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Recommendations

General

- The main priority for barasingha deer is strengthening the in situ populations to maintain populations with long term viability. *conservation*
- A follow up PHVA Workshop should be scheduled in 2 years to evaluate progress in implementing recommendations, review new data, revise the models, review and further develop management plans for each individual population.
- Continue the taxonomic work of the relationships of the 3 subspecies using molecular DNA technology.
- It is recommended not to use barasingha for reintroduction in India from the stocks outside of India since founder origins are uncertain. Given the availability of wild stock for translocation captive populations outside of India are not needed for genetic or demographic support of the wild populations in India.
- zoos* Zoos need to give a high priority to conservation education for the barasingha and its habitat.

Distribution and Census

Dudhwa Populations (Heta Population)

Sathiana population

Sathiana

and protection strategies and plans

Create patrol areas ('chowkis') at the breeding grounds of the Sathiana population which are outside of the protected area.

If the Sathiana population drops below 75, translocate it to another protected area. *Risk involved*

Renovate the road connecting Bumnagar Chauraha, Sumer Nagar, Kema Gowdi, and Gauri Phanta.

Other populations in Pilibhit and Katernighat need to be built up by providing added protection.

Kishanpur Wildlife Sanctuary

The opening of the Soheli Barrage floodgates has to be in consultation with the Forest department.

June 1988 / 1. Nov - 88

Staff and infrastructure at Kishanpur Wildlife sanctuary need to be built up.

There must be a monitoring of the Jhadithal and Ull river areas as the Barasingha population is distributed along these.

The plantations of Eucalyptus and teak have to be removed.

So that the water regime of the area, which is of crucial importance to the Barasingha is not disturbed, it is suggested that water be pumped in during the summers.

Pilibhit Population (General)

The entire Terai tract, being a unique ecosystem, needs to be brought under the unified command of wildlife wing. (General VP)

Plantations along the entire Terai tracts must be discouraged.

A study of the ^{all} Pilibhit populations - its movement, rutting, etc. need to be studied.

No human settlements must be allowed near Lakkabagha to ensure further protection.

There must be a control on grazing and a closure of the state seed farm. let's stop plantation

Wildlife extension activities must be carried out near all Barasingha areas. General (VP)

Efficient fire management, augmented by studies are essential. General (VP & PSC)

Hastinapur population needs to be studied and protected more extensively before any concrete management steps can be recommended.

MADHYA PRADESH (Kanha)

The enclosure that had been made for studying the Barasingha population on the advice of IUCN must be put to use.

Efficient management of fire is needed.

^{Barasingha} Barasingha from Kanha and Mukhi must be relocated to the meadows of Supkhar.

There must be a monitoring of the meadows and the encroachment of the meadows by woodlands must be looked into. controlled

The population must be monitored for diseases.

There must be proper ecological monitoring of the Barasingha population in Kanha.

It is suspected that jackals are preying on the young of the Barasingha in Kanha causing mortality of the fawns. Studies to confirm the same are necessary.

ASSAM

Information on population trends, threats and protection measures is needed.

Patrolling must be intensified especially along the North and the southern areas ^{Kaziranga} during the floods.

There must be better infrastructure and incentives for the staff.

Encroachments on the western side and the land use structure must be defined. ^{Kaziranga}

There must be detailed studies of the population in Kaziranga.

There must be a monitoring of the movement patterns of the Barasingha populations in both the protected areas, especially during floods. ^{Manas / Kaziranga}

We need to look at population trends, the threats and protection measures needed.

Manas has to have status survey of the population as no figures are available from the protected areas after insurgency in the area. There also has to be additional patrolling

Population Biology and Modelling

Survey and monitoring studies of barasingha populations need to collect census estimates and fawn production rates with an estimate of confidence limits. This would allow detection of population trends, unusual events, and environmental variation in demographic parameters. ^{Such as Earthquake ??}

Annual census estimates are needed for all populations. The census should record as accurately as possible the age structure of each population.

Basic life-table data on age and sex specific mortality and fecundity rates need to be collected for barasingha.

Poaching rates need to be monitored continuously in these populations.

Estimates of population size limits and trends over time (the "carrying capacity" values needed for the VORTEX model) for each population are needed. ^{More objective}

Appoint forest guards to do the work specifically of the migrants. The Spruce did it!

The percent of males actually participating in breeding needs to be known to estimate the effective population size.

Studies of migration rates and breeding success of the migrants needs to monitored.

Translocation and Reintroduction

Reinforce the existing population in the Katariniaghat (Katarnighat) Wildlife Sanctuary with animals taken from doomed populations (Faizibad,).

Restock the Suhagibarua Wildlife Sanctuary either by translocation from wild populations or reintroduction from captive stock or a combination of the sources. The animals for translocation could be taken from

Strengthen the standard management practices for the Pilibhit Division population to allow natural increase of this population.

Captive Population

Maintain stocks in Indian zoos as standby for possible future conservation needs of the species.

Supplement the captive population with new genetic variation from suitable wild populations to increase the proportion of the wild population genetic variation represented in the captive population. A suggested rate of addition is ?? animals per ? years, based upon modelling studies.

Complete DNA studies of the captive population: (1) to establish the amount of heterozygosity retained in the captive population as compared with the wild population, (2) to clarify matters of parentage and pedigree, and (3) to compare with the named subspecies.

All captive animals should be permanently marked and a studbook established.

Coordinate the genetic and demographic management of the entire captive population in Indian zoos.

Establish new captive populations of the unrepresented subspecies, if this is recommended as part of the management strategy for these subspecies.

If animals are required for reintroduction programs, develop an agreed collaborative management plan with the Forestry Department for production of the needed animals while maintaining the viability of the captive population.

CAPTIVE POPULATION MODELLING

Basic scenarios

1. Initial population and carrying capacity.

The zoo population was funded by 3 animals (2 males, 1 female) 18 years ago. At present, the population stands at 74. Carrying capacity was modelled at 100 for an initial population size of 3 in the model.

2. Age of first reproduction for females was and for males was 5 years

3. Fertility rate in females was taken as 90%

4. All adult male were included in the breeding group.

5. The mortality rates at neonatal stage was varied at 5%, 10% 15%.

The subadult mortality was modelled at 3% SD 1.

Adult mortality was modelled at 1.5 % SD 0.5

6. Catastrophes were not modelled

7. Inbreeding depression was assumed to be 0.

8. Simulation were run for 50 years 100 iterations

Results:

Mortality	Sr	Dr	N20	h20	N50	h50
5%	.1902	.219	77 +/- 25	70.1	99 +/-5	67.3
10%	0.1849	0.211	76 +/- 25	68.9	100 +/-5	65.9
15%	0.1732	0.203	60+/-27	67.5	100 +/-4	65.2

The results of these models indicate no probability of extinction in 50 years but a distinct reduction in heterozygosity (up to 1/3 initial value).

The models were tested from 20 years ago for mean population values existing today. On this basis supplementation was modelled to see the effect on the heterozygosity of the population.

Presently, scenarios including supplementation of 1.1 (adults) every year for 10 years from 21st (1996) to 30th year (2005) and for 30 years from 21st (1996) to 50th year (2025).