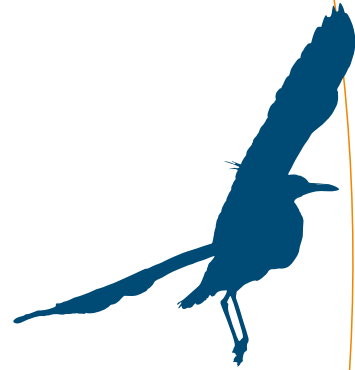


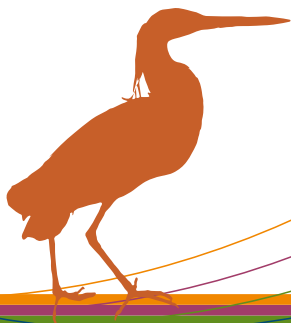
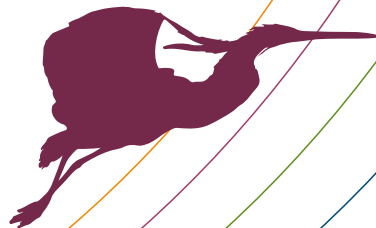
AGAMI HERON

(*Agamia agami*)



CONSERVATION PLAN

MAY 2015



Compiled by

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Geographical Scope

This conservation plan covers the species' range states: **Mexico, Guatemala, Belize, El Salvador, Honduras, Nicaragua, Costa Rica, Panama, Colombia, Ecuador, French Guiana, Suriname, Guyana, Venezuela, Brazil, Peru and Bolivia.**

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PREFACE

The Agami Heron is one of the most magnificent and unique herons. Its distinctively elongated morphology and plumage coloration earned it the name in Brazil of Socobeija-flor, the hummingbird heron. It is very discrete and secretive, and because of this it is scientifically little known. It is a jewel for the ornithologist but a puzzle for conservationists. A few short term studies have been done and a current project in French Guiana, the first long-term study, is providing astonishing results, which have already informed this first conservation plan for the species.

The purpose of the plan is to create a framework within which local actions can take place. The plan is based on available information in the literature but mostly has been derived from the knowledge of stakeholders all around the range of the species, and even beyond. We wish to thank all the contributors listed above, who took the time to read previous drafts, make comments, provide relevant data and information, and discuss the best ways to achieve the conservation of Agami Herons. Members of this group have served as the nucleus of an Agami Heron Working Group, recommended in this plan under the IUCN Heron Specialist Group.

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EXECUTIVE SUMMARY

The purpose of this plan is to provide a range-wide framework for the conservation and management of Agami Herons and their habitats. The Agami Heron is considered Vulnerable by Birdlife International/ IUCN because the population is expected to decline rapidly over the next three generations. Its range includes Mexico, Guatemala, Belize, El Salvador, Honduras, Nicaragua, Costa Rica, Panama, Colombia, Ecuador, French Guiana, Suriname, Guyana, Venezuela, Peru, Bolivia and Brazil.

The main threats to the Agami Heron include lack of protection of colony sites, limited legal protections, and habitat degradation. Other factors likely include environmental contamination, disturbance, and climate change.

The objectives of this plan are to improve its conservation status and knowledge through research and monitoring directives as well as a list of recommended conservation actions, which are:

1. Create an Agami Heron Working Group (AHWG),
2. Coordinate the monitoring of the population size and success at each important colony site by AHWG,
3. Assist BirdLife International and Wetlands International in updating conservation assessments and improving population estimations,
4. Protect each important colony site and feeding areas,
5. Protect important migratory stop-over sites,
6. Determine habitat areas containing important numbers of Agami Herons outside the nesting season,
7. Protect mangrove forests throughout the range and gallery forests in the Llanos,
8. Encourage educational and communication campaigns near the known Agami Heron colonies and
9. Revise this plan every ten years.



AVAILABLE
KEY
KNOWLEDGE



1.1 DESCRIPTION OF THE SPECIES



Nestlings in the colony



Immature Agami Heron



Agami Herons have a distinctive plumage



Lores turn red during courtship

The Agami Heron (*Agamia agami*), is unique among herons in both plumage coloration and body structure. It is one of several extant representatives of the oldest lineage of herons, which includes the Boat-billed Heron (*Cochlearius cochlearius*) and tiger herons and so is quite distinct from most heron species of the world (*Kushlan and Hancock, 2005*).

The Agami Heron is a medium sized heron (60-76 cm, 400-650 g (*S. Uriot, pers.com.*)). Males are somewhat larger than females. It has an exceptionally elongated snake-like neck and long bill (140-163 mm long), which alone is about one-fifth the bird's total length (*Kushlan and Hancock, 2005*). In contrast, its legs are short for a heron of its overall size. It is speculated that these characteristics correspond to its highly specialized feeding behavior.

Its plumage pattern also is distinct among herons, both in coloration and pattern. Wings and upper parts are green to powder blue as are shaggy plumes along the sides of the foreneck. The upper neck is chestnut and lower neck slate-gray with central white and chestnut lines. The underparts also are chestnut, leading to one of its common names, the Chestnut-bellied Heron. Legs and lores are yellow. In the breeding season, light blue ribbon-like plumes, which can reach 125 mm in length, develop on the head, which is otherwise black. Lores can turn to orange to red during courtship and during agonistic encounters (*BirdLife International, 2014; Erize, Rodriguez Mata, and Rumboll, 2006; Kushlan and Hancock, 2005; Hilty, 2003*). Immature birds are brownish, darker on the crown, and with streaked underparts. Facial skin and legs are greenish; eyes are yellow and become orange and red with age. The bird's unique plumage pattern marks its distinction from other herons. Observations suggest that the color pattern and changeable soft part colors appear to play important roles in the distinctive courtship behavior of the species.

The Agami Heron is in general a quiet bird, but it does have a range of vocalizations, including a low pitched rattling call, a complex "chump" call, most evident in colonies, and a repeated "chuc" call, used as a contact vocalization (*Hilty, 2003*). Vocalizations are most frequently given at breeding colonies. On the feeding ground, it seldom vocalizes and so is often overlooked. As a result, censuses away from breeding colonies and even determination of presence/absence are difficult to achieve.

Sound files can be found here

<http://gepog.org/Sonoth%C3%A8que/Agamia-agami>

<http://www.xeno-canto.org/species/Agamia-agami>

I.2 CONSERVATION STATUS

The Agami Heron is considered to be Vulnerable by Birdlife International / IUCN Red List because the population is expected to decline rapidly over the next three generations due to loss of its habitat (as predicted by a model of Amazonian deforestation) and possibly also due to hunting (*BirdLife International, 2012*). Unfortunately, in fact, nearly nothing is known about population size or trend. However there can be no doubt that habitat destruction is its greatest threat, and that of the Amazon one of particular importance as it covers so much of its overall range. There is no information that suggests that the overall population is large, despite its large overall range. Perhaps more importantly, it is now documented to be a congregatory species, apparently dependent on few large colony sites scattered over its large range. This clearly makes it vulnerable to disturbances at those sites as well as to loss of feeding habitat associated with colonies and in the nonbreeding season. Evidence suggests that in some places (Peru) egg collecting affects local populations. Only a few colony sites now are known, and it is likely that its dependence on relatively few nesting sites, any of which may be subject to habitat loss, makes it vulnerable.



I.3 TAXONOMY

Phylum: *Chordata*

Class: *Aves*

Order: *Pelecaniformes*

Family: *Ardeidae*

Genus: *Agamia* (Reichenbach, 1853)

Species: *Agamia agami* (Gmelin, 1789)

Alternative names: Chestnut-bellied Heron

Taxonomic sources

1. BirdLife International (2014) The BirdLife checklist of the birds of the world: Version 7. Downloaded from http://www.birdlife.org/datazone/userfiles/file/Species/Taxonomy/BirdLife_Checklist_Version_70.zip [xls zipped 1 MB].
2. (2014) HBW and BirdLife International Illustrated Checklist of the Birds of the World. Volume 1 - Non-passerines; Lynx Edicions in association with BirdLife.
3. Kushlan and Hancock 2005.

The taxonomy of the species appears well settled. But additional attention should be given to the infraspecific genetic structure of the species. Given the vast geographical distribution of the species, genetic material should be examined from individuals collected in widely separated locations (e.g. Costa Rica and Bolivia) to address the question of population differentiation, and perhaps subspeciation.

I.4 BIOLOGY

Ecology

Little is known of the ecology of the Agami Heron. What is known is summarized below.

Survival and productivity

There are no demographic data for the species.

Breeding

The Agami Heron nests colonially and in all cases so far known in remote and quite inaccessible locations. Study of the species is difficult because of the isolation of its colonies as well as its secretive behavior. Breeding of Agami Herons has been studied to some degree at several colony sites, in Costa Rica, Venezuela and French Guiana (Abella-Gutierrez and Lopez-Conlon, 2008; Marin A., 1989; Ramo and Busto, 1982; Reynaud and Kushlan, 2004). However, none of these studies has been long term.

The species breeds in both single species and mixed species colonies (Table 1). The sizes of some colonies are exceptional for a solitary feeding heron, up to hundreds or even over a thousand nests (Table 1) (BirdLife International, 2014; Kushlan and Hancock, 2005; Hilty, 2003; Marin A., 1989; Ramo and Busto, 1982; Reynaud and Kushlan, 2004, Stier et al. unpubl.). As the population depends on a few locations with high breeding numbers, such locations are significantly important when it comes to conservation.



Nest with two eggs



A chick and an egg in their nest



Feeding the young

All records suggest that nesting occurs during the wet season, depending on each country (Table 1) (Abella-Gutierrez and Lopez-Conlon, 2008; BirdLife International, 2014; Kushlan and Hancock, 2005; Hilty, 2003; Marin A., 1989; Ramo and Busto, 1982; Reynaud and Kushlan, 2004). However, this varies between sites and to some extent among years, apparently due to variation in rainfall and in response to disturbance. The species' apparent sensitivity to disturbance in the few accessible colonies (Gonzalez, 1999; Reis M., pers. com.; Chen D., pers.com.) is a matter of conservation concern.

Nests are loose platforms made of sticks built at a height of 1-2 m, sometimes up to 3 m above water (do Nascimento, 1990; Hilty, 2003; Marin A., 1989; Reynaud and Kushlan, 2004). Clutch size ranges from 2 to 4, with 2 being the most usual number. The eggs are unmarked, pale blue or blue-green and of average dimensions 49.6 x 35.75, 49.9 x 36.4 and 48x35 mm in Trinidad, Costa Rica and Brazil respectively (do Nascimento, 1990; Hilty, 2003; Kushlan and Hancock, 2005; Marin A., 1989; Reynaud and Kushlan, 2004).

Young grow rapidly, doubling weight in the first week (do Nascimento, 1990). Breeding success has not been measured precisely. Typically it would seem that 1 or 2 young fledge (Kushlan and Hancock, 2005). Mortality of chicks has been recorded once in Brazil and was about 18% (do Nascimento, 1990).

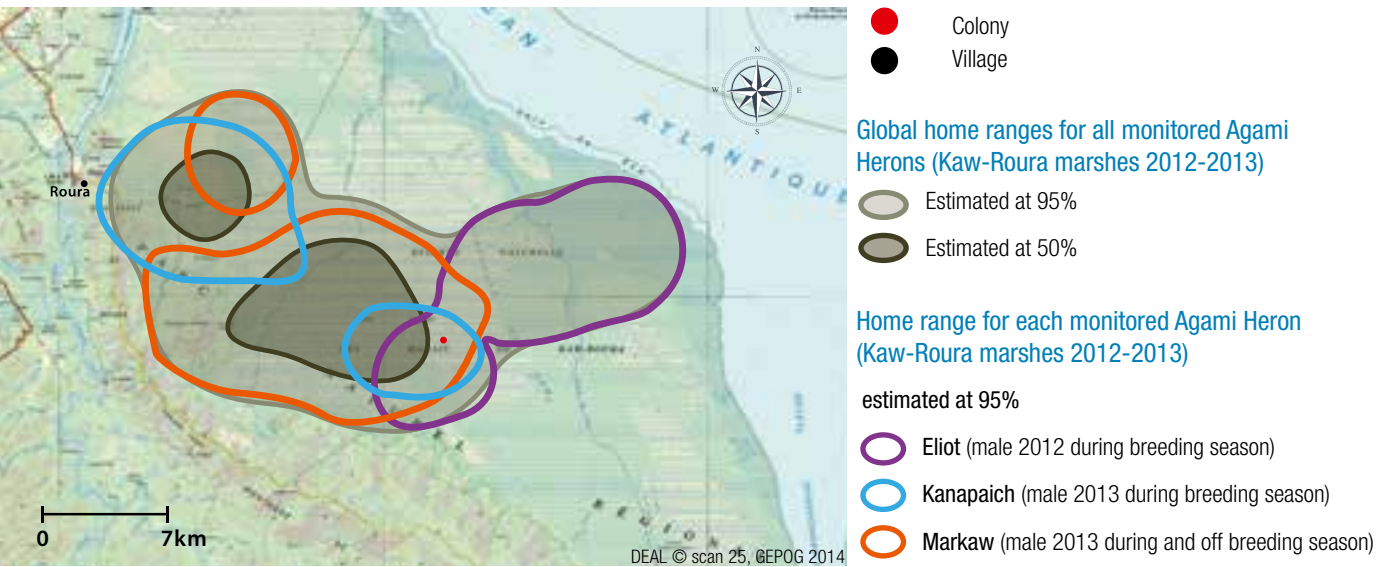
Breeding duration (defined as the total time a colony is active) has been measured twice in Costa Rica at the same colony, and was of 185 and 188 days (Abella-Gutierrez and Lopez-Conlon, 2008), after which the herons appear to abandon the colony site, although nests may be used by other species (Abella-Gutierrez and Lopez-Conlon, 2008; Marin A., 1989; Ramo and Busto, 1982) such as Cattle Egrets (*Ardea ibis*) in Costa Rica (Marin, 1989) and Venezuela (Ramo and Busto, 1982) and Boat-billed Herons (*Cochlearius cochlearius*) in French Guiana (Stier A., pers. com.).

Colony sites are re-used year after year, and those in protected sites appear to be used for many years. The apparent faithfulness of herons to colony sites makes it possible to focus conservation action on important sites.

Predation on the colony by Black Caiman (*Melanosuchus niger*), Tufted Capuchin (*Cebus apella*) and Great Black Hawk (*Buteogallus urubitinga*) has been recorded in French Guiana (Stier A. et al., unpublished).

Movements

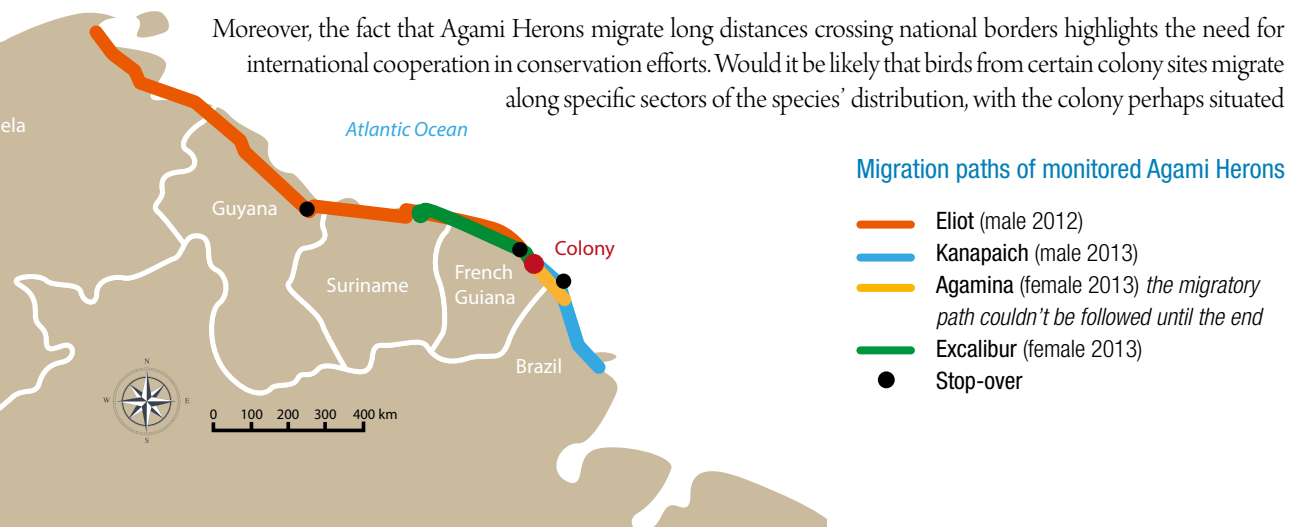
Successful monitoring of 5 adult Agami Herons in French Guiana equipped with Argos satellite transmitters in 2012 and 2013 showed that during the nesting period, a bird used an area of minimum 100 to maximum 200 km² around the colony site, which was mainly composed of marshes, swamp forests and mangroves (Stier A. *et al.*, unpublished). These results suggest that, for this colony at least, birds range more widely from the colony for foraging than other herons. Great Egrets (*Ardea alba*) for example seem to have home ranges from a few km² to 50 km² in USA (Brzorad J, *pers. com*). However, Argos fixes tend to overestimate the ranges as they are less precise than GPS fixes. The Agami Heron home ranges could thus be overestimated compared to the areas that are really used.

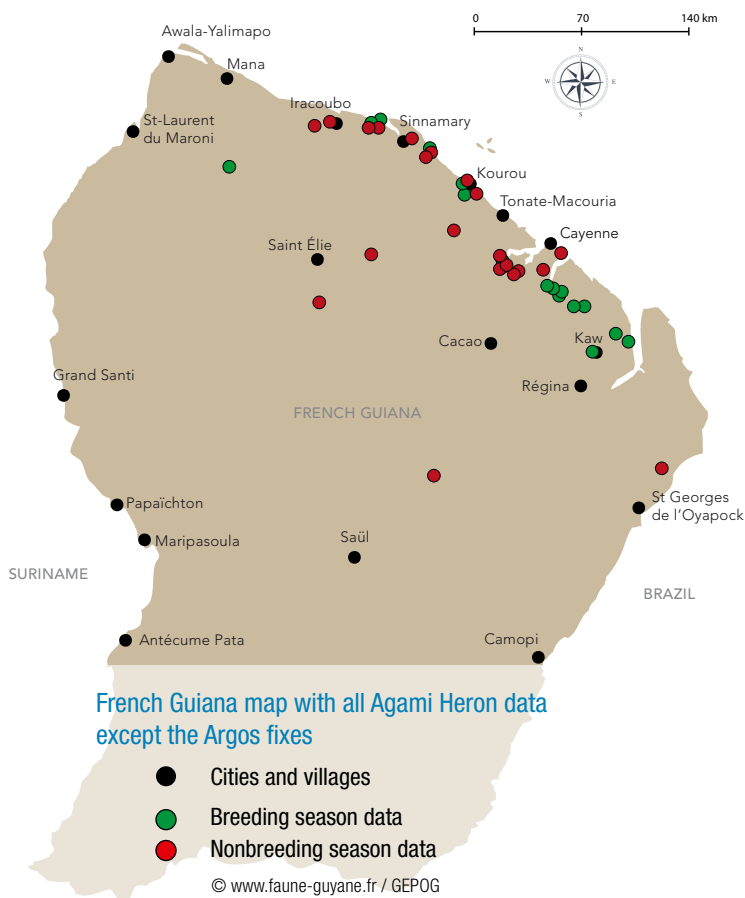


After nesting was completed, at the French Guiana colony, one of the five monitored birds remained near the colony. Based on other observations Agami Herons are generally sighted along the coast and in the interior of French Guiana all year. These results show that some birds remain locally, near the colony site, suggesting the need for protection of colony sites and nearby feeding habitat year around.

Four of the five monitored birds in French Guiana moved away after breeding. The migration distances, dates of departure and arrival as well as destinations were quite distinctive for each bird (Table 2). However, all migration paths were along the Atlantic coast, and included one substantial stop-over where the birds staged during 24 to 64 days (stop-overs of less than 8 days could not be detected with this method). Total migration distances were from 280 to 1,250 km (Stier A. *et al.*, unpublished). While the possibility of local movements previously had been suggested (Alvarado, 1995), prior to this study the Agami Heron was not understood to be migratory. Such long-distance movements between large colony sites and non-breeding sites indicate that protection is needed at colony sites, non-breeding areas, and at stop over sites. It especially means that colonies, particularly large ones, service birds from a wide region, sometimes exceeding 1 000 km, and the protection and management of these large colony sites becomes essential to the conservation of the species.

Moreover, the fact that Agami Herons migrate long distances crossing national borders highlights the need for international cooperation in conservation efforts. Would it be likely that birds from certain colony sites migrate along specific sectors of the species' distribution, with the colony perhaps situated





at its center? It is possible that Agami Herons may be composed of distinct populations using specific areas of the overall range. If so, then conservation actions might be required at the subpopulation level consisting of a large colony and the specific feeding areas that the birds use during nesting, on migration, and in the non-breeding season. As noted above in the taxonomy section, study of the genetic identity of Agami Herons throughout the range is needed.

Feeding

The feeding behavior of the Agami Heron is little known nor often described in detail. It is presumed to be specialized to feed along river banks and from vegetation along water courses (*Kushlan & Hancock, 2005*). It can be observed perched on banks, bushes or branches or walking slowly in shallow water on stream and pond edges (*Alvarado, 1995; Kushlan & Hancock, 2005*). It feeds typically from such perches alongside a waterbody under cover. It has relatively short legs and relatively long neck and long bill which are presumed to allow it to reach out far from the perch to capture a fish. It is likely a specialized fish feeder. Recorded prey include cichlids and characins (*BirdLife International, 2014; Kushlan and Hancock, 2005*), but not much more is known about its prey base. From a conservation perspective, protection of feeding sites, riparian zones, and their fish populations are essential for the Agami Heron.

1.5 POPULATION ESTIMATE AND TREND

As noted above, there are no precise data or information on population sizes and trends (*Kushlan & Hafner, 2000*). [Table 3](#) shows the Wetlands International and the IUCN/ BirdLife / Heron Specialist Group population estimates. In fact there is little validity to any calculation, as neither population densities nor effective range are documented sufficiently as to allow a density derived calculation. After breeding, it appears that birds disperse widely and become solitary and reclusive, making a non-breeding census impossible. Censuses, thus, are possible only at breeding colonies, few of which are known. Known colonies consist of no more than a few thousand pairs of birds. While certainly this is an underestimate of the range-wide species population, extrapolation with any degree of certainty seems tenuous. Given colony sizes of 100-1000 birds, the high end of the current Wetlands International estimate implies there exist between 25 to 250 colony sites for the species, the high end not being unreasonable. The current Bird Life / IUCN Global Population Estimate is a wide band, and likely too high on the upper side. If a number had to be chosen, 25,000 – 50,000 birds might be as good an estimate as any at this time. Clearly a more precise estimate is needed, which will require more information on the dispersion and size of more colonies.

Projection of a population trend is even more problematic. The 30% projected loss is calculated from the anticipated loss of habitat in the Amazon, which it is now clear is only part of the species habitat. So the habitat reductions anticipated in the Amazon would need to be modified based on threats over the rest of the range. Habitat loss could indeed be very critical to the population trend since as a congregatory species, the few nesting sites would create a small critical area of occupancy the loss of which could lead to a rapid reduction in regional populations. Clearly additional evaluation of population and habitat trends is needed.

TABLE 3 GLOBAL POPULATION ESTIMATES OF AGAMI HERON

REFERENCES	TOTAL RANGE	COUNTRIES WITH KNOWN COLONIES	ESTIMATE	TREND
(BIRDLIFE INTERNATIONAL, 2014; KUSHLAN & HANCOCK, 2005)	Mexico, Guatemala, Belize, El Salvador, Honduras, Nicaragua, Costa Rica, Panama, Colombia, Ecuador, French Guiana, Suriname, Guyana, Venezuela, Brazil, Peru, Bolivia	Costa Rica, Venezuela, Trinidad, Brazil, French Guiana	50 000 to 499 999 individuals	Unknown Suspected to lose >30% of population over 3 generations
(WETLANDS INTERNATIONAL, 2015)	-	-	10 000 to 25 000 individuals	Unknown

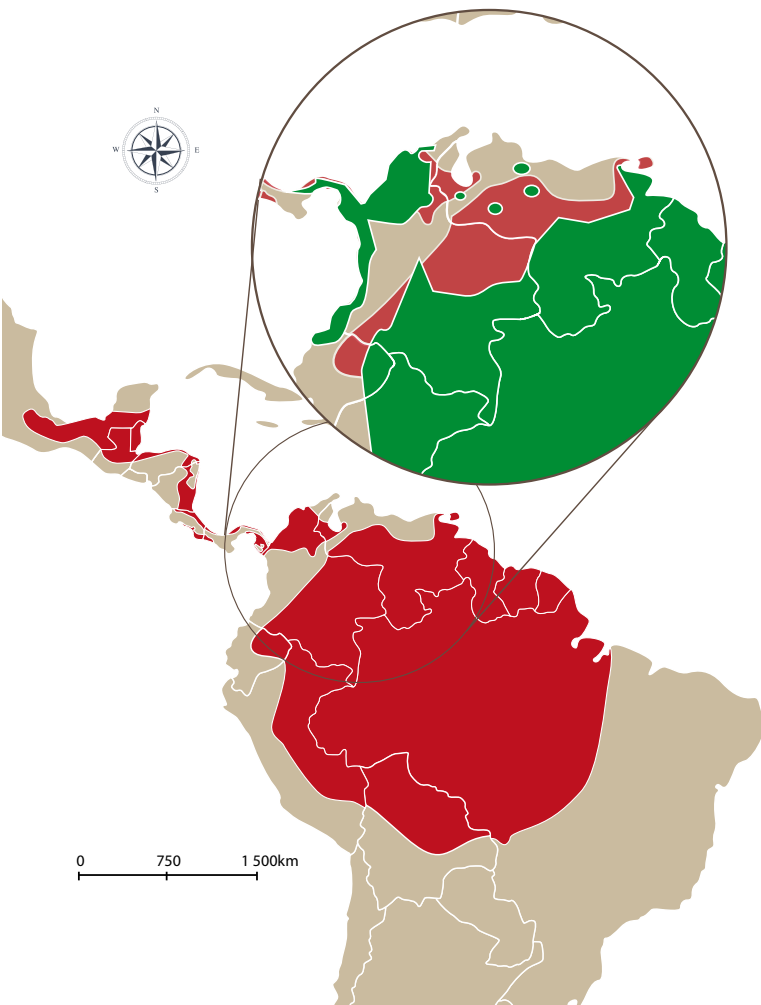


I.6 DISTRIBUTION

The Agami Heron is a Neotropical species occurring in Central and South America. However, its actual overall range and distribution within that range are very poorly known (*Kushlan and Hafner, 2000*). As presently understood, the known range extends from south-east Mexico through central and Caribbean Central America through the Amazon basin in South America, covering the following countries: Mexico, Guatemala, Belize, El Salvador, Honduras, Nicaragua, Costa Rica, Panama, Colombia, Ecuador, French Guiana, Suriname, Guyana, Venezuela, Peru, Bolivia and Brazil (*BirdLife International, 2014; Kushlan and Hancock, 2005*). They are observed only with difficulty, which makes the lack of sightings difficult to

interpret. As a result, at this time, the species' effective range is not calculable. Two renditions of the species range are shown below, a comparison showing how increased information can result in a marked reduction in known effective range. Fully documenting the details of the species' range is critical to designing local conservation strategies.

Annex 1 provides sightings that delineate the known range. Updating the knowledge on the current Agami Heron distribution range is an important step towards its conservation.



Distribution maps

Based on © Restall, Rodner, & Lentino, 2007

Based on © Ridgely et al. and BirdLife International (2011) Digital Distribution Maps of the Birds of the Western Hemisphere, version 4.0. In BirdLife International and NatureServe (2011) Bird species distribution maps of the world. *Agamia agami*. In: IUCN 2012. IUCN Red List of Threatened Species. Version 2012.1. <http://www.iucnredlist.org>. Downloaded on 16 September 2013.

TABLE 1 → INFORMATION FROM KNOWN BREEDING COLONIES OF AGAMI HERON

COUNTRY	COLONY	YEAR OF MONITORING	BREEDING PAIRS	OTHER SPECIES IN MIXED COLONIES
COSTA RICA	7 km South-East of Puerto Limon	1985 1986	6 11	Boat-billed Heron (<i>Cochlearius cochlearius</i>), Striated Heron (<i>Butorides striatus</i>), Cattle Egrets (<i>Ardea ibis</i>)
COSTA RICA	On an island within a lagoon in Pacuare Nature Reserve	2004 2005 2006 2008 2009 2011 2014 2015	124 119 213 76 (end of season) 62 25 117 73	Boat-billed Heron (<i>Cochlearius cochlearius</i>)
VENEZUELA	Close to the village of Santa Rosa, Estado Barinas, at 75 m from a large heronry of 2 000 pairs	1980	3	Black-crowned Night Heron (<i>Nycticorax nycticorax</i>), Yellow-crowned Night Heron (<i>Nyctanassa violacea</i>), Boat-billed Heron (<i>Cochlearius cochlearius</i>), Bare-faced Ibis (<i>Phimosus infuscatus</i>)
FRENCH GUIANA (FRANCE)	Kaw-Roura National Reserve	2002 2013	900 1607	Black-crowned Night Heron (<i>Nycticorax nycticorax</i>), Great Egret (<i>Ardea alba</i>), Boat-billed Heron (<i>Cochlearius cochlearius</i>), Cooi Heron (<i>Ardea coccoi</i>), Anhinga (<i>Anhinga anhinga</i>), Hoatzin (<i>Opisthocomus hoazin</i>)
PERU	Pacaya-Samiria National Reserve : colonies of Nueva Cajamarca and Padre Lopez	1996 1997 1998	No data	Great Egret (<i>Ardea alba</i>), Boat-billed Heron (<i>Cochlearius cochlearius</i>), Cooi Heron (<i>Ardea coccoi</i>), Anhinga (<i>Anhinga anhinga</i>), Neotropical cormorant (<i>Phalacrocorax brasilianus</i>)
PERU	Tapiche Reserve	2011 2012 2013 2014 2015	No precise number, current estimation over 1 000	Boat Billed Heron (<i>Cochlearius cochlearius</i>), Cooi Heron (<i>Ardea coccoi</i>), Anhinga (<i>Anhinga anhinga</i>), Neotropical cormorant (<i>Phalacrocorax brasilianus</i>), Great Egret (<i>Ardea alba</i>)
BRAZIL	Balbina Hydroelectric Dam, Amazonas State	1988	26 (but others had been over flooded)	None

Table 2

TABLE 2 → POST-BREEDING MIGRATION CHARACTERISTICS OF FIVE ADULT AGAMI HERONS EQUIPPED

NAME	PTT EQUIPMENT DATE	SEX	MIGRATION (yes/no)	MIGRATION DISTANCE (KM)	DEPARTURE	ARRIVAL
EXCALIBUR	26/04/2013	F	yes	280	29/04/2013	04/06/2013
MARKAW	25/04/2013	M	no	-	-	-
KANAPAICH	25/04/2013	M	yes	411	28/06/2013	01/10/2013
AGAMINA	25/04/2013	F	yes	?	28/04/2013	?
ELIOT	24/04/2012	M	yes	1250	08/07/2012	06/09/2012

Comment: Stop-overs of less than 8 days could not be detected with this method. As a consequence the calculated average speed might include periods of no migration.



BREEDING PERIOD	LEGAL STATUS OF THE SITE	CONSERVATION PROBLEMS	REFERENCES
Wet season	No data	Villagers cut trees and tall grass near the nesting area, and herons moved to a more secure site	Marin A., 1989; Alvarado G. pers. com.
Wet season, March to September in 2004 and February to August in 2005	Private Reserve from Endangered Wildlife Trust	Possible threat by chemical contamination, sedimentation and dykes/channels	Abella-Gutierrez; Lopez-Conlon, 2008; Alvarado, 2006; Denham J., pers. com.; Fernandez C., pers. Com.
Wet season June-September	Unprotected	Area heavily cultivated, extensive use of pesticides, remaining gallery forests quite reduced	Ramo & Busto, 1982 ; Morales L., pers.com.
Wet season April-July	National Reserve Ramsar Site. IBA (Important Bird Area)	No data	Reynaud & Kushlan, 2004; Stier A. et al., unpublished
No data	National Reserve	Eggs harvested every year by villagers, leading to abandonment of the colony	Gonzalez, 1999
End of January to mid-June	Private Reserve	Eggs harvested every year by locals, hunting and logging. The nesting area is expanding since the reserve establishment.	Reis M., pers. com.; Chen D., pers. com.
April-??	No data	Floods may endanger nests that are built near the water surface	do Nascimento, 1990

TRACKED WITH SATELLITE TRANSMITTERS IN FRENCH GUIANA (STIER A. ET AL., UNPUBLISHED)

MIGRATION LENGTH (DAYS)	NUMBER OF STOP-OVERS	STOP-OVER LENGTH (DAYS)	MIGRATION LENGTH STOP-OVERS EXCLUDED (DAYS)	AVERAGE MIGRATION SPEED EXCLUDING STOP-OVERS (KM/DAY)
36	1	24	12	23
-	-	-	-	-
95	1	61	34	12
?	≥1	?	?	?
60	1	24	36	35

Days of time spent at staging sites for less than 8 days.



I.7 HABITAT

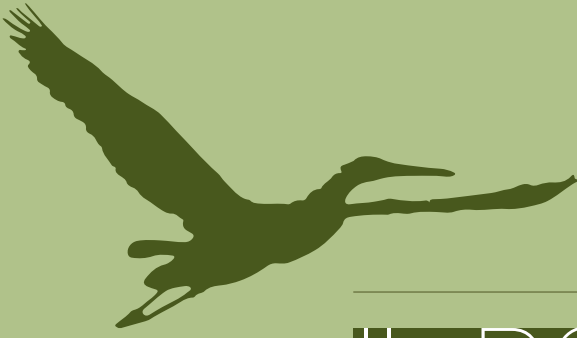
Agami Herons mostly occur from coastal mangroves to 300 m elevation, even though there are records at 2 600 m in Colombia's east Andes (*BirdLife International, 2014; Kushlan & Hancock, 2005*). However, they are mostly found at dense lowland forest stream margins (1 & 4) and in swamp forests (5 & 6), mangroves (2) and freshwater wetlands (3 & 7). They also occur around other water bodies such as pools or lakes. They are more rarely observed along dry forest streams (*BirdLife International, 2014; Erize et al., 2006; Kushlan & Hancock, 2005*). There is little precise information on habitat requirements (*Abella-Gutierrez & Lopez-Conlon, 2008; Kushlan & Hafner, 2000*). However, all evidence suggests it is primarily a bird of swamps, riparian forests and other water bodies. Specific habitats of conservation concern for the species thus include coastal mangroves, swamp forest and lowland forest streams.

I.8 KEY KNOWLEDGE SUMMARY

What little is known of the biology of Agami Herons (as summarized above) can inform conservation planning and action.

Key characteristics are

1. Colonial nesting, sometimes in large numbers (*Abella-Gutierrez & Lopez-Conlon, 2008; Reynaud & Kushlan, 2004*),
2. Solitary cryptic feeding under forest cover likely mostly on fishes (*BirdLife International, 2014; Kushlan and Hancock, 2005*),
3. The tendency to congregate from large areas into a limited number of nesting locations (*Stier A. et al., unpublished*),
4. Migration of sometimes more than 1 000 km with stop-over sites (*Stier A. et al., unpublished*), and
5. Use of wetland and mangrove habitats along coasts and riparian habitat inland (*BirdLife International, 2014; Erize et al., 2006; Kushlan Hancock, 2005*).



II. POPULATION THREATS



Population threats can be classified in several categories:

1. Habitat degradation,
2. Human disturbance,
3. Environmental contamination, and
4. Climate change (*Alvarado, 2006; Kushlan, 2007*).

Of these, Agami Heron conservation action could most profitably be focused on habitat and colony site conservation and protection from disturbance. Where Agami Herons face hunting pressure, limited legal protection and limited on site protection are clearly threats. The potential roles of contamination and climate change are less certain.

II.1 HABITAT DEGRADATION

Agami Heron habitat can be classified in four categories: colony sites, foraging areas near colony sites, migratory stop over sites, and nonbreeding habitats. All of these appear to be forested areas with marshes, mangroves, and riverine habitats. These habitats are threatened throughout the species' range. Accelerating deforestation in the Amazon basin facilitated by the expansion of the road network is considered as the primary factor leading to the recent upgrading of the species to "Vulnerable" in the IUCN red list (*BirdLife International, 2012*). The Orinoco basin includes many tributaries from Llanos of Colombia and Guiana Shield and Llanos of Venezuela. There is rampant deforestation for the cattle industry and other agriculture in these Llanos. These two activities degrade or literally wipe out gallery forests and transform water courses into artificial lagoons (*Morales L., pers.com.*).

Coastal habitats, particularly, are at risk because they are the most densely populated by humans and thus where natural habitats probably will be the most degraded or destroyed in the near future. Recent research showed that in 45% of Latin America protected areas, land and forest degradation increased by 250% between 2004 and 2009 (*Leisher, Touval, Hess, Boucher, & Reymondin, 2013*). The highest rates of degradation were in flooded grasslands/savannas and moist broadleaf forests, potential habitats for Agami Herons (*Leisher et al., 2013*).

The loss of habitat supporting colony sites, particularly large ones, is an exceptionally critical threat, given the dependence of birds from a wide region on such sites. As a result focused attention needs to be paid to protecting these sites from habitat alteration.

II.2 DISTURBANCE

Anecdotal evidence suggests that Agami Herons are sensitive to disturbance. They choose inaccessible sites for nesting. They feed under cover of dense foliage. A colony in Costa Rica was apparently abandoned due to monkeys, a situation rectified by re-isolating the nesting island (*Denham J., pers. com., Fernandez, C., pers. com.*). In Peru, Agami Heron eggs are harvested leading sometimes to abandonment of the sites (*Gonzalez, 1999*). Thus, it is very likely that this shy species could be very impacted by human disturbances. Wherever possible, colony sites should be protected from disturbance from people as well as other factors, as shown in the monkey example above. In addition to creating reserves for colony sites and patrolling them, education of local people near large sites is desirable and study should be undertaken to determine limits of disturbance threats in colonies that might serve a local education function through careful visitation.



A river with clear water



encounters a river with high water turbidity due to gold mining in French Guiana

II.3 ENVIRONMENTAL CONTAMINATION

Two types of environmental contamination may harm Agami Herons:

1. the increase in water turbidity and mercury contamination in forest rivers due to legal and illegal gold mining, and
2. the contamination of coastal habitats by chemicals due to the use of pesticides in agriculture or for other purposes and due to the proximity of urban areas.

However, levels of contamination in marshes and mangroves used by Agami Herons are unknown as are effects of mercury levels or turbidity.



II.4 CLIMATE CHANGE

Global warming can have potential effects on coastal Agami Heron populations, as on other coastal waterbird populations. Increase in sea level, change of storm behaviors (frequency and intensity, but also localization) and other severe weather events could lead to habitat degradation or loss. Change of climatic cycles may influence breeding periods and success. However, how these events could influence the species is not known.

II.5 LIMITED LEGAL PROTECTION

In Peru, Agami and Boat-billed Heron eggs are the most harvested of all present species in the heronries (*Gonzalez, 1999*) by indigenous people living in the Pacaya-Samiria National Reserve. Agami Herons have been cited as possible hunting targets (*BirdLife International, 2012*), but how far this threat affects the species is unclear. Nonetheless, given that these likely are long-lived birds, it is likely that any killing of adults is detrimental to population stability as would be repeated taking of eggs. So the species should be protected through its range.

To implement conservation actions and to be able to plan strategies, it is important to have a global vision of the different regulations applying across the range of the species. [Table 4](#) shows the international conservation agreements ratified by nations within the species' range. [Table 5](#) shows national legislation and other regulations applying to the heron. Overall, while most range states are part of international agreements, little information is available for those which have active species protection. More study should be done on the extent of legal protections and actual practices, especially around important colony sites.

TABLE 4 ➔ INTERNATIONAL CONVENTIONS AND AGREEMENTS RATIFIED BY RANGE STATES

COUNTRY	CBD	CMS	RAMSAR	WHC
MEXICO	X	-	X	X
GUATEMALA	X	-	X	X
BELIZE	X	-	X	X
EL SALVADOR	X	-	X	X
HONDURAS	X	X	X	X
NICARAGUA	X	-	X	X
COSTA RICA	X	X	X	X
PANAMA	X	X	X	X
COLOMBIA	X	-	X	X
ECUADOR	X	X	X	X
FRENCH GUIANA	X	X	X	X
SURINAME	X	-	X	X
GUYANA	X	-	-	X
VENEZUELA	X	-	X	X
BRAZIL	X	-	X	X
PERU	X	X	X	X
BOLIVIA	X	X	X	X

X: Yes

Information from: www.cbd.int – CBD = Convention on Biological Diversity, www.cms.int – CMS = Convention on the Conservation of Migratory Species of Wild Animals, www.ramsar.org – Ramsar = Convention on Wetlands, <http://whc.unesco.org> – WHC = World Heritage Convention

TABLE 5 ➔ NATIONAL LEGISLATION PERTINENT TO AGAMI HERONS

COUNTRY	LAW PROTECTING THE SPECIES	KILLING, EGG HARVESTING, NEST DESTRUCTION FORBIDDEN	HIGHEST AUTHORITY
MEXICO	Under special protection regarding the NORMA Oficial Mexicana NOM-059 -SEMARNAT-2010, Protección ambiental Especies nativas de México de flora y fauna silvestres	No data	No data
GUATEMALA	No data	No data	No data
BELIZE	Wildlife Protection Act, Chapter 220, Revised Edition 2000	No data	Minister responsible for wild life protection
EL SALVADOR	No data	No data	No data
HONDURAS	No data	No data	No data
NICARAGUA	No data	No data	No data
COSTA RICA	Minor threatened regarding the Ley de Conservacion de la Vida Silvestre, 1997	No data	No data
PANAMA	No data	No data	No data
COLOMBIA	The LEY 84 DE 1989 contains a general ban on hunting, with the exceptions of self-subsistence hunting and capture of animals for research.	No data	No data
ECUADOR	No data	No data	No data
FRENCH GUIANA	Arrêté du 25 mars 2015 fixant la liste des oiseaux représentés dans le département de la Guyane protégés sur l'ensemble du territoire et les modalités de leur protection.	X	Ministère de l'Écologie, du Développement Durable et de l'Énergie
SURINAME	Jachtwet (1954) Jachtbesluit (2002)	X	Ministerie van Ruimtelijke ordening, Grond- en Bosbeheer (Ministry of Environmental planning, land and forest management), Onderdirectoraat Bosbeheer (department of Forest management)
GUYANA	No data	No data	No data
VENEZUELA	Ley de protección a la fauna silvestre (1970) Ley de diversidad biológica (2000) Ley penal del ambiente (2012)	X except indigenous people who live according to their original traditions and culture	Ministerio del Poder Popular para Ecosocialismo y Aguas
BRAZIL	The Law on Environmental Crimes (Lei Federal nº 9.605 / 98) and Brazilian Code of Administrative Offences against the Environment (Decreto Federal nº 6.514/08).	X	IBAMA (Brazilian Institute of Environment and Renewable Natural Resources) – www.ibama.gov.br
PERU	No law	-	-
BOLIVIA	No data	No data	No data

Comment: "No data" means that information was not available during the writing process of this document, which doesn't mean that there is no protection



III. RESEARCH & MONITORING NEEDS





1



2



3



4

III.1 RESEARCH

Very little is known about the biology and ecology of this species. Conservation Action Plan for the Herons of the World (*Kushlan, 2007*) lists the need for increasing knowledge of the biology of this species as a high priority. The following is a list of research needs, in order of priority:

1. Find and determine the most important colony sites (through inventories, satellite transmitter equipment of birds during the non-breeding season or extrapolation of optimum nesting conditions on satellite imagery) for the species in general and for the regional populations as well as the feeding areas associated with them.
2. Determine impacts and mitigation of disturbances to colony sites.
3. Determine the best methods for colony site protection and management.
4. Better characterize movement patterns of breeding and non-breeding herons. This should be accomplished using satellite tracking, which is best done over at least one entire year.
5. Better determine the range of the species and distribution within that range.
6. Determine possible distinct populations through genetic analyses.
7. Better description and understanding of feeding behavior, feeding habitat use, prey and seasonality through observational studies in various locations and habitats and should focus in part on the apparently distinctive foraging habits of the species, as well as using isotopic analysis, stomach contents, and blood sampling where appropriate.
8. Determine mercury and pesticide levels of the species.
9. Examine potential infraspecific genetic structuring of the species.

III.2 INVENTORY AND MONITORING

Monitoring of the Agami Heron range wide and in all seasons seems fairly impossible, given the species wide distribution, inaccessible habitat and nocturnal habits. As a result inventory and monitoring efforts should be directed at colony sites, particularly large colonies. Monitoring needs for the species may be listed as:

1. Conduct inventories and use satellite transmitters to determine locations of colony sites. Add new sites to the colony site data base to be maintained by the Agami Heron Working Group ([Annex 1](#)).
2. Determine obstacles and opportunities for protection and management of sites.
3. Characterize colony site habitat by plant species, height and density, situation, water conditions, rainfall and other factors amenable to management.
4. Conduct counts of all colonies and if possible monitor important colonies annually using a standardized protocol (below) to determine the number of Agami Heron nesting pairs. If possible determine bird species composition of the heronry, date of arrival and departure of Agami Herons from the colony site.

5. Conduct banding on juveniles and check rings at every monitoring.
6. Estimate the reproductive success through egg success (nb of young that leave the nest / tot nb of eggs) and nest success (nb of clutches that produce young / tot nb of clutches) at every breeding season. This is possible if observation from egg laying until nest failure or young departure is done.

MONITORING PROTOCOL

Agami Herons have been counted in colonies in several ways, from a boat or ground nearby (In Pacuare Nature Reserve, Costa Rica) (*Denham J., pers. com., Fernandez C., pers. com.*), by counting flocks of birds entering the colony and extrapolating (in Kaw Marsh, French Guiana) (*Reynaud & Kushlan, 2004*), and nest by nest count from the ground or boat (in Kaw Marsh, French Guiana) (*Stier A. et al., unpublished*). Based on the results of these studies, the most appropriate way to count and monitor colonies is by using a nest by nest count from the ground or boat. If possible, this should be done using double-counting techniques or other methods of assessing bias in the count. If not possible, then every effort should be made to follow a standard protocol to be used across colony sites.

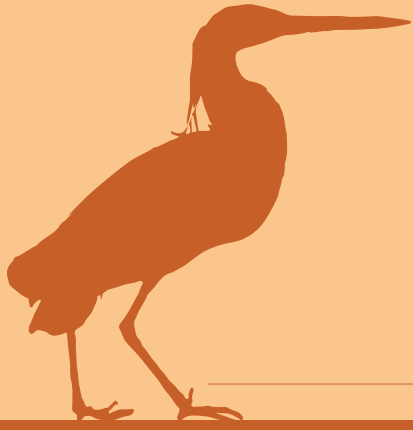
The protocol is:

1. Determine and detect the arrival of Agami Herons at the start of nesting.
2. Count nests during the first 15 days after the first hatchings, from land or from a boat. In all situations there should be a minimum of disturbance and noise. Staying within these 15 days minimizes the underestimation due to asynchronous installation of the birds (*Abella-Gutierrez & Lopez-Conlon, 2008*)
3. Count the entire colony or make extrapolations using the colony surface and counted surface.
4. Calculate the number of nesting birds (2 x number of nests).
5. Report findings to the Agami Heron Working Group.

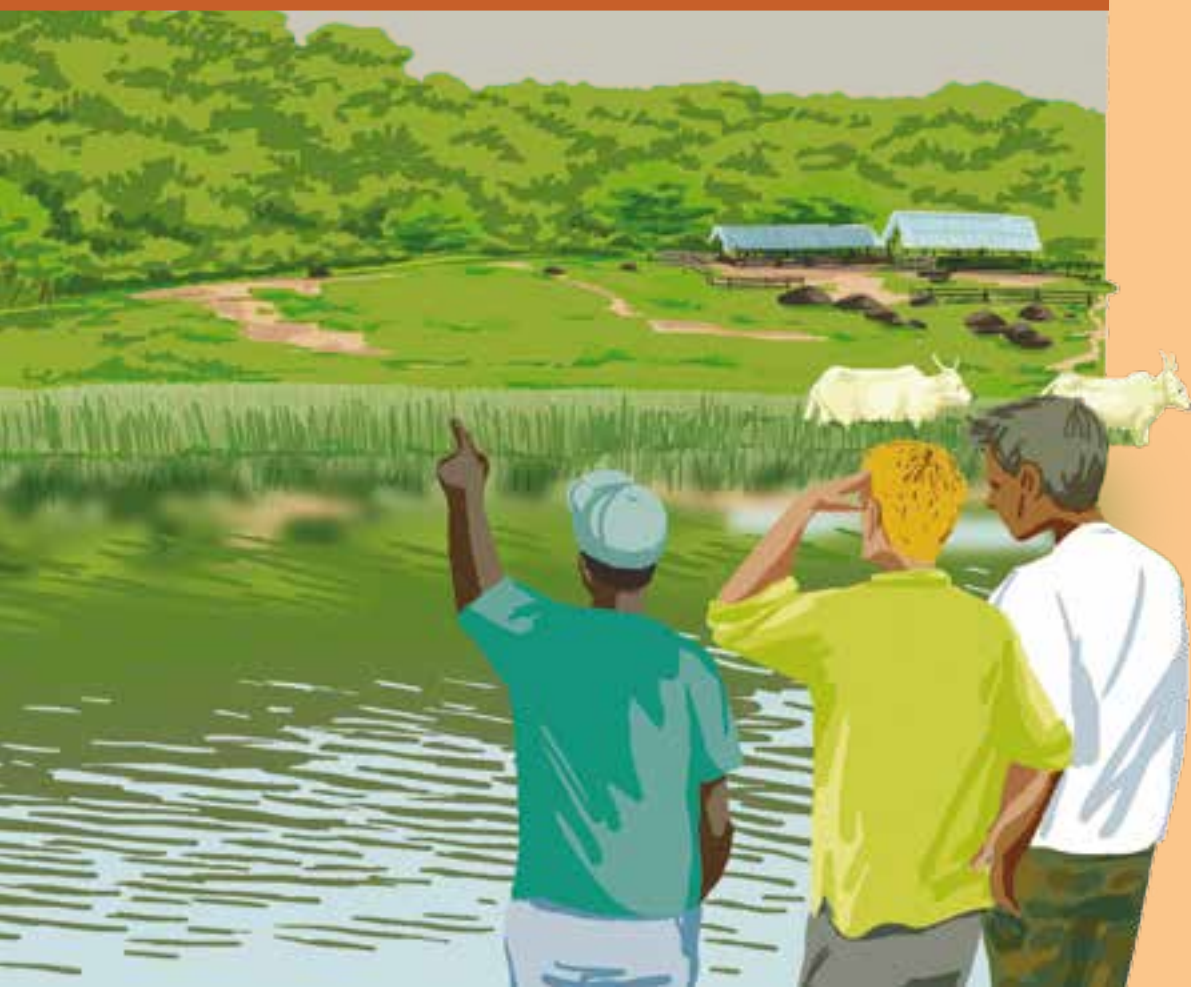
1. Fixing the nets to catch the herons.
2. Banding of an Agami Heron.
3. Argos satellite transmitter equipment.
4. An Agami Heron flying with its satellite transmitter.
5. Observation of the breeding colony of the Kaw-Roura marshes in French Guiana.
6. Breeding colony of the Kaw-Roura marshes in French Guiana.
7. Agami Herons perched in the breeding colony.
8. An Agami Heron near to the breeding colony.



Agami Heron



IV.
CONSERVATION
STRATEGY AND
ACTION



In this section, the overall conservation strategy and specific conservation actions, beyond research and monitoring, are delineated. While the strategy provides an overarching context for conservation, actual conservation action must be carried out by the appropriate stakeholders at both local and species-wide scales.

IV. 1 CONSERVATION STRATEGY

Based on available information, the conservation strategy for the species should concentrate on identification and protection of important colony sites, developing a better understanding of range, habitat needs and biology of importance to conservation coordinated through an Agami Heron Working Group.

IV. 2 CONSERVATION ACTIONS

Based on information now available, the following conservation actions are called for:

1. Create an Agami Heron Working Group (AHWG) under the IUCN Heron Specialist Group to improve communication and coordination among scientists, conservationists, and other stakeholders.
2. The AHWG should encourage and coordinate monitoring population size and success at each important colony site.
3. The AHWG should assist BirdLife International and Wetlands International in conducting periodic conservation assessments and participate in improving population estimations.
4. Local and regional stakeholders should protect each important colony site and known feeding areas through local and national engagement. With stakeholders, develop a management plan and implementation plan for each important colony site that will protect it from development, habitat alteration, and human disturbance. Such site planning should begin with known important sites already in protected areas, including Kaw-Roura National Nature Reserve (French Guiana), Pacuare Private Nature Reserve (Costa Rica), Cabo Orange National Parc (Brazil), Galibi and Wia-Wia Nature Preserve National Parcs (Suriname), or Delta del Orinoco National Park (Venezuela). Agami Herons need to be among the priority actions of the Conservation Plans of these areas, and networking should be implemented to homogenize conservation actions as well as monitoring and research protocols to make results comparable.
5. Protect each important stop over site through multispecies and habitat conservation action.
6. Determine habitat areas containing important numbers of Agami Herons outside the nesting season; determine the habitat quality and protect/manage as possible through regional conservation planning and action.
7. In the Orinoco Llanos Bioregion as well as the Pantanal and Marajo Island in Brazil, owners of large ranches may be important allies for Agami conservation by protecting gallery forests where Agami Herons live.
8. Where appropriate and feasible, launch some educational and communication campaign near the known Agami Heron colonies to promote a local pride and a friendly attitude toward Agami Herons.
9. The AHWG should revise this conservation plan every ten years, the next being in 2025.



The breeding colony in the Kaw-Roura marshes in French Guiana can only be accessed by helicopter



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ANNEX

Annex 1: Localities where the Agami Heron has been recorded





Annex 2: List and contact information for current or potential collaborators for Agami Heron actions

After summarizing current knowledge about the species biology and ecology, the localization of important known sites and potential threats, it is important to coordinate actions range wide between the different partners and organizations which are already or would be potential future collaborators to implement research, monitoring and conservation actions. These potential collaborators are listed below:

BRAZIL	Parque Nacional do Cabo Orange: Rua Getúlio Vargas, nº 235 – Bairro : Paraíso – Oiapoque-AP – CEP : 68.980-000 / +55 96 3521 2197 / ricardo.pires@icmbio.gov.br; paulo.silvestro@icmbio.gov.br; and ivan.vasconcelos@icmbio.gov.br
	Centro Nacional de Pesquisa e Conservação de Aves Silvestres (CEMAVE): BR-230 Km 10, Floresta Nacional da Restinga de Cabedelo, s/n, Caixa Postal 110, Agência Inter mares, Cabedelo-PB, CEP: 58.310-000 / +55 83 3245-5278 / joao.nascimento@icmbio.gov.br
COSTA RICA	Pacuare Nature Reserve - Carlos Fernández-Alfaro: Avenida 10, Calle 25, No. 2550, San Jose, Costa Rica / +506 2234 5890 / carlos@pacuarereserve.org and costarica@pacuarereserve.org
	Museo Nacional de Costa Rica - Ghisselle M. Alvarado Quesada: Departamento de Historia Natural - Ornitología - Museo Nacional de Costa Rica, Avenidas Central y Segunda, costado este Plaza de la Democracia - San José, Costa Rica / +506 2233 71 64 / galvarado@museocostarica.go.cr - ghisselle@gmail.com
FRENCH GUIANA	GEPOG Association: 15 Avenue Pasteur, F - 97300 Cayenne / +594 594 29 46 96 / association@gepog.org
	Réserve Naturelle Nationale de Kaw-Roura: PNR de Guyane, 31 rue François Arago BP 539, F - 97344 Cayenne Cedex/ contact.nkr.pnrg@gmail.com
	DEAL-Guyane : Direction de l'Environnement de l'Aménagement et du Logement : Impasse Burazé, CS 76003, F - 97306 Cayenne / 0594 29 66 50 / mnbsp.deal-guyane@developpement-durable.gouv.fr
	Pierre A. Reynaud: Les Orteaux, F - 05700 Trescléoux, France / pierre.reynaud1@free.fr
	Parc amazonien de Guyane: 1 rue Lederson, F - 97354 Rémire-Montjoly - Guyane française / Bertrand Goguillon / 0594 29 12 52 / 0694 38 36 99 / bertrand.goguillon@guyane-parcnational.fr
PERU	Tapiche Reserve: Ricardo Palma 516 Iquitos / +51 6560080 and +51 950664049 / greentrack@gmail.com
VENEZUELA	Luis Gonzalo Morales: Instituto de Zoología y Ecología Tropical, Universidad Central de Venezuela, Caracas, Venezuela/ luis.morales@ciens.ucv.ve
	Cristina Sainz : Universidad Simón Bolívar, Departamento de Biología de Organismos, Caracas, Venezuela / cristinasainzb@usb.ve



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