Online at: https://researchtrendsjournal.com **ISSN No:** 2584-282X

INTERNATIONAL JOURNAL OF TRENDS IN EMERGING RESEARCH AND DEVELOPMENT

Volume 1; Issue 1; 2023; Page No. 412-415

Received: 06-08-2023
Accepted: 13-09-2023

Investigate the interactions between flora species and other components of the coastal ecosystem

[1]Govind Shankar Singh and [2]Dr. Avinash Sharma

[1]Research Scholar, Monad University, Hapur, Uttar Pradesh, India
[2]Associate Professor, Monad University, Hapur, Uttar Pradesh, India

Corresponding Author: Govind Shankar Singh

Abstract

The research highlights the conservation challenges and management implications associated with the sustainable utilization of Gulf of Kutch flora. It emphasizes the importance of integrated coastal zone management, community-based conservation initiatives, and scientific research collaborations to protect and sustainably manage the region's botanical resources. The findings of this study contribute to the scientific understanding of coastal ecosystems, inform conservation strategies, and provide insights into the bio-economic opportunities offered by the flora in the Gulf of Kutch. Overall, this study underscores the importance of conserving and harnessing the bio-prospects of Gulf of Kutch flora for ecological sustainability, socio-economic development, and the well-being of coastal communities.

Keywords: Zone management, community-based, ecosystems, sustainability, communities

Introduction

The coastal wetlands have global, national as well as regional significance for conservation of marine biodiversity. They also act as barriers against storm surges, strong winds and cyclones and protect the hinterland and impose profuse impact on the microclimate of the area. Space Application Centre (ISRO), Amadavad, studied coastal wetlands of India, in 1992 and 1998 and area under different categories of wetlands in the country was estimated at 40230 sq. km. Among all coastal state of India. Gujarat has maximum area under marine influence, which was estimated to be approx. 25083 *sq.* km. (62.3~o). These include vast saline mudflats of the Ranns, tidai mudflats and mangrove. This makes the state incomparable in the country. Of the total area of wetlands (27175 sq. km) in the state, the coastal wetlands constitute 92.3'Yo while another study conducted by the SAC, Amadavad in 1992 estimated 28500 sq. km of area under coastal wetlands of which maximum area is under tidal mudflats and the 'nain contribution is from the great and the little Rann of the Kutch (19310 sq. km). The Kutch rank first among all districts, having maximum area (about 460 sq_ km.) under coastal wetlands in the State.

Ranns are "typical lands in the world and it is difficult to distinctly classify the two Ranns in categories of coastal wetlands or inlands wetlands. "Major parts of the Ranns do not receive tidal water even once a year, although they are influenced by tides during monsoon. During this period, intermixing of rain and tidal water creates different environment in the Ranns, which qualifies the area to be categorized into a special category of the wetlands.

A national park and four sanctuaries *viz.* Marine National Park, Jamnagar (162.9 sq. km), Khijadia Bird Sanctuary (295.0 sq. km), Wild Ass Sanctuary In the little Rann of Kutch (4953.7 sq. km) and Kutch Desert Wildlife Sanctuary (7506.2 sq. km) covering total area of 12923.9 sq. km have been notified by the State government to conserve biodiversity of the coastal wetlands. Thus large area of coastal wetlands has been protected by the State. Besides this, 31 protected areas with mangrove habitats have been notified in India of which one of them is located in Gujarat.

On the basis of studies conducted by SAC, Amadavad and information collected by the GEER Foundation-Gandhinagar" Gujarat coast is broadly divided into five regions; (i) the Rann of Kutch, (ii) the Gulf of Kutch, (iii) the Saurashtra coast, (iv) the Gulf of Kutch and (v) the south Gujarat coast. To protect areas of conservation importance, the state government has notified four protected areas *viz.*

Marine National Park and Sanctuary, Jamnagar, Khijadia Bird Scnctuary, Wiid Ass Sanctuary (Little Rann) and Kutch Desert Wildlife, water birds, wild ass, chinkara, lesser cats, faxes, wolf and varieties of desert biota occurring in the Gulf of Kutch in Jamnagar and declared to conserve coral reefs, mangroves and marine life therein.

Review of Literature

Roy (2015) [1] Gujarat has a longest coastline of about 1650 km among all the maritime states in India. The Gulf of Kachchh (22 15'-23 40' N; 68 20'-70 40' E) is the biggest gulf along the west coast of India in the Arabian Sea and it is endowed with 42 islands fringing with corals and mangroves which provide congenial habitat for seaweed growth. In the present study, the diversity and distribution of seaweeds were enumerated in the four selected islands namely Chhad, Dedeka-Mundeka, Goose, Narara. The study was carried out during January 2013 to May 2014. The parameters analyzed for seaweeds through line transect and quadrat method were frequency, density and percent algal cover. Totally 70 species were recorded of which 24 species belonged to Chlorophyta, 15 species to Phaeophyta and 31 species to Rhodophyta. The numbers of seaweeds found in Chaad, Dedeka-Mundeka (Dk-Mk), Goose and Narara were 44, 49, 33 and 31 respectively. An updated checklist of species in four islands is provided.

Since historic times, human beings were basically in need of plants for satisfying their daily requirements like food, shelter, clothes and medicine. Due to close relationship with environment, they established a distinctive system of knowledge concerning the utilization of plants. The human and animal life depends on the life supporting plant species surrounding the area. It has now become a concern of the modern world to preserve and gather all information and utility of these plant species. This paper highlights the study of ecologically important and life supporting plant species growing in Little Rann of Kachchh, a unique ecosystem and natural heritage site for wild ass. During this study about 108 plant species (44-herbs, 35-grasses, 12-shrubs, 10-trees and 7-climbers) have been observed in the study area. The most common species belong to dominant families like Poaceae, Cucurbitaceae, Papilionaceous, Cyperaceae and Chenopodiaceae. The fringe area is covered mainly with *Prosopsisjuliflora*. However, islands (bets) are mostly covered with *Suaedafruticosa* and *Suaedanudiflora*. The plants species like *Salvadorapersica*, *Salvadoraoleoides*, P. *juliflora*, *Tamarixaphyll*, *Urochondrasetulosa* are ecologically important. The plant species like *Crotolariaburhia*, *Capparis decidua*, *Commiphorawightii*, S. persica, S. *oleoides*, *Cyperusbulbosus* and *Pentatropisspiralisetc* are life supporting plants.

3. Objectives of the study

1. Investigate the interactions between flora species and other components of the coastal ecosystem
2. Identify threats to the conservation of flora biodiversity in the Gulf of Kutch, including habitat degradation, pollution, invasive species, and climate change impacts

4. Research Methodology

Coastal landscapes and their typical ecosystems are highly dynamic and fragile which are characterized by steep environmental gradients and controlled by geomorphological, physical and biological processes. Despite several constraints, coastal areas are highly diversified offering a wide range of floral diversity. Apparently, the coastal flora is more influenced by the geological setting and climate of the region. Specificity of the flora along the coastline is attributed to the presence of sand dunes, rocky coasts, mud flats, marshlands and intertidal and tidal zone areas. In addition, coastal areas form a unique ecosystem owing to combined influence of both fresh and saline water. This interaction causes the coastal landforms to support large diversity of flora and fauna which are crucial to the ecosystem. Coastal vegetation provides habitats, food and fodder for fauna as well as protection from the wave action. Coastal sand is continually being eroded and deposited on the shore by wave action. Therefore, the role of vegetation in dune fixation is critical since, they serve as wind trappers, sand binders and dune stabilizers. Apart from natural events, coastal areas are subjected to constant anthropogenic pressure which disturbs the coastal ecosystem. Therefore, it is a subject of prime importance to study the coastal areas in their natural state.

5. Result and data analysis

Table 1: Phytosociological attributes of herb species in coastal areas and its islands of Devbhoomi Dwarka district in GOK

No.	Botanical name	D (ind./m^2)	F (%)	A	A/F	RD (%)	RF (%)	RA (%)	IVI
1	*Aristida redacta*	3.97	39.02	10.18	0.26	18.75	9.07	3.69	31.51
2	*Aeluropus lagopoides*	3.81	35.96	10.60	0.29	18.00	8.36	3.85	30.21
3	*Halopyrum mucronatum*	2.43	14.43	16.83	1.17	11.47	3.35	6.11	20.93
4	*Sporobolus maderaspatana*	1.94	33.77	5.75	0.17	9.17	7.85	2.09	19.11
5	*Cyperus conglomeratus*	1.04	17.60	5.94	0.34	4.93	4.09	2.16	11.18
6	*Salicornia brachiata*	1.00	5.79	17.26	2.98	4.72	1.35	6.27	12.34
7	*Indigofera cordifolia*	0.76	20.87	3.65	0.17	3.60	4.85	1.32	9.77
8	*Pulicaria wightiana*	0.71	16.72	4.27	0.26	3.37	3.89	1.55	8.81
9	*Goniogyna hirta*	0.44	15.30	2.89	0.19	2.09	3.56	1.05	6.70
10	*Cressa cretica*	0.42	11.37	3.73	0.33	2.00	2.64	1.35	6.00
11	*Lepidagathis trinervis*	0.39	16.28	2.41	0.15	1.85	3.79	0.87	6.51
12	*Boerhavia chinensis*	0.39	18.36	2.10	0.11	1.82	4.27	0.76	6.85
13	*Barleria prionitis*	0.35	16.07	2.16	0.13	1.64	3.73	0.79	6.16
14	*Aerva lanata*	0.31	13.33	2.34	0.18	1.48	3.10	0.85	5.43
15	*Cyperus pangorei*	0.31	10.27	2.99	0.29	1.45	2.39	1.09	4.92
16	*Abutilon glaucum*	0.29	12.46	2.32	0.19	1.36	2.90	0.84	5.10
17	*Fimbristylis cymosa*	0.28	9.29	3.01	0.32	1.32	2.16	1.09	4.57
18	*Achyranthes aspera*	0.24	10.16	2.41	0.24	1.16	2.36	0.87	4.39

19	*Aloe barbadensis*	0.15	7.21	2.03	0.28	0.69	1.68	0.74	3.11
20	*Juncus maritimus*	0.12	5.14	2.26	0.44	0.55	1.19	0.82	2.56
21	*Apluda mutica*	0.11	0.55	20.40	37.33	0.53	0.13	7.41	8.06
22	*Boerhavia diffusa*	0.10	6.12	1.68	0.27	0.49	1.42	0.61	2.52
23	*Celosia argentea*	0.10	5.57	1.84	0.33	0.49	1.30	0.67	2.45
24	*Alysicarpus longifolius*	0.09	0.66	13.50	20.59	0.42	0.15	4.90	5.47
25	*Clitoria ternatea*	0.09	5.90	1.50	0.25	0.42	1.37	0.54	2.33
26	*Asparagus recemosus*	0.09	7.65	1.14	0.15	0.41	1.78	0.41	2.61
27	*Echinops echinatus*	0.07	3.83	1.94	0.51	0.35	0.89	0.71	1.95
28	*Suaeda fruticosa*	0.07	0.66	10.33	15.76	0.32	0.15	3.75	4.22
29	*Launaea procumbens*	0.07	4.48	1.49	0.33	0.31	1.04	0.54	1.90
30	*Sida cordifolia*	0.07	5.14	1.30	0.25	0.31	1.19	0.47	1.98
31	*Fagonia cretica*	0.06	4.04	1.38	0.34	0.26	0.94	0.50	1.70
32	*Argemone maxicana*	0.05	3.72	1.44	0.39	0.25	0.86	0.52	1.64
33	*Heliotropium curassivicum*	0.05	3.06	1.68	0.55	0.24	0.71	0.61	1.56
34	*Cleome viscosa*	0.05	3.93	1.25	0.32	0.23	0.91	0.45	1.60
35	*Commelina benghalensis*	0.05	1.86	2.53	1.36	0.22	0.43	0.92	1.57
36	*Enicostema hyssopifolium*	0.04	2.51	1.78	0.71	0.21	0.58	0.65	1.44
37	*Acanthospermum hispidum*	0.04	0.87	4.63	5.29	0.19	0.20	1.68	2.07
38	*Coculus hirsutus*	0.04	2.51	1.43	0.57	0.17	0.58	0.52	1.28
39	*Polycarpaea corymbosa*	0.04	0.22	16.50	75.49	0.17	0.05	5.99	6.21
40	*Solanum indicum*	0.03	2.62	1.33	0.51	0.17	0.61	0.48	1.26
41	*Tridax procumbens*	0.03	0.77	4.57	5.98	0.17	0.18	1.66	2.00
42	*Cucumis propheratum*	0.03	3.06	1.04	0.34	0.15	0.71	0.38	1.24
43	*Coldenia procumbens*	0.03	2.30	1.33	0.58	0.14	0.53	0.48	1.16
44	*Convolvulus microphyllus*	0.03	1.97	1.44	0.73	0.13	0.46	0.52	1.12
45	*Coccinia grandis*	0.03	1.64	1.53	0.94	0.12	0.38	0.56	1.06
46	*Solanum surattense*	0.02	1.97	1.22	0.62	0.11	0.46	0.44	1.01
47	*Justisia procumbens*	0.02	0.66	3.50	5.34	0.11	0.15	1.27	1.53
48	*Heliotropium ovalifolium*	0.02	1.42	1.54	1.08	0.10	0.33	0.56	0.99
49	*Limonium stocksii*	0.02	1.09	1.60	1.46	0.08	0.25	0.58	0.92
50	*Pentatropis spiralis*	0.02	1.31	1.33	1.02	0.08	0.30	0.48	0.87
51	*Dactyloctenium aegyptium*	0.02	0.22	7.50	34.31	0.08	0.05	2.72	2.85
52	*Euphorbia hirta*	0.02	1.20	1.27	1.06	0.07	0.28	0.46	0.81
53	*Sericostoma pauciflorum*	0.02	0.98	1.56	1.58	0.07	0.23	0.56	0.87
54	*Citrullus colocynthis*	0.01	0.77	1.71	2.24	0.06	0.18	0.62	0.86
55	*Ipomoea obscura*	0.01	0.87	1.50	1.72	0.06	0.20	0.54	0.81
56	*Rhynchosia minima*	0.01	0.87	1.50	1.72	0.06	0.20	0.54	0.81
57	*Ipomoea eriocarpa*	0.01	1.09	1.10	1.01	0.06	0.25	0.40	0.71
58	*Cucumis callosus*	0.01	1.09	1.00	0.92	0.05	0.25	0.36	0.67
59	*Sesuvium portulacastrum*	0.01	0.87	1.13	1.29	0.05	0.20	0.41	0.66
60	*Cistanche tubulosa*	0.01	0.66	1.33	2.03	0.04	0.15	0.48	0.68
61	*Vernonia cinerea*	0.01	0.77	1.14	1.49	0.04	0.18	0.41	0.63
62	*Cardiospermum halicacabum*	0.01	0.44	1.75	4.00	0.04	0.10	0.64	0.77
63	*Ipomoea pes-carpae*	0.01	0.55	1.40	2.56	0.04	0.13	0.51	0.67
64	*Pedalium murex*	0.01	0.55	1.20	2.20	0.03	0.13	0.44	0.59
65	*Physalis minima*	0.01	0.33	2.00	6.10	0.03	0.08	0.73	0.83
66	*Abutilon indicum*	0.01	0.55	1.00	1.83	0.03	0.13	0.36	0.52
67	*Cassia pumila*	0.01	0.33	1.67	5.08	0.03	0.08	0.61	0.71
68	*Commelina forskalaei*	0.01	0.33	1.67	5.08	0.03	0.08	0.61	0.71
69	*Corchorus depressus*	0.01	0.55	1.00	1.83	0.03	0.13	0.36	0.52
70	*Dactyloctenium sindicum*	0.01	0.55	1.00	1.83	0.03	0.13	0.36	0.52
71	*Eclipta prostrata*	0.01	0.22	2.50	11.44	0.03	0.05	0.91	0.98
72	*Rungia repens*	0.01	0.55	1.00	1.83	0.03	0.13	0.36	0.52
73	*Desmostachya bipinnata*	0.004	0.33	1.33	4.07	0.02	0.08	0.48	0.58
74	*Leucas aspera*	0.004	0.33	1.33	4.07	0.02	0.08	0.48	0.58
75	*Polygala erioptera*	0.004	0.44	1.00	2.29	0.02	0.10	0.36	0.49
76	*Alysicarpus procumbens*	0.003	0.22	1.50	6.86	0.02	0.05	0.54	0.61
77	*Ipomoea coptica*	0.003	0.33	1.00	3.05	0.02	0.08	0.36	0.45
78	*Ocimum basilicum*	0.003	0.33	1.00	3.05	0.02	0.08	0.36	0.45
79	*Pergularia daemia*	0.003	0.33	1.00	3.05	0.02	0.08	0.36	0.45
80	*Polycarpaea spicata*	0.003	0.33	1.00	3.05	0.02	0.08	0.36	0.45
81	*Tinospora cordifolia*	0.003	0.11	3.00	27.45	0.02	0.03	1.09	1.13
82	*Aerva ljavanica*	0.002	0.22	1.00	4.58	0.01	0.05	0.36	0.42
83	*Amberboa ramosa*	0.002	0.22	1.00	4.58	0.01	0.05	0.36	0.42
84	*Chrozophora rottleri*	0.002	0.22	1.00	4.58	0.01	0.05	0.36	0.42
85	*Grangea maderaspatana*	0.002	0.11	2.00	18.30	0.01	0.03	0.73	0.76
86	*Aristolochia bracteolata*	0.001	0.11	1.00	9.15	0.01	0.03	0.36	0.39
87	*Glinus lotoides*	0.001	0.11	1.00	9.15	0.01	0.03	0.36	0.39

88	*Indigofera linnaei*	0.001	0.11	1.00	9.15	0.01	0.03	0.36	0.39
89	*Leucas cephalotes*	0.001	0.11	1.00	9.15	0.01	0.03	0.36	0.39
90	*Peristrophe bicalyculata*	0.001	0.11	1.00	9.15	0.01	0.03	0.36	0.39
91	*Ruellia tuberosa*	0.001	0.11	1.00	9.15	0.01	0.03	0.36	0.39
92	*Striga gesneriodes*	0.001	0.11	1.00	9.15	0.01	0.03	0.36	0.39
93	*Vigna radiata*	0.001	0.11	1.00	9.15	0.01	0.03	0.36	0.39
						100.0	100.0	100.0	300.0

D (ind./m^2)= Density (Individual/Square meter), F (%)= Frequency (Percent); A= Abundance, A/F= Abundance/Frequency,
RD (%)= Relative Density (Percent), RF(%)= Relative Frequency (Percent), RA (%)= Relative Abundance (Percent),
IVI= Important Value Index.

6. Conclusion

Present study deals with the species-specific observation and distribution of threatened plants of western Kachchh region i.e. topographical situation of each habitat and composition of associated species are two important characteristics for distribution of each species. As discussed, the depletion of water table and erosion of soil with deficiency in soil nutrients also leads to decline the population size of such species and its further decline the habitat. Water and grazing have the positive co-relation which also leads to significant impact on threatened plants (McIntyre and Lavorel, 1994). Habitat wise and over all ecological distribution of threatened plants species reveals that *Commiphora wightii*, *Helichrysum cutchicum* and *Heliotropium rariflorum* are the most abundant and wide distribution species with significance population size in study area. While *Dipcadi erythraeum* and *Indigofera caerulea* var. monosperma and *Talinum portulacifolium* are very rare species and distributed with very few localities in study areas.

Habitat wise distributions of such threatened plants suggest that, mixed thorn forest habitat was most conservation significant habitat which supports 15 threatened plants among 19. Acacia forest and Euphorbia-Salvadora Forest also supports more 60% of total recorded threatened plants from study area. Apart from this, these three habitats and sparse grassland also support the good population of recorded threatened plants. Prosopis forest also supports the more than 50% of total recorded threatened plants and thus it is observed that Invasion of *Prosopis juliflora* in other forest area is still going and they are facing the problem of extinction. Wetland habitat supports only three threatened species with only 25 individuals but it is the only habitat for *Ammania desertorum* and thus it has high conservation significant. Including this *Dipacdi erythraeum*, *Ipomoea kotschyana*, *Limonium stockii* and *Talinum portulacifolium* have been also occur in the single habitat, which suggest conservation of their respected habitat for the survival of them.

7. References

1. Roy S, Salvi D, Brahmbhatt B, Vaghela N, Das L, Pathak B. Diversity and distribution of seaweeds in selected reefs and island in Gulf of Kachchh. Seaweed Res Util. 2015;37:12–19.
2. Joshi A, Desai A, Bhatt A, Dave T. Bio-resources and environmental status in Narara and Poshitra Islands at Marine National Park, Gulf of Kachchh, Gujarat. Int J Bioresour Stress Manag. 2018;9:262–268. doi:10.23910/IJBSM/2018.9.2.3C0411.
3. Alang ZC, Moir GFJ, Jones LH. Composition, degradation and utilization of endosperm during germination in the oil palm (*Elaeis guineensis* Jacq.). Ann Bot. 2018;61:261–268.
4. Anderson JW, Beardall J. Molecular Activities of Plant Cells: An Introduction to Plant Biochemistry. 2nd ed. Oxford: Blackwell; c2011.
5. Andrade ACS. The effect of moisture content and temperature on the longevity of heart of palm seeds (*Euterpe edulis*). Seed Sci Technol. 2011;29:171–182.
6. Anonymous. The double coconut of the Seychelles. West Aust Nut Grow Soc Yearb. 2016;2:6–20.
7. Anulov OV, Smirnova NI, Mestechkina NM, Shcherbukhin VD. Content and composition of non-starch water-soluble polysaccharides in seeds of some Fabaceae. Russ J Plant Physiol. 2018;45:802–804.
8. Aspinall GO, Rashbrook RB, Kessler G. The mannans of Ivory nut (*Phytelephas macrocarpa*) Part II. The partial acid hydrolysis of mannans A&B. J Chem Soc.; c2018. p. 215–21.
9. Avigad G, Dey PM. Carbohydrate metabolism: storage carbohydrates. In: Dey PM, Harborne JD, editors. Plant Biochemistry. San Diego: Academic Press; c2017. p. 143–203.
10. Awal A, Haq QN, Quader MA, Ahmed M. Structural study of a polysaccharide from the seeds of Borassus flabellifer Linn. Carbohydr Res. 2015;277:189–195.
11. Bacic A, Stone BA. Chemistry and organization of aleurone cell wall components from wheat and barley. Aust J Plant Physiol. 2011;8:475–495.
12. Bacon JSD, Edelman J. The carbohydrates of the Jerusalem artichoke and other Compositae. Biochem J. 2011;48:114–126.
13. Balasubramaniam K. Polysaccharides of the kernel of maturing and matured coconuts. J Food Sci. 2016;41:1370–1373.
14. Balasubramaniam K, Atukorala TMS, Wijesundera S, Hoover AA. Biochemical changes during germination of the Coconut (*Cocos nucifera*). Ann Bot. 2013;37:439–445.
15. Baskin CC, Baskin JM. Seeds: Ecology, Biogeography and Evolution of Dormancy and Germination. San Diego: Academic Press; c2011.