wildlife monitoring patrols, and there are only two Wildlife Department offices (both at lower elevations), which limits the capacity for effective management.

CONSERVATION NEEDS IDENTIFIED DURING A2P DISCUSSIONS

- Pilgrim management at the widest scale was considered the priority threat to be addressed within the Peak Wilderness Sanctuary Complex.
- An effective waste management scheme is urgently required. This could include a ban on all plastic in the area.
- Better access to water (e.g. taps for filling up re-useable water bottles).
- Annual waste programme to clean up Peak Wilderness Sanctuary.
- An ethical, environmentally sensitive code of conduct should be developed and provided as an essential briefing document for all visitors.

<ul style="list-style-type: none"> - Create a strategy for a targeted media campaign that focuses on responsible tourism during pilgrim season 'Be Like Buddha, Leave Only Footprints', which is broadcast through multi-media channels (TV, print, radio, online, through tourism agencies etc). - 'Security' checks should be conducted on all visitors, to check for plastics, alcohol and any other materials considered as not being suitable to take into the area (due to the rubbish pollution problem). - A strong programme of engagement with the local communities who live in the area, with regards to managing / minimising rubbish pollution and incentivising guardianship of the area. - Strict law enforcement (wildlife, forest, police, NGO's) within the peak Wilderness Sanctuary is required. 	
A2P IMMEDIATE NEXT STEPS	ACTION LEAD
<ul style="list-style-type: none"> - Discuss, plan and implement a comprehensive series of awareness workshops for tour guides and wildlife / forest guides, in collaboration with the Department of Wildlife. 	Anslem de Silva
POTENTIAL EXTERNAL COLLABORATORS AND STAKEHOLDERS	
<ul style="list-style-type: none"> - Wildlife Department - Forest Department - Ratnapura Kuruwita Municipal Council - Young Zoologists Association of Sri Lanka - Universities - Temple Authorities - NGO's of the area - Police and National security guards 	

Kalupahana (Uva Province) area (7 in Figure 3)

A2P PROJECT LEADS

Dinesh Gabadage, Suranjan Karunarathna, Dulan Jayasekara, Mendis Wickramasinghe

SITE INFORMATION

Kalupahana is an existing KBA located within the Uva Province of Sri Lanka, with an area of 214.37 km². The site does not intersect with any Protected Areas boundaries and a total of seven reptile species assessed as threatened (one Critically Endangered and six Endangered) during the workshop occur within the area: ***Rhinophis roshanpererai*, *Rhinophis drummondhayi*, *Cyrtodactylus edwardtaylori*, *Aspidura trachyprocta*, *Calotes nigrilabris*, *Ceratophora stoddartii*.**

The main issues threatening reptiles in this area stem from high rates of deforestation, causing habitat loss and degradation. Issues of conservation concern in the area include encroachment and increasing urbanisation, erosion and landslides, agricultural expansion (including tea plantations, vegetables, potatoes), increasing use of agrochemicals and forest fires. Additionally, increasing tourism associated with pilgrimages is adding pressure on habitat, with increasing rubbish pollution, habitat trampling and disturbance from campsites and hiking activities and additional fires in the area.

CONSERVATION NEEDS IDENTIFIED DURING A2P DISCUSSIONS

- Regulate camping in accordance to existing legislation.
- Raising awareness within local communities (including in local languages Sinhala and Tamil) about threatened reptiles and importance of the natural habitat.
- Co-ordinate a national workshop to plan sustainable tourism development, eco-friendly activities and practices (particularly during pilgrimages, camping, hiking etc), legislation review including optimal compliance and enforcement and awareness raising media campaign. This activity would be applicable to other KBA sites discussed in A2P sessions, for example the Peak Wilderness Sanctuary Complex.
- Better agricultural practices: initiate a workshop with plantation companies and other agricultural practitioners to develop agricultural best practice strategy for the Kalupahana (Uva Province) area.

A2P IMMEDIATE NEXT STEPS

- Community reptile awareness workshops to be coordinated and organised.
- Establish which tea companies are operating within the area and investigate their levels of conservation orientation. Based on their comments and interest, plan for a workshop with plantation companies and other agricultural practitioners to develop an agricultural best practice strategy for the Kalupahana area (Uva Province). This will need to include the identification of key experts from both the [reptile] conservation and agricultural fields to involve in the process, as well as wider stakeholders.

ACTION LEAD

Dinesh Gabadage to follow up with Sandun (Sabaragamuwa University)

Dulan Jayasekara

POTENTIAL EXTERNAL COLLABORATORS AND STAKEHOLDERS

- Forest Department
- Private tour groups / trip operators
- Local communities

- Private landowners
- Tea companies

Morningside and Handapan Ella Plains (Sinharaja IBA) (8 in Figure 3)

A2P PROJECT LEADS

Dulan Jayasekara, Dinal Samarasinghe, Mendis Wickramasinghe, Dulan Vidanapathirana and Dinesh Gabadage.

SITE INFORMATION

Morningside and Handapan Ella Plains is an existing KBA located within the south of Sri Lanka, with an area of 120.07 km². A total of 22 reptile species assessed as threatened (three Critically Endangered, 10 Endangered and nine Vulnerable), plus two trigger species assessed as Near Threatened occur within the area: *Calotes desilvai*, *Ceratophora erdeleni*, *Ceratophora karu*, *Aspidura drummondhayi*, *Ceratophora aspera*, *Cnemaspis molligodai*, *Dendrelaphis sinharajensis*, *Hemidactylus pieresii*, *Lankascincus greeri*, *Lycodon carinatus*, *Oligodon calamarius*, *Rhabdophis ceylonensis*, *Rhinophis tricoloratus*, *Aspidura brachyorrhos*, *Aspidura guentheri*, *Boiga barnesii*, *Cylindrophis maculatus*, *Dendrelaphis caudolineolatus*, *Dendrelaphis schokari*, *Lankascincus taylori*, *Oligodon sublineatus*, *Lyriocephalus scutatus*, *Cyrtodactylus cracens* and *Nessia gansi*.

Issues contributing to the threatened status of reptile in the area include tourism development, construction of roads within National Parks, buffer zones being under threat from the development of hotels and mini hydro stations, tea plantations and the use of agrochemicals, logging and extraction of non-timber forest products and illegal collection of reptiles for the pet trade.

CONSERVATION NEEDS IDENTIFIED DURING A2P DISCUSSIONS

- Strict enforcement of the existing conservation laws is required.
- Currently the area is managed by the Forest Department. The Wildlife Department needs to be involved in management of the area and there needs to be active communication between the two departments to coordinate, implement and enforce effective management practices.
- Adopt the proposal for Forest Reserve level protection of the area and establish its status as a Forest Reserve.
- Regulations on any future developments within the area are required.
- Areas with good quality habitat and high biodiversity adjoining Sinharaja require protection
- Reforestation programmes are needed in areas of key habitat.
- Awareness programmes need to be delivered to communities, guides, Forest Department, Wildlife Department, schools and universities.

A2P IMMEDIATE NEXT STEPS

- Organise a workshop for the Morningside and Handapan Ella Plains KBA, with key stakeholders and collaborators, to develop a strategy for instigating the conservation needs identified.

ACTION LEAD

Dulan Jayasekara, Dinal Samarasinghe, Mendis Wickramasinghe, Dulan Vidanapathirana and Dinesh Gabadage.

POTENTIAL EXTERNAL COLLABORATORS AND STAKEHOLDERS

- Wildlife Department
- Forest Department
- Local communities
- Tourism guides
- Schools
- Universities
- Young Zoologist Association of Sri Lanka

Enasalwatta (9 in Figure 3)

A2P PROJECT LEADS

Mendis Wickramasinghe, Dulan Vidanapathirana, Suranjan Karunarathna, Dinesh Gabadage, Madhava Botejue

SITE INFORMATION

Enasalwatta is a newly delineated KBA, located on the eastern ridge of the Sinharaja complex, west of Morningside in southern Sri Lanka. This KBA has an area of 11.07 km² and has been proposed based on the inclusion of nine threatened (five Critically Endangered, two Endangered and two Vulnerable) reptile trigger species within the site: *Calotes desilvai*, *Ceratophora erdeleni*, *Ceratophora karu*, *Cnemaspis godagedarai*, *Rhinophis erangaviraji*, *Cnemaspis pulchra*, *Cyrtodactylus subsolanus*, *Aspidura guentheri* and *Lyriocephalus scutatus*

Parts of the Enasalwatta are private land and some parts have recently (within the last 2 years) been taken over by the Forest Department. The area is difficult to access, there is limited infrastructure and recently many local people have been moving away from the area. Ten years ago, the community comprised of about 40 families, however this has now reduced to approximately 10-15 families.

CONSERVATION NEEDS IDENTIFIED DURING A2P DISCUSSIONS

Tea plantations and the increased use of agrochemicals are issues in this area and a threat to reptile species here. Urbanisation and encroachment from increasing tourism development are contributing to the loss of forest. Climate change is likely to impact this high-elevation species through the increasing frequency of drought (already frequent in this area and predicted to increase).

Some plantations are now abandoned, since the migration of local people has been increasing. These abandoned plantations should be planted with forest species and protected to increase forest habitat in the future.

A2P IMMEDIATE NEXT STEPS

ACTION LEAD

- | | |
|---|-----------------------|
| - Check with Forest Department about the numbers and locations of abandoned tea plantations. | Madhava Botejue |
| - Initiate dialogue with Forest department and local communities regarding establishing a re-planting programme to re-forest abandoned tea plantations. | Madhava Botejue |
| - Educate and train Forest Department staff about threatened reptile species. | Dulan Vidanapathirana |
| - Raise awareness within Forest Department, local communities and tourism operators. | Dulan Vidanapathirana |
| - Provide the community conservation organisation 'Sinharaja Green Friends' (located at Vihavahena Village, 10km away from Enasalwatta) with scientific training, education and directional support, so they can become guardians of Enasalwatta. | Dulan Vidanapathirana |

POTENTIAL EXTERNAL COLLABORATORS AND STAKEHOLDERS
<ul style="list-style-type: none">- Forest Department- Local communities- Tourism operators- Sinharaja Green Friends- Young Zoologist Association of Sri Lanka

Rammalekanda Forest Reserve (10 in Figure 3)

A2P PROJECT LEADS

Suneth Kannishka, Dulan Vidanapathirana, Dinesh Gabadage, Mendis Wickramasinghe

SITE INFORMATION

Rammalekanda Forest Reserve is an existing KBA, located in the southern region of Sri Lanka, with an area of 17.32 km². A total of 3 reptile species assessed as threatened during the workshop (one Critically Endangered and two Vulnerable) occur within the area: *Indotyphlops leucomelas*, *Cnemaspis rammalensis* and *Aspidura guentheri*. *Cnemaspis rammalensis* (a Critically Endangered, large day gecko) is endemic to the area and is not known from any other locations.

Rammalekanda Forest Reserve is an isolated outpost of the Rakwana Massif, which is managed by the Forest Department. Although Rammalekanda has Protected Status as a forest reserve, there is inadequate enforcement of this status. The main issues at the location are connected to human activities that result in habitat loss, degradation and fragmentation. These include urbanisation, agricultural expansion, particularly tea plantations and the use of agrochemicals. Illegal tree felling for tea cultivation is recognized as a major threat to this area, and natural habitats are being "slowly" destroyed by encroachment of surrounding settlements and plantations into the reserve, with new building being recently observed in the area. Forest fires area also common in this area, with fires being intentionally lit by poachers to flush out target prey. The area is likely to be highly sensitive to droughts, which are already becoming more frequent elsewhere in Sri Lanka as a likely consequence of climate change.

CONSERVATION NEEDS IDENTIFIED DURING A2P DISCUSSIONS

- Develop an awareness programme and train Nature School Foundation community about the three threatened species that occur in the area.
- Establish *Cnemaspis rammalensis* as a flagship species for the area.
- Species-level protection for *Cnemaspis rammalensis* is needed (particularly if the species becomes of interest in the pet trade), including protection within the Flora and Fauna Protection Ordinance.
- Encourage forest guardianship from NSP to protect habitat (particularly as there may be new species yet to be discovered from this region, which will most likely be point endemics).
- Involve the local community in new species discoveries to create a sense of connection to, and pride in the area and its unique biodiversity.
- Improved management and effective enforcement of the area is needed, including the establishment of a forest department office, to limit encroachment into this unique ecosystem.

A2P IMMEDIATE NEXT STEPS

- Initiate talks with the Young People's Organisation and Nature School Foundation about threatened reptiles in the area and the importance of *Cnemaspis rammalensis*
- Initiate talks with the Young People's Organisation and Nature School Foundation about planning and developing a campaign to adopt *Cnemaspis rammalensis* as a flagship species for the area.

ACTION LEAD

Suneth Kannishka, Dulan Vidanapathirana, Mendis Wickramasinghe

Suneth Kannishka, Dulan Vidanapathirana, Mendis Wickramasinghe

POTENTIAL EXTERNAL COLLABORATORS AND STAKEHOLDERS

- Young People's Organisation
- Nature School Foundation
- Herpetological Foundation of Sri Lanka
- Wildlife Department
- Forest Department
- Local communities
- NSP
- Young Zoologist Association of Sri Lanka

5. Threat-based conservation planning



Persecution of snakes

A2P PROJECT LEADS

A. A. Thasun Amarasinghe, Suranjan Karunarathna, Anslem de Silva, Dinesh Gabadage and Madhava Botejue and Mendis Wickramasinghe

ISSUE

Persecution was identified as a specific threat to six of the species assessed as threatened during the workshop (one Endangered and five Vulnerable): *Hypnale nepa*, *Boiga barnesii*, *Dendrelaphis caudolineolatus*, *Dendrelaphis schokari*, *Oligodon sublineatus*, *Oligodon sublineatus* and *Cylindrophis maculatus*. However, the issue of snake persecution applies to many snake species in Sri Lanka.

In Sri Lanka, snakes are of cultural and religious importance, for example, cobras have cultural significance to Tamil, Hindu and Buddhist populations. However, venomous snake bites are an issue in Sri Lanka and people have an inherent fear of snakes, which results in a tendency for people to kill snakes if they encounter them. Epidemiological studies have shown that fatality rates due to snake bite envenoming was 5.2 per 100,000 population, which was one of the highest death rates in the world (de Silva & Ranasinghe, 1983). Many non-venomous snakes look like venomous species in appearance and it is not possible for most people to distinguish between the venomous and non-venomous species (Figures 4a and b). This means that generally, any snake encountered is highly likely to be killed, due to a fear of snake bites from venomous snakes.

Figure 4. Venomous species (Fig 4a) and non-venomous species (Fig 4b), which are similar in appearance difficult for people to differentiate.



Figure 4a. Sri Lanka Krait *Bungarus ceylonicus*

© Panduka de Silva



Figure 4b. Sri Lanka wolf snake *Lycodon carinata*

© Panduka de Silva

The table below list the venomous species of snake most frequently encountered by humans and potential consequences if bitten by them.

Species	Impact of bite
<i>Naja naja</i> (cobra)	Bites can cause systemic reaction of which some could culminate in fatality
<i>Daboia russelii</i> (Russell's viper)	
<i>Bungarus caeruleus</i> (common krait)	
<i>Bungarus ceylonicus</i> (Ceylon krait)	
<i>Hypnale hypnale</i> (Merrem's hump nose viper)	
<i>Hypnale zara</i>	Bites which can cause severe systemic reaction, but have no deaths reported
<i>Echis carinatus</i> (saw scale viper)	
Other pit viper species	

Snakebite is an occupational hazard in Sri Lanka and farmers are the most vulnerable people. Human-snake conflict is particularly an issue in the Dry Zone of Sri Lanka as there is a large proportion of rural and agricultural land here. These areas are farther away from the capital and so tend to receive less attention from the government, which means schools and hospital are less developed and resourced. Teachers, doctors and government officials are not attracted to the dry zone, rural areas for work, as opportunities are rarer than in the capital. Alongside this, these areas have a high abundance of snakes, including a high number of venomous species and human/snake interaction is frequent.

Snake bites are most prevalent during harvesting periods in paddy fields. The demographic of snake bites is largely made of adult male farm workers and snake bites occur most during early morning and late afternoon/early evenings. When snake bites do occur, it is difficult to get help in time. Doctors also have a lack of knowledge to be able to correctly identify the snake responsible for a bite, which occasionally leads to the incorrect treatment being administered. For example, there are instances where patients have been given anti-venom for non-venomous snake bites, which has disastrously proved fatal for the patient. Snake training is provided to medical students during the third year of their studies; however, the curriculum only covers treatment of snake bites, not snake identification.

There are also many myths surrounding snakes, for example if you cut a python in half, they can stick themselves back together. The media often perpetuates this fear and mystery surrounding snakes through publishing negative snake-related hype stories, which influence people’s views.

CONSERVATION NEEDS IDENTIFIED DURING A2P DISCUSSIONS

- Education and awareness programme for schools on how to avoid snakes in gardens and what to do in the case of a snake bite. School education is considered appropriate as school children going home and talking with their families has proved to be the most effective way of educating adults.
- Education and training for doctors - doctors need to be able to identify non-venomous versus venomous species in order to be able to provide the correct treatment quickly and with confidence. Trained, aware doctors could help educate the public on snake identification, which may gradually help to reduce the fear of all snakes amongst rural populations, over time. Currently, the Snakebite Expert Committee of the Sri Lanka Medical Association (of which Ansem is a founder member) has published the latest information on the correct management of snake bite patients and an identification sheet of venomous species (Appendix VI).
- Nation-wide education and awareness campaign to nurture a positive connection between and snakes. This would include promoting the wonderful diversity of snakes in Sri Lanka, that not all species are venomous, myth-busting around snakes to eliminate some elements of fear, highlight the important of the ecological roles snakes provide in our environments and guidelines on what to do if you encounter a snake, without killing it. This campaign could involve partnering with national public heroes (such as cricketers Kumar Sangakar, Mahela Jawardina, Muttayya Muralidaran) to become champions for snakes in the publicity campaign.

Opportunity:

Funding is available to help improve the issue of snake persecution in Sri Lanka, through the World Bank ESCAMP (Ecosystem Management Programme), which is managed by the Wildlife Department and Forestry Department. In order to access funds, a proposal with objectives needs to be produced and submitted through the formal procedure.

A2P IMMEDIATE NEXT STEPS	ACTION LEAD
<ul style="list-style-type: none"> - Hold a workshop to develop a nation-wide snake awareness and publicity campaign strategy. 	Ansem de Silva – Snakebite Expert Committee of the Sri Lanka Medical Association is

	conducting awareness programmes for doctors and the public
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POTENTIAL EXTERNAL COLLABORATORS AND STAKEHOLDERS	
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- | | |
|---|--|
| <ul style="list-style-type: none">- Biodiversity Conservation Society- IUCN Sri Lanka- Government officials- Health officials- Relevant NGO's- Snakebite Expert Committee of the Sri Lanka Medical Association | |
|---|--|

Collection of reptiles for the international pet trade

A2P PROJECT LEADS

Anسلم de Silva, Dinal Samarasinghe, A. A. Thasun Amarasinghe

ISSUES

Wild collection for the international pet trade was identified as a specific threat to 11 reptile species assessed as threatened during the workshop (three Critically Endangered, five Endangered and three Vulnerable): *Ceratophora aspera*, *Ceratophora karu*, *Ceratophora stoddartii*, *Cophotis dumbara*, *Cnemaspis rammalensis*, *Calotes liocephalus*, *Calotes pethiyagodai*, *Ceratophora tennentii*, *Cophotis ceylanica*, *Lyriocephalus scutatus* and *Cyrtodactylus yakhuna*.



Ceratophora stoddartii
© Panduka de Silva



Lyriocephalus scutatus
© Panduka de Silva



Ceratophora aspera
© Panduka de Silva

Collection and trade of reptile species is prohibited, with a few exceptions. However, there is evidence of organised trafficking and there are growing concerns that considerable numbers of reptiles are being smuggled through or out of the country annually (Janssen & de Silva, 2019).

Reptile collection for the international per trade is particularly an issue in the Knuckles Ranges and the Central Highlands. Target reptile species are mostly agamids and the Sri Lankan pit viper *Trimeresurus trigonocephalus* (currently assessed as Least Concern) is also particularly targeted. *Lyriocephalus* is a monotypic genus, endemic to Sri Lanka and *Cophotis* and *Ceratophora* species are all endemic to Sri Lanka. Reptile collectors are both local and international (who come to Sri Lanka to collect species to top up breeding populations in their home countries. Few local people are extremely knowledgeable on the local habitat and where to find species of interest to international collectors. Collectors also target frogs, insects (particularly butterflies and stick insects) and spiders and contribute to the destruction of good habitat.

The table below lists the reptile species of most interest for the pet trade

<i>Lyriocephalus scutatus</i> Hump nose lizard	CITES Appendix II	Captive-bred in Japan.
<i>Calotes pethiyagodai</i> Pethiyagoda's crestless lizard	CITES listing is recommended	This species is known from the international pet trade and is advertised at higher prices than the related <i>C. liocephalus</i> (although it is thought that this species is included in this trade). The species is not known to be captive-bred, and so all animals in

		trade are presumed to have been illegally exported from Sri Lanka.
<i>Ceratophora stoddartii</i> Rhino horn lizard	CITES Appendix II	Possibly breeding in captivity. Often seen in trade under Southeast Asian species names, <i>Thaumatorhynchus brooksi</i> and <i>Hylagama borneensis</i>
<i>Cophotis ceylanica</i> Pygmy lizard	CITES Appendix II	Possibly breeding in captivity, however a 2019 CITES proposal indicates that "doubt has been cast over the veracity of these claims".
<i>Calotes liocephalus</i> Crestless lizard	CITES listing is recommended	This species is not thought to be captive-bred, so all animals in trade are presumed to be wild-caught. It is thought that animals are included in trade under the name <i>C. pethiyagodai</i> .
<i>Ceratophora aspera</i> Rough horn lizard	CITES Appendix II	High value in the international pet trade. Most animals are believed to be wild-caught.
<i>Ceratophora karu</i> Karunaratne's horn lizard	CITES Appendix I	This species has been reported in the online pet trade since 2017.
<i>Ceratophora tennentii</i> Leaf-nose lizard	CITES Appendix II	This species has been recorded in the US pet trade since 2016, including imports from Europe of animals advertised as both wild-caught and captive-bred.
<i>Cophotis dumbara</i> Knuckles pygmy lizard	CITES Appendix II	Reported in the European pet trade since 2015 and advertised for sale in the USA in 2018 (with claims these were the first imports of this species into the country). The scale of wild offtake is unknown, but the 2019 CITES proposal noted that the numbers of animals reported in trade suggest that animals are still being removed from the wild to supply this trade.
<i>Cnemaspis rammalensis</i> Rammale day gecko		Currently, there is not thought to be any substantial trade in this species. This is however Sri Lanka's largest day gecko and might be of increasing interest to the pet trade in the future, which would represent a major threat to this highly restricted, uncommon gecko.
<i>Cyrtodactylus yakhuna</i> Blotch bow-finger gecko		This is the most expensive gecko in the pet trade from Sri Lanka.
<i>Chrysopelea ornata</i> Ornate flying snake		NB. This species was not assessed during the workshop but is native to Sri Lanka and was mentioned in A2P discussions. It is a high value species and an increasing number of animals are being recorded in trade.

Challenges:

- New taxonomic descriptions drive interest for new species in trade and increase trade prices.
- There is no enforcement of permitted entry to National Parks.
- Reptiles are transported internationally through shipping lines and so go undetected by customs and government agencies.
- Small-scale exportation is possible through airline transport as not everyone who travels by air is security screened.

- Several reptile species were proposed for CITES Appendix I, however were adopted under CITES Appendix II. This has been heavily criticised as it is considered worse for the species to have them listed under Appendix II, than not at all, because if these species have a quota for a number of individuals of these species to be collected for trade, it may increase their popularity.

CONSERVATION NEEDS IDENTIFIED DURING A2P DISCUSSIONS

- Prioritise increasing effective conservation, including effective laws and regulations that are effectively enforced, within the Knuckles Conservation Area.
- Integrate all stakeholders, including the private sector, NGO's (EFL), public sector and local communities through Community Board Organisations.
- All airline travellers (including airline staff) should be security screened

A2P IMMEDIATE NEXT STEPS

Plan a workshop for 2020 to develop an integrated strategy for the effective management of the illegal Sri Lankan pet trade, involving all relevant stakeholders.

ACTION LEAD

Dinal Samarasinghe with BDS (Ms. Chanuka)

POTENTIAL EXTERNAL COLLABORATORS AND STAKEHOLDERS

- Museum Zoology Department
- Customs: Dedicated biodiversity related branch: Biodiversity Unit of Customs. Responsible for checking boarders for imports and exports: airport and shipping – legal shipments
- Samantha Gunasekara (writes CITES proposals)
- Wildlife Department – Park Rangers (including buffer zone). Responsible for carrying out raids within the park and at private property locations
- Forest Department – Rangers receive information from villagers and carry-out checks
- Biodiversity section of the Ministry for Environment – mediators for species conservation, focal point for Convention on Biological Diversity and reporting on Sri Lanka's National Biodiversity Strategy
- Police Department, Environment Unit – carry out raids at private properties
- Navy and coastguard – monitor boat activity around the periphery of Sri Lanka (Yala and Wilpattu have coastal boarders)
- NGO: Environmental Foundation Limited (EFL) [Dinal]: pass information to Wildlife Department (and customs), provide information for CITES listing proposals
- UNDP GEF small grant programme
- Ministry of Mahaweli Development and Environment
- Vincent Nijman – author on pet trade (activist and scientist, Oxford Brookes University)
- A relevant stakeholder group is already loosely in existence, developed for CITES COP (2019)

6. Intensive care-based conservation planning



Intensive care for *Aspidura ravanai*

A2P PROJECT LEADS

Sanjay Molur, Mendis Wickramasinghe, Dulan Vidanapathirana, Suranjan Karunarathna, Kanishka Ukuwela

ISSUES

Aspidura ravanai is a rare, semi-fossorial species of snake endemic to Sri Lanka, which has provisionally (subject to final review) been assessed as Critically Endangered for the IUCN Red List. The species is associated with montane cloud forests, where it is mostly found hidden under loose soil or logs, in shady areas with dense leaf litter and it can be found up to 30 cm below ground level. It is considered rare and is only known from a single area of approximately 3 ha within Sabaragamuwa Province. The main threat to the species is dieback of forest habitat, the causes of which remain unknown. The quality of habitat is also declining due to exotic, non-native vegetation replacing natural vegetation. Furthermore, the area is heavily impacted by tourism development (particularly associated with pilgrimages to this religious site) and related pollution, which is contributing to the continuous degradation of habitat.

Recommended conservation action requirements for the species include:

- **Education, Awareness and Communication:** focusing on the importance of the area for the survival of this rare species and increasing knowledge about the threats impacting it, through targeted programmes and campaigns. These activities should involve local communities, tourists and tourism developers, politicians and the Wildlife Department.
- **Site Protection:** Advocate for the area being classified as a Strict Nature Reserve.
- **Pollution Management:** Solid waste management plan is required and effectively implemented.
- **Habitat management:** Effective programme implemented to control invasive plant species.

CONSERVATION NEEDS IDENTIFIED DURING A2P DISCUSSIONS

It is recognised that *in-situ* conservation actions needed will require significant planning and time to initiate, put in place and subsequently take effect. Therefore, there is also a **need to investigate the feasibility of maintaining captive insurance populations of this species as an interim safety-net measure**, simultaneously to advancing the *in-situ* conservation actions required for the species.

The range of this species falls within the Peak Wilderness Sanctuary Key Biodiversity Area identified for Sri Lankan reptiles, which was discussed during another A2P session at this workshop. Please refer to the Site-directed conservation action planning section of this report on (page 28) for additional information on site-based conservation planning actions for this site.

A2P IMMEDIATE NEXT STEPS

Organise a meeting between key potential collaborators and stakeholders to discuss options for and feasibility of establishing and maintaining captive insurance population(s) of this species, including identifying the purpose, length and intended outcome of the programme.

ACTION LEAD

Sanjay Molur, Mendis Wickramasinghe, Dulan Vidanapathirana, Suranjan Karunarathna, Kanishka Ukuwela

POTENTIAL EXTERNAL COLLABORATORS AND STAKEHOLDERS

- Colombo University
- National Zoo
- Wildlife Department
- Forest Department

- Commercial Bank
- International Zoo partner
- Young Zoologist Association
- Volunteers
- Ape Kale, Wilpattu
- Dilmah Conservation
- Education Department
- Police Department

Intensive care for *Nessia layardi*

A2P PROJECT LEADS

Sanjay Molur, Kanishka Ukuwela, Anslem de Silva, Mendis Wickramasinghe

ISSUES

Nessia layardi is a fossorial snake species endemic to the wet zone of Sri Lanka, which has provisionally (subject to final review) been assessed as Critically Endangered for the IUCN Red List. It used to occur in coastal areas on the outskirts of Colombo and in Horagolla National Park. However, most of the areas near Colombo have been developed and the species is no longer recorded there. Presently, it appears that the species is now confined to Horagolla National Park, with an area of occupancy of 4 km². Populations here are thought to be declining. During several investigations this species was only found confined to a 10 m x 10 m area of sandy soil. Several places with similar soil conditions were checked in the park and the species was not found elsewhere. Additionally, there is evidence of wild boar digging and feeding on earthworms as well as this species.

CONSERVATION NEEDS IDENTIFIED DURING A2P DISCUSSIONS

It is recognised that *in-situ* conservation actions needed will require significant planning and time to initiate, put in place and subsequently take effect. Therefore, there is also a **need to investigate the feasibility of maintaining captive insurance populations of this species as an interim safety-net measure**, simultaneously to advancing the *in-situ* conservation actions required for the species.

A2P IMMEDIATE NEXT STEPS

- Install a predator proof fence around site where this species has been recorded most recently and instigate a monitoring programme for this species.
- Investigate opportunities for a seed grant to establish the predator proof fence and monitoring programme.
- Organise a meeting between key potential collaborators and stakeholders to discuss options for and feasibility of establishing and maintaining captive insurance population(s) of this species, including identifying the purpose, length and intended outcome of the programme.

ACTION LEAD

Anslem de Silva and Curator of Zoology Museum of Jayawardena Pura (who lives close to the park and has conducted previous research at the known location of this species).

Anslem de Silva

POTENTIAL EXTERNAL COLLABORATORS AND STAKEHOLDERS

- Horagolla National Park staff
- Jayawardena Pura University
- Colombo University
- National Zoo
- Wildlife Department
- Forest Department,
- Commercial Bank
- International Zoo partner

7. SUMMARY OF ACTIONS AND FURTHER WORK

A summary of next steps for the fourteen multi-species bundles, resulting from the A2P sessions of the Sri Lanka snakes and lizards' workshop is presented in Table 9. Workshop participants responsible for taking these actions forward are also provided.

Of the 102 species assessed as threatened during the workshop 70 species are covered within one or more of the fourteen multi-species bundles, with conservation planning next steps attributed to them.

An additional 28 species were included in one of the 23 Key Biodiversity Area sites that were not discussed during a specific A2P conservation planning sessions. It is recommended that conservation planning next steps are completed for these 23 sites in the future.

Future work could also focus on specific conservation planning around the threat of predation by native and introduced species, although it is recommended that this threat is considered as part of the site-based conservation planning actions.

Participants of the Sri Lankan IUCN Red List assessment, Key Biodiversity Areas and Assess to Plan workshop have formed a working group, co-ordinated by Ansem de Silva and Suranjan Karunarathna, who will oversee progress on the conservation planning actions for threatened species, as identified during the workshop. A full list of workshop participants is provided in Appendix II.

Table 9. Summary of next steps for the fourteen multi-species bundles resulting from the A2P sessions of the Sri Lanka snakes and lizards' workshop

A2P MUTLI-SPECIES BUNDLE	NO. OF THREATENED SPECIES	SUMMARY OF ACTIONS	A2P WORKSHOP PROJECT LEADS
Wilpattu Complex	4	<ul style="list-style-type: none"> - Organise a working group to develop a plan for an education and awareness campaign. - Organise a committee who can hold training workshops for jeep drivers / safari guides. - Seek potential sources of funding (e.g. Mohammed bin Zayed Species Conservation Fund, Chicago Zoological Society's CBOT Endangered Species Fund) for these two projects once full concept documents / proposals have been prepared. 	Suraj Goonewardene, Kanishka Ukuwela, Anslern de Silva, Naalin Perera, Suranjan Karunarathna, Majintha Madawala, Mendis Wickramasinghe
Ritigala Strict Nature Reserve	6	<ul style="list-style-type: none"> - Initiate discussions with the Forest Department and Archaeology Department to request that they declare their management boundaries and install checkpoints between their areas to increase the detection and prohibition of illegal activities occurring in the area. - Initiate dialogue with Temple Authority monks to discuss the potential development of a code of conduct for tourists. - Initiate discussions with Temple Authorities with regards to protecting the boundaries of the Strict Nature Reserve that occur within temple sites. 	<p>Mendis Wickramasingh and Suranjan Karunarathna</p> <p>Dulan Vidanapathirana</p> <p>Suranjan Karunarathna and Dulan Vidanapathirana</p>

A2P MUTLI-SPECIES BUNDLE	NO. OF THREATENED SPECIES	SUMMARY OF ACTIONS	A2P WORKSHOP PROJECT LEADS
		<ul style="list-style-type: none"> - Initiate discussions with the Ritigala Wildlife Museum, which is managed by the Wildlife Department, regarding the potential for increasing capacity and developing the venue as a conservation education centre with regards to the wildlife of the area. - Initiate discussions with local communities on developing a coordinated education programme (through a meeting with village leaders, in the first instance), focussing on increasing the awareness of threatened reptiles in the area and what practical actions villagers can do for their conservation. 	<p>Mendis Wickramasinghe and Dulan Vidanapathirana</p> <p>Suranjan Karunarathna, Dulan Vidanapathirana and Mendis Wickramasinghe</p>
Knuckles National Conservation Forest	19	<ul style="list-style-type: none"> - Present this finalised Sri Lanka snakes and lizards Red List, KBA and A2P workshop report to the Government Secretary and meet with Government Officials to discuss the results and the proposal to elevate the protected area status of the Knuckles national Conservation Forest. - Co-ordinate an associated international press release to raise awareness, globally. - Link with forest rangers, foresters and community based organisations to initiate discussions on developing a coordinated education programme to increase awareness of threatened reptiles in the area and what can be done for their conservation. 	<p>Anslem de Silva</p> <p>IUCN SSC, IUCN CPSG, IUCN-CI BAU, IUCN Sri Lanka, Sri Lanka reptile workshop participants</p> <p>Madhava Botejue and Dinesh Gabadage</p>

A2P MUTLI-SPECIES BUNDLE	NO. OF THREATENED SPECIES	SUMMARY OF ACTIONS	A2P WORKSHOP PROJECT LEADS
		<ul style="list-style-type: none"> - Subsequently, plan and develop a ‘train the trainer’ programme, to build capacity of forest rangers so they can provide education and awareness to tourists, local communities etc. - Explore and report back to workshop participants the possibility of extending the UNDP programme on sustainable to the Knuckles National Conservation Forest. - Link with existing Sri Lankan parliament research agenda and universities to initiate the idea of planning an integrated research and population monitoring plan regarding the impact of climate change and forest dieback. - WildLanka Symposium and UNDP small grant proposal. 	<p>Madhava Botejue, Dinesh Gabadage, Anslem de Silva, Sampath Goonatilake and Naalin Perera</p> <p>Sampath Goonatilake and Naalin Perera</p> <p>Sampath Goonatilake, Naalin Perera, Dulan Jayasekara, Kanishka Ukuwela, Mendis Wickramasinghe, Anslem de Silva</p> <p>Mendis Wickramasinghe</p>
Gannoruwa Forest Reserve	10	<ul style="list-style-type: none"> - Scope out and develop a proposal for a workshop to create a management plan for Gannoruwa Forest Reserve. - Co-ordinate and arrange a local community meeting to discuss the ideas of awareness-raising and re-introducing Kandian home gardens. 	Kanishka Ukuwela, Pradeep Samarawickrama

A2P MUTLI-SPECIES BUNDLE	NO. OF THREATENED SPECIES	SUMMARY OF ACTIONS	A2P WORKSHOP PROJECT LEADS
		<ul style="list-style-type: none"> - Arrange a meeting with GARC and Peradeniya University to discuss adopting more sustainable agriculture practices. 	
Nilgala complex	4	<ul style="list-style-type: none"> - Instigate a series of local community awareness programmes (see Goonewardene <i>et al.</i>, 2004 for info). - Promote reptiles and conservation in tourism by training local guides and communities. - Connect with Gal Oya Lodge to discuss developing their role as environmental educators and raising awareness on the wildlife of the area. This could include the lodge becoming a venue for training, involving the Forest Department, Wildlife Department, Police Environment Department, Archaeology Department and Development Authority. - Establish community societies to protect the environment and monitor illegal activities: pet trade, poaching, logging, forest fires. 	<p>Dinal Samarasinghe, Madhava Botejue and Suranjan Karunarathna</p> <p>Suranjan Karunarathna</p> <p>Dinal Samarasinghe</p> <p>Dinal Samarasinghe, Madhava Botejue, Suranjan Karunarathna</p>
Peak Wilderness Sanctuary complex	22	<ul style="list-style-type: none"> - Discuss, plan and implement a comprehensive series of awareness workshops for tour guides and wildlife / forest guides, in collaboration with the Department of Wildlife. 	Anslem de Silva
Kalupahana (Uva Province)	7	<ul style="list-style-type: none"> - Community reptile awareness workshops to be coordinated and organised. 	Dinesh Gabadage to follow up with Sandun (Sabaragamuwa University)

A2P MUTLI-SPECIES BUNDLE	NO. OF THREATENED SPECIES	SUMMARY OF ACTIONS	A2P WORKSHOP PROJECT LEADS
		<ul style="list-style-type: none"> - Establish which tea companies are operating within the area and investigate their levels of conservation orientation. Based on their comments and interest, plan for a workshop with plantation companies and other agricultural practitioners to develop an agricultural best practice strategy for the southern Kalupahana area. This will need to include the identification of key experts from both the [reptile] conservation and agricultural fields to involve in the process, as well as wider stakeholders. 	
Morningside and Handapan Ella Plains (Sinharaja IBA)	22	<ul style="list-style-type: none"> - Organise a workshop for the Morningside and Handapan Ella Plains KBA, with key stakeholders and collaborators, to develop a strategy for instigating the conservation needs identified. 	Dulan Jayasekara, Dinal Samarasinghe, Mendis Wickramasinghe, Dulan Vidanapathirana and Dinesh Gabadage.
Enasalwatta	9	<ul style="list-style-type: none"> - Check with Forest Department about the numbers and locations of abandoned tea plantations. - Initiate dialogue with Forest department and local communities regarding establishing a re-planting programme to re-forest abandoned tea plantations. - Educate and train Forest Department staff about threatened reptile species. - Raise awareness within Forest Department, local communities and tourism operators. 	<p>Madhava Botejue</p> <p>Madhava Botejue</p> <p>Dulan Vidanapathirana</p> <p>Dulan Vidanapathirana</p>

A2P MUTLI-SPECIES BUNDLE	NO. OF THREATENED SPECIES	SUMMARY OF ACTIONS	A2P WORKSHOP PROJECT LEADS
		- Provide the community conservation organisation 'Sinharaja Green Friends' (located at Vihavahena Village, 10km away from Enasalwatta) with scientific training, education and directional support, so they can become guardians of Enasalwatta.	Dulan Vidanapathirana
Rammalekanda Forest Reserve	3	- Initiate talks with the Young People's Organisation and Nature School Foundation about threatened reptiles in the area and the importance of <i>Cnemaspis rammalensis</i> . - Initiate talks with the Young People's Organisation and Nature School Foundation about planning and developing a campaign to adopt <i>Cnemaspis rammalensis</i> as a flagship species for the area.	Suneth Kannishka, Dulan Vidanapathirana, Mendis Wickramasinghe Suneth Kannishka, Dulan Vidanapathirana, Mendis Wickramasinghe
Persecution of snakes	6	- Hold a workshop to develop a nation-wide snake awareness and publicity campaign strategy.	Anslem de Silva – Snakebite Expert Committee of the Sri Lanka Medical Association is conducting awareness programmes for doctors and the public A. A. Thasun Amarasinghe, Suranjan Karunarathna, Dinesh Gabadage, Madhava Botejue and Mendis Wickramasinghe
Collection of reptiles for the international pet trade	11	- Plan a workshop for 2020 to develop an integrated strategy for the effective management of the illegal Sri Lankan pet trade, involving all relevant stakeholders.	Dinal Samarasinghe, A. A. Thasun Amarasinghe with BDS (Ms. Chanuka)

A2P MUTLI-SPECIES BUNDLE	NO. OF THREATENED SPECIES	SUMMARY OF ACTIONS	A2P WORKSHOP PROJECT LEADS
Intensive care for <i>Aspidura ravanai</i>	1	<ul style="list-style-type: none"> - Organise a meeting between key potential collaborators and stakeholders to discuss options for and feasibility of establishing and maintaining captive insurance population(s) of this species, including identifying the purpose, length and intended outcome of the programme. 	Sanjay Molur, Mendis Wickramasinghe, Dulan Vidanapathirana, Suranjan Karunarathna, Kanishka Ukuwela
Intensive care for <i>Nessia layardi</i>	1	<ul style="list-style-type: none"> - Install a predator proof fence around site where this species has been recorded most recently and instigate a monitoring programme for this species. - Investigate opportunities for a seed grant to establish the predator proof fence and monitoring programme. - Organise a meeting between key potential collaborators and stakeholders to discuss options for and feasibility of establishing and maintaining captive insurance population(s) of this species, including identifying the purpose, length and intended outcome of the programme. 	<p>Anslem de Silva and Curator of Zoology Museum of Jayawardena Pura (who lives close to the park and has conducted previous research at the known location of this species).</p> <p>Anslem de Silva</p> <p>Sanjay Molur, Kanishka Ukuwela, Anslem de Silva, Mendis Wickramasinghe</p>

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APPENDIX I

The 169 species of snakes and lizards assessed during the Sri Lankan IUCN Red List workshop.

The 102 species provisionally assessed as threatened are shaded (CR = red, EN = gold, VU = pale yellow). The 17 species assessed as Data Deficient are shaded in grey. The IUCN Red List website should be consulted for the final species assessment category and documentation, once assessments have been accepted and published.

Family	Species	IUCN RL category
AGAMIDAE	<i>Ceratophora erdeleni</i>	CR
	<i>Ceratophora karu</i>	CR
	<i>Cophotis dumbara</i>	CR
	<i>Calotes desilvai</i>	CR
	<i>Ceratophora aspera</i>	EN
	<i>Sitana bahiri</i>	EN
	<i>Ceratophora tennentii</i>	EN
	<i>Calotes manamendrai</i>	EN
	<i>Calotes pethiyagodai</i>	EN
	<i>Calotes nigrilabris</i>	EN
	<i>Ceratophora stoddartii</i>	EN
	<i>Cophotis ceylanica</i>	EN
	<i>Calotes liocephalus</i>	EN
	<i>Lyriocephalus scutatus</i>	VU
	<i>Sitana devakai</i>	VU
	<i>Otocryptis nigristigma</i>	LC
	<i>Otocryptis wiegmanni</i>	LC
	<i>Calotes liolepis</i>	LC
	<i>Calotes ceylonensis</i>	LC
<i>Calotes calotes</i>	LC	
BOIDAE	<i>Eryx conicus</i>	NT
COLUBRIDAE	<i>Oligodon calamarius</i>	EN
	<i>Dendrelaphis sinharajensis</i>	EN
	<i>Lycodon carinatus</i>	EN
	<i>Oligodon sublineatus</i>	VU
	<i>Boiga barnesii</i>	VU
	<i>Dendrelaphis schokari</i>	VU
	<i>Dendrelaphis caudolineolatus</i>	VU
	<i>Sibynophis subpunctatus</i>	LC
	<i>Lycodon anamallensis</i>	LC
	<i>Lycodon nympha</i>	LC
	<i>Dendrelaphis tristis</i>	LC
	<i>Liopeltis calamaria</i>	LC

Family	Species	IUCN RL category
	<i>Boiga forsteni</i>	LC
	<i>Boiga beddomei</i>	LC
	<i>Chrysopelea taprobanica</i>	LC
	<i>Lycodon aulicus</i>	LC
	<i>Dendrelaphis bifrenalis</i>	LC
	<i>Argyrogena fasciolata</i>	LC
	<i>Boiga ceylonensis</i>	LC
	<i>Coelognathus helena</i>	LC
	<i>Ahaetulla pulverulenta</i>	LC
	<i>Dendrelaphis oliveri</i>	DD
	<i>Lycodon gracilis</i>	DD
CYLINDROPHIIDAE	<i>Cylindrophis maculatus</i>	VU
ELAPIDAE	<i>Calliophis haematoetron</i>	EN
	<i>Bungarus ceylonicus</i>	NT
	<i>Naja naja</i>	LC
	<i>Bungarus caeruleus</i>	LC
	<i>Calliophis melanurus</i>	LC
GEKKONIDAE	<i>Cnemaspis godagedarai</i>	CR
	<i>Cnemaspis kohukumburai</i>	CR
	<i>Cnemaspis rammalensis</i>	CR
	<i>Cnemaspis hitihamii</i>	CR
	<i>Cnemaspis latha</i>	CR
	<i>Cnemaspis menikay</i>	CR
	<i>Cnemaspis ingerorum</i>	CR
	<i>Cnemaspis phillipsi</i>	CR
	<i>Cnemaspis butewai</i>	CR
	<i>Cnemaspis samanalensis</i>	CR
	<i>Cnemaspis retigalensis</i>	CR
	<i>Cnemaspis scalpensis</i>	CR
	<i>Cnemaspis nilgala</i>	CR
	<i>Cyrtodactylus ramboda</i>	CR
	<i>Cnemaspis tropidogaster</i>	CR
	<i>Cnemaspis gotaimbarai</i>	CR
	<i>Cnemaspis nandimithrai</i>	CR
	<i>Cnemaspis rajakarunai</i>	CR
	<i>Cnemaspis kivulegedarai</i>	EN
	<i>Hemidactylus scabriceps</i>	EN
	<i>Cnemaspis alwisi</i>	EN
	<i>Cnemaspis kallima</i>	EN
	<i>Cnemaspis kumarasinghei</i>	EN
	<i>Cnemaspis molligodai</i>	EN
	<i>Cnemaspis punctata</i>	EN
	<i>Cnemaspis pulchra</i>	EN
	<i>Hemidactylus pieresii</i>	EN

Family	Species	IUCN RL category
	<i>Cyrtodactylus fraenatus</i>	EN
	<i>Cyrtodactylus edwardtaylori</i>	EN
	<i>Cyrtodactylus subsolanus</i>	EN
	<i>Cnemaspis kandiana</i>	EN
	<i>Hemidactylus hunae</i>	EN
	<i>Cyrtodactylus yakhuna</i>	VU
	<i>Calodactylodes illingworthorum</i>	VU
	<i>Cnemaspis gemunu</i>	VU
	<i>Cnemaspis upendrai</i>	VU
	<i>Cyrtodactylus soba</i>	VU
	<i>Cnemaspis anslemi</i>	VU
	<i>Cnemaspis podihuna</i>	VU
	<i>Cnemaspis pava</i>	NT
	<i>Cyrtodactylus cracens</i>	NT
	<i>Cyrtodactylus triedrus</i>	NT
	<i>Cnemaspis silvula</i>	LC
	<i>Hemidactylus depresus</i>	LC
<i>Hemidactylus leschenaultii</i>	LC	
<i>Cnemaspis kandambyi</i>	DD	
<i>Cnemaspis amith</i>	DD	
GERRHOPILIDAE	<i>Gerrhopilus mirus</i>	CR
	<i>Gerrhopilus ceylonicus</i>	EN
LACERTIDAE	<i>Ophisops minor</i>	LC
	<i>Ophisops leschenaultii</i>	LC
NATRICIDAE	<i>Aspidura desilvai</i>	CR
	<i>Aspidura deraniyagalae</i>	CR
	<i>Aspidura ravanai</i>	CR
	<i>Rhabdophis ceylonensis</i>	EN
	<i>Aspidura trachyprocta</i>	EN
	<i>Aspidura drummondhayi</i>	EN
	<i>Aspidura copei</i>	EN
	<i>Aspidura ceylonensis</i>	VU
	<i>Aspidura guentheri</i>	VU
	<i>Aspidura brachyorrhos</i>	VU
	<i>Rhabdophis plumbicolor</i>	LC
<i>Atretium schistosum</i>	LC	
<i>Xenochrophis asperrimus</i>	LC	
SCINCIDAE	<i>Nessia layardi</i>	CR
	<i>Lankascincus deignani</i>	CR
	<i>Nessia monodactyla</i>	EN
	<i>Nessia hickanala</i>	EN
	<i>Nessia didactyla</i>	EN
	<i>Nessia bipes</i>	EN
<i>Lankascincus sripadensis</i>	EN	

Family	Species	IUCN RL category
	<i>Lankascincus greeri</i>	EN
	<i>Chalcidoseps thwaitesi</i>	EN
	<i>Lankascincus taprobanensis</i>	EN
	<i>Lankascincus taylori</i>	VU
	<i>Nessia sarasinorum</i>	VU
	<i>Dasia haliana</i>	VU
	<i>Eutropis bibronii</i>	NT
	<i>Nessia burtonii</i>	NT
	<i>Nessia gansi</i>	NT
	<i>Lankascincus gansi</i>	LC
	<i>Lankascincus fallax</i>	LC
	<i>Eutropis tammanna</i>	LC
	<i>Lankascincus megalops</i>	LC
	<i>Lankascincus dorsicatenatus</i>	LC
	<i>Eutropis madaraszi</i>	LC
	<i>Eutropis beddomei</i>	LC
	<i>Eutropis greeri</i>	DD
	<i>Lygosoma singha</i>	DD
	<i>Nessia deraniyagalai</i>	DD
	<i>Eutropis austini</i>	DD
<i>Eutropis floweri</i>	DD	
TYPHLOPIDAE	<i>Indotyphlops leucomelas</i>	CR
	<i>Indotyphlops lankaensis</i>	CR
	<i>Indotyphlops malcolmi</i>	EN
	<i>Indotyphlops violaceus</i>	DD
	<i>Indotyphlops veddae</i>	DD
	<i>Indotyphlops tenebrarum</i>	DD
UROPELTIDAE	<i>Rhinophis erangaviraji</i>	CR
	<i>Rhinophis phillipsi</i>	CR
	<i>Rhinophis roshanpererai</i>	CR
	<i>Rhinophis porrectus</i>	EN
	<i>Rhinophis melanogaster</i>	EN
	<i>Rhinophis tricoloratus</i>	EN
	<i>Rhinophis dorsimaculatus</i>	EN
	<i>Rhinophis philippinus</i>	EN
	<i>Rhinophis homolepis</i>	EN
	<i>Rhinophis blythii</i>	EN
	<i>Rhinophis drummondhayi</i>	EN
	<i>Rhinophis saffragamus</i>	VU
	<i>Rhinophis punctatus</i>	DD
	<i>Rhinophis oxyrhynchus</i>	DD
<i>Rhinophis lineatus</i>	DD	
<i>Rhinophis zigzag</i>	DD	
VIPERIDAE	<i>Hypnale nepa</i>	EN

Family	Species	IUCN RL category
	<i>Hypnale zara</i>	NT
	<i>Trimeresurus trionocephalus</i>	LC
	<i>Daboia russelii</i>	LC
	<i>Hypnale hypnale</i>	LC

APPENDIX II

Participants of the IUCN Red List Assessment, Key Biodiversity Areas and Assess to Plan workshop, 14 – 19 September 2019

NAME	ORGANISATION
Abyerami Sivaruban	University of Jaffna
Anslém de Silva	Amphibia and Reptile Research Organization of Sri Lanka
Claudine Gibson	IUCN SSC Conservation Planning Specialist Group
Dinal Samarasinghe	Environmental Foundation Limited, Sri Lanka
Dinesh Gabadage	Biodiversity Conservation Society, Sri Lanka
Dulan Jayasekara	University of Sri Jayewardenepura
Dulan Vidanapathirana	Herpetological Foundation of Sri Lanka
Dushantha Kandambi	University of Colombo
Kanishka Ukuwela	Rajarata University
Linda Susan Hodges	Amphibia and Reptile Research Organization
Madhava Botejue	Biodiversity Conservation Society, Sri Lanka
Majintha Madawala	Nature Exploration and Education Team
Marcelo Fabio Tognelli	IUCN-CI Biodiversity Assessment Unit
Mendis Wickramasinghe	Herpetological Foundation of Sri Lanka
Naalin Perera	IUCN, Sri Lanka
Nayana Wijayathilaka	University of Sri Jayewardenepura
Neil Ashley Cox	IUCN-CI Biodiversity Assessment Unit
Nethu Wickramasinghe	Herpetological Foundation of Sri Lanka
Philip Michael Bowles	IUCN-CI Biodiversity Assessment Unit
Pradeep Samarawickrama	Edverd & Christie Pvt Ltd.
Priyanka Iyer	Zoo Outreach Organisation
Sampath Goonatilake	IUCN, Sri Lanka
Sanjaya Karunarathna	IUCN, Sri Lanka

NAME	ORGANISATION
R.V. Sanjay Molur	Zoo Outreach Organisation
Shanelle Wikramanayake	Undergraduate, University of Washington
Suneth Kannishka	Young Zoologists Association, Sri Lanka
Suraj Goonewardene	Amphibia and Reptile Research Organization
Suranjan Karunarathna	Nature Exploration and Education Team
S.R. Ganesh	Chennai Snake Park
A.A. Thasun Amarasinghe	University of Indonesia
Vishan Pushpamal	Wildlife Conservation Society, Sri Lanka

APPENDIX III

Summary of the 33 Key Biodiversity Areas (KBAs) proposed for the inclusion of 105 reptile species.

No.	KBA name	Newly delineated or existing KBA	No. of species included	Species names	RL cat
1	Bambarabotuwa and Massienna	New	1	<i>Cnemaspis butewai</i>	CR
2	Beralihela	New	1	<i>Cnemaspis ingerorum</i>	CR
3	Dolukanda Conservation Forest	Existing	5	<i>Calliophis haematoetron</i>	EN
				<i>Cnemaspis alwisi</i>	EN
				<i>Nessia bipes</i>	EN
				<i>Lankascincus taylori</i>	VU
				<i>Lyriocephalus scutatus</i>	VU
4	Enasalwatta	New	9	<i>Calotes desilvai</i>	CR
				<i>Ceratophora erdeleni</i>	CR
				<i>Ceratophora karu</i>	CR
				<i>Cnemaspis godagedarai</i>	CR
				<i>Rhinophis erangaviraji</i>	CR
				<i>Cnemaspis pulchra</i>	EN
				<i>Cyrtodactylus subsolanus</i>	EN
				<i>Lyriocephalus scutatus</i>	VU
				<i>Aspidura guentheri</i>	VU
5	Gammaduwa	New	4	<i>Rhinophis phillipsi</i>	CR
				<i>Cnemaspis kallima</i>	EN
				<i>Cnemaspis phillipsi</i>	EN
				<i>Cnemaspis punctata</i>	EN
6	Gannoruua Forest Reserve	Existing	10	<i>Cnemaspis scalpensis</i>	CR
				<i>Lankascincus deignani</i>	CR
				<i>Cyrtodactylus fraenatus</i>	EN
				<i>Gerrhopilus ceylonicus</i>	EN
				<i>Hemidactylus pieresii</i>	EN
				<i>Aspidura brachyorrhos</i>	VU
				<i>Aspidura ceylonensis</i>	VU
				<i>Boiga barnesii</i>	VU
				<i>Lankascincus taylori</i>	VU
7	Garendi Ella	New	1	<i>Cyrtodactylus ramboda</i>	EN
8	Gilimale-Eratna	Existing	13	<i>Ceratophora aspera</i>	EN
				<i>Lycodon carinatus</i>	EN
				<i>Nessia didactyla</i>	EN
				<i>Oligodon calamarius</i>	EN
				<i>Rhinophis homolepis</i>	EN
				<i>Aspidura brachyorrhos</i>	VU
				<i>Aspidura ceylonensis</i>	VU

No.	KBA name	Newly delineated or existing KBA	No. of species included	Species names	RL cat
				<i>Aspidura guentheri</i>	VU
				<i>Boiga barnesii</i>	VU
				<i>Cylindrophis maculatus</i>	VU
				<i>Dendrelaphis caudolineolatus</i>	VU
				<i>Lyriocephalus scutatus</i>	VU
				<i>Oligodon sublineatus</i>	VU
9	Horagolla National Park	New	2	<i>Nessia layardi</i>	CR
				<i>Nessia burtonii</i>	NT
10	Ihala Kalugala	New	1	<i>Cnemaspis menikay</i>	CR
11	Kadugannawa	New	1	<i>Cnemaspis kohukumburai</i>	CR
12	Kalupahana	Existing	7	<i>Rhinophis roshanpererai</i>	CR
				<i>Aspidura trachyprocta</i>	EN
				<i>Calotes nigrilabris</i>	EN
				<i>Ceratophora stoddartii</i>	EN
				<i>Cyrtodactylus edwardtaylori</i>	EN
				<i>Lankascincus taprobanensis</i>	EN
				<i>Rhinophis drummondhayi</i>	EN
13	Kandapola Sita Eliya Forest Reserve	New	4	<i>Aspidura trachyprocta</i>	EN
				<i>Ceratophora stoddartii</i>	EN
				<i>Cophotis ceylanica</i>	EN
				<i>Cnemaspis gemunu</i>	VU
14	Kanneliya-Dediyagala-Nakiyadeniya Complex	Existing	9	<i>Indotyphlops leucomelas</i>	CR
				<i>Dendrelaphis sinharajensis</i>	EN
				<i>Lycodon carinatus</i>	EN
				<i>Oligodon calamarius</i>	EN
				<i>Rhabdophis ceylonensis</i>	EN
				<i>Rhinophis tricoloratus</i>	EN
				<i>Dendrelaphis schokari</i>	VU
				<i>Lyriocephalus scutatus</i>	VU
				<i>Oligodon sublineatus</i>	VU
15	Kegalle Sanctuary	New	5	<i>Nessia didactyla</i>	EN
				<i>Aspidura brachyorrhos</i>	VU
				<i>Aspidura guentheri</i>	VU
				<i>Dendrelaphis caudolineolatus</i>	VU
16	Knuckles Range extension	Existing	20	<i>Aspidura desilvai</i>	CR
				<i>Cophotis dumbara</i>	CR
				<i>Ceratophora tennentii</i>	EN
				<i>Calotes pethiyagodai</i>	EN
				<i>Calotes manamendrai</i>	EN
				<i>Calliophis haematoetron</i>	EN
				<i>Nessia bipes</i>	EN
				<i>Hypnale nepa</i>	EN
				<i>Cnemaspis phillipsi</i>	EN
				<i>Cnemaspis punctata</i>	EN
				<i>Chalcidoseps thwaitesi</i>	EN

No.	KBA name	Newly delineated or existing KBA	No. of species included	Species names	RL cat
				<i>Aspidura ceylonensis</i>	VU
				<i>Aspidura brachyorrhos</i>	VU
				<i>Nessia sarasinorum</i>	VU
				<i>Lankascincus taylori</i>	VU
				<i>Dendrelaphis schokari</i>	VU
				<i>Cyrtodactylus soba</i>	VU
				<i>Dendrelaphis caudolineolatus</i>	VU
				<i>Lyriocephalus scutatus</i>	VU
				<i>Cnemaspis kallima</i>	NT
17	Kokagala Reserve Forest	Existing	3	<i>Cnemaspis gotaimbarai</i>	CR
				<i>Calodactylodes illingworthorum</i>	VU
				<i>Rhinophis saffragamus</i>	VU
18	Kumana-Kudumbigala	New	5	<i>Cnemaspis nandimithrai</i>	CR
				<i>Hemidactylus hunae</i>	EN
				<i>Sitana bahiri</i>	EN
				<i>Calodactylodes illingworthorum</i>	VU
19	Lenagala Reserved Forest expanded	New	2	<i>Cnemaspis rajakarunai</i>	CR
				<i>Rhabdophis ceylonensis</i>	EN
20	Maragala	New	7	<i>Cnemaspis hitihamii</i>	CR
				<i>Cnemaspis kumarasinghei</i>	EN
				<i>Hemidactylus hunae</i>	EN
				<i>Cnemaspis podihuna</i>	VU
				<i>Cylindrophis maculatus</i>	VU
				<i>Aspidura brachyorrhos</i>	VU
				<i>Calodactylodes illingworthorum</i>	VU
21	Morningside and Handapan Ella Plains	Existing	24	<i>Calotes desilvai</i>	CR
				<i>Ceratophora erdeleni</i>	CR
				<i>Ceratophora karu</i>	CR
				<i>Cylindrophis maculatus</i>	CR
				<i>Aspidura drummondhayi</i>	EN
				<i>Ceratophora aspera</i>	EN
				<i>Cnemaspis molligodai</i>	EN
				<i>Dendrelaphis sinharajensis</i>	EN
				<i>Hemidactylus pieresii</i>	EN
				<i>Lankascincus greeri</i>	EN
				<i>Lycodon carinatus</i>	EN
				<i>Oligodon calamarius</i>	EN
				<i>Rhabdophis ceylonensis</i>	EN
				<i>Rhinophis tricoloratus</i>	EN
				<i>Aspidura brachyorrhos</i>	VU
				<i>Aspidura guentheri</i>	VU
				<i>Boiga barnesii</i>	VU
				<i>Dendrelaphis caudolineolatus</i>	VU
				<i>Dendrelaphis schokari</i>	VU
				<i>Lankascincus taylori</i>	VU

No.	KBA name	Newly delineated or existing KBA	No. of species included	Species names	RL cat
				<i>Oligodon sublineatus</i>	VU
				<i>Lyriocephalus scutatus</i>	VU
				<i>Cyrtodactylus cracens</i>	NT
				<i>Nessia gansi</i>	NT
22	Namanukula	New	5	<i>Aspidura deraniyagalae</i>	CR
				<i>Gerrhopilus mirus</i>	CR
				<i>Cnemaspis kumarasinghei</i>	EN
				<i>Cyrtodactylus edwardtaylori</i>	EN
				<i>Lankascincus taylori</i>	VU
23	Nilaveli	New	5	<i>Indotyphlops lankaensis</i>	CR
				<i>Indotyphlops malcolmi</i>	EN
				<i>Indotyphlops tenebrarum</i>	DD
				<i>Indotyphlops veddae</i>	DD
				<i>Indotyphlops violaceus</i>	DD
24	Nilgala	New	4	<i>Cnemaspis nilgala</i>	CR
				<i>Hemidactylus hunae</i>	EN
				<i>Nessia sarasinorum</i>	VU
				<i>Aspidura brachyorrhos</i>	VU
25	Pilikuttuwa and Maligatenna	New	1	<i>Cnemaspis tropidogaster</i>	CR
26	Peak Wilderness Sanctuary	Existing	23	<i>Aspidura ravanai</i>	CR
				<i>Cnemaspis samanalensis</i>	CR
				<i>Aspidura copei</i>	EN
				<i>Aspidura trachyprocta</i>	EN
				<i>Calotes liocephalus</i>	EN
				<i>Calotes nigrilabris</i>	EN
				<i>Ceratophora aspera</i>	EN
				<i>Ceratophora stoddartii</i>	EN
				<i>Cophotis ceylanica</i>	EN
				<i>Hypnale nepa</i>	EN
				<i>Lankascincus sripadensis</i>	EN
				<i>Lankascincus taprobanensis</i>	EN
				<i>Rhabdophis ceylonensis</i>	EN
				<i>Rhinophis blythii</i>	EN
				<i>Lyriocephalus scutatus</i>	EN
				<i>Aspidura brachyorrhos</i>	VU
				<i>Aspidura ceylonensis</i>	VU
				<i>Aspidura guentheri</i>	VU
				<i>Cnemaspis anslemi</i>	VU
				<i>Cylindrophis maculatus</i>	VU
				<i>Dendrelaphis caudolineolatus</i>	VU
				<i>Dendrelaphis schokari</i>	VU
				<i>Nessia burtonii</i>	NT
27	Rammalekanda Forest Reserve	Existing	3	<i>Indotyphlops leucomelas</i>	CR
				<i>Cnemaspis rammalensis</i>	CR
				<i>Aspidura guentheri</i>	VU

No.	KBA name	Newly delineated or existing KBA	No. of species included	Species names	RL cat
28	Ramboda	New	2	<i>Cyrtodactylus ramboda</i>	EN
				<i>Cnemaspis upendrai</i>	VU
29	Rattota	Existing	5	<i>Rhinophis philippinus</i>	EN
				<i>Calliophis haematoetron</i>	EN
				<i>Ceratophora tennentii</i>	EN
				<i>Aspidura brachyorrhos</i>	VU
				<i>Dendrelaphis caudolineolatus</i>	VU
30	Ritigala	New	6	<i>Cnemaspis ritigalensis</i>	CR
				<i>Nessia bipes</i>	EN
				<i>Aspidura brachyorrhos</i>	VU
				<i>Cylindrophis maculatus</i>	VU
				<i>Nessia sarasinorum</i>	VU
				<i>Oligodon sublineatus</i>	VU
31	Udawattakele Wildlife Sanctuary	Existing	3	<i>Gerrhopilus ceylonicus</i>	EN
				<i>Nessia monodactyla</i>	EN
				<i>Aspidura brachyorrhos</i>	VU
32	Victoria Randenigala Rantambe extension	New	1	<i>Cnemaspis kivulegedarai</i>	EN
33	Wilpattu Complex	New	4	<i>Nessia hickanala</i>	EN
				<i>Rhinophis dorsimaculatus</i>	EN
				<i>Rhinophis porrectus</i>	EN
				<i>Cylindrophis maculatus</i>	VU

APPENDIX IV

Summary of A2P species buckets for threatened Sri Lankan snakes and lizards (n=102).

THREAT		SITE		HABITAT		INTENSIVE CARE		SINGLE SPECIES
		<i>Aspidura ravanai</i>	CR	<i>Aspidura ravanai</i>	CR	<i>Aspidura ravanai</i>	CR	
<i>Ceratophora karu</i>	CR	<i>Ceratophora karu</i>	CR	<i>Ceratophora karu</i>	CR			
<i>Cophotis dumbara</i>	CR	<i>Cophotis dumbara</i>	CR	<i>Cophotis dumbara</i>	CR			
<i>Cnemaspis rammalensis</i>	CR	<i>Cnemaspis rammalensis</i>	CR	<i>Cnemaspis rammalensis</i>	CR			
<i>Cnemaspis scalpensis</i>	CR	<i>Cnemaspis scalpensis</i>	CR	<i>Cnemaspis scalpensis</i>	CR			
<i>Ceratophora aspera</i>	EN	<i>Ceratophora aspera</i>	EN	<i>Ceratophora aspera</i>	EN			
<i>Calodactylodes illingworthorum</i>	VU	<i>Calodactylodes illingworthorum</i>	VU	<i>Calodactylodes illingworthorum</i>	VU			
<i>Dasia haliana</i>	VU	<i>Dasia haliana</i>	VU	<i>Dasia haliana</i>	VU			
		<i>Nessia layardi</i>	CR			<i>Nessia layardi</i>	CR	
<i>Gerrhopilus mirus</i>	CR	<i>Gerrhopilus mirus</i>	CR					
<i>Calotes nigrilabris</i>	EN	<i>Calotes nigrilabris</i>	EN					
<i>Ceratophora tennentii</i>	EN	<i>Ceratophora tennentii</i>	EN					
<i>Calotes liocephalus</i>	EN	<i>Calotes liocephalus</i>	EN					
<i>Calotes pethiyagodai</i>	EN	<i>Calotes pethiyagodai</i>	EN					
<i>Ceratophora stoddartii</i>	EN	<i>Ceratophora stoddartii</i>	EN					
<i>Cophotis ceylanica</i>	EN	<i>Cophotis ceylanica</i>	EN					
<i>Cyrtodactylus fraenatus</i>	EN	<i>Cyrtodactylus fraenatus</i>	EN					
<i>Gerrhopilus ceylonicus</i>	EN	<i>Gerrhopilus ceylonicus</i>	EN					
<i>Hypnale nepa</i>	EN	<i>Hypnale nepa</i>	EN					
<i>Rhinophis homolepis</i>	EN	<i>Rhinophis homolepis</i>	EN					
<i>Lyriocephalus scutatus</i>	VU	<i>Lyriocephalus scutatus</i>	VU					
<i>Oligodon sublineatus</i>	VU	<i>Oligodon sublineatus</i>	VU					
<i>Boiga barnesii</i>	VU	<i>Boiga barnesii</i>	VU					
<i>Dendrelaphis schokari</i>	VU	<i>Dendrelaphis schokari</i>	VU					
<i>Dendrelaphis caudolineolatus</i>	VU	<i>Dendrelaphis caudolineolatus</i>	VU					
<i>Cylindrophis maculatus</i>	VU	<i>Cylindrophis maculatus</i>	VU					
<i>Cyrtodactylus soba</i>	VU	<i>Cyrtodactylus soba</i>	VU					
<i>Cyrtodactylus yakhuna</i>	VU	<i>Cyrtodactylus yakhuna</i>	VU					
		<i>Ceratophora erdeleni</i>	CR	<i>Ceratophora erdeleni</i>	CR			
		<i>Cnemaspis kohukumburai</i>	CR	<i>Cnemaspis kohukumburai</i>	CR			
		<i>Cnemaspis ingerorum</i>	CR	<i>Cnemaspis ingerorum</i>	CR			
		<i>Cnemaspis phillipsi</i>	CR	<i>Cnemaspis phillipsi</i>	CR			
		<i>Cnemaspis butewai</i>	CR	<i>Cnemaspis butewai</i>	CR			
		<i>Cnemaspis samanalensis</i>	CR	<i>Cnemaspis samanalensis</i>	CR			
		<i>Cnemaspis nilgala</i>	CR	<i>Cnemaspis nilgala</i>	CR			
		<i>Cnemaspis tropidogaster</i>	CR	<i>Cnemaspis tropidogaster</i>	CR			
		<i>Cnemaspis gotaimbarai</i>	CR	<i>Cnemaspis gotaimbarai</i>	CR			
		<i>Cnemaspis nandimithrai</i>	CR	<i>Cnemaspis nandimithrai</i>	CR			
		<i>Aspidura desilvai</i>	CR	<i>Aspidura desilvai</i>	CR			
		<i>Aspidura deraniyagalae</i>	CR	<i>Aspidura deraniyagalae</i>	CR			

THREAT	SITE	HABITAT	INTENSIVE CARE	SINGLE SPECIES
	<i>Indotyphlops leucomelas</i>	CR	<i>Indotyphlops leucomelas</i>	CR
	<i>Calliophis haematoetron</i>	EN	<i>Calliophis haematoetron</i>	EN
	<i>Cnemaspis alwisi</i>	EN	<i>Cnemaspis alwisi</i>	EN
	<i>Cnemaspis kivulegedarai</i>	EN	<i>Cnemaspis kivulegedarai</i>	EN
	<i>Cnemaspis molligodai</i>	EN	<i>Cnemaspis molligodai</i>	EN
	<i>Cnemaspis punctata</i>	EN	<i>Cnemaspis punctata</i>	EN
	<i>Dendrelaphis sinharajensis</i>	EN	<i>Dendrelaphis sinharajensis</i>	EN
	<i>Hemidactylus hunae</i>	EN	<i>Hemidactylus hunae</i>	EN
	<i>Hemidactylus pieresii</i>	EN	<i>Hemidactylus pieresii</i>	EN
	<i>Lankascincus greeri</i>	EN	<i>Lankascincus greeri</i>	EN
	<i>Lycodon carinatus</i>	EN	<i>Lycodon carinatus</i>	EN
	<i>Nessia hickanala</i>	EN	<i>Nessia hickanala</i>	EN
	<i>Oligodon calamarius</i>	EN	<i>Oligodon calamarius</i>	EN
	<i>Rhabdophis ceylonensis</i>	EN	<i>Rhabdophis ceylonensis</i>	EN
	<i>Rhinophis dorsimaculatus</i>	EN	<i>Rhinophis dorsimaculatus</i>	EN
	<i>Rhinophis porrectus</i>	EN	<i>Rhinophis porrectus</i>	EN
	<i>Rhinophis tricoloratus</i>	EN	<i>Rhinophis tricoloratus</i>	EN
	<i>Sitana bahiri</i>	EN	<i>Sitana bahiri</i>	EN
	<i>Cnemaspis podihuna</i>	VU	<i>Cnemaspis podihuna</i>	VU
	<i>Cnemaspis upendrai</i>	VU	<i>Cnemaspis upendrai</i>	VU
	<i>Sitana devakai</i>	VU	<i>Sitana devakai</i>	VU
	<i>Calotes desilvai</i>	CR		
	<i>Cnemaspis godagedarai</i>	CR		
	<i>Cnemaspis hitihamii</i>	CR		
	<i>Cnemaspis latha</i>	CR		
	<i>Cnemaspis menikay</i>	CR		
	<i>Cnemaspis rajakarunai</i>	CR		
	<i>Cnemaspis retigalensis</i>	CR		
	<i>Indotyphlops lankaensis</i>	CR		
	<i>Lankascincus deignani</i>	CR		
	<i>Rhinophis erangaviraji</i>	CR		
	<i>Rhinophis phillipsi</i>	CR		
	<i>Rhinophis roshanpererai</i>	CR		
	<i>Aspidura copei</i>	EN		
	<i>Aspidura drummondhayi</i>	EN		
	<i>Aspidura trachyrocta</i>	EN		
	<i>Calotes manamendrai</i>	EN		
	<i>Chalcidoseps thwaitesi</i>	EN		
	<i>Cnemaspis kallima</i>	EN		
	<i>Cnemaspis kumarasinghei</i>	EN		
	<i>Cnemaspis pulchra</i>	EN		
	<i>Cyrtodactylus edwardtaylori</i>	EN		
	<i>Cyrtodactylus ramboda</i>	EN		
	<i>Cyrtodactylus subsolanus</i>	EN		
	<i>Hemidactylus scabriceps</i>	EN		
	<i>Indotyphlops malcolmi</i>	EN		

THREAT	SITE	HABITAT	INTENSIVE CARE	SINGLE SPECIES
	<i>Lankascincus sripadensis</i> EN			
	<i>Lankascincus taprobanensis</i> EN			
	<i>Nessia bipes</i> EN			
	<i>Nessia didactyla</i> EN			
	<i>Nessia monodactyla</i> EN			
	<i>Rhinophis blythii</i> EN			
	<i>Rhinophis drummondhayi</i> EN			
	<i>Rhinophis philippinus</i> EN			
	<i>Aspidura brachyorrhos</i> VU			
	<i>Aspidura ceylonensis</i> VU			
	<i>Aspidura guentheri</i> VU			
	<i>Cnemaspis anslemi</i> VU			
	<i>Cnemaspis gemunu</i> VU			
	<i>Lankascincus taylori</i> VU			
	<i>Nessia sarasinorum</i> VU			
	<i>Rhinophis saffragamus</i> VU			
26 species	102 species	41 species	2 species	0 species

APPENDIX V

A2P conservation planning buckets and multi-species bundles for the 102 threatened species of Sri Lankan snakes and lizards

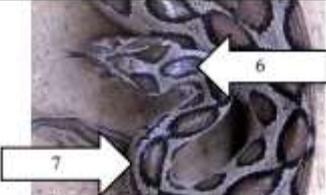
Family	Species	Draft IUCN RL cat.	Site											Habitat	Threat			Intensive care	Single species
			Wilpattu	Ritigala	Knuckles	Gannoruwa FR	Nilgala	Peak WS	Kalupahana	Morningside & HE Plains	Enasalwatta	Ramalkanda	Non A2P KBA		Snake persecution	Pet trade	Other non A2P threat		
AGAMIDAE	<i>Calotes desilvai</i>	CR								X	X								
	<i>Ceratophora erdeleni</i>	CR								X	X			X					
	<i>Ceratophora karu</i>	CR								X	X			X		X			
	<i>Cophotis dumbara</i>	CR			X									X		X			
GEKKONIDAE	<i>Cnemaspis butewai</i>	CR											X	X					
	<i>Cnemaspis godagedarai</i>	CR								X									
	<i>Cnemaspis gotaimbarai</i>	CR											X	X					
	<i>Cnemaspis hitihamii</i>	CR											X						
	<i>Cnemaspis ingerorum</i>	CR											X	X					
	<i>Cnemaspis kohukumburai</i>	CR											X	X					
	<i>Cnemaspis latha</i>	CR																	
	<i>Cnemaspis menikay</i>	CR																	
	<i>Cnemaspis nandimithrai</i>	CR											X	X					
	<i>Cnemaspis nilgala</i>	CR					X								X				
	<i>Cnemaspis phillipsi</i>	CR			X									X	X				
	<i>Cnemaspis rajakarunai</i>	CR												X					
	<i>Cnemaspis retigalensis</i>	CR		X															
	<i>Cnemaspis rammalensis</i>	CR										X		X		X			
	<i>Cnemaspis samanlensis</i>	CR						X						X					
	<i>Cnemaspis scalpensis</i>	CR				X								X			X		
<i>Cnemaspis tropidogaster</i>	CR												X	X					
GERRHOPILIDAE	<i>Gerrhopilus mirus</i>	CR											X			X			
NATRICIDAE	<i>Aspidura desilvai</i>	CR			X									X					
	<i>Aspidura deraniyagalae</i>	CR											X	X					
	<i>Aspidura ravanai</i>	CR						X						X				X	
SCINCIDAE	<i>Lankascincus deignani</i>	CR				X													
	<i>Nessia layardi</i>	CR											X						X
TYPHLOPIDAE	<i>Indotyphlops leucomelas</i>	CR										X	X	X					
	<i>Indotyphlops lankaensis</i>	CR											X						
UROPELTIDAE	<i>Rhinophis erangaviraji</i>	CR									X								
	<i>Rhinophis phillipsi</i>	CR											X						
	<i>Rhinophis roshanpererai</i>	CR							X										
AGAMIDAE	<i>Calotes liocephalus</i>	EN						X								X			
	<i>Calotes manamendrai</i>	EN			X														
	<i>Calotes nigrilabris</i>	EN						X	X								X		
	<i>Calotes pethiyagodai</i>	EN			X											X			
	<i>Ceratophora aspera</i>	EN						X		X				X	X				
	<i>Ceratophora stoddartii</i>	EN						X	X					X		X	X		

Family	Species	Draft IUCN RL cat.	Site											Habitat	Threat			Intensive care	Single species
			Wilpattu	Ritigala	Knuckles	Gannoruwa FR	Nilgala	Peak WS	Kalupahana	Morningside & HE Plains	Enasalwatta	Ramalkanda	Non A2P KBA		Snake persecution	Pet trade	Other non A2P threat		
	<i>Ceratophora tennentii</i>	EN			X							X				X			
	<i>Cophotis ceylanica</i>	EN						X				X				X	X		
	<i>Sitana bahiri</i>	EN										X	X						
COLUBRIDAE	<i>Dendrelaphis sinharajensis</i>	EN								X		X	X						
	<i>Lycodon carinatus</i>	EN								X		X	X						
COLUBRIDAE	<i>Oligodon calamarius</i>	EN								X		X	X						
ELAPIDAE	<i>Calliophis haematoetron</i>	EN			X							X	X						
GEKKONIDAE	<i>Cnemaspis alwisi</i>	EN										X	X						
	<i>Cnemaspis kallima</i>	EN			X							X							
	<i>Cnemaspis kivulegedarai</i>	EN										X	X						
	<i>Cnemaspis kumarasinghei</i>	EN										X							
	<i>Cnemaspis molligodai</i>	EN								X			X						
	<i>Cnemaspis pulchra</i>	EN									X								
	<i>Cnemaspis punctata</i>	EN			X							X	X						
	<i>Cyrtodactylus edwardtaylori</i>	EN							X			X							
	<i>Cyrtodactylus fraenatus</i>	EN				X											X		
	<i>Cyrtodactylus ramboda</i>	EN										X							
	<i>Cyrtodactylus subsolanus</i>	EN									X								
	<i>Hemidactylus hunae</i>	EN						X				X	X						
	<i>Hemidactylus pieresii</i>	EN				X				X			X						
	<i>Hemidactylus scabriceps</i>	EN																	
GERRHOPIIDAE	<i>Gerrhopilus ceylonicus</i>	EN				X						X					X		
NATRICIDAE	<i>Aspidura copei</i>	EN						X											
	<i>Aspidura drummondhayi</i>	EN								X									
	<i>Aspidura trachyprocta</i>	EN						X	X			X							
	<i>Rhabdophis ceylonensis</i>	EN						X		X		X	X						
SCINCIDAE	<i>Chalcidoseps thwaitesi</i>	EN			X							X							
	<i>Lankascincus greeri</i>	EN								X			X						
	<i>Lankascincus sripadensis</i>	EN						X											
	<i>Lankascincus taprobanensis</i>	EN						X	X										
	<i>Nessia bipes</i>	EN		X	X							X							
	<i>Nessia didactyla</i>	EN										X							
	<i>Nessia hickanala</i>	EN	X										X						
	<i>Nessia monodactyla</i>	EN										X							
TYPHLOPIDAE	<i>Indotyphlops malcolmi</i>	EN										X							
UROPELTIDAE	<i>Rhinophis blythii</i>	EN						X											
	<i>Rhinophis dorsimaculatus</i>	EN	X										X						
	<i>Rhinophis drummondhayi</i>	EN							X										
	<i>Rhinophis homolepis</i>	EN										X				X			
	<i>Rhinophis philippinus</i>	EN										X							
	<i>Rhinophis porrectus</i>	EN	X										X						
	<i>Rhinophis tricoloratus</i>	EN								X		X	X						
VIPERIDAE	<i>Hypnale nepa</i>	EN			X			X								X			

Family	Species	Draft IUCN RL cat.	Site											Habitat	Threat			Intensive care	Single species
			Wilpattu	Ritigala	Knuckles	Gannoruwa FR	Nilgala	Peak WS	Kalupahana	Morningside & HE Plains	Enasalwatta	Ramalkanda	Non A2P KBA		Snake persecution	Pet trade	Other non A2P threat		
AGAMIDAE	<i>Lyriocephalus scutatus</i>	VU			X	X		X		X	X		X			X	X		
	<i>Sitana devakai</i>	VU											X						
COLUBRIDAE	<i>Boiga barnesii</i>	VU				X			X			X		X					
	<i>Dendrelaphis caudolineolatus</i>	VU			X			X	X			X		X					
	<i>Dendrelaphis schokari</i>	VU			X			X	X			X		X					
COLUBRIDAE	<i>Oligodon sublineatus</i>	VU		X					X			X		X					
CYLINDROPHIIDAE	<i>Cylindrophis maculatus</i>	VU	X	X				X	X			X		X					
GEKKONIDAE	<i>Calodactylodes illingworthorum</i>	VU										X	X				X		
	<i>Cnemaspis anslemi</i>	VU						X											
	<i>Cnemaspis gemunu</i>	VU										X							
	<i>Cnemaspis podihuna</i>	VU										X	X						
	<i>Cyrtodactylus soba</i>	VU			X												X		
	<i>Cnemaspis upendrai</i>	VU											X	X					
	<i>Cyrtodactylus yakhuna</i>	VU														X			
NATRICIDAE	<i>Aspidura brachyrrhos</i>	VU		X	X	X	X	X	X			X							
	<i>Aspidura ceylonensis</i>	VU			X	X		X				X							
	<i>Aspidura guentheri</i>	VU						X	X	X	X	X							
SCINCIDAE	<i>Dasia haliana</i>	VU											X				X		
	<i>Lankascincus taylori</i>	VU			X	X				X		X							
	<i>Nessia sarasinorum</i>	VU		X	X		X												
UROPELTIDAE	<i>Rhinophis saffragamus</i>	VU										X							
Total number of threatened species in A2P bundle			4	6	20	10	4	22	7	22	9	3	N/A	N/A	6	11	12	N/A	N/A
Total number of species in A2P bucket			102									58	41	26	2	0			

APPENDIX VI

Medically important snakes of Sri Lanka in a nutshell - snake Identification guide sheet by Anslem de Silva

<p>Black snake with paired or single white bands (Fig.1) (in adults these are not distinct). Vertebrales or central row of dorsal scales much larger than costals (Fig.2).</p>		<p>Kraits, highly venomous</p>
<p>Flat rudder shape tail (Fig.3) – from sea or lagoon</p>		<p>Highly venomous</p>
<p>Distinct hood with two black spots on the ventral aspect (Fig.4). Dorsal side with spectacle or other marking (Fig.5)</p>		<p>Cobra – highly venomous. In a dead specimen, the hood could be spread out to see the markings</p>
<p>Triangular shape head with a white V shape mark (Fig.6). three chains of large spots, central large and distinct (Fig.7)</p>		<p>Russell's viper – highly venomous</p>
<p>Brownish snake with distinct cross like mark on the head (Fig.8)</p>		<p>Saw scale viper – venomous</p>
<p>Flat triangular head With large scales (Fig. 9). A pit between eye and nostril (Fig. 10). Snout raised.</p>		<p>Hump nosed viper – venomous</p>
<p>Green snake, large triangular head with a pit between eye and nostril (Fig.11)</p>		<p>Green pit viper – venomous</p>