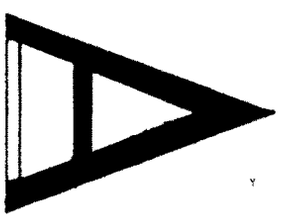


VEGETATION

VEGETATION

Kutch by and large is an arid area, which topographically is almost a plain. The district of Kutch provides the fascinating study of the extremes for a naturalists, owing to its variety of land and water, plains and hills, desert and non desert, trees and bare lands, alongwith varying bird and animal life. Campbell (1880) in Gazetteer of Bombay Presidency has described the region as a bare ground with no forest and a few trees and quoted, "The most striking feature of the country was its sterility. its naked rocky hills and sandy plains, while its barrenness are heightened by the scarcity of trees and general absence of anything that can be termed as jungle".

In contrast to adjoining parts of Gujarat State, the vegetation of Kutch is distinct, both in terms of its quality and floristic composition. The different

vegetational aspects encountered in the region, can be broadly classified into two main heads viz. Natural vegetation and Artificial vegetation.

Natural vegetation

a) Forest vegetation

b) Aquatic vegetation

c) Marshy and sandy saline vegetation

Artificial vegetation

a) Vegetation along road sides

b) Vegetation of Agricultural crops, weeds and hedge flora.

c) Vegetation of Rakhals, raised by human agencies as protected forests.

The area under study has been divided into 5 zones viz.. north, east, south, west and central. Vegetational types met- with in different zones have been described to get a clear idea of the vegetation as a whole. During the study, special emphasis was laid on rare plant taxas which are localised to specific sites in different zones.

NORTH ZONE

The zone is bounded on its northern side by large stretch of the Great Rann of Kutch. The area of this is approximately

1000 sq.km. 'Banni', the local name for the area, is more or less flat in nature and forms a buffer zone between mainland of Kutch and the Great Rann of Kutch. However, at few places low hillocks can be seen, 'Kala dungar' is the highest hill in the area (484 mts). Few rivers from central mainland of Kutch traverse along this zone to meet the rann of Kutch. Soil in this area by and large is sandy loam, showing mixture of sand and clay in a limited area of the northern part.

Bhirandiyara, Vadli, Kuran, Khavada and surrounding areas were explored. The main vegetational types observed in the region are:

Forest Vegetations

Forest in true sense can be seen only at few sites. 'Kala dungar'depicts mixed vegetation showing elements of thorny scrub and dry deciduous forest. The dominant plant taxa includes Acacia senegal, Prosopis cineraria, Salvadora persica, Zizyphus nummularia. Besides, dry deciduous plants metwith infrequently are Sterculia urens, Lannea coromandelica, Maytenus emarginata and Tecomella undulata. All these, together form the vegetation on the top and slopes of the hill. While, low hillocks in the area are occupied by scattered trees of Acacia senegal, Prosopis

cineraria, Maytenus emarginata, Capparis decidua, Salvadora persica, and Zizyphus numularia. During monsoon, Justicia simplex, Inula grantioides, Heliotropium supinum, Tridax procumbans, Indigofera tinctoria and Sida ovata are observed growing as undergrowth. The foothills and surrounding area show presence of Cassia occidentalis, C. tora, Tephrosia villosa, Vernonia cinerea, Heliotropium ovalifolium, Indigofera cordifolia and Sida ovata. Open areas on the slopes of the hillocks and nearby areas also show presence of grasses, dominant among which are Sporobolus fertilis, Aeluropus lagopoides, Eragrostis viscosa, Cenchrus ciliaris, Aristida histricula and Chloris montana.

Aquatic vegetation

There are few puddles and 1-2 ephemeral rivulets present in the area. The elevated banks of these puddles and rivulets show permanent vegetation, mainly consisting of Capparis decidua, Euphorbia tirucalli and Leptaedenia pyrotechnica.

During monsoon, the puddles are mainly occupied by Marsilea quadrifida and Utricularia sp. The wet muddy beds are covered by Portulaca oleracea and Ammania baccifera. After completion of monsoon, dried muddy beds of puddles are seen to be occupied by Solanum surattense, Triumfetta hispidium, Cressa cretica, Solanum indicum and Glinus lotoides.

During monsoon, the vegetation on the banks of the rivulets, mainly conists of few scattered herbs such as Heliotropium ovalifolium, Tephrosia purpurea, Acalypha indica, Triumfetta rotundifolia and Cassia italica. The same is replaced during winter by plant community consisting of Solanum indicum, Cressa cretica and Gnaphalium polycaulon.

Marshy and Sandy Saline Vegetation

Along road sides, Capparis decidua, Zizyphus nummularia, Maytenus emarginata and Salvadora persica are growing naturally, while, Prosopis cineraria, Prosopis chilensis, Acacia nilotica subsp. indica and Casuarina equestifolia have been planted along the roadsides. During monsoon, in open areas near roadsides and on wastelands Indigofera cordifolia, I. tinctoria, Abutilon indicum, Sida ovata S. tiagii, Euphorbia prostrata, Peristrophe bicalyculata and Alysicarpus procumbens are commonly observed. In addition to the above mentioned plants, Achyranthus aspera, Aerva javanica, Cassia italica, C. auriculata and Citrullus calocynthis are infrequently observed. Only at few spots Fagonia cretica is conspicuously noticed.

Haloxylon recurvum - a rare plant from kutch observed only in sandy saline or rocky habitats.

Plate No. 4

Agricultural Crops, Weeds and Hedge Vegetation

Cultivated fields are lined with hedges of Euphorbia tirucalli and Prosopis cineraria. Common climber or twinner noted on hedges includes, Tinospora cordifolia, Sarcostemma acidum, Coculus hirsutus, and Momordica dioica, and Sericostoma pauciflorum.

Because of the poor quality of soil and lack of irrigation facility, Jowar, Bajari, and Castor are cultivated at few localities only during monsoon. Common weeds of these cultivated fields are Chenopodium album, Sonchus oleraceus, Asphoedelus tenuifolius, Heliotropium marifolium and Cleome vahliana.

The noteworthy, interesting plant species having specific and restricted distribution in the area are Heliotropium bacciferum (Boraginaceae), Schweinfurthia pterosperma (Scrofulariceae) at Kuran and Monsonia senegalensis (Geraniaceae) at foot hills of Kala Dungar.

EAST ZONE

This zone is bounded by great rann of Kutch on north, Little rann of Kutch on east, Gulf of Kutch on south and central zone on west. The study area of this zone is approximately

2000 sq.kms. But, for a few elevations in the north, the area is more or less flat in nature. The highest hill is situated at village Bela (188 mts.). River Chang and few rivulets originating from centre, traverse this area to meet the rann of Kutch. Soil in the inland areas is sandy-gravelly, while it is sandy-saline on northern and southern sides.

Anjar, Gandhidham, Bhadreshwar and surrounding areas have been visited. The main vegetational types observed in this region are:

Forest Vegetation

Forest in general are thorny scrub, occupying limited areas and mostly located on elevated areas and hillocks. The forests show dominance of Prosopis cineraria, Acacia senegal, Capparis decidua and Euphorbia caducifolia. The co-dominant taxas, noticed alongwith the above mentioned dominant taxas are Salvadora persica, Cassia auriculata, C. obtusifolia, Zizyphus nummularia, Mimosa hamata and Tecomela undulata. During monsoon, in open areas and at the base of hillocks plants viz. Indigofera cordifolia, I. oblongifolia, Tephrosia purpurea, Sida ovata, Heliotropium marifolium, Euphorbia granulata, Blepharis linarifolia, Cassia italica, Crotalaria burhia are quite conspicuous. In addition, grasses, such as Sporobolus indicus, Cynodon dactylon and Desmostachya bipinnata are also quite common.

Aquatic Vegetation

Aquatic water bodies include river Chang, few rivulets, ponds and puddles. Permanent vegetation on the banks of the rivers and ponds resemble the north zone. But, special mention must be made of Ruppia rostellata and Vallisneria spiralis in stagnant waters, during the monsoon. On the wet banks, Suaeda fruticosa and Cleome vahliana are quite common, while Phyla nodiflora, Glinus lotoides, Polygonum plebeium, Cyperus laveigatus, C. rotundus, C. compressus, Scirpus tuberosus and Aeluropus lagopoides, monopolise the dried beds.

Besides plant species mentioned above, sewage canals at Gandhidham show luxuriant growth of Portulaca oleracea, Ammania baccifera, Blumea obliqua, Croton bonplandium. In addition to above mentioned plants Eclipta prostrata, Alternanthera ficoides and Amaranthus spinosus are infrequently observed on dried muddy beds of these sewage canals.

The pond at Nigal Rakhal shows aquatic vegetations of submerged plants like Vallisneria spiralis and amphibious ones like Marsilea quadrifida and on dried beds, in addition to these plant species mentioned above, Polygonum plebeium is also noticed. The elevated banks of the pond and surrounding area is largely occupied by Prosopis cineraria

Vallisneria spiralis - a common constituent of aquatic vegetation.

Sesuvium portulacastrum - usually observed on saline sandy/marshy river beds.

Plate No. 5

which probably must have been planted recently.

Marshy and Sandy Saline Vegetation

By and large, sandy saline area occupy large part of the northern side and sandy marshy area extends all along the sea on the southern side. Sandy saline vegetation resembles the north zone in its floristic composition.

The chief inhabitants of sandy marshy vegetation are Avicennia marina and Salvadora persica, in the form of long stretch, extending a few kms. As and when sea water recedes over the exposed sandy-marshy beds, plant communities mainly consisting of Sesuvium portulacastrum, Atriplex stocksii, Salsola baryosma, Cressa cretica, Salicornia bractiata and Aeluropus lagopoides make their appearance.

In sandy saline areas, adjacent to marshy soil show presence of plant communities mainly consisting of Juncus maritimus, Cyperus laviegatus, Suaeda nudiflora, Sporobolus marginatus, Urochondra setulosa and Aeluropus lagopoides. In addition, plant species such as Calotropis procera, Cassia auriculata, Cassia italica, Cucumis prophetarum, Launaea decumbens, Convolvulus arvensis, Zizyphus nummularia, Cleome villosa, Solanum surattense are also noticed in the nearby areas.

Road side Vegetation

Along road sides, Prosopis cineraria, Azadirachta indica, and Acacia senegal have been recently planted. Little away from the roads on both the sides Cassia auriculata, C. italica, Indigofera oblogifolia, Calotropis procera, Zizyphus numularia, Euphorbia prostrata and Calotropis gigantia are observed in their usual wilderness. During monsoon, open areas on either side of roads and railway lines are dominated by Echinops echinatus, Zaleya govindia, Cleome viscosa, C. gyanandra, Tribulus terestris, Solanum indicum, Acanthospermum hispidum, Aristolochia bracteata and grasses like Cenchrus ciliaris, Chloris barbata, Aristida adscensionis. Mats of Euphorbia arbiculata occupy large plain areas along railway tracks.

Total parasite Cuscuta chinensis has been observed attacking, Prosopis chilonsis, Zaleya govindia and Cassia auriculata.

Agricultural crops, weeds and Hedge Vegetation

Due to absence of irrigation facilities, the agriculture is poor. Main crops grown during monsoon are Millets, Jowar and Bajari. Only at few specific sites Wheat and Cotton fields are present. Eclipta prostrata, Cyperus rotundus, Corcorus olitorius, Sonchus arvensis, Chenopodium album, Asphodelus tenuifolius, Anagalis arvensis and Oxalis corniculata are

the common weeds in these crop fields.

Ipomoea kotschyana (Convolvulaceae) and Fagonia cretica var. schweinfurthia (Zygophyllaceae) have restricted distribution and are located at specific sites in this zone.

SOUTH ZONE

This zone is bounded on north by Bhuj-Gandhidham highway, on east by Anjar Taluka, on south by gulf of Kutch and on west by Nalia Taluka. The area has by and large a plain topography, with few hillocks scattered here and there. Rukamavati, Bhuki rivers and other rivulets, traverse this area to meet gulf of Kutch. Noteworthy feature of the area is different soil types, sandy marshy near sea-coast on southern side, sandy gravelly adjacent to sandy-marshy and loamy or Black-clayey in the main-land of the zone.

Mandvi, Mundra, Bhadreshwar, Bharapar and surrounding area have been explored for the study. The main vegetational types noticed in the zone are:

Forest vegetation

Forests are confined to low hillocks and hill slopes. These scrub forests show dominance of Acacia senegal, A. leucophloea, and A. nilotica subsp. indica, while, Prosopis

Cleome vahliana - commonly seen at the base of hillocks.

Convolvulus auricomus - commonly observed climber on the hedges.

Plate No. 6

cineraria appears to have been recently introduced. The overall growth of these trees appear healthier than in other zones described earlier. Besides, plants such as Grewia tenax, Periploca aphylla, Mitragyna parviflora, Prosopis chilensis, Abutilon fruticosum are also observed in these forests. During monsoon forest undergrowth mainly consists of Dicoma tomentosa, Zornia gibbosa, Indigofera cordifolia, I. linifolia, Tephrosia purpurea, T. villosa and Justicia heterocarpa.

Sandy or gravelly soil near forest vegetation mainly consists of perennials such as Cassia auriculata, Cassia anguistifolia, Zizyphus nummularia, Capparis decidua, Leptadenia pyrotechnica and Indigofera oblongifolia. Other associated herbs observed are Aerva javanica, Solanum indicum, Cassia italica, Indigofera linifolia, Alternanthera viridis, Viola cinerea, Polycarpea coryembosa, Inula grantioides, Convolvulus prostratas, Evolvulus alsinoides. Hibiscus palmatus and H. ovalifolius. The common grasses intermixed with above herbs includes Cymbopogon martini, Eragrostis viscosa, Sporobolus marginatus. Aristida adscensionis, and Apluda mutica.

Aquatic vegetation

The permenant vegetation of the elevated banks of the river includes Phoenix sylvestris, Capparis decidua, Prosopis

cineraria, Leptadenia pyrotechnica and Solanum incanum. In addition, during monsoon and post-monsoon, plant communities, mainly consisting of Crotolaria burhia, Cassia auriculata, Alysicarpus procumbens, Indigofera linifolia, Tephrosia purpurea and Polygala erioptera are often observed. At few spots submerged aquatic such as Valisneria spiralis, Potamogeton pectinatus and Hydrila verticilata have been recorded. Wet muddy banks of the river support vegetation consisting of hygrophyllous plants such as Ipomoea aquatica, Marsilea quadrifida, Eclipta prostrata and slopes of the banks usually support plants such as Sida ovata, Sida alba, Tephrosia purpurea, Alternanthera sessilis, Triumfetta pentandra and Phyla nodiflora.

Vegetation of ponds and puddles, by and large, is similar to preceeding zones. However, dried muddy beds show presence of Glinus lotoides, Gnaphalium polycaulon, Polygonum plebeium, Heliotropium supinum, and Argemone mexicana in addition to the usual inhabitants.

Marshy and Sandy Saline Vegetation

Sandy saline coast at Mandvi depicts presence of dominant sedges viz. Cyperus arvensis and Cyperus conglomeratus. In addition, plants such as Convolvulus prostratus, Lotus garcini and Ipomoea pes-carprae are infrequently observed.

Adjacent to the coast, Leptadenia pyrotechnica, Sericostema pauciflorum, Indigofera argentea, Polygala irregularis are noticed. On plain areas, large number of Prosopis chilensis have been grown by the forest department, to check sand dunes.

Sandy marshy coast are situated at Bhadreshwar and Mundra. The mangrove forest consists of usual contituent viz. Avicennia marina and Salvadora persica at both the places. Wet saline marshy beds at Bhadreshwar are chiefly inhabited by Suaeda nudiflora, Sporobolus marginatus, Cyperus arenaris, Dichanthium annulatum, Pulicaria angustifola, Desmostachya bipinnata and Urochondra setulosa. While, wet beds at Mundra, in addition to above mentioned plants,show conspicuous presence of Salichornia bracteata and Aeluropus lagopoides.

Roadside vegetation

Vegetation along roadsides mainly consists of planted trees of Ficus religiosa, Ficus benghalensis, Azadirachta indica and Prosopis cineraria. Hilly terrains along the roads show natural vegetation, which mainly includes Mitragyna parviflora, Maytenus emarginata, Capparis decidua, Zizyphus mauritiana,Mimosa hamata, Acacia leucophloea, Periploca aphyla, and Euphorbia caducifolia. During monsoon, open

Euphorbia caducifolia - common constituent of thorny scrub forest in the region.

Hibiscus palmatus - infrequently observed on gravelly soils at Nakhtrana.

Indigofera tinctoria

common weed in fallow fields and along roadsides.

Abutilon fruticosum - a rare plant in Gujarat but common in Kutch.

Plate No. 8

areas and wastelands along roadsides are occupied by plant communities, constituting of Indigofera cordifolia, Tribulus terrestris, Solanum surattens, Acanthospermum hispidum, Peristrophe bicalyculata, Tephrosia purpurea, Euphorbia tirta. In addition at few places Pergularia daemia, Tridax procumbens, Hibiscus palmatus, Euphorbia hamata, Cleome viscosa, C. vahiliana, Justicia simplex, Sida ovata Indigofera linei, I. cordifolia and Blepharis linnarifolia are infrequently noticed.

Agricultural Crops, Weeds and Hedge Flora

Due to availability of irrigation facilities, agriculture is practiced in large scale in this zone. In addition to usual food grains, cultivation of wheat, cotton and groundnut is practiced by the farmers. Vegetable crops of Carrot, Onion, Brinjal, Lady's finger and Cabbage are also grown in this area.

In addition to crop weeds mentioned in earlier zones, mention may be made of Anagalis arvensis, Oxalis corniculata, Celosia argentea, Flaveria trinervia, Phyllanthus madraspatensis, Borreria pumila and Trianthema triquetra which are observed in crop fields.

At Mundra and Mandvi cultivation of Phoenix dactylifera (Date Palm) is practiced on large scale, on sandy saline

soils.

In this zone plant species like Indigogera coerulea, I. argentea, and Lotus garcini (Fabaceae) and Halopyrum mucronatum (Poaceae) are interesting for the studies as they have restricted in distribution.

West Zone

The area of this zone is bounded on north by Great Rann of Kutch, on east by central zone and Mandvi taluka, on south by Arabian sea and on west by sea creek and a part of the Rann. The major part of the area is more or less plain, but, the central part near Mata-na-madh, is having hilly terrain. Dinodhar hill is the highest hill in this zone (382 Mts.). The area is traversed by rivers Kanakavati, Khari, Mithi and few rivulets, some of which ultimately drain into the Arabian sea in south and Rann of Kutch in north. Typical soil types metwith in the other zones are also encountered here viz. sandy saline, sandy marshy, sandy-gravelly and black clayey and/or alluvial.

In the present study, places such as Nakhtrana, Nalia Narayan Sarovar, Jakhau, Mata-na-madh, Dinodhar and surrounding areas were visited. The main vegetational aspects which can be enlisted in this zone are as follows:

General view of open thorny scrub forest showing Salvadara persica, Prosopis cinerarea and Premna resinosa at Kotda.

Forest showing association of thorny scrub and dry deciduous plant species, Nalia.

Plate No. 9

Forest Vegetation

Thorny scrub forests are mostly confined to hilly regions. Some of these forests are natural, while a few have been raised by the forest department. Dinodhar and Mata-na-madh depicts mixed vegetation consisting of thorny scrub species along with a few dry deciduous species. The dominant plant taxa present are Acacia senegal, Acacia nilotica, subsp. indica, Acacia leucophloea, Euphorbia caducifolia of thorny scrub type and Bombax ceiba, Lannea coromandelica, Sterculia urens, Premna resinosa, Securinga leucopyrus, Moringa oleifera, Cordia gharaf, Carrisa congesta, Salvadora persica, S. oleoides and Commiphora whightii of dry deciduous type. Maerua oblongifolia and Sericostemma acidum are commonly noticed on above mentioned plants. Forest at Dinodhar and Mata-na-madh are comparatively better off as regards the quality and quantity of the vegetational cover of hills and the surrounding plain areas. On cleared areas, nearby hillocks dominance of Prosopis cineraria and Prosopis chilensis is quite conspicuous. Over and above, the tree species mentioned formerly, the composition of the vegetation also includes plant communities mainly consisting of Capparis decidua, Zizyphus nummularia, Zizyphus mauritiana, Cassia auriculata, Vernonia cinera are perrenials and annuals like Indigofera cordifolia, Fagonia cretica var. schweinfurthii, Pavonia arabica, Pavonia

Degraded stage of thorny scrub vegetation on low hillock near Nakhtrana.

General view of thorny scrub vegetation showing Prosopis chilensis, Acacia nilotica and others.

Plate No. 10

zeylanica, Triumthema indicum, Melhania tomentosa, Monsonia senegalensis, Seddera latifolia, Tephrosia villosa, T. purpurea, Sonchus auricomus . Other associated species also noticed along with these plants are Tridax procumbens, Launaea residifolia, Tribulus terrestris, T. rajasthanensis, Echinops echinatus, Blepharis linnarifolia, Inula grantioides, Euphorbia nimula, Euphorbia hirta, Dicoma tomentosa, Hibiscus ovalifolius and Convolvulus arvensis.

The common grasses intermixed with these plants includes Panicum antidotale, Aristida adscensionis, Cymbopogon martini, Pernisetum setarum, Cenchrus ciliaris, Chloris barbata, Cynodon dactylon and Sporobolus madraspatanus.

Aquatic Vegetation

Aquatic vegetation mainly consists of two rivers, rivulets, Ponds and puddles , Permanent vegetation on the elevated river banks have Phoenix sylvestris, Capparis decidua, Leptadenia pyrotechnica, Euphorbia caducifolia, and Prosopis cineraria, as a chief constituent. At few places on the slopes, Chascanum marrubifolium and Cassia anguistifolia have been observed. During monsoon and postmonsoon period, herbaceous plant species such as Crotalaria burhia, Cassia italica, Tephrosia purpurea, Polygala erioptera, Trianthema hispidium, Seddera latifolia, and Periploca aphyla are often

observed. At few specific spots Seddera latifolia and Helichrsum cutchium have been observed. The elevated banks and slopes also supports plant communities mainly consisting of Sida ovata, Alternanthera sessilis, Achyranthus aspera, Sericostema pauciflorum and Phyla nodiflora. Wet muddy banks of rivers supports plant species viz.Eclipta prostrata, Ipomoea pes-caprae, Marsilea quadrifida, Portulaca oleracea, and Evolvulus alsinoides. Wet banks of Khari river, in addition to above mentioned permanent and post monsoon vegetation, show conspicuous presence of Fragmatis karka and Scirpus tuberosus. Along the river course at few places, where water is stagnant, submerged plants like Vallisneria spiralis and Hydrila verticilata show luxuriant growth.

Ponds and puddles nearby villages, show presence of hydrophylic plant species such as Potomogeton pectinatus, Typha angustata, Najas marina, Nymphoea nouchalli and Ipomoea aquatica. There is no marked difference in floristic composition between the wet bed of this zone and the preceding ones. In addition to usual components of the dry beds, at places plants like Alternanthera spiralis, Alternanthera hybridis, Digera muricata, Heliotropium supinum, Blumea obliqua and Argemone mexicana have been observed.

At Tera and Narayan Sarovar, on old constructed pond walls, Capparis cartilaginea along with Kickxia ramosissima have

been recorded.

Sandy Marshy and Saline Vegetation

Like the preceding zones i.e. East and South zones, along the sea coast, vegetation consists of usual constituents of marshy vegetation. Only difference lies in the extent of these plant communities.

The vegetation of sandy saline beds also resembles those of east and south zones. However, mention may be made of Zygophyllum simplex, Atriplex stocksii and Salichornia bractiata, which were not noticed in earlier zones.

Roadside Vegetation

Along roadsides, in contrast to roadside trees of preceding zones (East, North and South), the common trees observed are Acacia nilotica, Acacia leucophloea, Acacia arabica, Zizyphus nummularia, Euphorbia caducifolia in this zone. Prosopis chilensis, Ficus benghalensis and Ecualyptys Sp. which have been planted in recent past, by the forest department.

The monsoon and postmonsoon flora of wastelands and nearby open areas resembles that of other zones in floristic composition.

Avicennia marina - usual component of mangroove vegetation along sea coast in the region. Jakhau

Atriplex stocksii - a rare plant observed in sandy saline situations.

Plate No. 11

Agricultural Crops, Weeds and Hedge Flora

In this zone better irrigation facilities are available and hence agriculture is practiced on a large scale. Farmers prefer to grow Jowar, Bajari, Til and other millets in Kharif season and wheat and Gram in Rabi. Cotton and Groundnut are also grown in minor proportion.

The hedges of the fields show presence of live hedges like earlier zones. These hedges show presence of climbers such as Pergularia daemia, Rhynchosia minima, Coculus hirsutus, Balsamia momardica, and Mukina madraspatans. Agave americana & Aloe barbadensis are also observed at few places.

This zone is most interesting because of the presence of a number of plant taxa, which are not commonly metwith in other localities. Moreover, these plant taxa are restricted or localised in distribution. The noteworthy plant species recorded from this zone are Senra incana, Abutilon pannosum, Pavonia arabica, Pavonia zeylanica and Sida tiagii (Malvaceae), Zygophyllum simplex, Fagonia cretica var schweinfurthii, Tribulus rajasthanensis (Zygophyllaceae), Premna resinosa, Chascanum marrubifolium (Verbenaceae), Capparis cartilaginea (Capparidaceae) and Helichrysum cutchicum (Asteraceae).

Central Zone

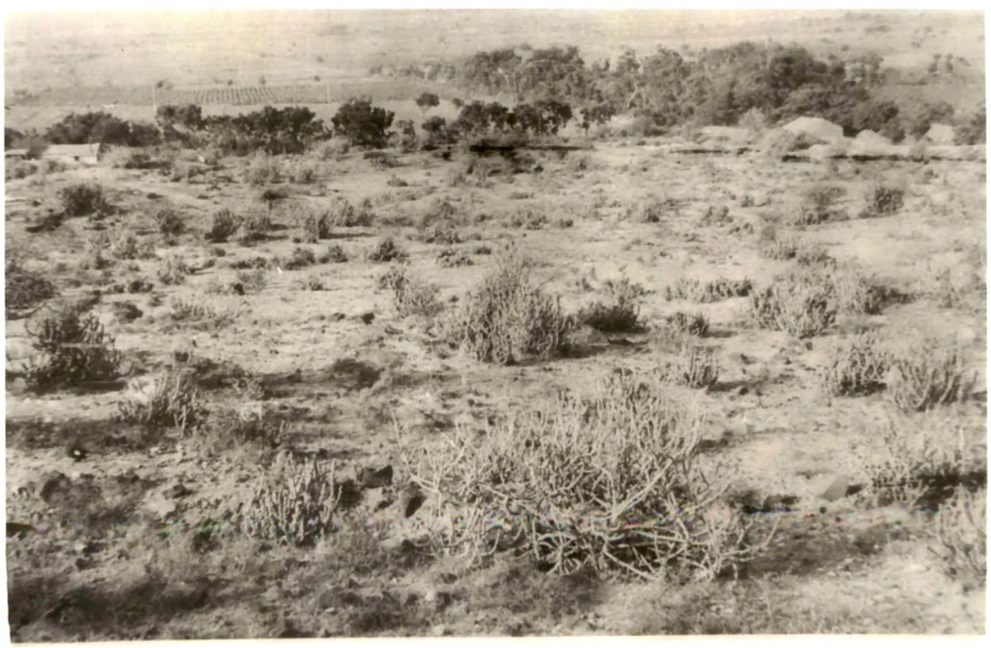
The Central zone is surrounded by the four zones viz. North, East, South and West, sandy saline part of Banni on north side, by Anjar taluka on east, by Bhuj-Gandhidham highway on south and by Nakhatrana taluka on west. The area included in this zone is more or less plain with few hillocks, located surrounding Bhuj city. The hillocks are medium sized having steep slope on northern side. The main hillocks of the area are Bhujiya, Chaudava and Nadibaugh. Number of rivers starting from this region and run towards north and south to meet Rann and Arabian sea. Khari, Mithi and Pur are the main rivers traversing this area. Types of soil are more or less similar to those of other zones.

For the study, Bhuj, Loriya, Summarasar, Madhapar, Ler, Sumatra, and surrounded area were explored. The forest vegetation, aquatic vegetation, sandy saline vegetation, roadside vegetation and agricultural crops, weed and hedge flora, are the different vegetational types observed in this zone.

Forest Vegetati on

The forests are mostly thorny scrubs confined to hillocks and surrounding plain areas. The constituent elements by and

General view of thorny forest on hillocks showing Acacia nilotica, Prosopis cinerarea and Euphorbia caducifolia Bhuj.



Thorny scrub forest on gravelly soils at the base of hillocks, Bhuj.

Plate No. 12

large, are the ones metwith in the north zone and west zone. In addition Salvadora oleoidis, Lycium barbarum, Capparis decidua and Euphorbia caducifolia are also dominant constituents of the thorny scrubs.

Plain areas surrounding hillocks, during monsoon are occupied by a number of annual plants which were not met with as undergrowth in other zones. Chief herbaceous ones are Dicoma tomentosa, Convolvulus auricomus, Farsetia jacquemontii, Inula grantioides, Hibiscus ovalifolius, Hibiscus palmatus, Blepharis linnarifolia and Plauchea argentea. In addition Cucumis prophetarum, Indigofera linneii, Convolvulus prostratus. Evolvulus alsinoides and Euphorbia nimula like annual prostrate plants are also noticed. A number of grasses are also met along with the above mentioned taxa of which Chrysopogon fulvus, Cenchrus ciliaris, Cymbopogon martini and Chloris barbata are the chief ones.

Rakhals, both natural as well as artificial ones are present in this area. Sumarasar rakhal is the largest and well protected, which shows the presence of usual constituents of thorny scrubs mentioned earlier. In addition, mention may be made of the occurrence of Tamarix aphyla, Acacia arabica and grasses like Vettivera zinzoides, Demostachya bipinnata and Cenchrus setigerus.

Ler is another natural rakhal which shows presence of constituents those found in Summarasar rakhal. However, presence of Premna resinosa, Carcisa congesta, and Lycium barbarum is worth mentioning. Chaudava, Nadibaugh and Mochi rai are rakhals in this area. Out of these, Chaudava is natural one and Nadibaugh & Mochi rai are artificial ones.

Aquatic Vegetation

Khari, Mithi and Pur are the main rivers in this area., The permanent vegetation on elevated banks does not differ markedly from the earlier described zones. However, plants like Grewia tenax, Phoenix sylvestris, Euphorbia caducifolia, Salvadora persica and Tamarix aphylla are noticed. The aquatic and hygrophyllous plant communities do not show any difference, in terms of floristics, with the rivers of west and south zones. However, Khari river at Bhuj shows presence of Fragmatis karka and Scirpus tuberosus on its exposed banks.

Hamirsar and Pragsar, constructed ponds of Bhuj city show the presence of hygrophyllous plant communities like Marsilea quadrifida, Portulaca quadrifida, Sesbania sesban, Azolla Sp, and free floating ones like Nelumbo nucifera, Nymphoea nauchalli. Exposed dried banks show conspicuous presence of Glinus lotoides, G. oppositifolia, Blumea obliqua, Phyla

Pure strands of Fragmatis karka along the muddy banks of khari river.

Plate No. 13

Inula grantiodies - observed in patches on sandy gravelly slopes in monsoon.

Pedalium murex - common weed of fallow fields.

Plate No. 14

Melhania futteyporensis a member of Sterculiaceae occur on sandy gravelly soils, dinodhar.

Cassia auriculata a common species observed along the roadsides.

Plate No. 15

nodiflora, Argemone mexicana and Cyperus laevigatus. Over and above other constituents present in the earlier zones are also noticed along with the above listed plant communities.

Sandy Saline and Marshy Vegetation

Only at one specific spot, this type of vegetation has been noticed. But its presence is very limited in terms of plant communities comprising of plants like Haloxylon recurvum, Salsola baryosma and Cressa cretica. Marshy vegetation is totally absent.

Roadside Vegetation

Vegetation along roadside and open areas near roads is more or less similar to those of surrounding zones, in terms of the species as well as the rudaral vegetation.

Agricultural Crops, Weeds and Hedge Flora

In agricultural fields, along the periphery of the zone, Kharif and Rabi crops are grown. During winter, in fallow fields, a number of weeds are observed of which Anagalis arvensis, Oxalis minima, Vaccaria pyramidata, and Asphoedelus tenuifolius are quite conspicuous along with

the other weeds, commonly noticed in surrounding zones.

Salvadora oleoides (Salvadoraceae), Senra incana, Pavonia grewioides (Malvaceae), Helichrysum cutchicum (Asteraceae) and Seddera latifolia (Convolvulaceae) are the interesting plants and found at specific sites at Nadibaugh rakhal and Loriya thorny scrub forest.