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Centre for Environment Education

Towards Green and Socially-Sound Recovery in Rural and Farm Sector

CASE STUDY OF THE MARGINALIZED BHIL COMMUNITY FROM DROUGHT-PRONE PARALA VILLAGE IN VAIJAPUR BLOCK, DIST. AURANGABAD, MAHARASHTRA

Photo : Satish Awate

ABOUT US

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INTRODUCTION

Bajra (Pearl millet-*Pennisetum glaucum*), locally called *bajari*, is the most widely-grown variety among all millets in India. It is a highly nutritious coarse cereal grain and highly suitable for cultivation in semi-arid zones. In India, the total area under millet cultivation is 7,652 thousand hectares and the total production is 10,863 thousand MT. Rajasthan, Maharashtra, Gujarat and Uttar Pradesh are major *bajari*-producing states in India. The *bajari* is mostly consumed as a major cereal in these states. Presently, village traders and the APMC commission agents largely facilitate the aggregation of *bajari*. The producer's share in the profit is very less as *bajari* is sold to these aggregators in an uncleaned and unsorted form.

The *Bhil* is a marginalized Scheduled Tribal community residing in the semi-arid zone in Vaijapur block of Aurangabad district and its livelihood depends on a bajari-centric crop system, goat and poultry rearing. The average annual rainfall of the Vaijapur block is 763.4 mm (Meteoblue, 2022). However, the region is highly drought-prone and has a history of periodic droughts which have continued after a famine in 1972-73. Records at Biodiversity Park, Parala show deficient rainfall from 2015 to 2018, of 161.2 mm, 339.6 mm, 381 mm and 113 mm. Extreme rainfall occurred in 2021-22 at the harvesting stage which destroyed standing crops. Only maize was able to withstand the heavy rainfall. Such extreme events, possibly induced by climate change, are adding to the vulnerability of farming and tribal communities. The study was conducted to rapidly assess national and state-level scenarios and value chains of various livelihood sources (agriculture, goatry, poultry) in the region and the impact of climate change on the production system.

APPROACH

Bajari (Pearl Millet) is largely a subsistence crop for the *Bhil* community in Parala. It is necessary to understand the overall basket of agricultural and allied livelihoods to identify the potential for green and socially-just economic recovery of the community. This study puts the *Bhil* community at the centre and recognizes its extreme vulnerability to climate change impacts in this highly drought-prone region, which intersects with its socio-political marginalization, the community has faced over generations, and which continues in various forms in present times. This approach to the study was adopted as a course correction when it was realized that focusing on a single produce or livelihood would not be effective given the socio-ecological complexity of the context.

Photo : Satish Awate

STUDY AREA

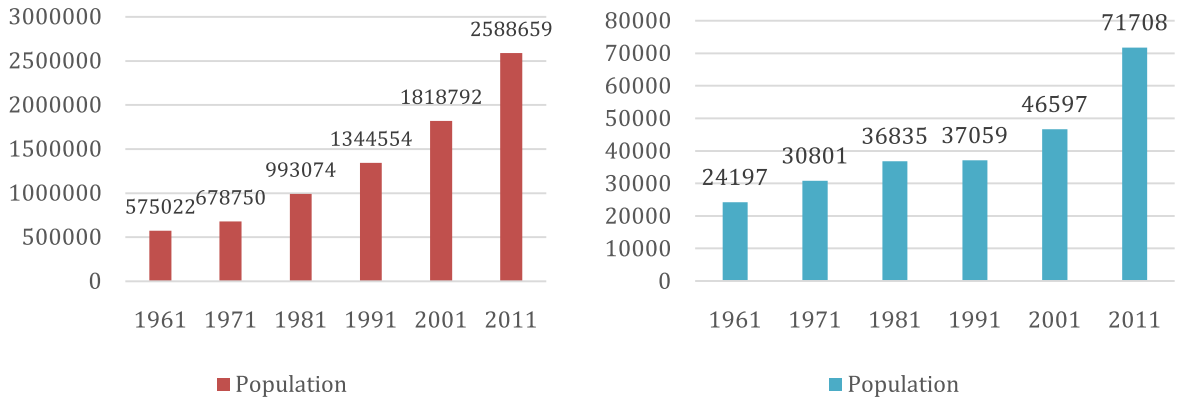
Parala village is located in the Aurangabad district of Maharashtra. It is at a 76 km distance from Aurangabad city and 24 km from block headquarters Vaijapur. The population is 2,333 distributed amongst 487 households. The major crops are cotton, corn, *bajari*, onion and sugarcane. The reserved forests have a savanna grassland-type terrain. The *Bhil* tribal community, constituting 23.5 per cent of the village population, lives in the reserved forest area.

Demographic characteristics of Parala village

Population (in 2011)	2333
Total area	3155.33 ha
Cultivable area	2123.28 ha
Irrigated area	143 ha
Dryland	1953.18 ha
Forest land	712.63 ha
Grazing land	272.47
No. of wells	448
No. of borewells	12

Lokparyay is a people's movement active in this region for more than three decades, organizing Scheduled Tribes, Scheduled Castes and other marginalized groups. Through a long-drawn struggle using non-violent methods, 79 *Bhil* families in Parala secured Individual Forest Rights over 137.171 Ha of forest land in 2011 under the Forest Rights Act of 2006. *Lokparyay* took up the effort of following up with the district administration for the issue of 'Caste certificates' as identification documents to over 30,000 individuals belonging to the *Bhil*, Thakar and Pardhi Scheduled Tribal communities through a special drive in 2009.

Bhil community population in Maharashtra state and Aurangabad district



Source: Census of India 2011

OVERVIEW OF MAIN CROPS AND ANIMAL HUSBANDRY AT NATIONAL AND STATE LEVELS

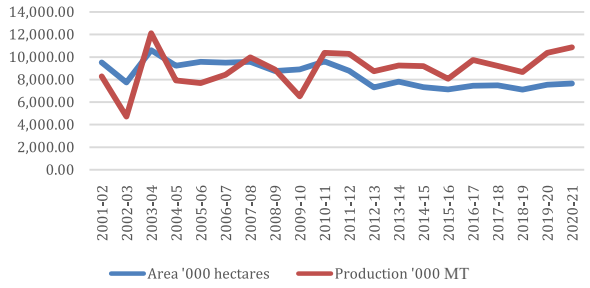
BAJARI

1. *Bajari* (Pearl Millet) is the most widely-grown millet in India. It is consumed as a cereal in winters and the surplus is used as animal feed. It is a highly nutritious coarse cereal grain, suitable for cultivation in semi-arid zones. Though *bajari* is tolerant to drought, heat and soil salinity, other adverse climatic conditions like heavy rainfall, especially in October and November, are causing damage to the *bajari* crop in Maharashtra.

2. In 2020-21 in India, the area under cultivation of *bajari* was 7,652 thousand hectares and total production was 10,863 thousand MT. The area under cultivation of *bajari* has decreased from 9,529 thousand hectares in 2000-01 to 7,652 thousand hectares in 2020-21. The percentage decrease in area under *bajari* in the last twenty years is 19.7 per cent (CMIE, 2022).

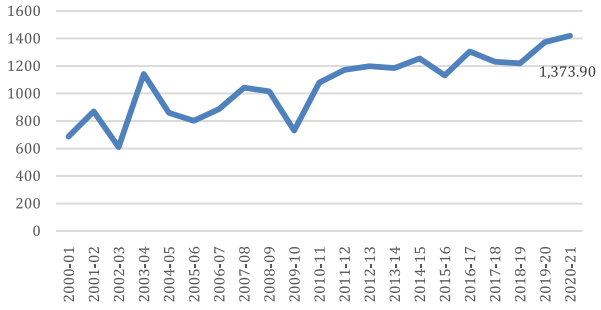
3. Though the area under *bajari* has decreased, the production of *bajari* has increased from 8,284 thousand MT in 2000-01 to 10,863 thousand MT in 2020-21 owing to an increase in productivity. The increase in the production of *bajari* in the last twenty years is 23.7 per cent (CMIE, 2022).

Area under cultivation and production of Bajari in India



Source: CMIE, 2022

Yield of Bajari in India (kg/ha)

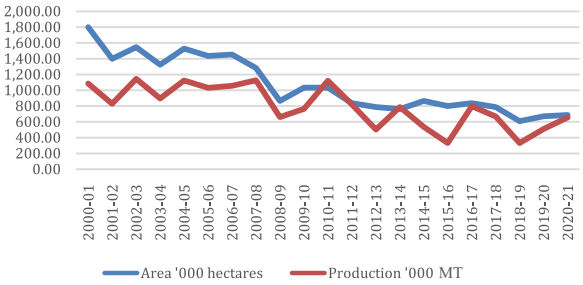


Source: CMIE, 2022

4. The *bajari* productivity in India in the year 2000-01 was 687.7 kg/ha which has increased to 1,373.9 kg/ha. Rajasthan, Maharashtra, Gujarat and Uttar Pradesh are the top *bajari*-producing states (CMIE 2022).

5. In Maharashtra, 687.5 thousand hectares was under the *bajari* crop and the total production was 656.6 thousand MT in 2020-21. The area under cultivation and production of *bajari* in

Area under cultivation and production of Bajari in Maharashtra



Source: CMIE, 2022

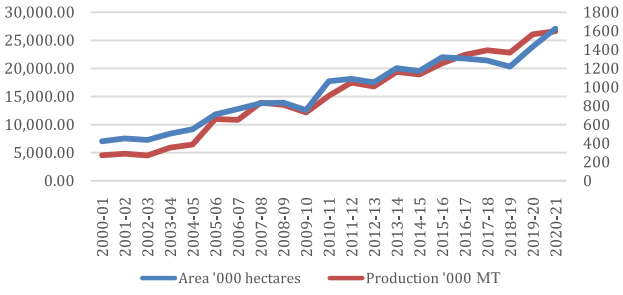
Maharashtra has been consistently decreasing over the last 20 years, from 1,800 thousand hectares in 2000-01 to 672.8 thousand hectares in 2020-21. Similarly, the production of *bajari* has decreased from 1,087.7 thousand MT to 512 thousand MT over the past twenty years (CMIE 2022) (Directorate of Economics Statistics, 2021). The cropping pattern in this semi-arid zone is changing to onion, corn, cotton etc.

ONION

1. In 2020-21 in India, the area under onion cultivation was 1,624 thousand hectares and total production was 26,641 thousand MT. The area under cultivation of onion has increased from 421.9 thousand hectares in 2000-01 to 1,624.3 thousand hectares in 2020-21. There has been a 285 per cent increase in the area under onion cultivation in the last twenty years.

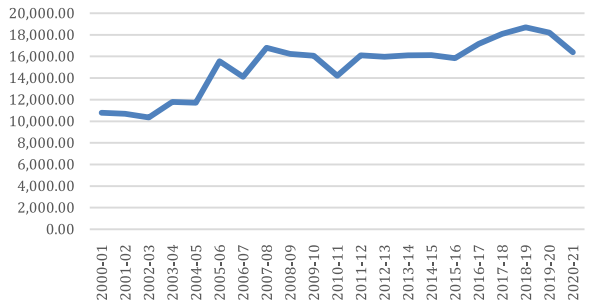
2. The production of onions in India has also increased from 4,550.5 thousand MT in 2000-01 to 26,641 thousand MT in 2020-21, an increase of 485.5 per cent in the production of onions in the last twenty years.

Area under cultivation and production of onion in India



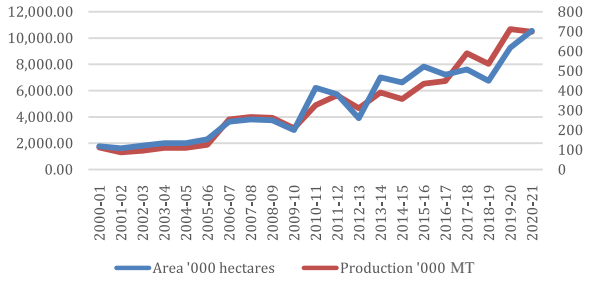
Source: CMIE, 2022

Yield of onion in kg/ha



Source: CMIE, 2022

Area under cultivation and production of onion in Maharashtra



Source: CMIE, 2022

3. The productivity of the onion crop in 2000-01 was 10,785.7 kg/ha which has increased to 16,401.6 kg/ha. Though onion productivity has increased by 52.1 per cent over the last twenty years, productivity has sharply declined by 12.3 per cent in the last three years.

4. Maharashtra, Madhya Pradesh, Karnataka, Gujarat and Rajasthan are the top onion-producing states.

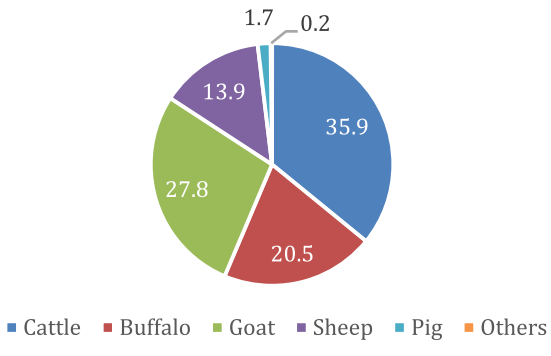
5. In Maharashtra, overall, 703.8 thousand hectares of land is under the onion cultivation and the total production of onion in Maharashtra in 2020-21 was 10,476.5 thousand MT.

6. The area under cultivation and production of onion in Maharashtra has had crests and troughs and overall, it shows an increasing trend over the last 20 years. In Maharashtra, the area under onion cultivation has increased from 118.1 thousand hectares in 2000-01 to 703.8 thousand hectares in 2020-21. Similarly, the production of onion has increased from 1,687.5 thousand MT to 10,476.5 thousand MT in the past twenty years. The area under cultivation and production had decreased in 2009-10, 2012-13 and 2018-19.

ANIMAL HUSBANDRY INCLUDING GOATRY AND POULTRY

1. As per the 2019 livestock census survey, the total population of livestock in the country is 535.78 million. Between the years 2012 and 2019, the livestock population increased by 4.6 per cent. Between the years 2012 and 2019, the population of cattle and buffalo increased by a mere 0.83 per cent and 1.06 per cent respectively, but the population of sheep and goats increased by 14.12 per cent and 10.14 per cent.

Per cent distribution of livestock population in India, 2019



Source: 20th Livestock Census, 2019

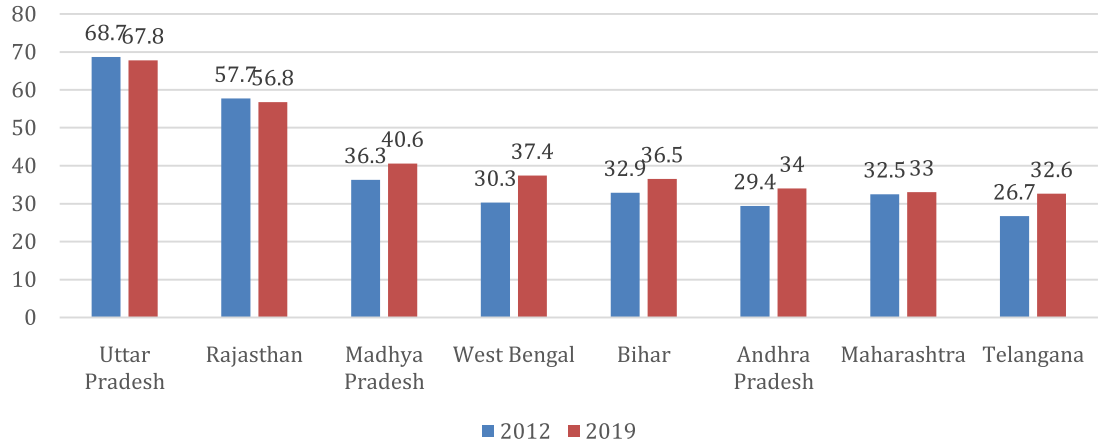
	Population (millions)		Per cent
	2012	2019	increase
Cattle	190.9	192.49	0.83
Buffalo	108.7	109.85	1.06
Sheep	65.07	74.26	14.13
Goat	135.17	148.88	10.14

Source: 20th Livestock Census, 2019

2. In India, Uttar Pradesh, Rajasthan and Madhya Pradesh are the states with the largest livestock populations. The largest growth of livestock populations is in West Bengal and Telangana, at 23.32 per cent and 22.21 per cent respectively. Between the years 2012 and 2019, the livestock population in Maharashtra increased by only 1.61 per cent (Department of Animal Husbandry & Dairying, 2019).

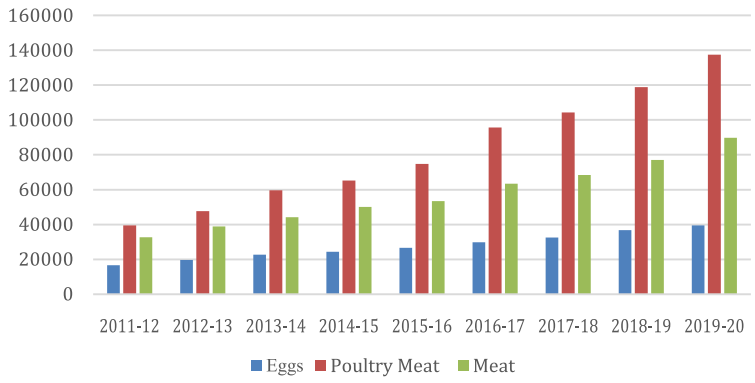
3. The population of the total exotic/crossbred cattle has increased by 26.9 per cent in 2019 as compared to the 2012 census. There is a decline of 6 per cent in the total Indigenous (both recognized breeds and non-descript varieties) cattle population over the previous census. Between 2010-2020, the production of eggs increased by 137 per cent, poultry meat by 247 per cent, other meat by 175 per cent and wool production by 37 per cent.

Livestock population (millions) of major states of India in 2012 and 2019



Source: 20th Livestock Census, 2019

Production of eggs, poultry meat and meat in India (2011-2020)



Source: 20th Livestock Census, 2019

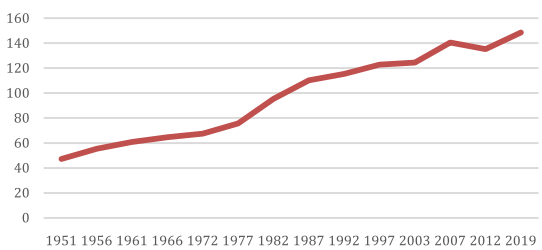
4. As per the 2019 census, the total goat population in the country is 148.88 million and it is 27.8 per cent of the total population of livestock. Between 2012 and 2019, the population of male goats decreased by 14.7 per cent while the population of female goats, in-milk goats and dry goats increased by 19.7 per cent, 15.4 per cent and 9.9 per cent respectively.

Category	Population in 2012 (millions)	Population in 2019 (millions)	Per cent change
Male goat	37.62	32.10	-14.7
Female goat	97.56	116.78	19.7
In-milk goat	36.25	41.83	15.4
Dry goat	25.31	27.82	9.9
Total	**135.17**	**148.88**	**10.1**

Source: 20th Livestock Census, 2019

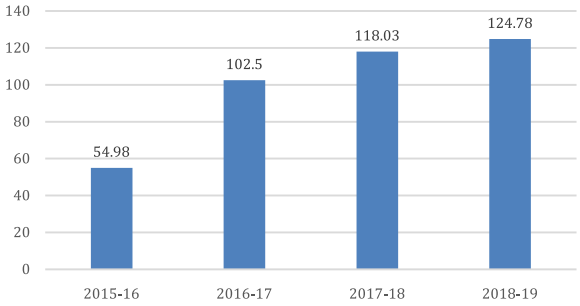
5. As per the 2019 census, Rajasthan, West Bengal and Uttar Pradesh are the top states in goat population. Between 2012 and 2019, the population of goats in West Bengal, Jharkhand and Madhya Pradesh has increased by 41.49 per cent, 38.59 per cent and 38.09 per cent while the goat population in Uttar Pradesh, Rajasthan and Odisha has decreased over the same period. The goat population in Maharashtra increased by 25.7 per cent between 2012 and 2019.

Goat population in millions in India (1951-2019)



Source: 20th Livestock Census, 2019

Goat meat production in India (2015-19)
(Thousand MT)

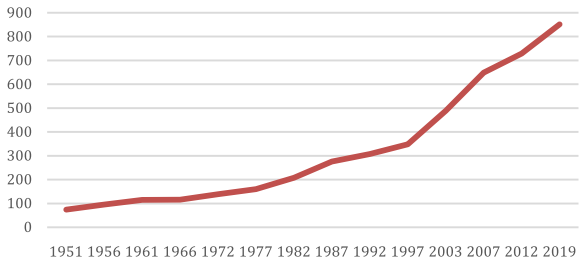


Source: 20th Livestock Census, 2019

6. Between the years 2010 and 2020, egg production has increased by 137 per cent, chicken production by 247 per cent and meat production by 175 per cent. As local demand for meat is not being addressed, India also imports meat from other nations. In the year 2019, India imported 47.82 thousand MT and 4.85 thousand MT of sheep and goat meat from New Zealand and Australia respectively.

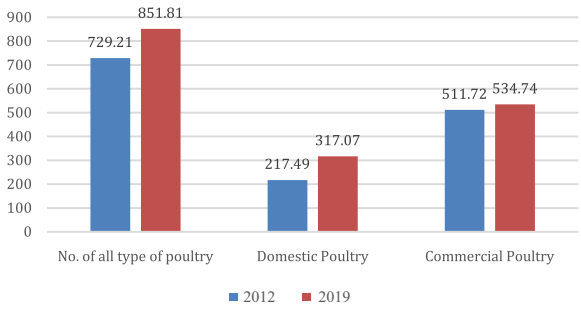
7. The total poultry in India was 851.81 million in 2019 and it has increased by 16.8 per cent between the years 2012 and 2019.

No. of poultry in millions in India (1951-2019)



Source: 20th Livestock Census, 2019

No. of poultry 2012 and 2019 in India (millions)



Source: 20th Livestock Census, 2019

8. The number of domestic poultry was 317.07 million and it accounts for 37.2 per cent of the total poultry population. The number of domestic poultry has increased by 45.8 per cent between the years 2012 and 2019. The number of commercial poultry was 534.74 million and its share is 62.8 per cent of the total population. Commercial poultry has increased by a mere 4.5 per cent between the years 2012 and 2019.

STUDY AREA-SPECIFIC FINDINGS

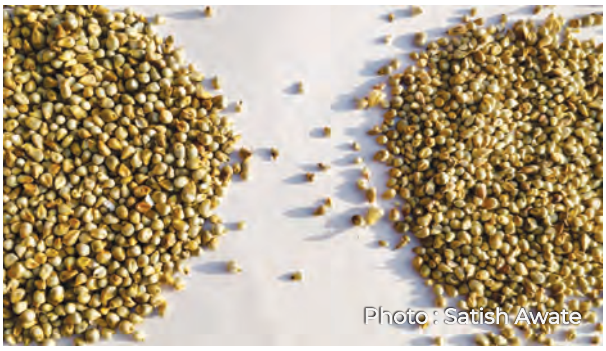
AGRICULTURE

1. In Parala village, *bajari* and cotton are major crops of the kharif season (monsoon crops). The region faces water scarcity during the rabi season and wheat and chickpeas are the main crops during the rabi season (winter). The other major crops in the region are corn, onion and moth beans. Onion is sown in all three seasons and it largely depends on the availability of irrigation.

2. The yield of *bajari* is 504.2 kg/ha which is much below the average yield of 1,373.9 kg/ha at the country level.

Crop	Season	Area under cultivation in acre (%)	Total production (quintal/bales)
Bajari	Kharif	263 (46)	537
Cotton	Kharif	127 (21)	470
Corn	Kharif	65 (11)	837
Onion	Kharif, Rabi, Summer	22 (4)	45
Moth bean	Kharif	34 (6)	38
Others (wheat, chickpeas)	Rabi	79.5 (12)	Not Available

3. Hybrid varieties have largely replaced traditional varieties. 'Uswad' is a local variety of *bajari* on the verge of extinction. Its grain size is larger than that of the hybrid variety and local villagers prefer its taste compared to the hybrid variety. It also provides far superior quality fodder. With the push for hybrid varieties and the lower yield of the Uswad variety, vulnerability to high winds forced farmers in the region to shift to the hybrid varieties of *bajari*. In recent years, untimely rains in the months of September and October have damaged the *bajari* crop and the region is witnessing an increasing shift towards the maize crop.



Seeds of Hybrid *bajari* (right side) and Uswad *bajari*

4. Farmers in Parala usually take the *bajari* production largely for household consumption. The market price offered for *bajari* is only Rs. 15-30 per kg on average, which is non-remunerative.

5. Apart from *bajari*, farmers in Parala used to cultivate moth beans, green gram and groundnut. Attacks in recent years by wild animals like wild boar, chinkara and nilgai and the destruction of the crops have caused losses to the farmers and they have stopped cultivating these crops. In the field survey and meetings, farmers reported crop destruction during 5 - 10 October 2022 on 17 acres and 10 guntha farmlands belonging to 15 farmer families. The affected crops were groundnut, moong, pearl millet, maize and cotton.

6. In recent times, farmers from the village are benefiting more from onion crops and therefore they prefer to sow onion on at least a part of their land even with volatility in market demand and price. *Pol, rangadi* and white onions are three popular varieties of onions in the region. The *pol* variety is planted in the kharif season, *rangadi* in rabi while the white and/or red onion variety is planted in the summer season. The farmers receive Rs. 5-18 on average for a kilogram of onions. The untimely rains often cause damage to the onion crop.

Maize field destroyed by Wild Boar

Onion varieties, production and prices in Parala

Onion	Season	Area (acre)	Total Production (quintal)	Productivity (quintal/acre)	Price (Rs/quinta)
Pol-Red variety	Kharif	12	663	55.3	1300-1400
Rangadi-Red Variety	Rabi	4.5	143	31.8	1000-1200
Unhali-Red & White Variety	Summer	5.5	770	140	1700-1800

7. At present, the area under onion cultivation by the *Bhil* community in Parala is 22 acres and the total production is 1,576 quintals. The productivity of summer onions is higher compared to kharif and rabi onions. Summer onions also fetch a higher price as compared to onion production in the other two seasons.

8. The *bajari* crop is not profitable for farmers due to low crop yields and the low price received in the market. Farmers are shifting towards corn and onion cultivation but they need to provide a sustainable source of water for their farms. With the increase in irrigation demand, there is a danger of increased exploitation of groundwater in this drought-prone region.

9. The availability of electricity for agriculture is another challenge faced by farmers in the region. The poles and transmission lines of lengths 6-7 km beyond the Wadaji village have not been erected as an assessment of forest land is pending. Houses beyond this point do not have electricity. In the village clusters that do have electricity access, the supply is irregular and hence farmland cannot be

irrigated on time which impacts production. Farmers have applied for the installation of solar pumps under the PM-KUSUM scheme. Eleven farmers in the village have received solar pumps under this scheme.

10. None of the farmers in the study cohort have conducted soil tests. They often apply fertilizers based on their judgement. Given the semi-arid climatic conditions, lack of irrigation and protective agricultural techniques, it is critical to have precision application based on soil testing. Current soil testing facilities are inaccessible to the farmers.

11. With the large subsistence reality of agriculture, the *Bhil* community significantly depend upon allied activities such as goatary and poultry for their livelihoods, apart from casual labour.

GOATARY

1. Out of the 140 *Bhil* families in Parala village, 50 families are dependent on goat rearing. Each of these 50 families is rearing an average of five goats. The goats are of a local *Kathori* breed, which is the most well-adapted to local climatic and geographical conditions. It has a small udder, is sturdy, and is adapted to the rocky and gravelly terrain of this region. The popular *Osmanabadi* and *Sangamneri* varieties do not survive in this local climatic condition as experiments by *Lokparyaya* (local organization) members in the past have demonstrated. The other varieties kept in small numbers in this region are *Telangi, Bor* and *Jamnapari*.

Comparison between four different varieties of goats in the region

Characteristics	Kathori	Telangi	Bor	Jamnapari
Size	Small to Medium	Small to Medium	Medium (preferred for mutton)	Large
Milk yield	Medium	Medium	Medium	High
Disease resistance	Hardy	Hardy	Hardy	Prone to disease
Weight gain in 3 months	14-15 Kg	14-15 Kg	15-18 Kg	15-18 Kg

2. The female *Kathori* goats produce 0.5-1 litre of milk everyday, which is consumed in the household. The live female goats of weight 20-25 kg are sold at Rs. 7,000 to 8,000 while pregnant goats fetch a price of Rs. 10,000 to 12,000. The male goats of weight up to 15-20 kg are sold at Rs. 10,000 to 12,000. The mortality and morbidity of goats are high especially during the monsoon season, which is also a fodder scarcity period.

3. The major goat markets nearby are Loni, Andarsul, Khandala, Yeola, Naandgao, Naya Dongari, and Jalgaon. Traders from these areas come to Parala village to purchase goats.

Goats of Local *Kathori* Breeds

POULTRY

Almost all families of the *Bhil* community in the village have 4 to 5 birds of local poultry varieties. Around 16 families have a total of 550 poultry birds which is equivalent to 35 birds per household. A few families also rear poultry of the 'RR' variety and sell their eggs. The birds are sold without weighing them, for Rs. 300 to 350 per bird. Eggs are sold at Rs. 10 per piece.

Local Breeds of Poultry

RECOMMENDATIONS

1 There is an urgent need to conserve the *Uswad bajari* variety in situ and through a community-based participatory approach involving scientists.

2. Innovations in affordable protective farming techniques are needed in light of increasingly extreme weather events. At present, the cost of a 2-inch SS pipe-based polyhouse can range from Rs. 30-40 lakhs per acre. Social innovations towards cooperative farm pooling and cluster-based production systems can be enablers in overcoming the various challenges faced by agriculture.

3. The grader machine has a capacity of 3 tonnes/hr with an electricity load of 3KW and costs around Rs. 4,50,000. This can be installed in the cluster as an enterprise to support livelihoods and value addition could promote climate-resilient millet-based cropping systems, which are in decline today.

4. The study site has very good solar energy potential. The larger region of Marathwada has the third-best potential after Jodhpur in Rajasthan and Kutch in Gujarat. Besides the electricity generation potential for solar microgrids towards irrigation from the Manyad reservoir, solar dryers could be installed to make dried onion flakes and other vegetables. The solar dome-shaped dryer with a 1-ton capacity an area of 67 m^2 costs Rs. 1,90,000 and takes and average of 24 hours to dry onions. The other option could be an electric dryer/dehumidifier connected to a solar net metering system. The cost of a dehumidifier of 1.15 m^3 of capacity with an electricity load of 9 KW is around Rs. 1,50,000. The 5 kg of fresh onions are processed into 1 kg of dried slices with the potential of about 50 to 60 per cent value addition at the rate of Rs. 15 per kg of fresh onions.

5. Goat and poultry rearing offer clear opportunities to improve the livelihoods of the *Bhil* community, which is traditionally well-versed in goatary and poultry practices. Their habitat offers free-range meat and egg production which is in great demand with increasing consumer awareness of antibiotic-free and ethically-raised poultry and meat products. Cluster-based goat breeding and poultry hatchery units are recommended with a trained para-veterinary service provider from among the community. The region produces maize, which is largely exported. Given the need for animal feed, it is recommended to establish a small-scale maize and millet-based feed manufacturing unit catering to the cluster.

6. To address the need for aggregation and better market access, collectivization in the form of FPCs is recommended. A collective focus on goat and poultry, combined with fish production from the Manyad reservoir in the same site can be promoted.

7. To check the destruction of crops by wild animals, especially by wild boars and nilgai, solar fencing technology can be tested for its effectiveness. Apart from reducing damage to existing major crops, such protection would also enable the farmers to revive various local pulse crops such as *math, moong, kulith,* and *tur* which were traditionally grown in rainfed farming and are important for nutritional security.

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