



Socio-Economic Utility of Coastal Flora Growing in and Around Mangrol Taluka (Junagadh) of Gujarat

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ABSTRACT

Halophytes are widely distributed throughout several regions due to the presence of the saline condition. The present paper reflects vegetation cover along with plant species of different kinds in the coastal area of Mangrol taluka of Gujarat, India. It consists of 25 plant species under 25 genera and 12 families of angiosperm. During the field survey, observations were made and plant characteristics and habitat of flora were studied. The main objectives of the present study are the identification, baseline survey and utility of saline plants in the area. The utility of the plants such as ecological and economic (such as medicinal, industrial and commercial, etc.) which can reflect their significance to the society. Majority of the plant species found are naturally occurring, but a few of them are agricultural plants used for various purposes. Due to increasing population growth, urbanization and especially over-demanding medicinal plants people are harvesting without any knowledge of regeneration and conservation, due to which many species are threatened. Because of this, it is very important to conserve plant species, which are extensively utilized in various purposes.

INTRODUCTION

India has a coastline of about 7,516.6 km long with 2.02 million km² exclusive economic zone and 0.13 million km² continental shelf (Khoshoo 1996) and it covers nine states and two union territories. Gujarat coastal line has a length of approximately 1600 km; it constitutes about 24% of the total coastal length of India. Coastal zone is an important biogeographically habitats of the Indian subcontinent (Rodgers & Panwar 1998). Coastal areas are vulnerable to be invaded by tides, and conventional saline-alkali land management measures can hardly achieve the desired results because of serious salinity problems, harsh natural conditions, simple ecosystem structure, poor stability, and fragile ecological environment (Zhang 2018). According to Stoker (1928), the critical level of salinity for plants is 0.5% of the dry weight. Though the fact that only a small group of higher plants can grow in the saline habitats was recognized many hundred years ago yet the name "halophyte" was assigned to such plants by Pallas in the early nineteenth century. Researches on biological diversity and its values, uses, loss, conservation and management during the last two decades has made a spectacular niche in the field of environmental science (Vyas & Joshi 2014). In recent years, however, the attention is being paid worldwide to accommodate the salt-tolerant species such as *Cressa*, *Suaeda*, *Trianthema*, *Salvadora*, to support animal life and providing useful pharmacological as

well as economic aspects for human (Nikalje et al. 2018).

The local community around the coast relies on these basic resources, collecting and using many plant species for food, wood, fibre, fuel and medicine. Their high utility in economic and medicinal usage is an important contributing factor to their overexploitation. Salinity is among the major environmental crisis and serious threat to food, fuel and fibre production in the world. This problem, which extends to more than 100 countries, is encountered in all types of climate due to the consequence of both natural processes as well as human interference (Shabala & Munns 2017). The continual use of coastal plants over many years without any replanting, it has resulted in an accelerated decline in the loss of a wide range of threatened and endangered species. This kind of survey is necessary to explain the usefulness of coastal vegetation to the human community living around the coast.

MATERIALS AND METHODS

Study Area

Mangrol taluka of Junagadh district is situated on the extreme coast of Gujarat having dense vegetation of coastal flora. Nine villages of Mangrol taluka and three villages of Madiya taluka were surveyed for the present study 21°13'N to 21°00'N and 69°59' E to 70°13' E. Total area surveyed under the present study was approximately 40 km, along the coastline

of Mangrol taluka consisting of various villages on the coast.

Data Collection

As described earlier, twelve villages were surveyed namely, Antroli, Diwasa, Sangavada, Shil, Lodge, Rahij, Maktupur, Mangrol, Khodada, Khambhadiya, Jujarpur and Chorvad. Plant species along the coast of 40 km around Mangrol taluka were observed and identified and recorded for the baseline study. The number of each species in all the surveyed villages was recorded along with their habitat in which they were found. Based on the number of species, they were distributed into families in which they belong and utility of all the species were studied.

RESULTS

In the present investigation a total of 25 species of coastal flora belonging to 18 families were enumerated (Fig. 2) in the coastline of Mangrol taluka (Junagadh). As stated earlier, 12 villages namely Antroli, Diwasa, Sangavada, Shil, Lodge, Rahij, Maktupur, Mangrol, Khodada, Khambhadiya, Jujarpur and Chorvad located on the coastal belt were identified and selected for the current study. From these locations, four species which were found to be dominant in the majority of areas were noted to be *Cyprus conglomerates*, *Halopyrum mucronatum*, *Prosopis juliflora* and *Casuarinas equisitifolia*. Habitats of these plants are saline and hence can be considered as halo-

phytic vegetation. Halophytic vegetation is growing in different parts of the habitat by facing several environmental stresses.

For this study, a maximum of 15 species was found in the village of Lodge, and at least 4 species were found in the village of Shil, in the coast between Antroli to Chorvad village. As shown in Fig. 2, it was interesting to observe and note that the species in the rocky area are higher than in any other habitats such as sand dunes and moist areas.

SD=Sand dunes, M=Marshy, RP=Rock pools Among the habitat of selected coastal sites, sand dunes were found to be more followed by rock pools and marshy region. In the coastal areas surrounding Mangrol taluka, 9 villages with sand dunes are given in Table 1 such as Antroli, Sangavada, Shil, Maktupur, Mangrol, Khodada, Khambhadiya, Jujarpur and Chorvad; 2 villages with rocky pool are Lodge and Rahij and 1 village with marshy space is located in Diwasa. According to the survey, highly coastal floras are found on rocky pools (Fig. 2), while vegetation is less common on sandy dunes and marshy places.

As shown in Table 2, the *Fabaceae* family is found to be most dominant than all other families. There are three types of plants found in the Fabaceae family, namely *Lotus garcini*, *Prosopis juliflora* and *Indigofera oblingifolia*. Two species are found in Convolvulaceae, Poaceae, Acanthaceae and Amaranthaceae family and in addition to this, 1 plant is found in all family found here.

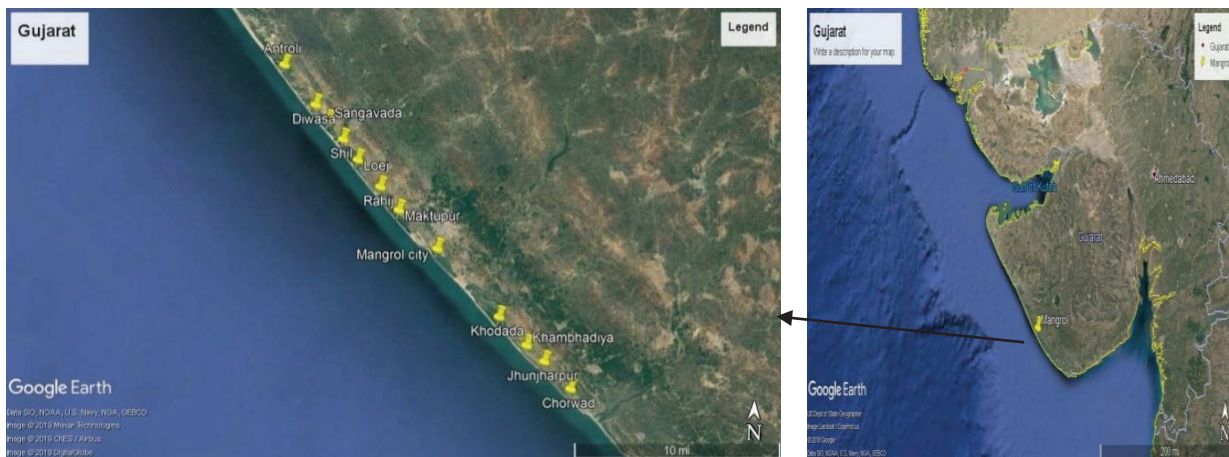


Fig. 1: Map showing study area (Source: Google earth).

Table 1: The habitat in and around Mangrol taluka.

Habitat	No. of habitat	Location
SD	9	Antroli, Sangavada, Shil, Maktupur, Mangrol, Khodada, Khambhadiya, Jujarpur, Chorvad
RP	2	Lodge and Rahij
M	1	Diwasa

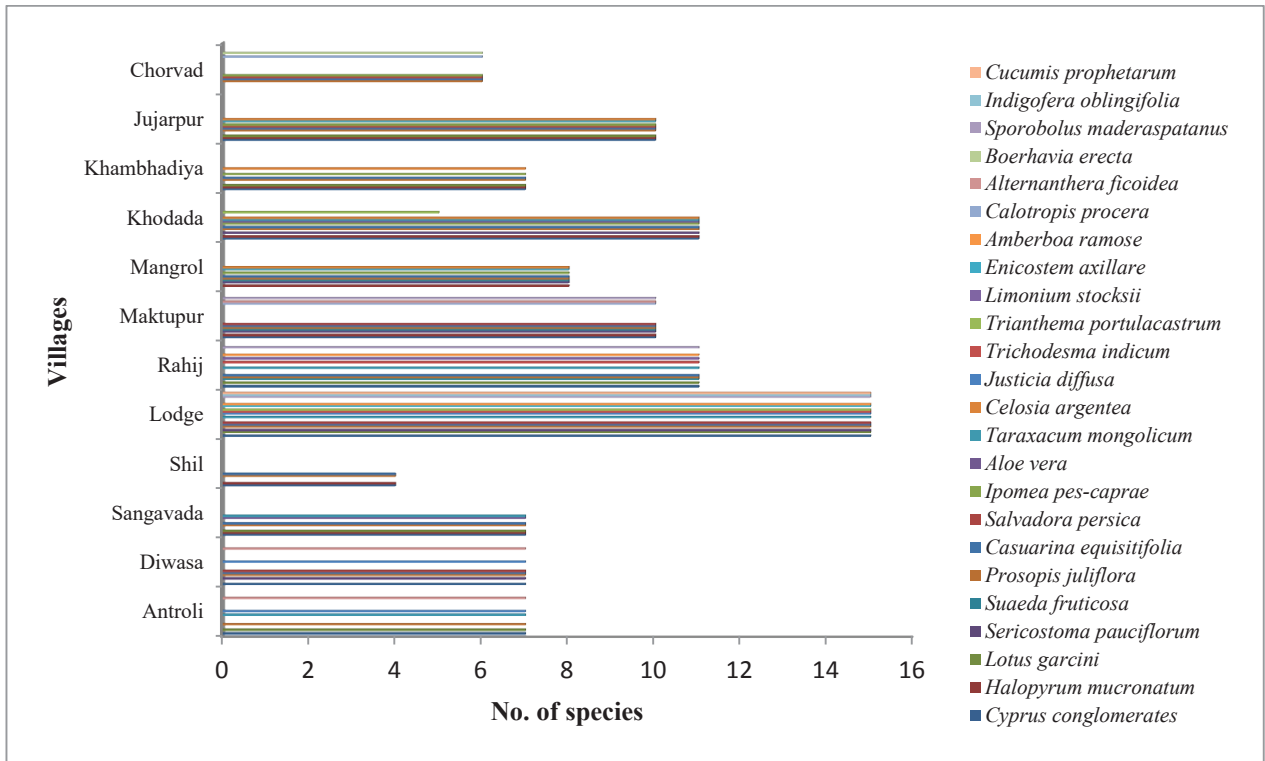


Fig. 2: Village-wise species richness.

Table 2: No. of Genera present in each family.

Sr. No.	Family	No. of Genera
1.	Fabaceae	3
2.	Convolvulaceae	2
3.	Poaceae	2
4.	Acanthaceae	2
5.	Amaranthaceae	2
6.	Boraginaceae	1
7.	Chenopodiaceae	1
8.	Cucurbitaceae	1
9.	Plumbaginaceae	1
10.	Cyperaceae	1
11.	Casuarinaceae	1
12.	Salvadoraceae	1
13.	Asphodelaceae	1
14.	Asteraceae	1
15.	Aizoaceae	1
16.	Gentianaceae	1
17.	Apocynaceae	1
18.	Nyctaginaceae	1

Table 3: Checklist of coastal flora showing scientific name, common name, family, habit & utility.

S. No.	Plant name	Family	Habitat	Common name	Plant part used	Utility	References
1	<i>Cressa cretica</i>	Convolvulaceae	H	Rudravanti	Whole plant	enriches the blood and useful in constipation	(Chopra et al. 2006)
2	<i>Cyprus conglomeratus</i>	Cyperaceae	H	-	Whole plant	used as fodder for animals	(Keblawy 2011)
3	<i>Halopyrum mucronatum</i>	Poaceae	G	-	Whole plant	coastal dune stabilizer	(Khan et al. 1999)
4	<i>Lotus garcini</i>	Fabaceae	H	-	Leaves	Used in benefits of kidney, controls diarrhea, for sleep deficiency	(Ghulam 2002)
5	<i>Sericostoma pauciflorum</i>	Boraginaceae	S	Karvash, Matravalli	Whole plant	Diabetes, dysentery, urinary infection	(Thakar 1998)
6	<i>Suaeda fruticosa</i>	Chenopodiaceae	S	Shrubby seablight	Leaves Whorl plant	Treatment of ophthalmia Making soap and glass	(Wichens 2012)
7	<i>Prosopis juliflora</i>	Mimosaceae	T	Gando baval	Wood	Production of hard wood for mosaics, boards and sleepers, good quality firewood	(Gomes 1977)
8	<i>Casuarina equisetifoliys</i>	Casuarinaceae	T	Saru, she-oak	Root, stem	Treatment of dysentery	(World health organization 2009)
9	<i>Salvadora persica</i>	Salvadoraceae	T	Meswak tree, Piludi	Wood Roots	Useful for fuel Used as a toothbrushes	(Uphof 1959)
10	<i>Ipomea pes-caprae</i>	Convolvulaceae	C	Morning glory or goat's foot, Maryada vel	Stem Leaves Root	Made in ropes Used to extirpate fungoid growth of ulcers Relief in bladder diseases	(Burkill 1985)
11	<i>Aloe vera</i>	Asphodelaceae	H	Indian aloe, Kuvarpathu	Whole plant	Cosmetic & medicinal purpose, Used in commercially as an ingredient in yogurts, beverages, and some desserts	(Reynolds & Tom (Ed.) 2004)
12	<i>Taraxacum mongolicum</i>	Asteraceae	H	Dandelions	Whole plant	Treat inflammation, swollen lymph nodes, cysts and abscesses, as well detoxifying the kidney and liver	(Roger & George 2004)
13	<i>Cucumis prophetarum</i>	Cucurbitaceae	C	Spiked melon	Fruit	Used as an emetic	(Uphof 1959)
14	<i>Justicia diffusa</i>	Acanthaceae	H	Water willow	Leaves	Used in ophthalmic	(Chopra et al. 1986)
15	<i>Trichodesma indicum</i>	Boraginaceae	H	Undhaphuli, Indian borage	Leaves, root	treatment of cough	(Subban & AlarmalMangai 2012)
16	<i>Trianthema portulacastrum</i>	Aizoaceae	H	Black pigweed	Whole plant	Used as a vermifuge and is useful in rheumatism	(Aggarwal & Kaur 2017)
17	<i>Limonium stocksii</i>	Plumbaginaceae	H	Sea-lavender	Whole plant	Used as a food, pharmaceutical, cosmetics and other industrial products	(Akashi & Ayabe 2010)
18	<i>Enicostem axillare</i>	Gentianaceae	H	Mahmejo	Whole plant	Used as a laxative, stomachic and tonic	(Chopra et al. 1986)

Table Cont....

S. No.	Plant name	Family	Habitat	Common name	Plant part used	Utility	References
19	<i>Lapidagathis cristata</i>	Acanthaceae	H	Hiran-chaaro (pathar-kotar)	Whole plant	Antiallergic medicine & used as a fodder	(Panda 2002)
20	<i>Calotropis procera</i>	Apocynaceae	S	Auricula tree	Stem Root Seed capsules Leaves	Termite proof stem used for roofing and building huts Treatment of snakebites Used as a stuffing material in mattresses Treatment of asthma	(Von Maydell 1990)
21	<i>Alternanthera ficoidea</i>	Amaranthaceae	H	Calico plant	Whole plant	Bioagent in greywater treatment	(Abbasi & Tauseef 2018)
22	<i>Boerhavia erecta</i>	Nyctaginaceae	H	Erect spiderling, Satodi	Whole plant	Used as a vermifuge	Achigan-dako 2009)
23	<i>Sporobolus maderaspatanus</i>	Poaceae	G	-	Whole plant	Used as a forage	(Joshi 2011)
24	<i>Celosia argentea</i>	Amaranthaceae	H	Common cockscomb	Whole plant	It could purge the liver of pathogenic fire, improve eyesight, and eliminate nephelium	(Shen 1997)
25	<i>Indigofera oblingifolia</i>	Fabaceae	S	Jhil, Jhiladi	Leaves Stem Root	Treat skin rash & stomach pain Treatment of mercurial salivation Used as a purgative	(Chopra et al. 1986)

H = herb, S = shrub, T = tree and G = grass and C = Climber



1: *Cressa cretica*



2: *Suaeda fruticosa*



3: *Sericostoma pauciflorum*



4: *Ipomea pes-caprae*



5: *Salvadora persica*



6: *Halopyrum mucronatum*



7: *Taraxacum mongolicum*



8: *Calotropis procera*



9: *Lotus garcini*

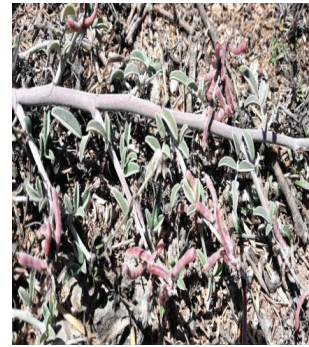
PLATE 1



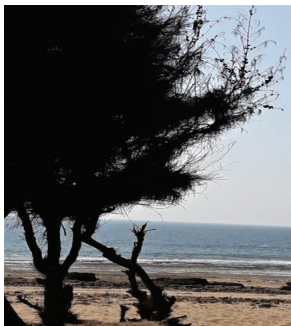
10: *Justicia diffusa*



11: *Trianthema portulacastrum*



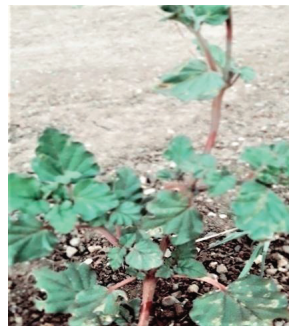
12: *Indigofera oblongifolia*



13: *Casuarina equisetifolia*



14: *Alternanthera ficoidea*



15: *Boerhavia erecta*



16: *Amberboa ramosa*



17: *Prosopis juliflora*

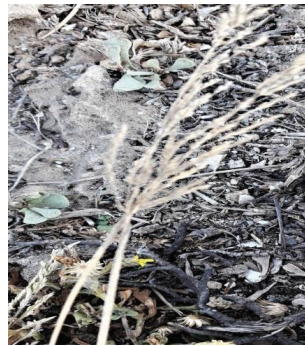


18: *Cucumis prophetarum*

PLATE 2



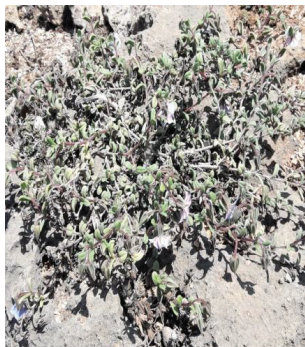
19: *Limonium stocksii*



20: *Sporobolus maderaspatanus*



21: *Aloe vera*



22: *Trichodesma indicum*



23: *Celosia argentea*



24: *Eriosema axillare*



25: *Cyperus conglomerates*

PLATE 3

Fig. 3: Plant species of the study area (Plates 1-3).

Coastal vegetation is not commonly used for economic gain, but it also identified for ethnomedicinal, handicrafts and many other uses. Numerous reports have documented the utility of coastal flora in rural and tribal areas all over the world as a successful home remedy against different ailments (Hamburger & Hostettmann 1991, Hammiche & Maiza 2006, Hussain et al. 2003). Among the species, herbs were found to be more (14 sp.) followed by shrubs (4 sp.), trees (3 sp.), grass (2 sp.) and climbers (2 sp.) (Fig. 3). In the available literature, the vegetation of coastal flora was highly used in

traditional and ethnobotanical interests were recorded after the critical screening.

CONCLUSION

The present work reflected a detailed and comprehensive database and descriptive survey of coastal flora which compiled the economic and ecological utility of the plant species observed for identifying the potential of the Mangrol coast. Throughout the 40 km coastline of the study area, twenty-five

coastal species were observed and recorded for their utility. The interesting fact is to interpret that these 25 species were listed under 18 families, which showed the immense potential of all the species observed in various treatments of diseases. It also revealed that Mangrol taluka having a coastal belt in highly diversified in terms of plant species with reference to the coastal line based on the habitat. These plant species were recorded on different coastal habitats comprising of sandy, rocky and marshy.

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