Table S1. Details of gharial samples (N = 93) used in the study

Sample ID	Year	Length (m)	Weight (Kg)	Sex	Size/age	Location	Latitude	Longitude
516	2014	5.33	850	Male	Adult	Kasua	26.641402°	78.992847°
6	2013	4.34	>500	Male	Adult	Bithuana	26.789104°	78.688672°
505a	2017	4.07	>350	Male	Adult	Chilonga	26.762567°	78.813982°
669	2017	3.58	165	Female	Adult	Kasaua	26.641402°	78.992847°
10	2013	3.25	79	Female	Adult	Mahua	26.770783°	78.629170°
207	2009	3.25	94	Female	Adult	Chilonga	26.762567°	78.813982°
523	2014	3.2	109	Female	Adult	Jagtauli	26.576760°	79.048329°
401	2010	3.13	15-160	Female	Adult	Barchouli	26.563597°	79.071122°
522	2014	3.1	90	Male	Adult	Jagtauli	26.576760°	79.048329°
652	2017	3.1	121	Female	Adult	Pituwan	26.620279°	79.008288°
534	2017	3.05	116	Female	Adult	Sashon down	26.533270°	79.104297°
216	2009	3.02	85	Female	Adult	Nakhnoli	26.766571°	78.764985°
520a	2014	3.01	106	Female	Adult	Jagtauli	26.576760°	79.048329°
676	2017	2.93	89	Female	Subadult	Khera channel	26.672613°	78.972692°
203	2009	2.91	33	Female	Subadult	Chilonga	26.762567°	78.813982°
204	2009	2.91	37	Female	Subadult	Chilonga	26.762567°	78.813982°
521a	2014	2.91	79	Male	Subadult	Jagtauli	26.576760°	79.048329°
212	2009	2.89	90	Female	Subadult	Nakhnoli	26.766571°	78.764985°
502a	2017	2.8	88	Female	Subadult	Gatikolan	26.675022°	78.995127°
210	2009	2.78	55	Female	Subadult	Nakhnoli	26.766571°	78.764985°
667	2017	2.77	63	Female	Subadult	Kasaua	26.641402°	78.992847°
16	2013	2.75	78	Male	Subadult	Gatikolan	26.675022°	78.995127°
509a	2014	2.72	68	Female	Subadult	Khera channel	26.672613°	78.972692°
17	2013	2.71	63	Male	Subadult	Pituwan	26.620279°	79.008288°

Sample ID	Year	Length (m)	Weight (Kg)	Sex	Size/age	Location	Latitude	Longitude
672	2017	2.68	59	Male	Subadult	Khera channel	26.672613°	78.972692°
508	2014	2.65	64	Male	Subadult	Khera channel	26.672613°	78.972692°
677	2017	2.65	65	Male	Subadult	Khera channel	26.672613°	78.972692°
517	2014	2.63	57	Male	Subadult	Pituwan	26.620279°	79.008288°
322	2010	2.62	60	Male	Subadult	Pituwan	26.620279°	79.008288°
514	2017	2.62	60	Female	Subadult	Kasua	26.641402°	78.992847°
666	2017	2.62	60	Male	Subadult	Barecha	26.602234°	79.014478°
8	2013	2.61	59	Male	Subadult	Bithuana	26.789104°	78.688672°
18	2013	2.61	57	Male	Subadult	Pituwan	26.620279°	79.008288°
13	2013	2.57	71	Female	Subadult	Baroli	26.699324°	78.870604°
653	2017	2.54	57	Female	Subadult	Pituwan	26.620279°	79.008288°
14	2013	2.53	54	Male	Subadult	Gatikolan	26.675022°	78.995127°
11	2013	2.52	41	Male	Subadult	Goara	26.763486°	78.617461°
665	2017	2.49	47	Female	Subadult	Barecha	26.602234°	79.014478°
206	2009	2.48	41	Female	Subadult	Nakhnoli	26.766571°	78.764985°
671	2017	2.48	44	Male	Subadult	Khera channel	26.672613°	78.972692°
19	2013	2.44	50	Female	Subadult	Jagtauli	26.576760°	79.048329°
512a	2014	2.43	50	Male	Subadult	Kasua	26.641402°	78.992847°
481	2017	2.42	48	Female	Subadult	Patharra	26.476620°	79.229885°
515a	2014	2.42	48	Female	Subadult	Kasua	26.641402°	78.992847°
512b	2017	2.41	41	Female	Subadult	Patharra	26.476620°	79.229885°
673	2017	2.37	38	Female	Subadult	Khera channel	26.672613°	78.972692°
399	2010	2.35	45	Male	Subadult	Khera channel	26.672613°	78.972692°
15	2013	2.34	46	Female	Subadult	Gatikolan	26.675022°	78.995127°

Sample ID	Year	Length (m)	Weight (Kg)	Sex	Size/age	Location	Latitude	Longitude
344	2010	2.34	45	Male	Subadult	Pituwan	26.620279°	79.008288°
390	2010	2.31	45	Male	Subadult	Pituwan	26.620279°	79.008288°
483	2017	2.26	34	Male	Subadult	Patharra	26.476620°	79.229885°
209	2009	2.25	32	Female	Subadult	Nakhnoli	26.766571°	78.764985°
333	2010	2.24	40	Male	Subadult	Pituwan	26.620279°	79.008288°
689	2017	2.22	39	Male	Subadult	Patharra	26.476620°	79.229885°
NL	NA	2.22	39	Male	Subadult	Patharra	26.476620°	79.229885°
513	2014	2.19	29	Male	Subadult	Kasua	26.641402°	78.992847°
4	2013	2.12	23	Male	Subadult	Gatikolan	26.675022°	78.995127°
205	2009	2.11	27	Male	Subadult	Chilonga	26.762567°	78.813982°
511b	2017	2.09	28	Female	Juvenile	Patharra	26.476620°	79.229885°
661	2017	2.08	26	Female	Juvenile	Barecha	26.602234°	79.014478°
300	2010	2.06	30	Male	Juvenile	Kasua	26.641402°	78.992847°
380	2010	2.05	30	Male	Juvenile	Kasua	26.641402°	78.992847°
518	2014	2.04	25	Male	Juvenile	Barchouli	26.563597°	79.071122°
525	2017	2.04	25	Male	Juvenile	Pali	26.529086°	79.161134°
20	2013	2.03	28	Male	Juvenile	Pituwan	26.620279°	79.008288°
519	2014	2.03	25	Male	Juvenile	Barchouli	26.563597°	79.071122°
484	2017	1.99	28	Male	Juvenile	Patharra	26.476620°	79.229885°
651	2017	1.91	21	Male	Juvenile	Pituwan	26.620279°	79.008288°
659	2017	1.89	16.5	Female	Juvenile	Barecha	26.602234°	79.014478°
482	2017	1.88	24	Female	Juvenile	Patharra	26.476620°	79.229885°
2	2013	1.86	20	Female	Juvenile	Kumoni	26.763095°	78.768594°
5	2013	1.83	15	Male	Juvenile	Hatkant	26.783154°	78.742347°

Sample ID	Year	Length (m)	Weight (Kg)	Sex	Size/age	Location	Latitude	Longitude
549	2017	1.78	17	Male	Juvenile	Pituwan	26.620279°	79.008288°
541	2017	1.77	22	Male	Juvenile	Pituwan	26.620279°	79.008288°
509b	2017	1.77	18	Male	Juvenile	Patharra	26.476620°	79.229885°
515b	2017	1.77	17	Male	Juvenile	Pali	26.529086°	79.161134°
687	2017	1.75	15	Male	Juvenile	Patharra	26.476620°	79.229885°
7	2013	1.72	12	Female	Juvenile	Bithuana	26.789104°	78.688672°
655	2014	1.72	13	Male	Juvenile	Barecha	26.602234°	79.014478°
679	2017	1.64	10	Male	Juvenile	Khera channel	26.672613°	78.972692°
486	2017	1.47	10	Male	Juvenile	Patharra	26.476620°	79.229885°
485	2017	1.42	7	Female	Juvenile	Patharra	26.476620°	79.229885°
502b	2017	1.42	11	Female	Juvenile	Patharra	26.476620°	79.229885°
520b	2017	1.42	7	Male	Juvenile	Pali	26.529086°	79.161134°
3	2013	1.41	6	Male	Juvenile	Gatikolan	26.675022°	78.995127°
522b	2017	1.37	7	Male	Juvenile	Pali	26.529086°	79.161134°
1	2013	1.34	6	Female	Juvenile	Murong	26.760834°	78.787483°
532	2017	1.25	6	Male	Juvenile	Sashon down	26.533270°	79.104297°
654	2017	1.22	5.5	Male	Juvenile	Barecha	26.602234°	79.014478°
501	2014	1.08	4	Male	Juvenile	Patharra	26.476620°	79.229885°
527	2017	0.95	2.5	Male	Juvenile	Pali	26.529086°	79.161134°
505b	2017	0.94	2	Male	Juvenile	Patharra	26.476620°	79.229885°
510	2017	0.76	1	Male	Juvenile	Patharra	26.476620°	79.229885°

Table S2. Details of perfect and compound SSR loci mined from the Gharial Genome using KRAIT software

Locus	Repeat motif	Number of Repeats	Forward Primer	Reverse Primer	Expected product length (bp)
Tri Repeats					
GMM1	AAT	13	TGTTGGCTCACTTCTTTCCC	CACCACTACTAGTCCGTTGGG	319
GMM2	ATT	14	GCTACCCTCATCAAATCCCCC	TGTATGCAAGATACTCTGGGGG	223
GMM3	TGC	13	AAGGGAGGGTTGTTAAGGAGG	CCTTTGCTTCTCGGTCTACCC	145
GMM4	TAT	10	TTGGTGCTTGGACTCTTTGC	ACAGAATTTCTTTTTCCTTCCTGC	178
GMM5	AAG	10	GGACACAGGACAAGAACAAGC	TGTCAGCTCCAAGTGATCCG	247
GMM6	TAA	12	GGTGTCACTCCAGGGAAATCC	CTGGGGTTTTGTCAACTGTGG	323
GMM7	ATA	11	CCCGCCCCCTCAATAAAGC	CGGAAGAGCAAATGTCACAGC	245
GMM8	TAT	20	TGAGCAGTTTATGTAGACCCCC	ACTCCAGGATAAGGACAGATGC	260
GMM9	TAA	16	TCTGGTCAAGGGAAGAATGGC	CTTGATGCAAAGAGGAAAGCG	168
Tetra Repeats					
GMM10	TTCA	8	TAACTGGTCCTTGGGGTTCC	CAAAGATTTGCAGTTCCTTTTAGC	282
GMM11	ATAA	9	TGTTAAGTGTTTAGTGGCTGAATCG	TCCATTTTGCCAAGTCTGCC	233
GMM12	TAGA	13	CTGCCTGTTCCTTTACTGCC	TCTGGGCTGAGAACTTCTTGG	257
GMM13	AAAG	8	AAATGGCAAGTTCAGGTCCC	TGCTGCATCTGTCCCTTGG	180
GMM14	TTTA	8	GCCTGTGCCAAAATATACTTCC	CGGTCCTTCACAGCAATTCC	270
GMM15	CACT	12	TTAGCCTCAAGACCCTCCCC	GCAACACACTTCAGTCTTACACC	262
GMM16	GATA	17	CAGATGGGGCTTAGGAGAAGG	TGAAAATTGGGTTTGGCTGC	213
GMM17	ATCT	17	TGGTTTTGTCTAGATCATGTTTCCC	ACCTATCAGTTTCATTTCAACACCC	352
GMM18	TTGT	43	CTGTGGTGATGGAAGACTTTGC	GTTTCCCCTTCTCTCTCTCTCC	143
GMM19	GAGT	9	TTAAACCCAAAGAGTAAGGCC	TACATGGCTCTAGTGAAGGG	137
GMM20	GTGA	20	TACTGCGGCATCATCATTCC	AGGAGAATTTGGTGTGTGAAATGG	247
GMM21	TAGT	10	TTTGTCTTCCCTGGTGCTGC	ACAAACAAACACCCAACTCTGC	320
GMM22	TATC	14	AGCTGTTTCTAAGGGGAGCC	GGCAATAGTTCTGAAAAGGACACC	295

Compound		*Length*			
GMM23	AC-TC	94	AAGAGAGCATGTGGGTGTGG	AGTGTGTGTGTGTAGGCAGG	203
GMM24	GT-GA	68	AGTAGAGGGACATTTGCAGC	CACGTTCAAGATTTAGATACTGAGG	161
GMM25	AC-AC	84	TGAGCTGGACATTACACACCC	ACGATTCAATCCTGCAACCC	250

Table S3. Comparative table of all the previously developed microsatellite maker for various crocodilian species and present microsatellite markers for gharial. PIC: polymorphic information content; NA : Not available

Species	**No. of microsatellite markers**	**No. of alleles per marker**	**PIC (mean)**	**Ho**	**References**
Siamese crocodile *(Crocodylus siamensis)*	20	1.6	NA		(Chaeychomsri et al. 2008)
Siamese crocodile *(Crocodylus siamensis)*	14	4.35	0.44	0.063-0.649	(Yu et al. 2011)
Siamese crocodile *(Crocodylus siamensis)*	8	4	NA		(FitzSimmons et al. 2001)
Siamese crocodile (Crocodylus siamensis)	22	9.86	0.54		(Lapbenjakul et al. 2017)
Cuban crocodile *(Crocodylus Rhombifer)*	8	2	NA		(FitzSimmons et al. 2001)
Saltwater crocodile *(Crocodylus porosus)*	8	2.5	NA		(FitzSimmons et al. 2001)
Saltwater crocodile *(Crocodylus porosus)*	22	13.59	0.678	0.486	(Lapbenjakul et al. 2017)
American crocodile *(Crocodylus acutus)*	12	3.6	NA		(FitzSimmons et al. 2001)
Australian freshwater crocodile *(Crocodylus johnstoni)*	22	3.27	NA		(FitzSimmons et al. 2001)
Phillipine crocodile *(Crocodylus mindorensis)*	11	2.54	NA		(FitzSimmons et al. 2001)
Mexican crocodile *(Crocodylus moreleti)*	11	2.09	NA		(FitzSimmons et al. 2001)
Nile crocodile *(Crocodylus niloticus)*	8	1.37	NA		(FitzSimmons et al. 2001)

Species	**No. of microsatellite markers**	**No. of alleles per marker**	**PIC (mean)**	**Ho**	**References**
Nile crocodile *(Crocodylus niloticus)*	7	6.7	NA	0.51	(Bishop et al. 2009)
Nile crocodile *(Crocodylus niloticus)*	11	11.81	0.69	0.594	(Van Asch et al. 2019)
Mugger crocodile *(Crocodylus palustris)*	14	5.5	0.27-0.94	0.55	(Aggarwal et al. 2015)
American alligator *(Alligator mississippiensis)*	11	5.27	NA	0.466	(Glenn et al. 1998)
American alligator *(Alligator mississippiensis)*	11	5.18	NA		(Glenn et al. 1998)
American alligator (Alligator mississippiensis)	8	8.5	NA	0.69	(Davis et al. 2002)
American alligator *(Alligator mississippiensis)*	17	0.6	NA	0.185-0.889	(Subalusky et al. 2012)
Chinese alligator *(Alligator sinensis)*	11	2.81	NA	0.400-0.482 0.520-0.621	(Jing et al. 2009)
Chinese alligator *(Alligator sinensis)*	10	7.2	NA	0.249	(Zhu et al. 2009)
Chinese alligator *(Alligator sinensis)*	14	2.92	NA	0.025-0.975	(Wu et al. 2012)
Broad-snouted caiman *(Caiman latirostris)*	13		NA		(Zucoloto et al. 2002)
Spectacled caiman *(Caiman crocodylus)*	12	9.66	NA	0.62	(de Oliveira et al. 2010)
Caiman yacare	12	6.16	NA	0.37	(de Oliveira et al. 2010)
Broad-snouted caiman *(Caiman latirostris)*	8	5	NA	0.31	(Amavet et al. 2017)
Smooth fronted caiman *(Paleosuchus trigonatus)*	10	3.8	0.42	0.46	(Muniz et al. 2019)

Species	**No. of microsatellite markers**	**No. of alleles per marker**	**PIC (mean)**	**Ho**	**References**
Cuvier's dwarf caiman (*Paleosuchus palpebrosus*)	9	NA	NA	0.66	(Muniz et al. 2018)
False gharial *(Tomistoma schlegelii)*	18	5.1	NA	0.105 0.684	(Chang et al. 2014)
False gharial *(Tomistoma schlegelii)*	10	4.9	0.65	0.588–1	(Astani 2015)
Gharial *(Gavialis gangaticus)* using captive samples	18	5.5	0.56	0.73-1.00	(Jogayya et al. 2013)
Gharial *(Gavialis gangaticus)* Chambal population	7	3	NA	0.42	(Sharma et al. 2021)
Gharial (Sample from NCS population)	15	3.73	0.44	0.51	Present study

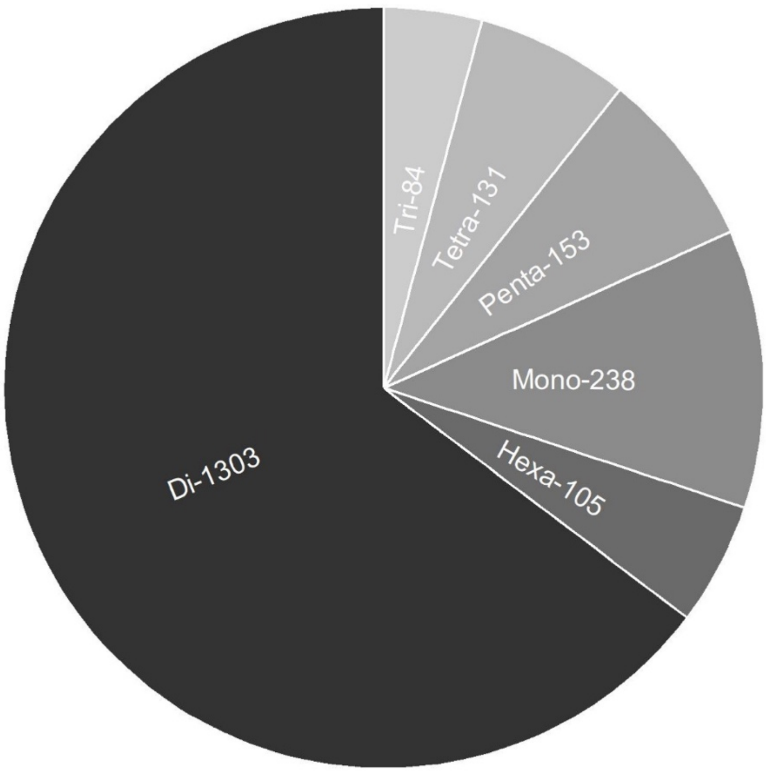

Fig S1. Relative prevalence of all mined SSR loci having different types of motifs

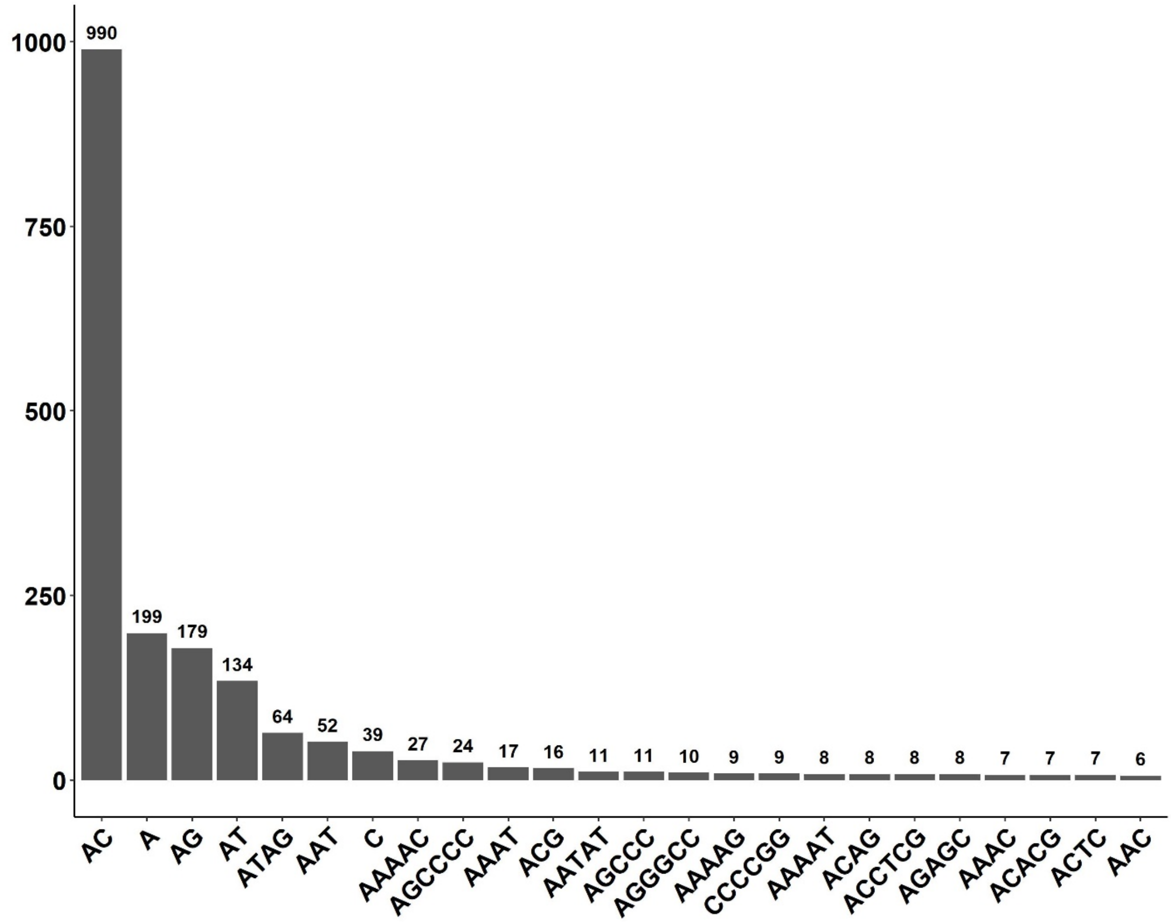

Fig S2. Relative abundances of different categories of repeat motifs

References

Aggarwal RK, Lalremruata A, Dubey B (2015) Development of fourteen novel microsatellite markers of *Crocodylus palustris*, the Indian mugger, and their cross-species transferability in ten other crocodilians. Conservation genetics resources 7:197-200

Amavet PS, Rueda Eva C, Vilardi Juan C, Siroski P, Larriera A, Saidman BO (2017) The broad-snouted caiman population recovery in Argentina. A case of genetics conservation. Amphibia-Reptilia 38:411-424

Astani BS (2015) Genetic variation of southeast asian crocodile, *Tomistoma schlegelii* Muller, using microsatellite and inter simple sequence repeat markers.

Bishop JM, Leslie AJ, Bourquin SL, O'Ryan C (2009) Reduced effective population size in an overexploited population of the Nile crocodile (*Crocodylus niloticus*). Biological Conservation 142:2335-2341

Chaeychomsri W, Chaeychomsri S, Tuntirungkij M, Tabthipwon P, Noparatnaraporn N, Siripholvat V (2008) Characterization of microsatellite markers for the Siamese crocodile and amplification in the closely related genus *Crocodylus*. Agriculture and Natural Resources 42:682-692

Chang Y-C, Li S-H, Chang M-H, Chen S-L (2014) Isolation and characterization of 18 microsatellite loci for an endangered fresh water crocodile *Tomistoma schlegelii*. Conservation Genetics Resources 6:495-498

Davis LM, Glenn TC, Strickland DC, Guillette Jr LJ, Elsey RM, Rhodes WE, Dessauer HC, Sawyer RH (2002) Microsatellite DNA analyses support an east-west phylogeographic split of American alligator populations. Journal of Experimental Zoology 294:352-372

de Oliveira DP, Farias IP, Marioni B, Campos Z, Hrbek T (2010) Microsatellite markers for mating system and population analyses of the spectacled caiman *Caiman crocodilus* (Linnaeus 1758). Conservation Genetics Resources 2:181-184

FitzSimmons NN, Tanksley S, Forstner MR, Louis EE, Daglish R, Gratten J, Davis S (2001) Microsatellite markers for *Crocodylus*: new genetic tools for population genetics, mating system studies and forensics. Crocodilian biology and evolution:51-57

Glenn TC, Dessauer HC, Braun MJ (1998) Characterization of microsatellite DNA loci in American alligators. Copeia:591-601

Jing W, Wang X-L, Lan H, Fang S-G (2009) Eleven novel microsatellite markers for the Chinese alligator (*Alligator sinensis*). Conservation genetics 10:543-546

Jogayya KN, Meganathan P, Dubey B, Haque I (2013) Novel microsatellite DNA markers for Indian Gharial (*Gavialis gangeticus*). Conservation Genetics Resources 5:787-790

Lapbenjakul S, Thapana W, Twilprawat P, Muangmai N, Kanchanaketu T, Temsiripong Y, Unajak S, Peyachoknagul S, Srikulnath K (2017) High genetic diversity and demographic history of captive Siamese and Saltwater crocodiles suggest the first step toward the establishment of a breeding and reintroduction program in Thailand. PloS One 12:e0184526

Muniz FdL, Campos Z, Hernández Rangel SM, Martínez JG, Souza BC, De Thoisy B, Botero-Arias R, Hrbek T, Farias IP (2018) Delimitation of evolutionary units in Cuvier's dwarf caiman, *Paleosuchus palpebrosus* (Cuvier, 1807): insights from conservation of a broadly distributed species. Conservation genetics 19:599-610

Muniz FL, Ximenes AM, Bittencourt PS, Hernández-Rangel SM, Campos Z, Hrbek T, Farias IP (2019) Detecting population structure of Paleosuchus trigonatus (Alligatoridae: Caimaninae) through microsatellites markers developed by next generation sequencing. Molecular biology reports 46:2473-2484

Sharma SP, Ghazi MG, Katdare S, Dasgupta N, Mondol S, Gupta SK, Hussain SA (2021) Microsatellite analysis reveals low genetic diversity in managed populations of the critically endangered gharial (*Gavialis gangeticus*) in India. Scientific Reports 11:5627

Subalusky AL, Garrick RC, Schable NA, Osborne J, Glenn TC (2012) Development and characterization of tetranucleotide microsatellite loci for the American alligator (*Alligator mississippiensis*). Conservation Genetics Resources 4:567-570

Van Asch B, Versfeld WF, Hull KL, Leslie AJ, Matheus TI, Beytell PC, Du Preez P, Slabbert R, Rhode C (2019) Phylogeography, genetic diversity, and population structure of Nile crocodile populations at the fringes of the southern African distribution. PLoS One 14:e0226505

Wu Q, Wu X, Glenn T (2012) Fourteen novel microsatellite loci in the Chinese alligator (*Alligator sinensis*) isolated via 454 pyrosequencing. Conservation Genetics Resources 4:729-732

Yu D, Peng J, Hu S, Gao S, Fu M, Hu H, Zou J (2011) Analysis of genetic variation and bottleneck in a captive population of Siamese crocodile using novel microsatellite loci. Conservation Genetics Resources 3:217-220

Zhu H, Wu X, Xue H, Wei L, Hu Y (2009) Isolation of polymorphic microsatellite loci from the Chinese alligator (*Alligator sinensis*). Molecular ecology resources 9:892-894

Zucoloto RB, Verdade LM, Coutinho LL (2002) Microsatellite DNA library for *Caiman latirostris*. Journal of Experimental Zoology 294:346-351