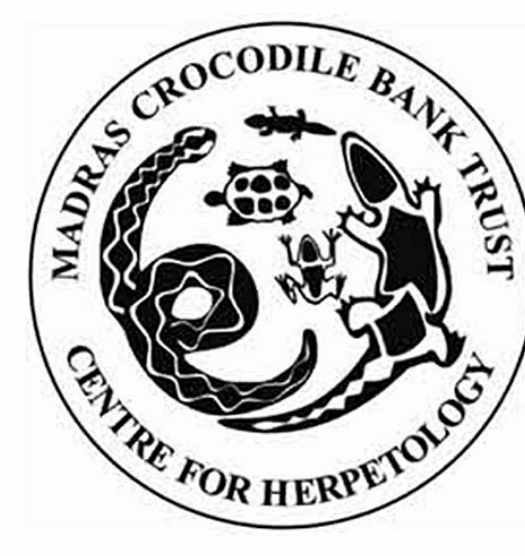


# Chasing Chambal *Chitra*: spatial ecology and seasonal activities



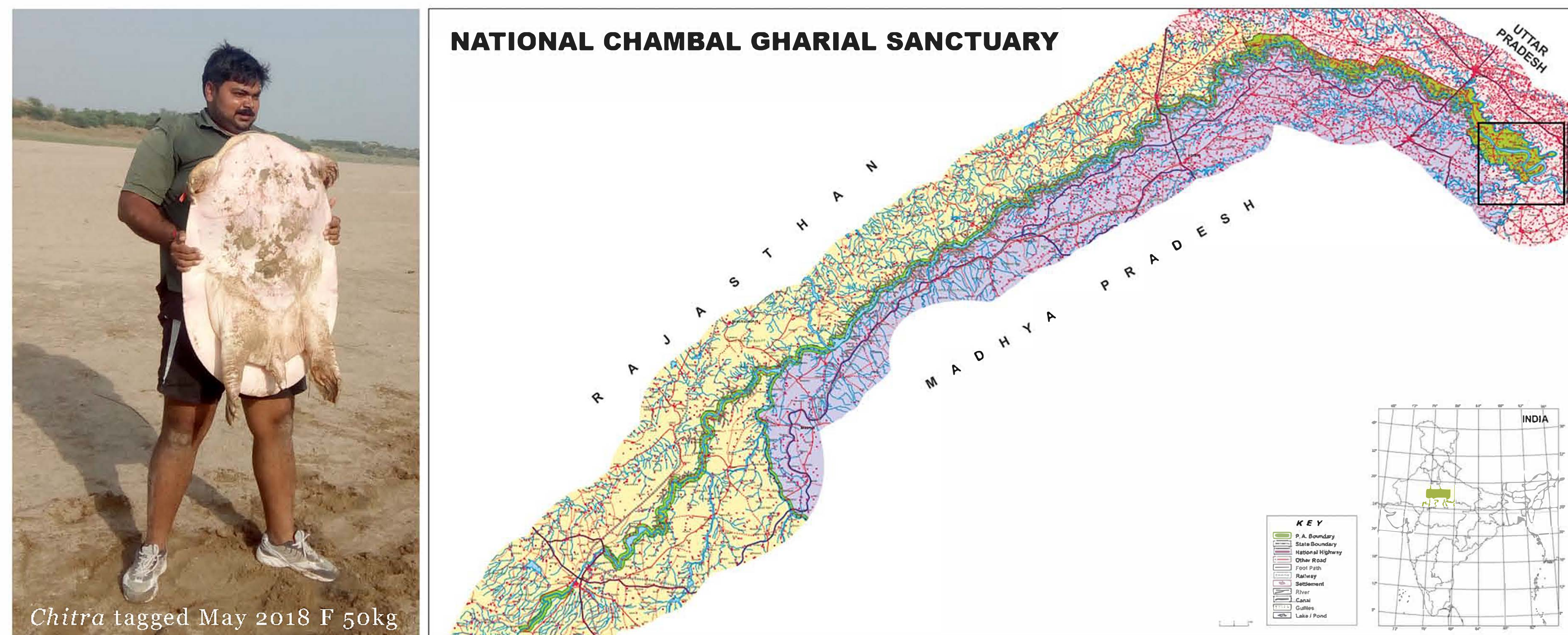
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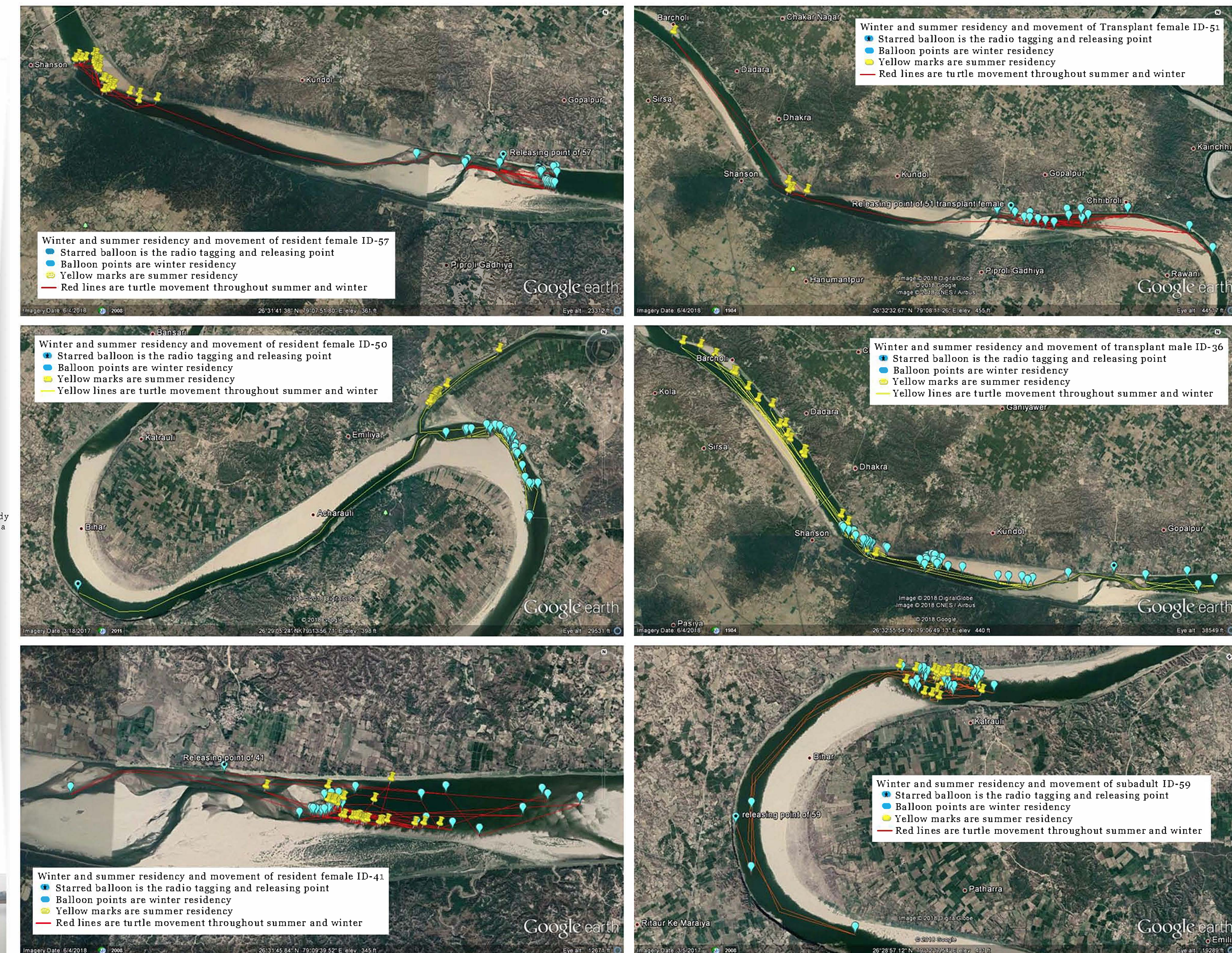
## Abstract-Introduction

The Indian narrow-headed softshell turtle, *Chitra indica*, is a riverine species restricted to south Asia. We studied movements as well as seasonal activities of 11 adults and one subadult in the lower Chambal and Yamuna Rivers near confluence in north India. Each turtle was radio-tagged with a VHF transmitter attached to rear carapace, and tracked at 0.5-2km range, multiple times per week. Behavioral observations were made visually and/or by monitoring radio signals for 1-4 hrs. daily. In November 2017, 5 adults (IM:4F) and subadult (F), ranging from 7-15 kg weight, and from 36-53 cm carapace length were tagged. In May 2018, 6 more turtles, all females, ranging from 11-50kg weight, and size from 46-79 cm carapace length were tagged. Here, we present preliminary results for the group tagged initially. We logged 697 observations over 389 turtle-days on 4 resident turtles, released at their capture sites (=448 obs.), and on 2 transplanted turtles, shifted 62 river kms from their capture site to a release location within the protected National Chambal Sanctuary (=249 obs.). These observations were made on 165 days, from Dec 2017 thru May 2018 (=180 days study period). Four resident females (3 adults; 1 subadult) occupied 2.6, 2.7, 7.3 and 11.7 river kms; two transplants occupied 13.1 and 14.3 river kms during the same period. Winter (Dec-mid Mar) behaviors consisted of daytime movements into shallow water (0.5-1m depth), and nighttime retreats to moderate depths (2-4m). Tracking signals were strong and detectable day and night. In contrast, summer (mid-Mar thru May) behaviors consisted of movements into shallow water only at night, and daytime retreats to deep pools (>5m depths) where tracking signals were undetectable. The single male turtle, a transplant, moved more frequently from pool to pool, over longer distances (>5 kms) than any of the tracked females. Transmitter ambient temperatures from 2 turtles ranged from 7-7.5 to 23.3-24.2 C in winter, and from 20.3-21.5 to 29.6-29.9 C in summer. When fishing occurred nearby, tagged turtles moved to adjacent areas with relatively less disturbance.

## Methods



## Results



## Discussion, Conclusion and Future steps

The radio-tagged *Chitra* exhibited individually distinct spatial patterns, ranging from residency at single location (subadult 59) to widely spaced movements upstream and downstream (adult transplanted male 36). The two transplanted individuals moved more frequently and over longer distances, relative to the residents that were monitored (compare upper right, 51 vs. 57 upper left; adult male movement 36). The min/max home range of the transplanted animals were 4/6km and 105/125 ha in winter, and 6/7km and 134/207 ha during summer. In contrast, the resident observed 1/4 km and 36/166 ha during winter, and 1/2 km and 4/57 ha during summer (Table 1). Major findings to date are: 1) each *Chitra* had individually specific spatial pattern, 2) activity and home range varied seasonally, 3) seasonal movement was not clearly up or down stream, 4) patterns varied with size and sex, 5) additional data is needed on more animals over longer periods. Future plans involve monitoring breeding behaviors, monsoonal movements, as well as nesting as it relates to seasonal activities / areas occupied by residents.

## Acknowledgements

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TABLE 1: DISTANCE, HOME RANGE ESTIMATES, RIVER DIRECTION & SUMMED MOVEMENTS OF 6 *CHITRA* IN WINTER AND SUMMER

SEX	Animal ID	Season	Winter and summer season residence		Home range		River movement direction	SUM all movement (KM)
			Center	Range	Distance (Km)	Area (ha.)		
Resident turtles								
F	50	W	AS	AS-BN	2.6	64	DOWN STR	23
	50	S	BH	AS-DH	2	3.5	NONE	
F	57	W	PL	PL-KH	2.1	94	UP & DOWN STR	27
	57	S	SS	SS-BST	1.2	38	UP & DOWN STR	
F	41	W	KH	PL-KR	4.1	166	NONE	28
	41	S	KH	PL-KR	1.1	57	DOWN STR	
SA	59	W	KA	PT-LP	1.1	36	UP & DOWN STR	24
	59	S	KA	PT-KA	1.5	36	UP & DOWN STR	
Transplanted turtles								
M	36	W	KN	KN-SS	4.3	109	UP STREAM	74
	36	S	BST	JG-BST	6.5	134	UP & DOWN STR	
F	51	W	KH	PL-BS	5.9	126	DOWN STR	50
	51	S	SS	BR- BST	5.5	207	UP & DOWN STR	

Abbreviation: W= winter, S=summer, M= male, F=female, SA=Subadult, KN=Kundal, SS=Shason BST=Baba sidha temple, AS=Asewa, BN= Babain, BH=Bhareh, PL=Palighar, BS=Bansari BR=Barchauli, DH=Dharpura, KH=Khera, KA=Katoli, LP=Lalpura, PT=Patharya.

TABLE 2: SUMMARY OF THE TRACKING EFFORT FOR 6 *CHITRA*

Sex	ID	Carapace Length (cm)	Days Tagged	Days Monitored						Total	Not Found	Track Days
				Dec 2017-MAY 2018 (180 days)								
Resident turtles												
				D	J	F	M	A	M			
F	50	38.5	180	11	12	10	9	13	6	61	2	59
F	57	37	180	16	9	12	11	10	5	63	18	45
F	41	36.2	180	17	11	10	10	12	3	63	8	55
SA	59	29.5	180	17	7	9	12	13	6	64	7	57
Total			720	61	39	41	42	48	20	251	25	216
Transplanted turtles												
M	36	42	180	17	14	11	14	15	5	76	7	69
F	51	36	180	15	10	11	11	12	3	62	28	34
Total			360	32	24	22	25	27	8	138	35	103

TABLE 3: SUMMARY OF WINTER AND SUMMER SEASON RESIDENCY, MAXIMUM MOVEMENT DISTANCES AND SUMMED DISTANCES MOVED FOR SIX TELEMETERED *CHITRA* IN CHAMBAL RIVER

SUMMARY												
ANIMAL DETAILS			Track Days	Cap Site	Rel site	Winter season residency	Summer season residency	Max (km) Distance location	Loc max	Distance (KM) Movement		
ID	Sex	CL (cm)										
Resident turtles												
50	F	38.5	59	LP	LP	AS	DH	15.2	AS-DH	23.3		
57	F	37	45	PL	PL	KH	SS	2.2	KH-SS	26.8		
41	F	36.2	55	PL	PL	KH	KH	4.5	KH	27.7		
59	SA	29.5	57	LP	LP	KA	KA	5.82	KA	24.4		
			216					X=6.9		X=25.5		
Transplanted turtles												
36	M	42	69	BS	PL	KN	BR	14.2	BR-KN	73.8		
51	F	36	34	BS	PL	KH	BR	16.6	KH-BR	50.6		
			103					X=15.4		62.2		

\*X=mean value