Ethnographic GIS Mapping of the Seasonal Migration Routes of Mobile Pastoralists of the Deccan Plateau Region of Telangana

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Seasonal migration is one of the main characteristics of mobile pastoralism. Similar to other parts of the world, mobile pastoralist communities of India also practice seasonal migration. However, the biogeographical diversity of the sub-continent may have presented the opportunity for the evolution of two major forms of pastoralist migrations: horizontal (predominantly found in plains) and vertical (popularly known as transhumant, the up and down movement over mountains). Dating back to 9000 – 6000 B.P., pastoralism is one of the oldest, resilient and sustainable livestock production systems in the world (Dong, 2016). However, very little is understood about this age old livestock production system, especially in the Indian context. Alarmingly, studies on the different facets of mobile pastoralism and seasonal migration patterns across the country including the Deccan Plateau region hitherto remains abysmally poor or absent (Sharma, et al. 2003).

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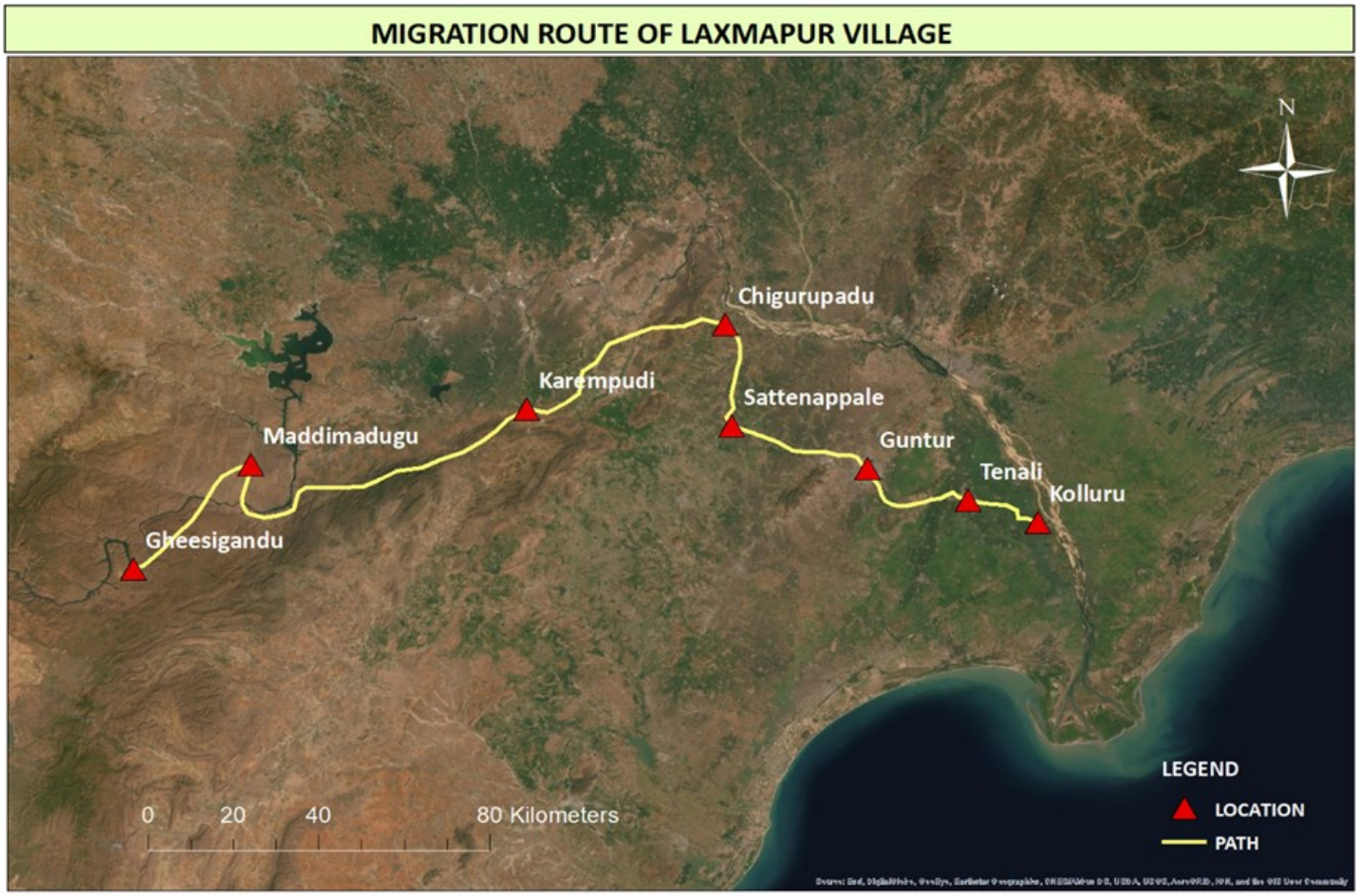
The International Center for Agricultural Research in the Dry Areas (ICARDA), Oregon State University, USA and the Central Arid Zone Research Institute (CAZRI), India has conducted a multi-disciplinary study on seasonal migration patterns of the *Raikas,* a mobile pastoral community of Rajasthan state, India. The study focuses on the socio-economics and mapping the seasonal migration movements of the *Raikas,* using the Global Positioning System (GPS) collars mounted on the livestock of the *Raikas*. The study helped the team of scientists consisting of rangeland experts, socio-economists, veterinarians, and Geographic Information System (GIS) spatial analysts in mapping the exact seasonal migration routes of the pastoralists, total distance of the migration routes, time spent for grazing at different locations, preferred fodder by the livestock, extant and location of watering points, etc.

Results and recommendations of the study is now guiding the policy -makers and government officials to take necessary measures in improving the condition of the commons and grazing lands along the migration routes, creation of watering points, setting up of forage resources, arranging mobile veterinary services along the route and access to near real-time information over cell-phones on the condition of forage resources, etc. The study was envisioned to improve the livelihoods of the *Raikas* by creating access to local markets to sell livestock and their products along the seasonal migration routes (Louhaichi, 2014).

Similar to the study conducted by ICARDA on seasonal migration routes of *Raikas* of Rajasthan, India, many projects were conducted across the globe, especially in Africa. The project on mapping of the pastoralist-livestock corridors the eastern Senegal of Africa includes local perceptions of 1) the benefits and costs of corridors, 2) the effect of the recognition of corridors on competing land uses (particularly farming), 3) the need for and means to recognize and protect corridors, and 4) the appropriate level of authority to recognize and protect corridors. Observations of the study shows that corridors are perceived as a means of protecting local farms from livestock passing through and critical for facilitating access to pastures (Kitchell, *et al.* 2014).

In this background a study was commissioned by Sahjeevan-Centre for Pastoralism to map the seasonal migration routes of the pastoralists across the Deccan Plateau region of India, with an objective to gain better understanding of the system. Three predominantly pastoralist villages of Kalamalonipallli and Lakshmapur Tanda (BK) village, Amrabad mandal, Nagarkurnool district, School Tanda village of Ramareddy mandal, Kamareddy district, Sarpanch Tanda village of Sirkonda Mandal, Nizamabad district, Rudrangi village of Rudrangi mandal of Rajanna Sircilla district of the Indian state of Telangana and Kottalacheruvu and Krishnapuram village of Atmakur Mandal,



Kurnool district of Andhra Pradesh were randomly selected as the study sites for purpose of the present study.

The study adopts an Ethnographic Geographic Information Systems Technique for data collection and analysis (Oskarsson, 2012). Data of the seasonal migration routes of the pastoralists was collected through focus group discussions. The predominantly qualitative data (names of the major destinations along the seasonal migration routes) was used to generate coordinates using Google Earth to determine the geographic location of such destinations along the migration routes. The coordinates thus generated are fed into ArcGis platform to generate digital maps featuring the seasonal migration routes of pastoralists of the study area. In a preliminary attempt digital maps of the seasonal migration routes of the pastoralists of the study area were developed for only three study villages of Lakshmapur Tanda (BK) village, Kalamalonipalli village and School Tanda village of Telangana state.

The Seasonal Migration Pattern of Mobile Pastoralists in the Study Area

The annual seasonal migration of pastoralists of Lakshmapur Tanda (BK) comprises of two phases and across two different ecological systems. One includes short distance local movement in and around the Nallmala forest (which includes Amrabad Tiger Reserve), while the other is long distance, inter-state migration across agro-ecological systems of the adjacent state of Andhra Pradesh.

Short distance local movement starts during the month of July and continues till January (7 months), when herds return home with the onset of monsoon season, when fodder and water are aplenty. The herds spend this period of the year inside the Nallamala forest area, grazing in the customarily used pasture lands called locally as *"penta"*. There are at least 26 – 27, pentas inside the Nallamala forest area. The herds move among these pentas, spending a month or so at each *penta* or as long as resources exist, before moving on to another *penta*. Herds usually travel 5 – 10 km every day grazing on *pentas* inside the Nallamala forest area. The cattle usually feeds on a wide variety of vegetation, which includes: Nandara gaddi, Erra gaddi, Allam gaddi, Kamachi (aromatic herb), Pattadi aaku, etc. The names of few customarily used pentas located inside the Nallamala forest is provided in the table (1).

Table: 1. Names of the Customarily used Pentas used by Pastoralists of Lakshmapur Tanda (BK) Located inside the Nallamala Forest.

Alatam penta	Tammagarugu
Narsingbai	Garasa penta
Erjan	Bandamachilaka
Gunivani penta	Ghandaral
Gundalarevu	Chinchelona

Long distance inter-state seasonal migration starts during the month of February and continues till the end of June (5 months). Local pastoralists leave for seasonal migration when local resources (fodder availability in the forest areas) shrinks. It usually involves crossing of inter-state borders to arrive at their destination located in and around Tenali region of AP. Cattle herds move across the agriculture fallows grazing on the crop residue and stubble of paddy, sorghum and other crops. The inter-state migration is rather a recent phenomenon, it came into to practice less than a decade ago. Details of the inter-state migration route of the pastoralists of Lakshmapur Tanda (BK) is provided in the *table (2)*.

Similarly, pastoralist family of Kalamalonipalli practices both Short distance movement in and around the Nallmala Forest and go out on long distance migration but within the Telangana state. The short distance movement includes about 15 km travel from the camp every day. The herd moves among the different customarily used penta (pasture lands) located inside the Nallamala forest. The seasonal short distance migration starts with the onset of monsoon, usually in June and continues up to January. Details of the few customarily accessed pentas by the herd is presented in the *table (3)*.

Table: 3. Major Camping Sites of the Pastoralists of Kalamalonipalli village during the Seasonal Short Distance Migration

Kommanapenta	Kollam
Rayalacheruvu	Erupulammacheruvu
Erjan	Bandamachilaka

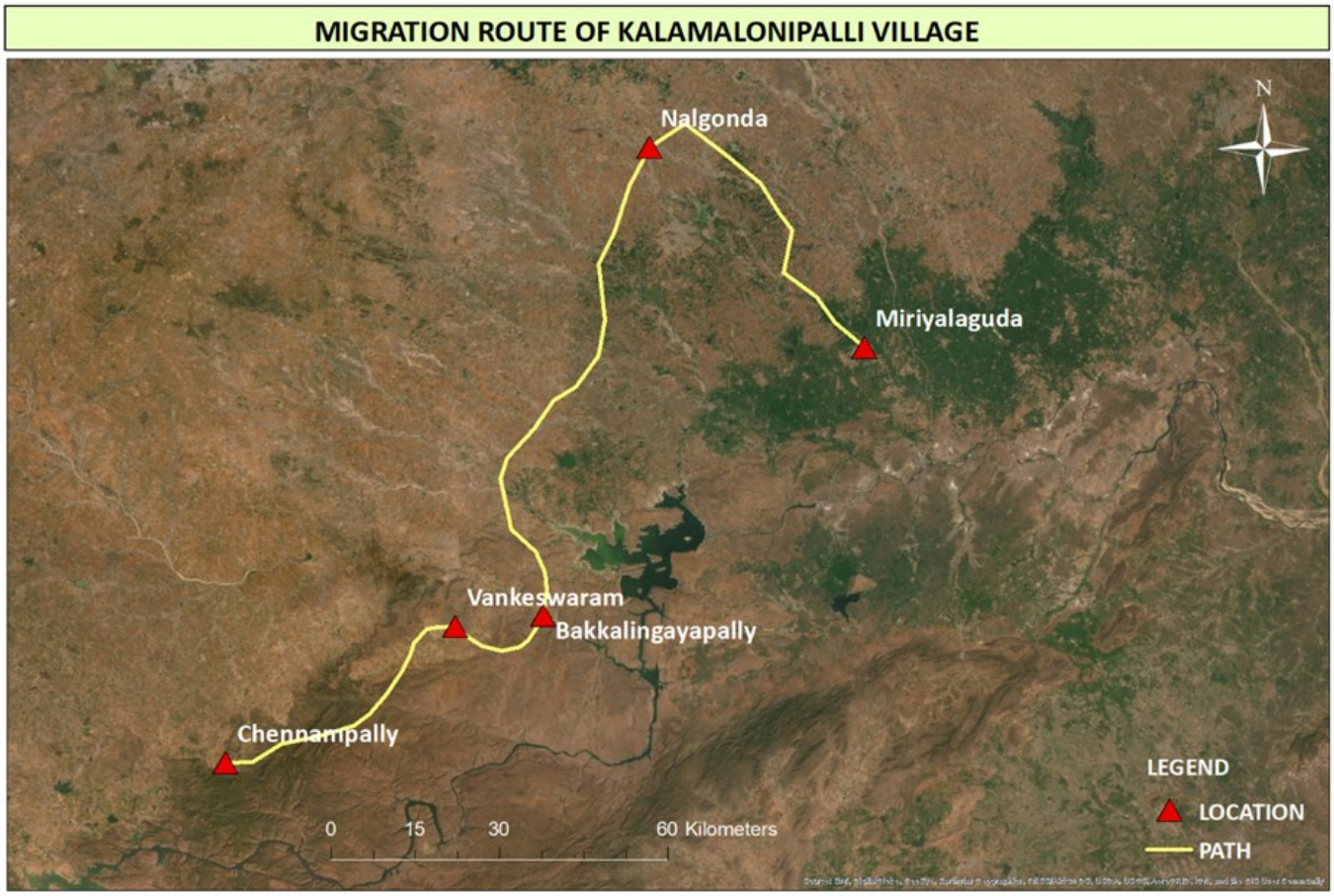
The long distance inter-state migration was unheard of to the local Golla community earlier, it is rather a recent phenomenon as per the information of the family. It all started a decade ago, following an outbreak of Gudala rogam, the family started taking their herd away to save the cattle from contracting the deadly disease. It was reported that Gudala rogam is fatal for calves, adolescents, and pregnant/lactating cows. It was reported that a couple of years ago local herders have sold over 3000 cattle from the fear of losing them to the fatal disease.

The seasonal long distance migration starts in the month of February after the celebration of Sivaratri and continues for 4 – 5 months, usually from February to June. The herd spends most of the time traversing across the rice fallows, grazing stubble and other crop residue. Cows calve during January - April which overlaps with the long migration. Usually three people accompany the herd during migration. Herders take turns (shifts of 3 hours each from 6 PM – 6 AM) at night to prevent the cattle from going astray and raid crops. The herder is usually accompanied by few dogs during both the long and short migration. Dogs not only alert the herder and herd not only potential danger from predators and cattle lifters but also defend them from attacks of wildlife. Major destinations of the long migration is listed in the *table (4)*.

Table: 2. Route of the Inter-state Seasonal Migration of the Pastoralists of Lakshmapur Tanda (BK)

S.No	Major Destinations Along the Migration Route	Coordinates	State
1	*Gundanathi penta (or any other penta)*	Point of origin	Telangana
2	*Cheeramani banda (or any other penta)*	Point of origin	Telangana
3	*Aramancha penta (or any other penta)*	Point of origin	Telangana
4	*Palenka Devudu gudi (temple)*		Telangana
5	*Maddimadugu*	16°18'42.7"N 79°08'19.0"E	Telangana
6	*Gheesigandu revu (river bank)*	16°05'17.3"N 78°53'26.3"E	Telangana
7	*Chigurupadu*	16°36'42.6"N 80°08'14.7"E	Andhra Pradesh
8	*Karampudi*	16°25'50.8"N 79°43'06.8"E	Andhra Pradesh
9	*Sattenpalli*	16°23'41.4"N 80°09'03.1"E	Andhra Pradesh
10	*Guntur*	16°18'12.5"N 80°26'08.0"E	Andhra Pradesh
11	*Tenali*	16°14'10.6"N 80°38'52.0"E	Andhra Pradesh
12	*Kolluru (destination)*	16°11'16.7"N 80°47'38.9"E	Andhra Pradesh

*Note: After arriving at the destination (Guntur-Tenali-Kolluru), herds spend most of the time grazing crop residue and stubble, traversing across the rice fallows. At the onset of monsoon season pastoralists follow the same route to return home. Upon arrival at the native place, families gather at the village outskirts to greet and welcome the returning herds amid performance of traditional.



Pastoralists of School Tanda stay home for about five months from July to October; during which the cattle herds are grazed predominantly over the village commons, cultivable fallows and the adjacent forest areas. The herds usually move within 10 km radius, and covering a distance of about 18 - 20 km daily, for grazing. Many customarily used grazing patches are located inside the adjacent forest are, few prominent ones are: Limidi, Lingannapeta, Kota devudu, and Chendra devudu. Details of the grazing areas around School Tanda are presented in the *table (5)*. Traditionally, herds are penned adjacent to the houses but this practice has changed now. Currently, herds are penned away from the village, at designated patches over the commons, adjacent to the forest with waterbodies to supply water for the cattle. Unlike the Golla / Yadava community, Lambadas do not build large penn's/ cattle shelters adjacent to their homes. In comparison with Lambadas, the Golla/Yadava pastoralists of this region maintain better cleaning and sanitation of the cattle shelters.

Table: 5. Details of the Grazing Areas around School Tanda when Herds Stay at the Native Village

Place	Coordinates	Month	State
School Tanda (Origin)		Late October – Early November	Kamareddy district, Telangana
Maddi kota			
Reddy peta			
Kondapur			

The seasonal long distance migration of pastoralists of School Tanda commences immediately after celebration of Diwali festival, which is usually the last week of October or the first week of November and continues up to June. The herds linger around the grazing patches inside the forests until the Shivaraathri festival, or until harvesting season of the Rabi Jowar crop (sorghum) draws to an end. Soon after harvesting of the jowar crop, herds are moved across the cultivable fallows for grazing. Herds spend about 10 – 15 days at each village along the migration route, penning at farms for a price (cash and kind). The long distance migration route of the pastoralists of School tanda extends all the way to Balakonda from their native place. The local pastoralists follows the same route to return home. Details of the long migration routes is presented in the *table (6)*.

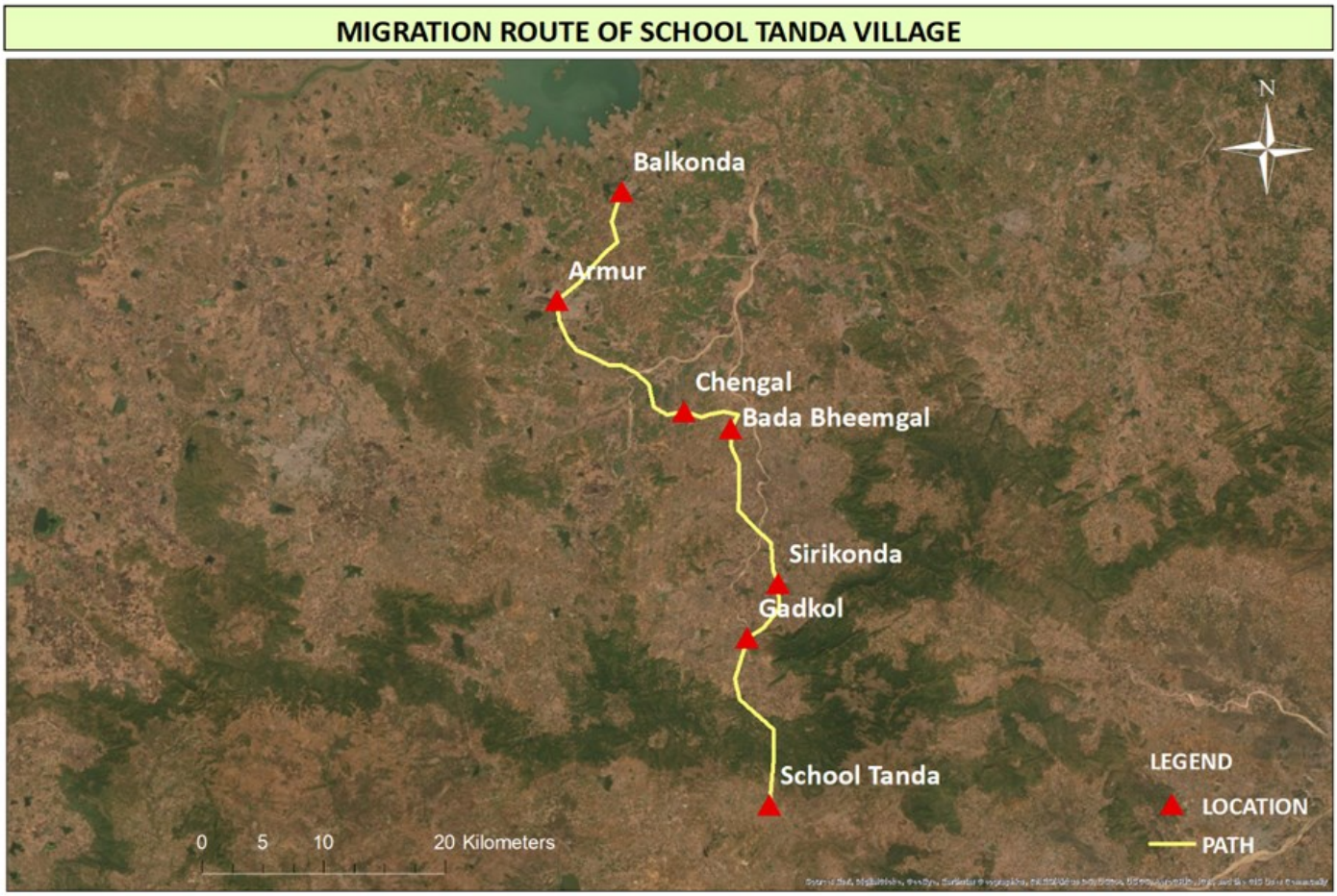


Table: 6. Details of the Route and Season of Annual Long Distance Migration of Local Lambadas

Place	Coordinates	State
School Tanda (Origin)	18°24'56.8"N 78°26'41.7"E	Kamareddy district, Telangana
Maddi kota		
Reddy peta		
Kondapur		
Gadukol	18°32'23.5"N 78°25'43.0"E	
Sirikonda	18°34'47.8"N 78°27'04.1"E	
Kundoor		
Gunugopula		
Bada Bheemgal	18°41'38.9"N 78°24'60.0"E	
Armur	18°47'22.2"N 78°17'16.2"E	
Chengal	18°42'26.2"N 78°22'55.1"E	
Arugula		
Balakonda (destination)	18°52'13.1"N 78°20'09.7"E	

The pastoralist family of Sarpanch Tanda practices both short and long distance seasonal migration. The family stays at home from July to October, during which they practice short distance movement covering a distance of 8 – 10 km (one way) everyday, grazing over village commons, cultivable fallows and forest areas surrounding their village. The herds move out for long distance seasonal migration during late October – early November, after celebration of Diwali festival. The long distance seasonal migration continues from October/November to June, predominantly grazing over cultivable fallows and penning over farm lands. Three to five people usually accompany the herd on migration. Details of the movement of pastoralists of Sarpanch Tanda is presented in the *table (7)*.

Table: 7. Details of the Route and Season of Annual Migration of Local Lambadas

Place	Coordinates	State
School Tanda (Origin)	18°24'56.8"N 78°26'41.7"E	Kamareddy district, Telangana
Sarpanch Tanda (origin)	18°29'41.9"N 78°25'47.7"E	Nizamabad district, Telangana
Tumpally	18°29'12.3"N 78°27'31.9"E	- do -
Gadkol	18°32'23.5"N 78°25'43.0"E	- do -
Ram madugu		- do -
Kondur		- do -
Muchkur	18°38'15.7"N 78°27'40.8"E	- do -
Bheemgal	18°42'05.3"N 78°27'14.6"E	- do -
Bada Bheemgal	18°41'38.9"N 78°24'60.0"E	- do -
Elpur	18°45'50.9"N 78°23'38.9"E	- do -
Fatehpur	18°50'51.6"N 78°18'11.6"E	- do -
Balkonda	18°52'13.7"N 78°20'13.1"E	- do -
Nirmal (destination)	19°05'42.9"N 78°20'36.9"E	Nirmal district

Note:
The pastorals use the same migration route to return home – however, they seldom use an alternate route which passes via Bhainsa.

Unlike the local Lambadas, the local Golla pastoralists of Rudrangi village do not practice long distance seasonal migration, instead they move the herds within a radius of 15 – 20 kms around the village, all year around. Herds are grazed over the village commons and cultivable fallows for most part (eight months) of the season (November – June) and put up inside the forest for about four months from July to October. There are about 16 – 20 customary grazing patches located inside the forest and herds are moved over the customary grazing patches depending on the availability of fodder and water. Details of the movement of pastoralists of Rudrangi village is presented in the *table (8)*.

Table: 7. Details of the Customary Grazing Areas Inside the Forest of Rudrangi Village

Place	Coordinates	State
Rudrangi Village (Origin)	18°37'32.4"N 78° 42'27.7"E	Rajanna siricilla district, Telangana
Nalla gutta		-do-
Kalagandi		-do-
Bugga devastanam area		-do-
Sir Bugga rjarajeshwari swamy area		-do-
Lonka rameswara swamy area		-do-
Patcha gutta		-do-
Kalapayya		-do-
Kottapeta		-do-
Malyala		-do-
Haindalupi		-do-
Bolabanda		-do-
Konda gutta		-do-
Guba gutta (destination at the neighbouring village, Salugula)		-do-
Rajula gutta (destination at the neighbouring village, Salugula)		-do-

Forest vegetation *Late July – Early November*

Pastoralists of Kottalacheruvu village graze their cattle herds over the village commons and agriculture fallows for eight months (November – June) and move them into the surrounding Nallmala forest for the rest four months (July – October) of the year. Herds are kept inside the forest from July – October to prevent them from raiding crops. Herds are grazed at customarily used pentas (place with fodder and water) located inside the Nallamala forest. There are approximately seven pentas spread across two forest beats namely: Indreswaram beat (located on the east of the village) and Golukuntala beat (located on the west of the village). There are two pentas located inside Indreswaram beat: Sasanam and Kanuguntala peta and five pentas are located inside Indreswaram beat: Sadaram, Aara, Lingamayya, Egasari and Sari pentas. Calves are born during February – April, when herds are moving inside the forest. Animals often fall sick from eating Nuruku gaddi (a type of grass) found in this region. Around 30 animals died recently from a sudden outbreak.

Pastoralists of Krishnapuram village take their cattle herds to the surrounding hillocks for grazing for nine months during the monsoon/winter seasons (June – Feb). The customary grazing areas of Gaji banda, Garigalamma, and Tirumala Konda, are located on Bendi Konda (hillock) located about 10 km from the village. Bendi Konda is spread in an area of approximately 20 km2. Herds are moved across the cultivable fallows for three months during summer (March – May), grazing over the stubble and crop residue. Movement of pastoralists of Nallamala-Pasa cattle of Kurnool district is provided in the *table (9)*.

Table: 9. Details of the Pentas Located inside the Nallamala Forest, Customarily used by the Pastoralists in Kurnool District

S. No	Name of the Mandal	Name of Forest Patch Customarily Used for Grazing
1	Atmakur	Rollapenta
		Nallapasu konda
2	Bandi Atmakur	*Same as Velugodu*
3	Gaddivemula	Gmmadi konda
		Palabuggajendla
		Vundutla jenda
		Gunki banda
4	Kothapalli	Sangameswaram konda
		Ankalamma kota
		Mallayyaashala
5	Pamaulapadu	*Same as Gaddivemula*
6	Velugodu	Pavuralagutta
		Rudrakodu
		Mallelamma cheruvu
		Annaram cheruvu
		Kammakunta cheruvu
		Pallaebai vanka
		Peddalinu

There is some variation in the seasonal migration of pastoralists among the sample villages. Pastoralists of Lakshmapur tanda (BK) and Kalamalonipalli follow the same pattern in terms of season and duration short and long term migration but the distance they cover during migration differs significantly. Pastoralists of School tanda and Sarpanch tanda follow the same pattern in terms of season and duration short and long term migration but the distance they cover varies. Although, Rudrangi and Kottalacheruvu villages are geographically located in different states and located far apart but interestingly pastoralists of both the villages are found to follow the same pattern in terms of short and long seasonal migration. Although, pastoralists of Krishnapuram village do not go far on long distance migration, nonetheless they spend relatively longer time grazing their herds inside the forests and relatively shorter time grazing their herds on commons and cultivable fallows in and around the village. The summary of seasonal migration pattern of the study villages is presented in the *table (10)*.

Table: 10 Summary of the Seasonal Migration Pattern of Pastoralists in the Study Area

S. No	State	District	Name of the Village	Period of Short Distance Migration	No. of Months	Period of Long Distance Migration	No. of Months	Approx. Distance (one way) of Long distance Migration (in KM)
1	Telangana	Nagarkurnool	Laksham-puram tanda	Jul - Jan	7	Feb - Jun	5	571
			Kalamalonipalli	Jul - Jan	7	Feb - Jun	5	327
		Kamareddy	School tanda	Jul - Oct	4	Nov - Jun	8	
		Nizamabad	Sarpanch tanda	Jul - Oct	4	Nov - Jun	8	
		Rajanna sircilla	Rudrangi	Nov - Jun	8	Jul - Oct	4	
2	Andhra Pradesh	Kurnool	Kottalacheruvu	Nov - Jun	8	Jul - Oct	4	
			Krishapuram	Mar - May	3	Jun - Feb	9	

Conclusion

It was observed that mobile pastoral communities of the study area practice both short and long seasonal migration in sync with the monsoon and local cropping season. It was reported that pastoralists of Nagarkurnool district, Telangana started migrating longer distances and spreading wider to maintain distance among the herds to prevent disease outbreaks. However, further studies are necessary to ascertain these claims. The seasonal migration route of the local pastoralists include traversing and grazing over forest ecosystems (Nallamala forest range), commons, village pastures and cultivable fallows. The study finds that pastoralists of the study area have been facing many challenges with regards to their mobility. Much of these restrictions come in the form of restrictions imposed by the forest department from accessing their traditional customary grazing lands located inside the forests and shrinking of commons and village pasture lands.

The need to promote and facilitate unrestricted livestock mobility in semi-arid regions of the world has been recognized by social and biophysical scientists (Kitchell et al. 2014; Sharma et al. 2003; Ellis and Swift 1988; Niamir-Fuller 1999; Scoones 1994) as well as the national governments of many countries in the world, especially Africa (Bonnet and Hérault 2011; Touré 2004; Wabnitz 2006). This recognition, in support of mobility and the rights of pastoral communities, however, did not translate into action, in terms of creation of suitable policies and institutions to ensure livestock mobility (Kitchell, et al. 2014; Sharma et al. 2003; Fernandez-Gimenez and Le Febre 2006; Galvin 2009; Niamir-Fuller 1999).

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