

Promoting Conservation, Research And Education For The World's Amphibians

# FrogLog



*Nyctimantis pomba* © Pedro Peloso

## Strategic conservation plans developed for two Brazilian species

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ASG establishes a new Task Force for Eastern Asian Salamanders

### CONTRIBUTED ARTICLES

The threat of roadkill to caecilians in India and recommendations for its mitigation

### ASG WEBINAR ABSTRACTS

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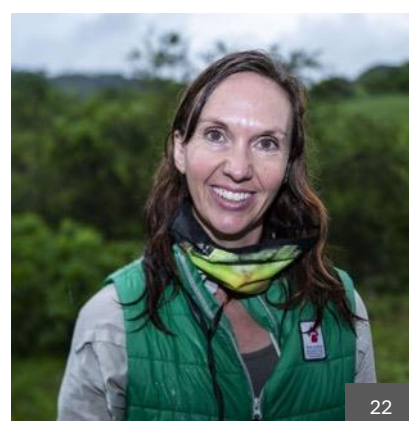
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FrogLog is produced by the IUCN SSC Amphibian Specialist Group (ASG) to serve as the amphibian conservation community's news publication.

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# Dear Readers,

It is a pleasure to be able to share FrogLog with you all again, following a short hiatus while the production of FrogLog was restructured and renewed! FrogLog is now an ASG-only product, and we are incredibly grateful to everyone who has participated in the life and growth of the publication over the years, especially for the transition from a newsletter to the amazingly colourful and glossy document it has become. We thank the Amphibian Survival Alliance team for their work and dedication over the last decade, and especially we thank Candace M Hansen who has been key to the production of FrogLog for even longer and, without whom FrogLog would simply not exist. We also thank all the past Editorial Board members for their dedication to the publication. The clarification of the segregation of tasks between ASG and ASA allows us to work better without walking on each other feet, while collaborating further as two different entities for the conservation of amphibians.

The new FrogLog has changed style to adapt to the times, and while it is difficult to replicate the beautiful format, we are trying our best to find a sustainable way to keep on publishing for many years in the future. The focus, however, has not changed, and we will keep on releasing stories about amphibian conservation from all parts of the world; about caecilians, salamanders and frogs. From now on, we aim to publish FrogLog twice a year, but all the articles will be posted in an early-view format on our website ([www.iucn-amphibians.org](http://www.iucn-amphibians.org)), once accepted. The new guidelines are also online, and you are welcome to visit and submit if you are interested! We are happy to disseminate all types of conservation and research news about amphibians, including those that might not be “original enough” for the scientific literature, as well as negative results, as they are still important sources of information to support evidence-based conservation actions.

This first issue of the “new” FrogLog reviews all the recent developments related to the work of the ASG, including the publication of the third update of the global Amphibian Conservation Action Plan, and the State of the World's Amphibians report. We also introduce the speakers and topics of our new Webinar Series. For this renewal of FrogLog, we have four contributed articles, related to strategic conservation plans for two Brazilian frog species, caecilian roadkills in India and related policy recommendations to address the threat, successful reintroduction of treefrogs in Luxembourg, and the impact of climate change and the resulting 2023 drought events on treefrog breeding activities in China.

If you are interested in FrogLog and want to help, please reach out at [froglog@amphibians.org](mailto:froglog@amphibians.org), we might find a role for you to express your interest in amphibian conservation!



**Amaël Borzée and Sally Wren**

*ASG Co-Chairs*

# ASG News



**Figure 1:** *Hynobius leechii*. One of the focal species of the EASaTF.  
© Amaël Borzée.

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Since the last issue of FrogLog, ASG has been very busy – the results of the second Global Amphibian Assessment ([GAA2](#)) were published in Nature in 2023 (1) with a broader analysis of results presented in the State of the World’s Amphibian report ([SOTWA](#); 2), and the updated Amphibian Conservation Action Plan ([ACAP](#); 3) was released earlier this year (see separate articles in this issue). We have also been working to help improve communications to and between ASG members – we now have an email member newsletter which we have been using to share updates, information about grants, updates in the network, etc. In addition, we have established a [webinar series](#) to facilitate sharing of research and conservation projects relevant to informing our amphibian conservation work.

ASG’s [Atelopus Task Force](#) has been operating since 2020, but recently we have been working to establish additional Task Forces, informed by the findings of the GAA2 and ACAP, focused on specific areas of need. The first of these, the Eastern Asian Salamander Task Force ([EASaL-TF](#), Figure 1) was established in May 2024 (4), in response to the GAA2 finding that more than 65% of Caudata in Eastern Asia are threatened, alongside the likelihood that threats to these species are increasing in the region. The goal of the EASaL-TF is to identify actions necessary to address the threats to salamanders in the region, through scientific research and the implementation of conservation plans, at both the regional and species level. In addition, the EASaL-TF

will engage and establish partnerships with communities, stakeholders, and governments to raise awareness and support for salamander conservation, and enable the implementation of collaborative actions across the region. However, as not all threats are identified, the first actions to be taken is to collect data to inform extinction assessments, including defining range boundaries and identifying threats, highlight lineages in urgent need of taxonomic research, and develop action plans for Endangered and Critically Endangered species.

We have also had some changes in the ASG Secretariat –we have been joined by Izabela Barata, who has taken on a new role of Regional Network Officer for the Americas. We hope this role will strengthen the ASG network in the region, facilitating collaborations and encouraging engagement and action. In addition, after 12 years serving as ASG Co-Chair, Ariadne Angulo has stepped down from this position, and has been replaced by Sally Wren. Sally has been an ASG Programme Officer since 2013, with her main focus on leading the ACAP update, and was in the role of Deputy Chair prior to taking on the Co-Chair role. We thank Ariadne for the many years of tireless contribution she has made to ASG, first working on the amphibian Red List, and most recently as Co-Chair - the ASG is a stronger network for her efforts. We are grateful that Ariadne will continue to support ASG in an advisory role, to ensure a smooth transition.

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## Key Findings from Second Global Amphibian Assessment and the Path Forward

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The second Global Amphibian Assessment (GAA2) was completed in June 2022, and it confirmed that amphibians are the most threatened animal group in the world (40.7% of species). The joint initiative between IUCN, Synchronicity Earth and Re:wild evaluated 8,011 species for the IUCN Red List, 2,268 of which were assessed for the first time. The full breakdown of results from the GAA2 were published in *Nature* in 2023 (1), and in the ‘[State of the World’s Amphibians](#)’ report (Figure 1; 2). Other key findings highlighted major threats affecting amphibians, identified key landscapes of threatened species globally, and demonstrated the need to scale up conservation efforts for amphibians worldwide.

The updated Red List Index (RLI) shows the status of amphibians is continuing to deteriorate, particularly for salamanders and species in the Neotropics (1). Previous to the GAA2, disease and habitat loss were responsible for 91% of status deteriorations (i.e. species moving to a higher Red List Category) between 1980–2004, coinciding with the novel outbreak of chytridiomycosis across the Neotropics. While disease continues to be a threat to amphibians worldwide, ongoing and projected climate change effects have emerged as the dominant primary driver of status deteriorations (39%) since 2004, closely followed by habitat loss and degradation (37%). Increasing severity, duration and scale of droughts and fire events, changes in rainfall pattern and habitat shifting and alteration can, for example, reduce breeding success, and degrade available habitat for amphibians. Research into the effects of climate change has demonstrated detrimental effects to amphibians and their habitats in various regions such as Venezuela, Australia, Brazil and the USA, although the true impacts of climate change on amphibians are thought to be underestimated (1).

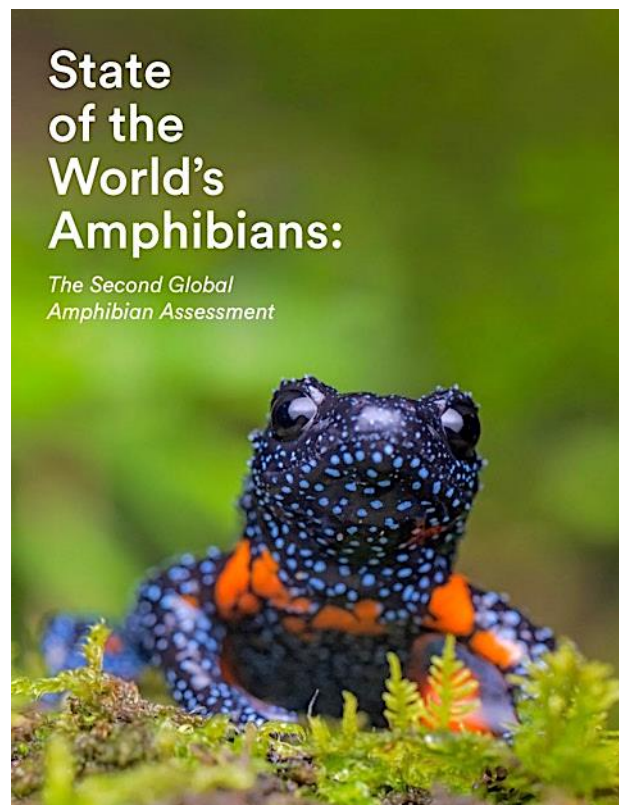


Figure 1: State of the World's Amphibians report.

The number of threatened amphibians (those that are categorised as Critically Endangered, Endangered and Vulnerable) has now reached 2,873, and the countries that contained the most threatened amphibians were identified (Figure 2), with these species increasingly concentrated in the amphibian rich regions of Tropical Andes, Mesoamerica, Madagascar, the Western Ghats in India, southern Brazil, Venezuela and southern and central China. Other hotspots for threatened amphibians include the Caribbean, Sri Lanka, western Cameroon and eastern Nigeria, the Eastern Arc Mountains in Tanzania, and the Annamite Mountains in Vietnam (1).

Habitat loss remains the most common threat affecting 93% of all threatened amphibian species across the globe. Agriculture is the biggest driver of habitat loss, affecting 77% of all threatened species, followed by timber and plant harvesting (53%) and infrastructure development (40%). Disease, climate change effects, fire and over-exploitation also continue to contribute to amphibian declines, with species usually experiencing the compounding effects of multiple, simultaneous threats. During the GAA2, four more species were

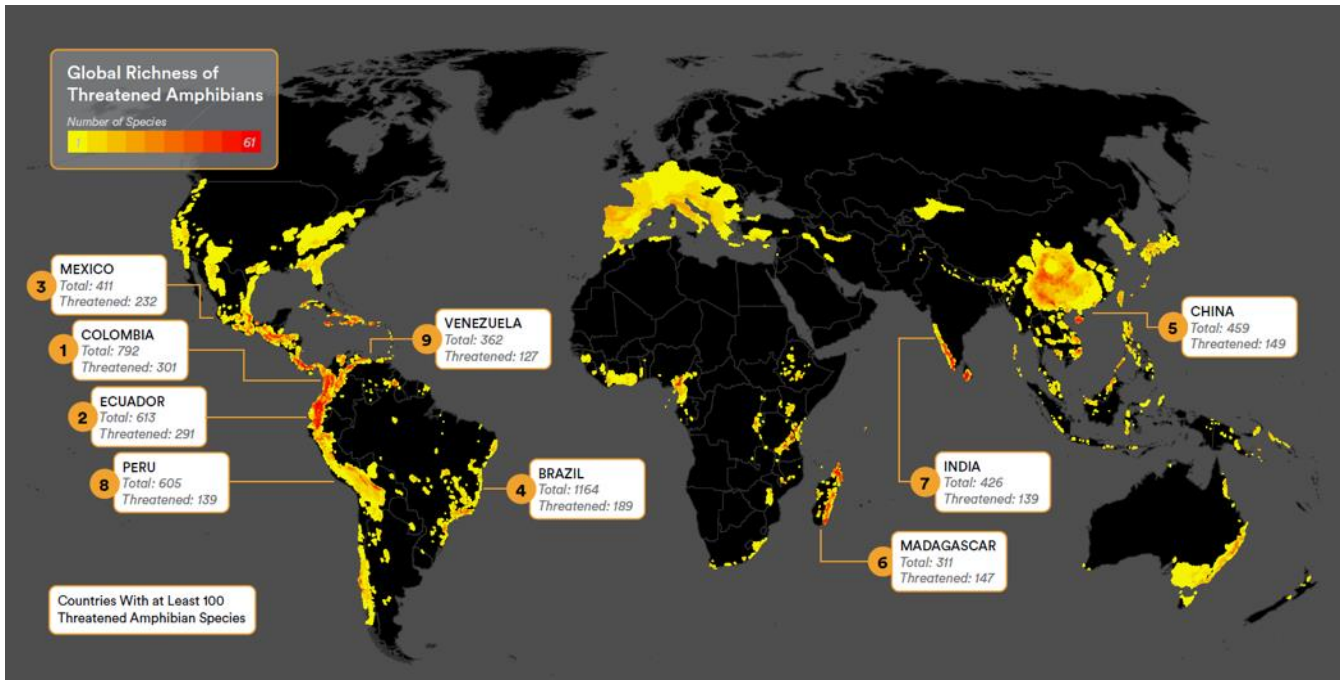


Figure 2: Top ten countries of threatened amphibians from the GAA2. Source: State of the World's Amphibians report.

declared ‘Extinct’, bringing the global total to 37, and 23 more species are considered ‘Possibly Extinct’. With the high level of survey effort required before declaring a species as ‘Extinct’ on the Red List, it is very likely that the number of species that have disappeared is also underestimated.

The good news is there were some genuine improvements in status (i.e. species moving to a lower Red List category) between 2004-2022. Of the 120 species that improved in status, 63 species now have a lower risk of extinction mainly due to increased habitat protection through the creation of new, effective, protected areas and/or improved management. This was particularly evident in Costa Rica, India and Sabah in Malaysia (1). However, with less than 2% of all known amphibian species improving in status since 2004, it is clear that more conservation action is required and at a larger scale to reverse the current extinction crisis

The GAA2 was a collaborative effort of over 1,000 researchers from around the world. The Amphibian Red List Authority (ARLA) team would like to extend our gratitude to everyone that took part in the GAA2, and contributed their data and expertise to this process, as

well as to our donors who also made this work possible. The research of all of the experts is vital to the success of the GAA and highlights the urgent need for ongoing amphibian conservation efforts. The third Global Amphibian Assessment (GAA3) officially began in January 2024 with a new strategy, and aims to be completed by the end of 2028. The ARLA is currently reaching out to Regional ASG Chairs and Red List Coordinators to begin this work and introduce the new strategy which aims to address lessons learnt from the first two GAAs, while building a more sustainable long-term GAA process.

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# Amphibian Conservation Action Plan updated

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The updated Amphibian Conservation Action Plan, a collaborative document authored by more than 100 global experts, was published in July, collating the most up-to-date evidence base to inform amphibian conservation action.

Released earlier this year, the updated [Amphibian Conservation Action Plan](#) (ACAP; Figure 1; 1), synthesises developments in amphibian conservation knowledge and practice. The ACAP release is the first of two complementary documents that will make up the 2024 ACAP. This 'status review' document, conceived and edited by the IUCN SSC Amphibian Specialist Group (ASG), is authored by over 100 experts from more than 25 countries, most of them ASG members, and went through an open consultation period allowing for broader input from all interested parties. It outlines developments over the last 15 years in major themes relevant to amphibian conservation. For each of those themes, the authors identify key knowledge gaps and conservation priorities. After two introductory chapters, the document is divided into three sections focused on different aspects of conservation: Threats, Informing decision-making, and Species management.

Nearly 41% of amphibian species are at risk of extinction according to the [Second Global Amphibian Assessment](#) (GAA2) published on The IUCN Red List of Threatened Species™ in 2023, which confirmed the group's 2004 status as the most threatened class of vertebrates (2, 3; see also Hobin et al, from page 4 in this issue). This new ACAP document updates earlier versions of the global Amphibian Conservation Action Plan, first published in 2007 (4) and updated as a digital resource in 2015. The Plan highlights the need for urgent action to address this conservation crisis.

The new ACAP is a cornerstone for amphibian conservation globally, as well as regionally, and it



Figure 1: Cover of the 2024 Amphibian Conservation Action Plan.

provides an advanced tool kit to all interested in the conservation of these species. The purpose of this updated ACAP document is both to help guide researchers in identifying the most important knowledge gaps, so areas that will have a significant impact for on-the-ground action can be prioritised, and to support those implementing amphibian conservation activities to make evidence-based decisions. While not a one-size-fits-all solution – all chapters will not be equally applicable to all species – conservation practitioners can pull information from relevant sections to help guide their work. As such, ASG's goal is that this globally-scoped document informs action at regional and local levels, and likewise, that ASG acts as a conduit for regional experiences to feed into global knowledge, improving the evidence-base for amphibian conservation action worldwide.

To halt and reverse the long-standing amphibian population declines and prevent more species extinctions, it is critical that amphibian conservation becomes both an integral and a conspicuous part of the biodiversity conservation agenda worldwide. One of



**Figure 2:** Darwin's frog (*Rhinoderma darwini*) is classified as Endangered on the IUCN Red List, due to its small area of occupancy, fragmented population and ongoing threats. In 2023, the amphibian chytrid fungus was found to have reached Tantauco Park, Chile, causing the collapse of the largest known populations of this species. An emergency rescue plan has been developed and needs to be implemented urgently in order to protect this last stronghold. © Andrés Valenzuela Sánchez.

the 2024 ACAP's key messages is that adequate financial and human resources and necessary policy measures are key to addressing this decades-long crisis.

The ASG hopes that this freely available updated ACAP will help provide a solid evidence-base for amphibian conservation actions globally, see Figure 2 for an example, as well as highlighting areas of knowledge where more research is needed. The updated document was downloaded over 5,000 times since its release in July to the end of September, so we are pleased to see that it is already being well used. The updated ACAP document can be downloaded from the IUCN website as a whole document, or from the ASG website as separate chapters.

We call on every conservation organisation, government, responsible business and the general public to consider amphibians a top priority for conservation efforts; amphibians deserve it, and the planet needs them.

### Acknowledgements

Thank you to everyone, notably the numerous ASG members, and non-members who contributed to

updating the ACAP. We sincerely appreciate your work, and your commitment to improving global amphibian conservation efforts.

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## Introduction to our new ASG webinar series

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In May 2024, the Amphibian Specialist Group (ASG) launched the ASG Webinar Series, an initiative designed to catalyze global collaboration in amphibian conservation. This series aims to address critical issues by fostering a collaborative environment where participants can share cutting-edge research and explore new methodologies for conservation. By bringing together diverse voices from around the globe, the series seeks to inspire innovative solutions that can be implemented across various ecological contexts.

The ASG has appointed dedicated Webinar Officers to facilitate regional engagement. Dasi Ong from Malaysia is the point of contact for speakers from Asia and Oceania; María José Chang from Guatemala oversees contributions from the Americas and the Caribbean; and Steven Allain from the UK coordinates with

European speakers. The organization is currently seeking an officer to represent Africa, highlighting its commitment to inclusivity and global representation.

We invite participants to share their expertise by presenting their own research or applied conservation experience, and we welcome you to suggest colleagues for future webinars. You can catch up on previous sessions by visiting the ASG's YouTube Channel, where you'll find valuable insights into ongoing conservation efforts. You can also catch up on the summary of selected webinars in this edition of FrogLog, page 21. Registration for the Webinar Series is open, so you can stay informed about upcoming events and actively engage in this important field.

As amphibians face unprecedented challenges, the ASG Webinar Series shines as a beacon of hope, bringing together a global community committed to preserving these essential species through collaboration and knowledge-sharing. This initiative not only enriches scientific discussions but also empowers everyone involved to take meaningful steps toward effective amphibian conservation strategies. Stay tuned to our next webinars, we will announce them on our ASG social media platforms.

If you're interested in presenting your work, please contact the person in charge in your region respectively.

**ASG Webinar web page:** <https://www.iucn-amphibians.org/resources/asg-webinar-series/>

**ASG Youtube channel:** [Amphibian Specialist Group Webinars - YouTube](#)

**ASG webinar mailing list:** [https://docs.google.com/forms/d/1q5T1N3gX6En6wjVr54a5mk8NJedO9JN\\_RrDiRb4mZE/edit](https://docs.google.com/forms/d/1q5T1N3gX6En6wjVr54a5mk8NJedO9JN_RrDiRb4mZE/edit)

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**Figure 1:** Red List Authority Global Coordinator Janice Chanson sharing recent results from the second Global Amphibian Assessment.

## ASG at the 10th World Congress of Herpetology

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The IUCN SSC Amphibian Specialist Group (ASG) is the International Union for Conservation of Nature's (IUCN) global volunteer network of dedicated experts who donate their time and expertise to create a community from where practical amphibian conservation can be advanced based on a solid foundation of science. This network currently consists of over 300 members in over 40 regions, enabling the ASG to act at a global scale.

During the week of the 5<sup>th</sup> of August 2024, co-chair Prof. Amaël Borzée and secretariat members organised the IUCN SSC Amphibian Specialist Group Lunch Meeting at the 10<sup>th</sup> World Congress of Herpetology (WCH) in Kuching, Malaysia. The 5-day conference aims at promoting herpetological research, education and

### WCH as it happened:

1. 8 plenary talks
2. 32 symposia
3. 2 workshops
4. 81 open sessions
5. two poster sessions
6. several thematic events
7. 1484 delegates from 76 countries

conservation, by facilitating communication between individuals, societies and other organisations engaged in the study of amphibians and reptiles. With over 1,400 delegates from 76 countries in 2024, the meeting brings together the world's top herpetologists every four years.

The ASG Lunch Meeting aimed at gathering numerous amphibian conservation-minded people at the WCH, enabling the members of the network to meet in person. During the event, recent developments were shared with an audience of c. 50 amphibian experts. Firstly, co-chair Dr Amaël Borzée introduced the group

to ASG global goals and touched on Task Force plans and the recent ACAP publication. Red List Authority Global Coordinator Janice Chanson shared the recent results from the second Global Amphibian Assessment (GAA2, Figure 1). Completed in June 2022, GAA2 updated the 5,743 species from the GAA1 and added 2,000+ first-time assessments for newly described species. The key findings of the GAA2 are available in *Nature*: Ongoing declines for the world's amphibians in the face of emerging threats (1), and illustrated in the *State Of the World's Amphibians* report (2) (please also refer to article pages 4-5 of this edition of FrogLog).

To showcase ASG regional work Dr Jeanne Tarrant (Figure 2), Regional Chair for Southern Africa presented results from their network in advancing amphibian conservation in Lesotho, South Africa, Namibia, Mozambique, Botswana, Zambia, Zimbabwe, Angola and Malawi. Next, Dr Luis Fernando Marin da Fonte, *Atelopus* Survival Initiative coordinator, shared the progress and updates of the *Atelopus* Task Force, the first ASG task force, officially established in 2020 in response to the need to implement coordinated and collaborative actions to ensure the survival of harlequin toads. Finally, Dr Bela Barata introduced herself as the new secretariat member, explaining how her new role as ASG Network Officer is looking at facilitating collaborations and encouraging engagement and interaction of members with a special focus on the Americas.

We closed the day with a special social event at a traditional Malaysian restaurant, where everyone was welcome to attend. During dinner, 17 amphibian enthusiasts shared their work with their peers providing interesting discussions and new ideas for the next steps of ASG. This informal setting enabled conversation between the Secretariat and ASG members, a rare occasion to get everyone together. It also enabled conversation between people with different degrees of experience, facilitating the spread of conservation ideas and skills.

The next World Congress of Herpetology will be held in Spain, in 2028 – back to Europe 29 years after the first meeting was held, in Canterbury, UK. Until then ASG will continue to provide the scientific foundation to inform effective amphibian conservation action around the world, enabling members to deliver the ACAP and Red List assessments while also developing task forces and strengthening regional and thematic working groups.

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**Figure 2:** Regional Chair for Southern Africa Dr Jeanne Tarrant presenting results from their network.

# Contributed Articles

## Strategic Amphibian Conservation Plans (PECAns): Novel Initiative for Amphibian Conservation In Brazil

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It is well known that amphibians face numerous threats worldwide, leading to population declines and species extinctions (1). To fight extinction and minimize declines, unified conservation efforts, and cohesive actions are essential. The IUCN SSC Amphibian Specialist Group is represented in Brazil by the regional working group (ASG Brazil), which has been actively engaged in conservation initiatives for Brazilian amphibians since 2006 (2). ASG Brazil serves as a central hub to assist activities involving amphibian conservation, and to centralize information on amphibian conservation efforts, thereby facilitating research and promoting connections within the wider amphibian conservation community in Brazil.

ASG Brazil has recently initiated a significant effort aimed at advancing the conservation of Brazilian amphibians: the Strategic Amphibian Conservation Plans (Planos Estratégico de Conservação de Anfíbios -



**Figure 1:** The two amphibian species whose Strategic Amphibian Conservation Plans (PECAns) have already been published. A) *Nyctimantis pomba* © Pedro Peloso. B) *Pithecopus rusticus* © Elaine Lucas.

PECAns). These plans are designed to engage key stakeholders in devising conservation strategies for targeted Brazilian threatened amphibian species. The selection of species for inclusion in a PECAn was derived from the results of the Conservation Needs Assessment (CNA) workshop held in 2020. During this workshop, Brazilian specialists evaluated 67 threatened amphibians, identifying 14 species as high-priority candidates for conservation interventions, including *ex situ* husbandry efforts (3). As such, our objective is to develop a PECAn for each one of these species in the coming years.

In 2022, we completed two PECAns, contemplating two species: *Nyctimantis pomba* (Figure 1A) and *Pithecopus rusticus* (Figure 1B). These species were selected due to their Critically Endangered Red List assessments (4, 5) and high conservation priority. Additionally, both species already have ongoing conservation actions, including *ex situ* management (4, 5). The PECAns were organized by members of ASG Brazil, with the support of the leading researchers for both species, Clodoaldo Lopes de Assis (Universidade Federal de Viçosa - UFV) and Elaine Maria Lucas (Universidade Federal de Santa Maria - UFSM), as well as Amphibian Ark's coordinator, Luis Carrillo.

We had the participation of 44 stakeholders, encompassing researchers, government officials, and individuals with varied expertise and diverse backgrounds. Our approach for selecting participants and conducting the meetings followed the Conservation Planning Specialist Group (CPSG)



Figure 2: One of the online meetings for the development of the Strategic Amphibian Conservation Plans (PECANs). © ASG Brazil.

guidelines. Furthermore, many stakeholders knew both species, facilitating the discussion of these species' conservation actions during the meetings. The development of the PECAN for *N. pomba* and *P. rusticus* was carried out simultaneously through seven online meetings which had an average duration of four hours (Figure 2). The decision to address both species simultaneously was based on their currently similar threat scenario. Each species is represented by a single population confined to distinct private properties, with *N. pomba* and *P. rusticus* endemic to the states of Minas Gerais and Santa Catarina, respectively. Both species' populations suffer from habitat degradation caused by agriculture, livestock intrusion, logging, and potential impacts from unregulated land use, hydropower projects, and frequent fires (4, 5). At each meeting, we tackled different topics, including reducing knowledge gaps about the species and their habitats; identifying, characterizing, and mitigating threats; and establishing strategies focusing on communication and awareness-raising for species conservation.

From the meetings, we were able to gather significant information and narrow the existing knowledge gap regarding species' biology, reproduction, natural history, ecophysiology, and threats. The published PECANs (Figure 3A and 3B) consolidate this knowledge, presenting detailed, current information on each species and outlining the goals and actions necessary for their conservation. For example, we identified 59 conservation actions for *N. pomba* and 56 for *P. rusticus*.



Figure 3: Strategic Amphibian Conservation Plans (PECANs) published to date. A) PECAN cover for *Nyctimantis pomba*. B) PECAN cover for *Pithecopus rusticus*.

Additionally, we established a virtual dashboard listing all actions and stakeholders responsible for delivering each one, which may facilitate sharing information and expert contributions to specific actions. The link to the stakeholders' list is provided at the end of each PECAN. The PECAN for *N. pomba* was published in May 2023 (Figure 3A), while the PECAN for *P. rusticus* was published in November 2023 (Figure 3B). The plans were published only in Portuguese; however, interested parties needing information in other languages can contact ASG Brazil to request it. The duration of both plans is five years (2023-2028), with subsequent meetings scheduled to assess the progress of proposed actions. Meanwhile, new PECANs for other high-priority

species will be initiated by ASG Brazil. We are confident that the PECAnS will become essential tools for accurately targeting conservation activities, helping to reduce threats to Brazilian amphibian species.

The plans can be accessed through the QR codes in Figures 1A and 1B or through the links below:

- <https://www.iucn-amphibians.org/wp-content/uploads/sites/4/2023/05/Plano-Estrategico-de-Conservacao-de-Anfibios-%E2%80%94-Nyctimantis-pomba.pdf>
- <https://www.iucn-amphibians.org/wp-content/uploads/sites/4/2023/11/Plano-estrategico-de-conservacao-Pithecopus-rusticus.pdf>

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# Immaculate treefrogs, climate change and rice paddies: a system increasingly out-of-synchronisation

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Immaculate treefrogs (*Dryophytes immaculatus*) are distributed on the alluvial plains of the Yangtze River basin (1). They occur in low-elevation wetlands, which are today mostly comprised of rice paddies in this area as rice agriculture has replaced the very large majority of natural wetlands over the last 7000 years (2, 3), and especially starting 4200 years ago (4). Originally, their breeding season is likely to have been regulated by spring floods of alluvial plains, but it is not strongly constrained by the artificial flooding of rice paddies.

The immaculate treefrogs are likely to have been abundant in the past, with some populations stable over geological times (5), but the numbers are currently low, and the listing as Least Concerned by The IUCN Red List of Threatened Species (6) requires an update (7). One of the main challenges in doing so is determining the threats that have triggered and are maintaining the decline. These threats could result from the natural variation in population size in amphibians (8), but it is unlikely as it would have affected syntopic species and no other species breeding in the same habitat is declining as drastically as *D. immaculatus* (but note that most species are declining, and especially the very abundant *Pelophylax nigromaculatus* (9)). As a result, human activities are likely to be the main drivers of population decline, and principally habitat loss and climate change, following the global pattern of threats to amphibians (10).

Rice farming within the range of the species has stagnated over the last decade due to a combined suite of factors including water scarcity and global warming (11), but also due to cultural changes resulting in a shift in diet (12, 13). In addition, the development of agricultural practices had a negative impact on the landscape used by the species. For instance, fragmentation at the rice paddy scale (14), as well as the development of concrete structures along the banks of rice paddies for irrigation (15), have resulted in a decrease in population size and a loss of microhabitat available for the sister species, the Suweon treefrog (*Dryophytes suweonensis*). The ability of the treefrogs to exploit agricultural wetlands in northeast Asia is of primary importance as treefrogs align their breeding activities with rice farming (16), and as rice grows faster with adequately high temperatures, the impacts of climate change mean that farmers can plant rice significantly later in the season, up to a certain threshold (17, 18), leaving treefrogs without access to the hydroperiod needed for spawning and tadpoles to develop (19).

While a decrease in rice agriculture has been recorded (17, 20), it is difficult to understand changes at the local scale, especially in view of the shift in rice plantation. Spring 2023 was among the driest spring ever recorded in East Asia (21), and we informally interviewed farmers during the rice planting season of 2023 to understand the direct impact of global warming on their activities. The message of all farmers questioned was uniform, stating that in general rice agriculture has declined over the years, corroborating the data available. In addition, in some areas of Jiangsu and Anhui Provinces, China, rice was planted during the first week of July, instead of May or June. Rice plantation in 2023 was among the latest in the experience of the farmers questioned, resulting from the exceptional drought that did not allow timely harvest of wheat in the fields where rice is planted later in the season (22, 23). The drought resulted in a general lowering of water reserves as water is redirected towards other uses, such as watering of dry crops and animal farming. Some farmers indicated that they would not plant rice in 2023 as it was already too late in the season and the prospect of a poor harvest was too high. In addition, the drought of 2022 had also affected farmers' choice for crops in 2023, and some farmers, or their contractors, opted for dryland rice farming in 2023 instead of traditional rice farming.

As a result of the changes in rice farming activities, and especially flooding, that regulate spawning by *D.*



**Figure 1:** Male *Dryophytes immaculatus* holding on rice seedling before calling. Taizhou, Jiangsu, May 2022. © Ningjing Wang.

*immaculatus*, the breeding activity of the species was delayed by a large number of days, as the species should start breeding in early May (19), with the latest males heard calling on July 10<sup>th</sup> in 2022 (unpublished data; Figure 1). This estimate highlights a decrease in the breeding time-window by about two-thirds.

As the species relies on flooding for spawning, and that water is maintained for a specific period, eggs may have time to hatch and tadpoles perhaps have time to develop and metamorphose, but several problems arise with changing practices influenced by climate change. So far, there are no data regarding the development requirements of tadpoles in the species, in terms of time needed to complete growth and metamorphosis, but also regarding adequate temperatures. Development of tadpoles is heat dependent, e.g., (24), but too high temperatures can easily reach the critical maximum of the species (25), e.g., (26), especially in shallow non-shaded water bodies (27) where tadpoles are present at a later season than in the past and therefore exposed to higher temperatures. Interestingly, most farmers were able to identify the species of interest as they mentioned a small green frog on vegetation above ground level, a colour and behaviour that only matches with *D.*

*immaculatus* in the area. However, they also noticed that the species had disappeared from their fields in the last decades.

As the immaculate treefrog is threatened by a long list of factors, conservation plans and activities must be developed to neutralise these threats. A specificity here is that the species is almost uniquely found in rice paddies, and thus involving farmers in their conservation is a critical requirement. A positive outcome could be the development of eco-labels, providing monetary benefits to farmers hosting immaculate treefrogs in their fields, e.g., (28).

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## Roadside caecilians at risk: habitat management needs in Amboli's Western Ghats

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Habitat loss is one of the primary drivers of amphibian population decline (1). Roads contribute to habitat loss primarily by fragmenting habitats and creating edge effects. Increasing road infrastructure also causes hinderance in species' dispersal, disrupts wildlife movement, reduces gene flow and increases wildlife mortality. As a result, these factors severely affect populations, especially for species that are already declining (2). The severity of the impact depends on road characteristics and traffic intensity (2), and in some situations during nighttime, it results in mass amphibian roadkill (3).

The Western Ghats are a major hotspot of amphibian diversity and endemism in India (4) while facing major threats to biodiversity due to increasing development and the expansion of road networks (5). As a result, cold blooded amphibians are among the vertebrates most killed on roads in the Western Ghats (6). The Amboli landscape, located in the Konkan region of the northern Western Ghats of Maharashtra, India, is a blend of rural settlements amidst pristine evergreen forests and is home to several endemic and threatened caecilians (7). However, rapid changes in land use due to mass tourism and real estate development are threatening this delicate ecosystem. Over the course of our decade-long surveys (2012-2022), we have observed that the increasing and widening road networks, along with infrastructure development, have caused significant disturbances to caecilian



**Figure 1:** Amboli caecilian (*Gegeneophis danieli*) spotted roadside in Chaukul road in Amboli, Sindhudurg, Maharashtra, India in 2022. © Vishal Kumar Prasad.

populations, in the form of habitat fragmentation and habitat loss. This complex ecosystem of moist evergreen forests, high-elevation ferricrete plateaus, agricultural lands, and urban areas, supports several caecilians species alongside human populations. However, road constructions have fragmented the Amboli landscape, cutting through various habitats. These areas are ecologically rich, particularly the specialized ferricrete plateaus, when temporary rain-fed pools or shallow ponds form on both sides of roads, and serve as ephemeral breeding pools for many amphibians during the rainy season. Therefore, these roads pose a significant threat to amphibians migrating to breed, and numerous individuals are killed by vehicles while crossing, specifically in the monsoon when the subterranean caecilians surface out due to water saturation in the soil.

During nighttime road surveys conducted during the rainy season between June 26 and July 7, 2022, along the route from Ajara Checkpost to Amboli Waterfall and Nenevadi Bus Stand in Chaukul (approximately 10 km), we observed at least 22 live caecilians on the road between 20:00 and 22:00 hours. These included individuals from the Grandisoniidae and Ichthyophiidae family: *Gegeneophis danieli* (Figure 1), *Gegeneophis sp.*, *Ichthyophis davidi* (Figure 2), and *Uraeotyphlus bombayensis*. We moved them to a safe distance from the roads to avoid collusion with vehicles. We also reported several roadkills of *Gegeneophis danieli*, *Ichthyophis davidi* and *Uraeotyphlus bombayensis* (Figure 3) during the surveys. *Ichthyophis davidi* is listed as Data Deficient (8) and *Gegeneophis danieli* as a Least Concern (9) on the IUCN Red List of Species despite the decline in the quality and extent of their habitat due to the increasing



**Figure 2:** Uttaraaghat striped caecilian (*Ichthyophis davidi*) observed on the state highway in Amboli, Sindhudurg, Maharashtra, India in 2022. © Vishal Kumar Prasad.



**Figure 3:** A road kill of a Bombay caecilian (*Uraeotyphlus bombayensis*) seen on the road near Ajara check post in Amboli, Sindhudurg, Maharashtra, India in 2022. © Vishal Kumar Prasad.

road network, road kills from motor vehicles on the roads, use of pesticides, and clearing of forests for urban settlements.

Most caecilian species live underground, emerging mainly during the monsoon rains in the Western Ghats. This elusive behaviour makes it particularly challenging for researchers to assess their distribution, population sizes, and the specific threats they face. As a result, we lack sufficient data for many caecilian species, with 44% of species currently classified as Data Deficient globally. India holds the highest number, 26 species, of Data Deficient-listed caecilians species (10). To address these gaps, targeted studies to better understand the conservation status of caecilians and accurately evaluate their extinction risks are highly needed. Identifying the threats they face is critical for informing effective conservation plans at both the regional and global levels.

Finally, to decrease the threats resulting from road development in Amboli, we recommend:

- a) Amphibian crossings: building tunnels or culverts specifically for amphibians provides safe passages across roads and reduces the risk of collisions from motor vehicles. These crossings should be strategically placed based on the movement patterns of species, highlighting caecilian's natural history (11).
- b) Temporary amphibian-specific seasonal low height fencing at strategic locations: fencing along roads can direct amphibians to safe crossing points, preventing them from crossing at hazardous locations (12).

- c) Temporary road closures at nighttime: temporarily closing roads during specific times when amphibians are most active, here at night, especially near critical breeding or migration areas to reduce road crossings and lower collision risks (13).
- d) Warning signs: visible warning signs in known crossing areas to alert drivers about amphibians on the road, encouraging cautious driving.
- e) Speed limits and traffic calming: lowering speed limits and adding speed bumps or rumble strips in amphibian crossing areas, especially during the breeding season, to slow vehicles and increase driver awareness.

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# Successful reintroduction of the European tree frog (*Hyla arborea*) in Luxembourg

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Luxembourg used to contain widely-spread populations of the European tree frog (*Hyla arborea*, Figure 1), yet by 2010, only one small and isolated population in the east of the country remained – the species was close to extinction on the national level. Reintroductions carried out at two release sites in the south-west and west of Luxembourg from 2012 to 2014 allowed new tree frog populations to develop over the last decade. The noticeable differences regarding development and spread of the reintroduced populations were an interesting, though apparently not unusual finding. While one stayed at its release site for seven years, the second dispersed almost immediately and to date, the furthest newly populated site is situated at 8.2 km from the release site as the crow flies. The developing populations were reinforced by further

reintroductions in three supplementary sites from 2019 to 2024, with the aim to facilitate dispersal particularly into areas where natural dispersal would have been impeded by motorways and major roads. Over the entire duration of the project, more than 7,000 juveniles and tadpoles were released.

The animals have been monitored closely via annual acoustic chorus counts since 2013, with currently 830 calling males at 61 sites. To date, the total number of calling males as well as the total number of colonized sites show strong exponential increases. The European tree frog population emerging from our reintroduction project now covers an area of around 135 km<sup>2</sup> and we expect its further expansion.

Our article (1) provides a comprehensive overview of the project from the start to the current status, including logistical and epidemiological aspects as well as the results of the population monitoring. Finally, we address practical implications for conservation management, the challenges ahead and the future focus of the project.

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Figure 1: European tree frog (*Hyla arborea*). © Liza Glesener.

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## An overview of the ASG

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Webinar held 29<sup>th</sup> May 2024

The IUCN SSC Amphibian Specialist Group (ASG) is the International Union for Conservation of Nature's (IUCN) global volunteer network of dedicated experts who donate their time and expertise to create a community from where practical amphibian conservation around the world can be advanced based on a solid foundation of science. This network currently consists of over 330 members in over 40 regions/countries, enabling the ASG to act on a global scale. Herein we offer a brief overview of the ASG network, its structure, key pillars, its work and how it informs broader amphibian conservation globally.



## The state of the world's amphibians

Kelsey Neam <sup>1,2</sup>

<sup>1</sup> Rewild.

<sup>2</sup> Amphibian Red List Authority – IUCN SSC Amphibian Specialist Group, Gland, Switzerland.

Webinar held 26<sup>th</sup> June 2024

*The State of the World's Amphibians: The Second Global Amphibian Assessment*, is an extensive evaluation of the current status of amphibians globally. Based on over a decade of research by more than 1,000 experts, this report delves into the threats amphibians face today and reveals a continued decline in amphibian conservation status, with 41% of species now threatened with extinction. The State of the World's Amphibians calls for a substantial increase in conservation efforts, highlighting key areas and species in need of protection, and urging immediate action to safeguard amphibian populations worldwide.



## Introducing Anura Africa: South Africa's New Amphibian-Focused NGO

Jeanne Tarrant <sup>1</sup>

<sup>1</sup> Anura Africa, South Africa.

Webinar held 31<sup>st</sup> October 2024

Launched in February 2024, Anura Africa is a South African-based Non-Profit Company (NPC) dedicated to addressing key gaps in amphibian conservation across southern Africa, with a future vision extending to the broader African continent. As the only organization solely focused on amphibians in the region, Anura Africa aims to build a strong, continent-wide network to support amphibian biologists and implement targeted conservation efforts for the most threatened frog species. Leveraging the expertise of its founders, Anura Africa fosters in-country partnerships to identify critical conservation needs and enhance local capacities for sustainable amphibian management. Our mission centres on advancing amphibian conservation through evidence-based projects, building local conservation capacity via partnerships and research collaborations. This mission underscores our recognition of amphibians as vital indicators of ecosystem health and resilience. By focusing on amphibians, we aim to foster a comprehensive approach to ecosystem management, benefiting both these species and their broader habitats. Our organizational strategy aligns with the latest Red List assessments for southern Africa, guiding our conservation priorities and actions. By integrating amphibian conservation into larger landscape-level strategies, we aim to tackle pressing environmental challenges such as species extinction, habitat destruction, climate change, pollution, and disease. Through these initiatives, Anura Africa is committed to

ensuring the long-term resilience of amphibian species, habitats, and associated communities across Africa.



## Toads and frogs on the roads. Actions to reduce the impact of road infrastructure on amphibian populations: 30 years of Italian experiences

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Webinar held 20 November 2024

The negative relationship between amphibian populations and road traffic has been a topic of attention in Europe for decades and for many years it has been a conservation problem not only linked to the narrow circle of specialists, but widely considered by large groups of enthusiasts and citizens. Despite this positive development, the problem remains current. The European Road network is increasingly dense and vehicular traffic increasingly intense. In some more far-sighted countries, mitigation includes an annual budget to progressively reduce the negative impact of road killing, but in many others the interventions are still strongly correlated to the interest of the public and the irreplaceable action of volunteers. In all these years the survival of many amphibian populations, often theoretically protected by national regulations and international conventions and directives, is almost entirely due to spontaneous groups and associations of these volunteers. The Italian case is emblematic: since 1992, the first year of the start of amphibian rescue actions on the roads in Lombardy, this type of active conservation activity today involves, after more than 30

years, at least a hundred annual programs. In the same years, the closure of roads or the installation of permanent barriers or the construction of underground tunnels rationed or made mandatory only for new large road infrastructures. Here we want to talk about it starting from the basic problem: do these actions, these methods of intervention, those artifacts, after a long time actually achieve the desired result? That is, are the amphibian populations that are the object of all this disappearing anyway? And what could be the alternatives, equally applied and monitored by now, that could really make a difference?



## Ecology & Conservation Genetics of Mesoamerican Amphibians

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Webinar held 26 September 2024



