

Survival Blueprint

Purple frog, *Nasikabatrachus sahyadrensis*



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1. STATUS REVIEW

1.1 Taxonomy:

Purple Frog (*Nasikabatrachus sahyadrensis*) is one of the two species of the family Nasikabatrachidae. The phylogenetic relationship with the frogs in the family Sooglossidae makes them living evidences for the Gondwanaland hypothesis.

Class : Amphibia
 Order : Anura
 Family : Nasikabatrachidae
 Genus : Nasikabatrachus
 Species : *Nasikabatrachus sahyadrensis*

1.2 Distribution and population status:

The Purple Frog (*Nasikabatrachus sahyadrensis*) is endemic to Kerala and Tamil Nadu States of the Western Ghats mountains of Kerala, India. There have been no exact estimates of population size in the past for the species as the animal is fossorial in nature. The IUCN Red List assessment was published in 2004 (Biju, 2004) soon after the description of the species in 2003. This assessment reports observations of 135 individuals, of which only 3 were females and assessed the species as Endangered (Biju, 2004). Breeding populations of the species have been reported from Cardamom Hill range to Camel Hump Mountains in Western Ghats of Kerala and Tamil Nadu (Zachariah et al. 2012). The EDGE of Existence fellowship project (2017-2019) reports information on 131 breeding sites as well as the extension of the northern most limits of the species in Kerala to Periya Ghats, Kerala at an elevational range of 20m - 1400m. Threats to the species include linear intrusions into their habitats, dams (large and small), habitat loss and consumption.

1.2.1 Global distribution:

Country	Population estimate (plus references)	Distribution	Population trend (plus references)	Notes
India	Unknown There is no published information on the population estimate of the purple frog. However, during the EDGE of Existence fellowship project the team recorded 180 breeding pairs from a single oviposition site in the year 2018.	Western Ghats	Unknown	The IUCN assessment reports 135 individuals (S.D. Biju. 2004) from Idukki district which is only a very small area compared to its complete distribution



1.2.2 Local distribution:

Country	Region / province	Site	Level of Protection	Population size	Reference	Notes
India	Western Ghats, Kerala	Cardamom Hills- Seasonal streams in moist deciduous, evergreen forests and grasslands in the mountains	More than 50% of the breeding habitats are inside the Protected Areas (PA) including Achenkovil Forests, Periyar Tiger Reserve. 30 % of the breeding habitat are outside Pas including private lands and plantations	Unknown	Present study, Zachariah et al. 2012	
India	Western Ghats, Kerala	Anamalais- Seasonal streams in moist deciduous, evergreen forests in the mountains	More than 50% of the habitat inside PAs including Idukki Wildlife Sanctuary, Thattekad Bird Sanctuary, Malayattoor Forest Division	Unknown	Present study, Zachariah et al. 2012	
India	Western Ghats, Kerala	Nilgiris- Seasonal streams in moist deciduous, evergreen forests in the mountains and moist deciduous forests	Found in PAs including Silent Valley National Park, Nilambur Forest Division	Unknown	Present study, Zachariah et al. 2012	



India	Western Ghats, Kerala	Camel Hump Mountains- Seasonal streams in moist deciduous, evergreen forests and grasslands in the mountains	Found in PAs including Kozhikode Forest Division	Unknown	Present study, Zachariah et al. 2012	
India	Western Ghats, Kerala	Kattapana, Idukki District	Found in Idukki Wildlife Sanctuary	135	S.D. Biju. 2004, Present study, Zachariah et al. 2012	This is not the exact population estimate but the number reported in the 2004 IUCN assessment (Biju, 2004).
India	Western Ghats, Tamil Nadu	Valparai, Topslip	Found in Anamalai Tiger Reserve	Unknown	Zachariah et al. 2012, Raj et al. (2011)	

1.3 Protection status:

The purple frog is currently assessed as Endangered by the IUCN (Biju, 2004). The species is not currently protected, but it still comes under the Biodiversity Act, 2002 by the Government of India which ensures the protection of all biodiversity. Only 50% of the breeding habitats fall within protected area network in India while the remaining habitats are not protected that includes private lands and plantations.

If accepted, the proposal submitted to the Government of Kerala to make purple frog as the state frog of Kerala will significantly increase the conservation attention towards the species.

1.4 Ecology, behaviour and habitat requirements:

Adult frogs are fossorial in nature. They perfectly time their emergence from underground with the early rains when their egg laying sites are inundated by seasonal streams which begin to flow. At the start of these rains, male frogs come close to the surface and begin to call from underground tunnels. Pairs enter amplexus inside the tunnel and the females, who are double the size of the males, carry the male frogs on their backs to the egg laying sites which are crevices along the fast-flowing torrential streams. Purple frogs lay their eggs in the crevices. Soon after the mating and egg



laying, the adult frogs dig down to their underground burrows, the entire process may only take a couple of days; spotting a frog is therefore a huge challenge. The eggs soon develop into tadpoles with highly suctional (sucker like) mouthparts. These suckers allow the tadpoles to cling onto rocks in fast flowing currents and they are able to graze undisturbed on algae growing on the rocks covered by torrential water. There are very few frogs that can exploit this seasonal habitat, and this is how the tadpoles avoid competition with other aquatic life as well as predators. It takes around 100 to 120 days for the tadpoles to metamorphose (turn into miniature frogs) after which they also go underground (Biju and Bossuyt 2003; Dutta et al. 2004; A. K. S. Das 2006; Radhakrishnan et al. 2007, Zachariah et al. 2012).

1.5 Threat analysis:

Threat	Description of how this threat impacts the species	Intensity of threat (low, medium, high, critical or unknown)
Road Kills	Linear intrusions like roads bisecting through their habitats acts as death traps for purple frogs. Adult purple frogs, while moving to breeding sites during monsoons cross the roads which bisect their route to the oviposition sites and they get killed by passing motor vehicles.	High
Consumption of tadpoles and adults	Consumption of tadpoles/adults as a medicine for asthma/respiratory disorders by indigenous communities in very few locations	Low
Check Dams	Smaller dams submerging the oviposition sites	Low
Pesticide Applications	Extensive use of pesticides. Intensity of threat is unknown but suspect high intensity as many of the private plantations adjoining breeding habitats use pesticides	Unknown
Habitat loss	Loss of breeding habitats to developmental processes, mining, habitat degradation in private lands as well as natural calamities including floods and landslides	High



1.6 Stakeholder analysis:

Country	Stakeholder	Stakeholder's interest in the species' conservation	Current activities	Impact (positive, negative or both)	Intensity of impact (low, medium, high or critical)
India	Protected Area Managers	Protection of the National Parks, Wildlife Sanctuaries and Reserve Forest Division along with its biodiversity	Protection	Positive	High
India	Local Governing bodies	Understanding the biodiversity, tourism promotions and ensuring its conservation	Only recently the purple frog is getting famous. State frog proposal has created more attention for the species	Both	medium
India	Local NGOS	Environment conservation	Awareness, gathering funds to support conservation. Maintaining good relations with the Government	Both	High
India	Indigenous communities	Non-Timber Forest Products collection/ Consumption of adults and tadpoles by Indigenous communities in Idukki for respiratory disorders	Improve activities to increase sustainability in collection activities	Both	High
India	Local People	Tourism/ road networks	Increase awareness towards conservation	Both	High
International	Scientific community and herpetology enthusiasts	Research & conservation	International attention for the species. Funding for conservation projects. Collaboration in research	Positive	High



1.7 Context and background information that will affect the success of any conservation action for this species:

	Description	Barriers to conservation	Opportunities for conservation
Socio-cultural effects and cultural attitudes	People are quite aware of need for conservation of wildlife and hence the areas where the consumption of the adults and tadpoles happen still support good populations of the species possibly because of the sustainable collection methods by the indigenous communities	Currently, only people from indigenous communities of Kulamavu, Idukki, Kerala are known to consume the tadpoles and adults. The younger generation is not really as keen as older ones to continue the consumption. The possibility of increasing the rate of consumption as delicacy rather than as a medicine might be a potential threat	Comparing the purple frog with the mythological King Mahabali who was banished to the underworld by the supreme god and was later given permission to visit his disciples once every year from the underground (Paathaalam) has improving the acceptance and awareness about the significance of the species among public
Economic implications	Many of the habitats are mountains and they receive a lot of tourism	Increased tourism puts a lot of pressure on the habitat as well as traffic on roads that bisect purple frog habitats. This can lead to more casualties for the species.	Eco-tourism in a sustainable way boosting the species as a mascot and connecting the species with ancient Mahabali legend can increase the positive attitude of the drivers towards the species there by making them cautious at times when they use the roads during the purple frog breeding. Sustainable tourism may also influence economic upliftment for locals.
Existing conservation measures	Protection of biodiversity in already established Protected Area Network as well as outside PAs. No specific management plan currently exists.	Building of Check Dams, littering in waterfalls/streams (clogging oviposition sites) which are also tourist areas that generate important revenue for the Forest Department	The presence of the charismatic species can be utilised in increasing the educational value of the species and facilitate its conservation.



Administrative/ political set-up	Passing laws to protect the species, providing funds to conserve the species, including the species in Schedules of Wildlife Protection Act	Political views can differ between parties on their interests, can be a threat towards conserving any species	The evolutionary history and the connection with Mahabali story can be used in highlighting the importance of the species
Local expertise and interest	Expertise in identification of the species and also conservation attention has increased wherever awareness campaigns were conducted	Prohibition of people from local tourist spots, ban of night traffic can create a negative impact on the conservation of the species, Prohibition of using plastics and any garbage throwing in the streams	Many threats can be mitigated once the frog is declared the state frog
Resources	Development is prioritised over conservation in India in general. An increasing amount of forest is being cleared in the name of development and many projects that are environmentally damaging are getting environmental clearances at a much greater rate than before hence resources are limited as of now.	Focus on large charismatic animals and the interests of the ruling parties	If the purple frog becomes the Kerala State Frog it is likely that funds for conserving the species will be more easily obtained.



2. ACTION PROGRAMME

Vision (30-50 years)	
Conservation of Purple Frog and its habitat	
Goal(s) (5-10 years)	
Purple Frog as an ambassador for amphibian conservation thereby addressing the major threats and creation of new protected areas	
Objectives	Prioritisation <i>(low, medium, high or critical)</i>
Addressing the threats	Critical
Creation of Protected Areas with purple frog as the flagship species	Critical
Understanding the underground life, diet, longevity and distance of dispersal from breeding sites	Critical
Establishing population size and monitoring population trends	Critical
Reinforcement of awareness programs	High
Promotion of sustainable tourism	High



Activities	Country / region	Priority (low, medium, high or critical)	Associated costs (currency)	Time scale	Responsible stakeholders	Indicators	Risks	Activity type
Objective 1: Addressing threats								
Road Kills	India/Kerala	Critical	10000 GBP/ year	10 years	Forest Department, Public works Department, Tourism Department, Drivers	Night traffic ban, presence of signboards on roads, speed bumps and other mitigation measures, responsible driving, reduced road kills,	Night traffic Ban in human populated areas might not be easy	Improving knowledge/ Education & awareness
Consumption of adults and tadpoles	India/ Kerala	Medium	2000 GBP/year	5-10 Years	Indigenous communities, Government, Forest Department	No consumption outside indigenous communities	Information about the consumption to public might drive demand as a delicacy item.	Education & awareness
Screen adults, larvae and post metamorphic animals and potentially sympatric amphibians for <i>Batrachochytrium dendrobatidis</i> (Bd).	India/Kerala	High	1000 GBP/ year	2 years	Kerala Forest Department, NGO's, Institutes around prime habitats	Total number of swabs done and analysed	Securing permission	Improving knowledge
Establishing biosecurity Protocol	India/ Kerala	Critical	2000 GBP/year	5 years	Forest Department	Biosecurity protocol established and made	Strict enforcement	Land water management/



						mandatory for researchers working on amphibians and freshwater ecosystems to follow as condition of research permission being granted.	of the protocol might vary with changing Protected Area Managers once every three years	education & awareness
Dams/ Check Dams	India/ Kerala	High	10000 GBP/ year	10-20 years	Forest Department, Local Governing bodies, Electricity Board	No further loss of Oviposition sites	Need for water storage, no alternatives for hydel power	Land/ water management
Objective 2: Creation of Protected Areas with purple frog as the flagship species								
Identification of areas for creation of Protected Areas	India/ Kerala	High	100000 GBP/ year	5-10 years	Forest Department, Local Governing bodies, NGO's	Areas protected, Private Land procured and entrust Kerala Forest Department	Procurement of private land and too many stakeholders including big companies.	Land/ Water Management
Identifying areas that are already Protected for making purple frog the Key Species	India/ Kerala	Medium	1000 GBP/ year	5-10 years	Kerala Forest Department	Number of areas where purple frog is the Keystone species/ flagship species	Focus on large charismatic species	Land/ Water Management
Identifying distribution of the species outside Kerala	India / Tamil Nadu, Karnataka	High	2000 GBP/year	5-10 years	Tamil Nadu Forest Department, Karnataka Forest Department	Areas surveyed	Securing permission	Improving knowledge



Objective 3: Understanding the underground life, diet, longevity and distance of dispersal from breeding sites								
Site fidelity studies	India/ Kerala	High	2500 GBP/year	3 years	NGO's, Institutes around prime habitats, researchers	Information on site fidelity published	Securing funds	Improving knowledge
Understanding the underground life	India/ Kerala	High	5000 GBP/ Year	5 years	NGO's, Institutes around prime habitats, researchers	Information on fossorial life published	Securing funds	Improving knowledge
Activity pattern in vocalisation in males	India/ Kerala	High	5000 GBP/ Year	2 years	NGO's, Institutes around prime habitats	Information on activity pattern published	Securing funds	Improving knowledge
Dispersal of the species from breeding habitats	India/ Kerala	High	5000 GBP/Year	5 years	NGO's, Institutes around prime habitats	Information on dispersal published	Securing funds	Improving knowledge
Social Studies	India/ Kerala	High	5000 GBP/ Year	2 years	NGO's, Institutes around prime habitats	Threats identified	Securing funds and permissions	Improving knowledge
Skeletochronology studies	India/ Kerala	High	1000 GBP/ year	5 years	Forest Department, NGO's, Institutes around prime habitats	Information on lifespan	Securing funds and permissions	Improving knowledge
Objective 4: Reinforcement of awareness programs								
Awareness programs	India/ Kerala	High	5000 GBP/ Year	5 years	NGO's, Kerala Forest Department, Government Departments Institutes around prime habitats, key groups including indigenous communities, naturalists, eco-tourism guides and drivers	Increase in knowledge of the species among local public, indigenous communities, eco- tourism guides and drivers, students, teachers, Kerala Forest Department and other concerned authorities	Reaching all stakeholders in a wider landscape	Education and Awareness



Objective 5: Promotion of sustainable tourism								
Information gathering for sustainable tourism activities	India/ Kerala	Medium	2500GBP/ Year	5 years	Forest Department, Tourism Departments, NGO's, Private Tourism Sector	Detailed report on potential sites for nature tourism to sight purple frog adults or tadpoles	Ensuring sustainable tourism, interests of the ruling Governments. Ensuring funds go back to local communities	Capacity Building
Cleaning activities in tourism sites	India/ Kerala	High	5000 GBP/ Year	5 years	Forest Department, Tourism Departments, NGO's, Private Tourism Sector	Reduced littering/clogging of oviposition sites	Ensuring sustainable tourism. Strict enforcement of cleaning	Education and awareness



3. LITERATURE CITED

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