BIODIVERSITY & ECOLOGICAL CONCERNS :

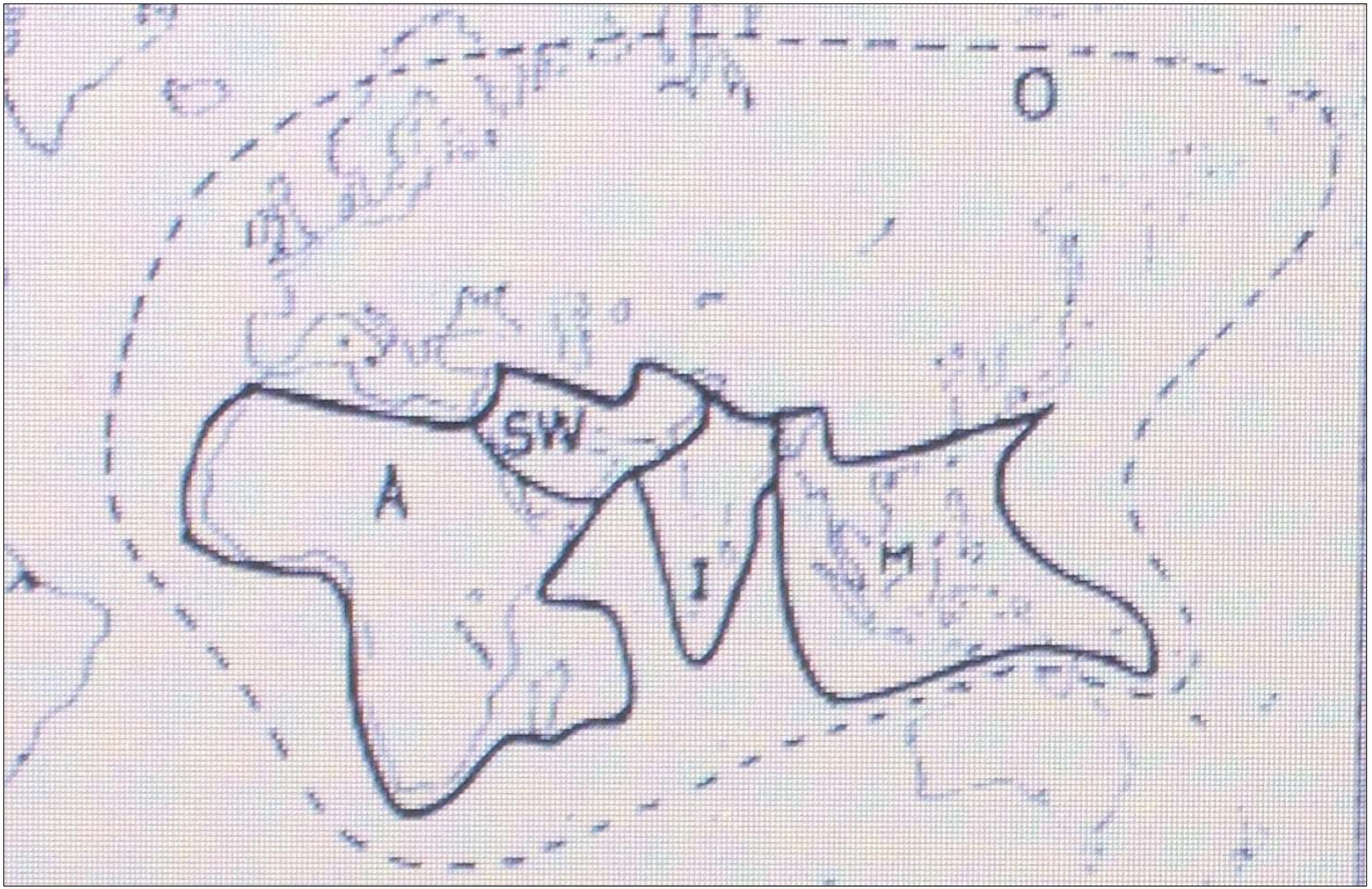
THE ARAVALLIS OF GUJARAT

27 February 2013

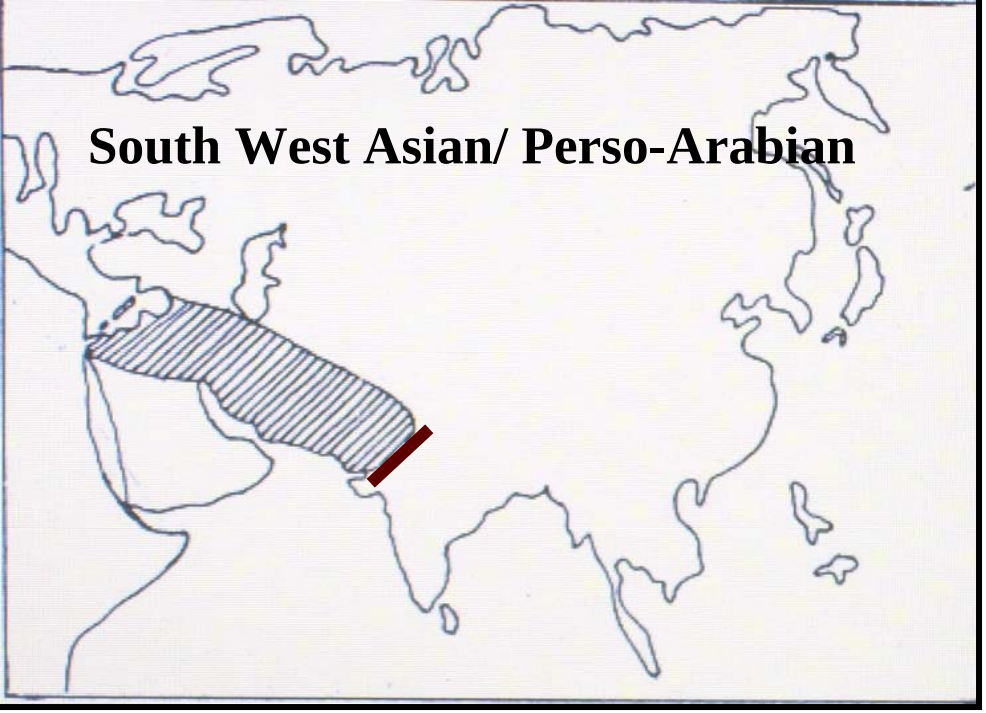
Dr. Leena

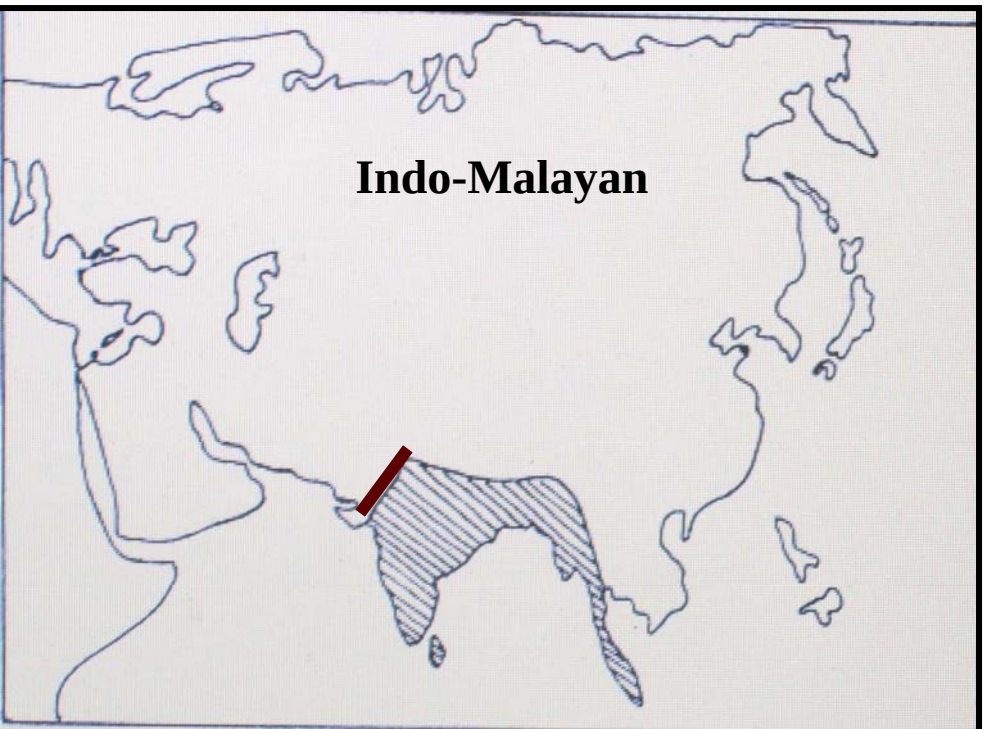
Society for Promotion of Wasteland Development, New Delhi

Global importance of the region



Phyto-Geographical Regions - Distribution patterns (Hypothetical)
O-Old world, A- African, SW- South West Asian, I-Indian, I+M-Indo-Malayan



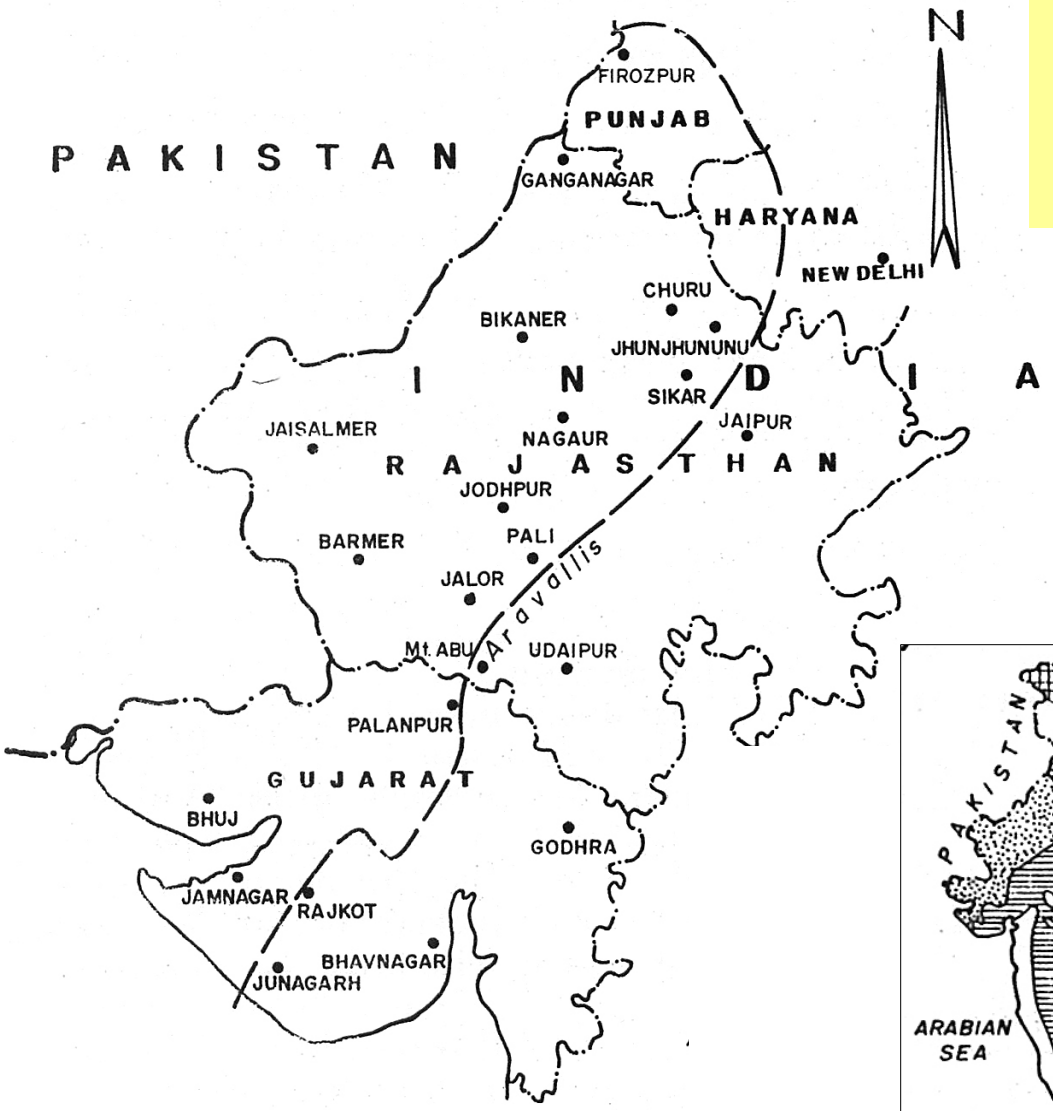


Great Aravallis : Drude's Line

- Drude (1890,1913) stated- the line limiting **Perso-Arabian** and **Indo-Malayan** elements runs along the Aravallis and extends southwards to the Gulf of Cambay.
- The western or **Perso-Arabian** elements (Mediterranean, south-west Asian and African) are dominant over the eastern or Indo-Malayan element in the region west of Aravallis. In the Aravallis and the eastern region the proportion of eastern element exceeds that of the western element.
- Drude's line therefore, runs along the western side of the Aravallis, being the region of changeover between the two floras dominated by eastern or western elements.

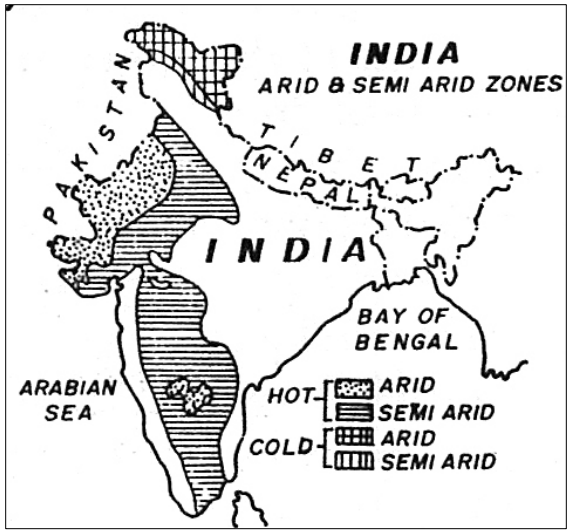
ARAVALLIS OF GUJARAT: ARID & SEMI ARID ZONES

Aravallis in Gujarat:
Rajasthan border (North)
to Pavagadh hills (South)



Eastern side: Dry Deciduous Forest

Western side: Desert



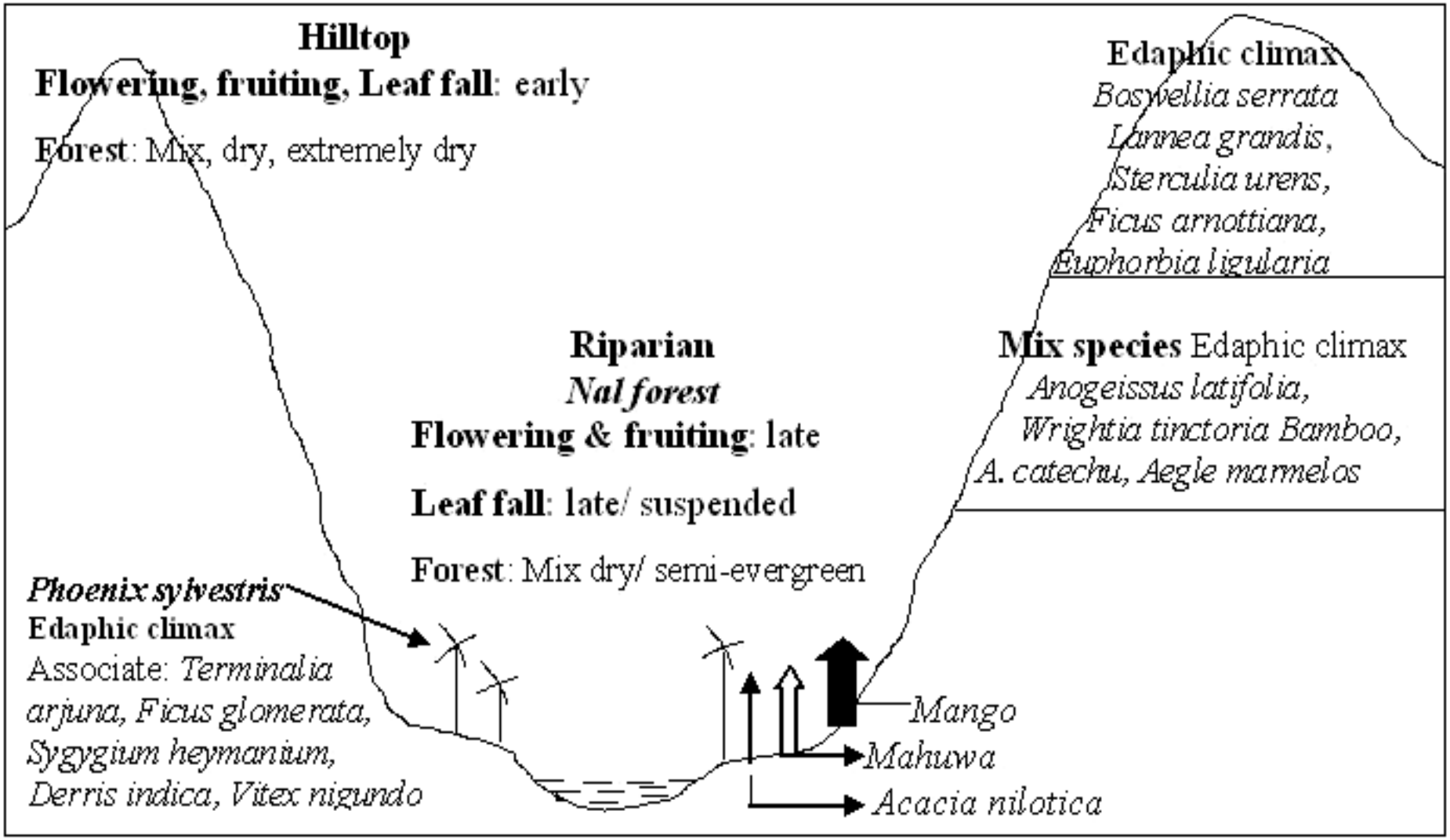
SALIENT FEATURES OF THE DESERT

The western side of Aravallis

- Center of Endemism
- Eastern most fringe of great Saharo-Tharian desert
- Hot desert, drought prone area
- Spread over parts of Gujarat, Rajasthan, Haryana and Punjab.
- Stunt and sparse vegetation
- Storeyfication lacking or poorly developed
- Supports pastoral system (route, fodder (>35 Grass sp.), food, etc)
- Nesting ground of Flamingo birds & Wild Ass habitat

ARAVALLIS OF GUJARAT:

Diagrammatic representation of forests



ARAVALLIS OF GUJARAT :

MAJOR ECOSYSTEM TYPES

- **NATURAL ECOSYSTEM**
  - **TERRESTRIAL ECOSYSTEM**
    - i. Grassland ecosystem
    - ii. Desert ecosystem
    - iii. Ravinous ecosystem
    - iv. Forest ecosystem
  - **AQUATIC ECOSYSTEM**
    - **Limnic (Ecosystem of fresh water)**
      - i. Lentic ecosystem (stagnant fresh water)
      - ii. Lotic ecosystem (flowing water)
- **MAN MADE ECOSYSTEM**
  - **Urban-ecosystem (cropland, orchard, towns, etc.)**

ARAVALLIS OF GUJARAT: MAJOR FOREST TYPES

DRY TROPICAL FORESTS

Group 5. TROPICAL DRY DECIDUOUS FORESTS

Subgroup 5A. Southern Tropical Dry Deciduous Forests

C_1. Dry Teak bearing Forest

C_{1a}. Very Dry Teak Forest

C_{1b}. Dry Teak Forest

C_3 Southern Dry Mix Deciduous Forest

Subgroup 5B. Northern Tropical Dry Deciduous Forests

C_2 Northern Dry Mix Deciduous Forest

Seral Types

$_1S_1$ Tropical Riverine Forest

ARAVALLIS OF GUJARAT: MAJOR FOREST TYPES

Edaphic Climax

- E_1 *Anogeissus pandula* Forest
- DS_1 *Anogeissus pandula* Scrub
- E_2 *Boswellia* Forest
- E_3 *Acacia nilotica* Forest
- E_5 *Butea* Forest
- E_6 *Aegle* Forest
- E_8 *Phoenix* Grove
- E_9 Dry Bamboo Brakes

Degradation Stages

- DS_1 Dry Deciduous Scrub
- DS_3 *Euphorbia* Scrub
- DS_4 Dry Grassland

Group 6. TROPICAL THORN FORESTS

Subgroup 6B. Northern Tropical Thorn Forests

- C_1 Desert Thorn Forest
- DS_1 *Zizyphus* Scrub
- DS_2 Tropical *Euphorbia* Scrub

Edaphic Climax

- E_1 *Euphorbia* Scrub
- E_2 *Acacia senegal* Forest
- E_4 *Salvadora* Scrub

Species distribution in different locations in Aravallis of Gujarat

Location	Fauna Sp.	Flora Sp.
Jessore WLS & Ambaji –Balaram WLS	>450	428
Kuvarsi-Danta	>200	389
Chitrasani-Palanpur	>300	394
Bhuro dungar- Vijaynagar	>250	421
Zer-Dhareswar- Vijayngr	>200	419
Undapani-Bhiloda	>138	345
Hathol-Bhiloda	>280	328
Shamalaji- Sabarkantha	>300	480
Taranga hills- Mahesana	>140	289
Mahesana (Sunsi, Modhera)	>390	460
Pavagadh hill-Panchmahal	>400	398
Total	**>700**	**>1200**

Incomplete list…Biodiversity study is going on…

RED LISTED PLANTS OF THE REGION

36 Species

Butea monosperma var. lutea

(yellow flowered *Butea*)

&

Eulophia ochreata

(Rare-terrestrial Orchid)

Reported first time from the Aravallis of Gujarat

Species	Family	Life form
Barleria acanthoides	Acanthaceae	Shrub
Boswellia serrata	Burseraceae	Tree
Buchanania lanzan	Anacardiaceae	Tree
Butea monosperma var. lutea	Fabaceae	Tree
Celastrus paniculatus	Celastraceae	Climber
Chlorophytum borivilianum	Liliaceae	Herb
Commiphora wightii	Burseraceae	Tree
Ephedera foliata	Ephedraceae	Shrub
Eulophia ochreata	Orchidaceae	Herb
Gloriosa superba	Liliaceae	Climber
Limonia acidissima	Rutaceae	Tree
Manilkara hexandra	Sapotaceae	Tree
Moringa concanensis	Moringaceae	Tree
Oroxylum indicum	Bignoniaceae	Tree
Ougeinia oogeinsis	Fabaceae	Shrub
Peganum harmala	Zygophyllaceae	Herb
Pterocarpus marsupium	Fabaceae	Tree
Sterculia urens	Sterculiaceae	Tree
Tecomella undulata	Bignoniaceae	Tree
Terminalia arjuna	Combretaceae	Tree
Withania coagulans	Solanaceae	Herb

PENINSULAR AND WESTERN GHATS ELEMENTS IN ARAVALLIS OF GUJARAT

Acacia ferruginea
Miliusa tomentosa
Soymida febrifuga
Tectona grandis
Dinopium benghalense puncticolle (Southern Golden-backed Woodpecker)
Francolinus pictus (Painted Francolin)
Gallus sonneratii (Grey Junglefowl)
Galloperdix spadicea (Red Spurfowl)
Turdus merula nigropileus (Black-capped Blackbird)
Nectarinia zeylanica (Purple-rumphed Sunbird)
Zoothera citrina cyanotus (White throated Ground Thrush)
Ahaetulla nasuta (Common Green Whip Snake)
Coluber gracilis (Slender Racer)
Macropisthodon Phumbicolor (Green Keelback)

Extinction from the region

Species	Site of presence	Yrs of Extermination (Approx.)
Lion	Ahmedabad (Guj)	1830
	Baroda (Guj)	1832
	Deesa (Guj)	1878
	Palanpur (Guj)	1880
	Anadara (Raj)	1872
	Abu (Raj)	1881

Wild life Corridor from Gujarat to S.Raj & Vis.

Species distribution in different location in Aravallis of Gujarat

Local Community's Relation with Biodiversity in Daily Life & Livelihoods:

Location	Fauna Sp.	Flora Sp.	No of plants used by local community			
			Wild edible	Medicine	NTFP	Fodder
Jessore WLS & Ambaji –Balaram WLS	>450	428	**80**	**253**	**69**	**31**
Kuvarsi-Danta	>200	389	**74**	**207**	**55**	**30**
Chitrasani-Palanpur	>300	394	**69**	**211**	**46**	**20**
Bhuro dungar- Vijaynagar	>250	421	**66**	**213**	**44**	**19**
Zer-Dhareswar- Vijayngr	>200	419	**73**	**214**	**51**	**28**
Undapani-Bhiloda	>138	345	**22**	**213**	**23**	**10**
Hathol-Bhiloda	>280	328	**31**	**203**	**31**	**27**
Shamalaji- Sabarkantha	>300	480	**39**	**200**	**48**	**32**
Taranga hills- Mahesana	>140	289	**39**	**97**	**39**	**19**
Mahesana	>390	460	**106**	**329**	**40**	**42**
Pavagadh hill-Panchmahal	>400	398	**42**	**279**	**49**	**39**
Total	**>700**	**>1200**	**170**	**453**	**139**	**69**

Incomplete list…Biodiversity study is going on…

Folk Medicine

***Vitex trifolia L. or V.negundoL*. (VERBENACEAE) Nagod/Dhuni**

- ✓ The decoction of leaves relieve any pain and swelling.
- ✓ The boiled leaves are bandaged on swellings due to rheumatism and on boils to relieve pain.
- ✓ The stem twig is used as tooth brush.
- ✓ The fresh leaf juice is inhaled or paste of flower applied on forehead to relieve headache.
- ✓ Leaves are added in preparation of hair oil as a hair tonic.
- ✓ Leaves are boiled in water and then vapour is inhaled though nose (nostrils) to relieve headache and fever.
- ✓ The powered seed mixed with ghee add jaggery to prepare '*sukhadi*' (sweet cake)' . The *sukhadi* is eaten daily to cure sciatica and rheumatism.
- ✓ The leaf juice is slightly heated and mixed with any edible oil and then such oil is dropped in the ear for any ear complaints.
- ✓ The decoction of leaves used to wash wounds for healing.
- ✓ A pillow stuffed with the leaves is places under the head to relieve headache.
- ✓ The crushed dried leaved filled in *bidi* then smoked to relieve cough and headache.
- ✓ The fresh root first given incense and then tied on right arm to cure fever.

Biodiversity in daily life: Wild edibles

Taste of Wild

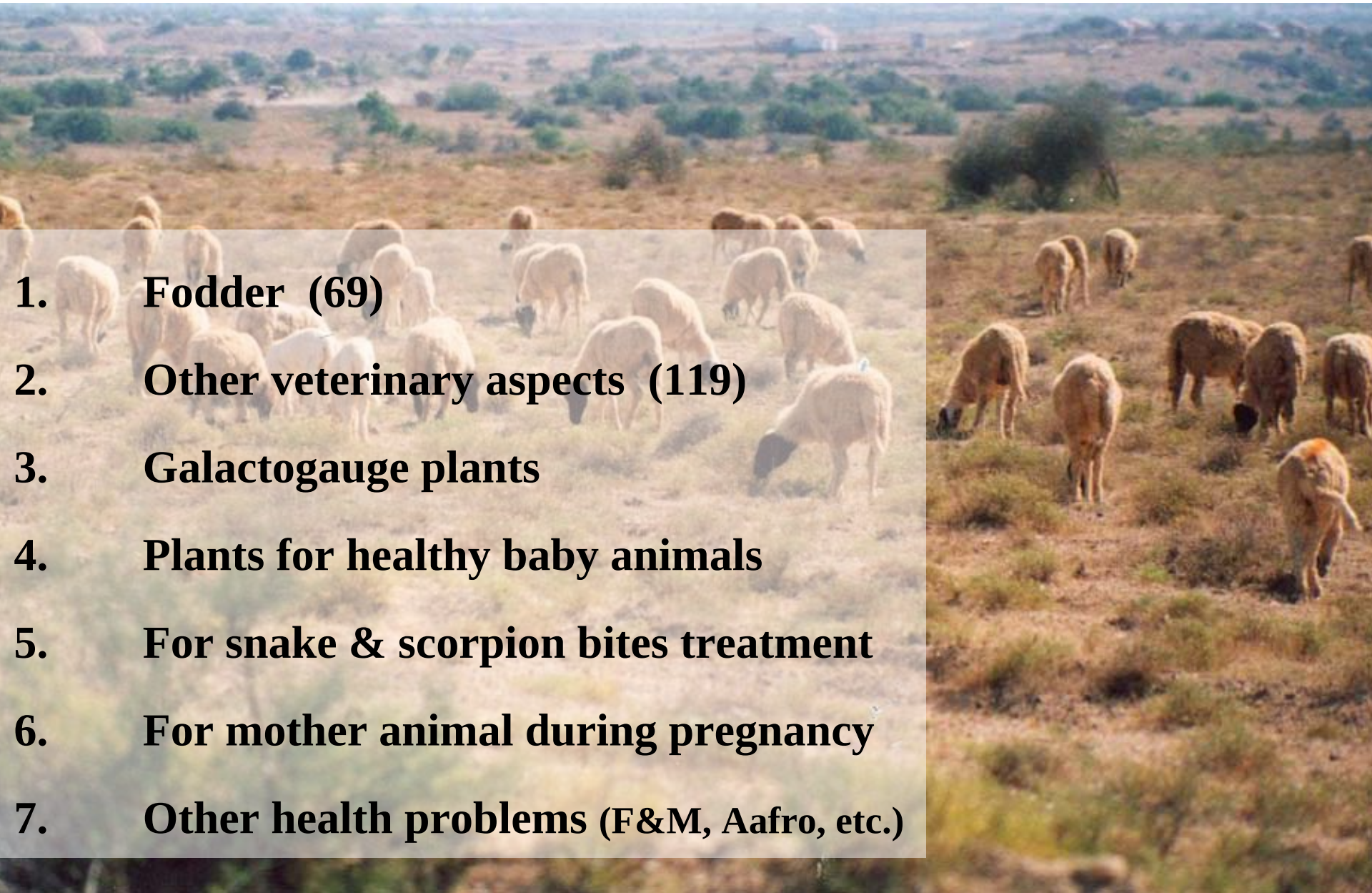
Very Healthy

Highly Nutritious

Important in local food system
&
species conservation

Countless nutritious & delicious recipes from Wild…

Fodder and other veterinary resources



1. Fodder (69)
2. Other veterinary aspects (119)
3. Galactogauge plants
4. Plants for healthy baby animals
5. For snake & scorpion bites treatment
6. For mother animal during pregnancy
7. Other health problems (F&M, Aafro, etc.)

Aravallis in Gujarat… Major Threats

1. **Mining**
2. **National Highway from Sanctury and Wild life Corridors**
3. **Pollution**
4. **Road Trampling (Big & Small Mammals, rhodents, reptiles, primates)**
5. **Tourism (Aarasur, Ambaji, Balaram, Shamlaji, Taranga, Pavgadh, WLSs)**
6. **Electrocution (Birds, Bats, flying fox)**
7. **Poaching**
8. **Illegal Trade of some wild floral & faunal species**
9. **Encroachment (Non forestry development activities)**
10. **Opening of canopy and degradation of natural storeyfication**
11. **Decreasing old aged trees (*Mahua, Butea*, etc.)**
12. **Destructive Harvesting**
13. **Soil erosion**

Cont…

Aravallis in Gujarat… Major Threats

14 **Changed Agriculture Trends**

15 **Over use of Pesticides/ Insecticides**

16 **Destruction of Grasslands**

17 **Over Grazing (due to pasture routes disturbed)**

18 **Repeated Drought and decreasing water regime**

19 **Scarcity of Surface Water**

20 **Invasive Species**

21 **Habitat Alteration**

22 **Habitat Loss**

23 **Fire**

24 **Desertification**

25 **Dispersed Habitations**

26 **Wells without Parapet Wall (threat for wild animals)**

Impacts on life

- Water channels affected
- Animal husbandry & related systems affected
- Agriculture production affected due to decreasing water regimes & decreasing numbers of pollinators
- Decreasing NTFPs, related economy affected
- Decreasing honeybee population (Honey, wax decreased)
- Decreasing cover and increasing aridity- affecting all natural resources based support systems
- Increased conflicts

FRA

- **Around 2500 individual cases have been approved.**
- **Many Rabaris came from outside and settled here after 1965; they have also filed cases for forest land.**
- **Several border issues are also in the queue.**
- **As the district Banaskantha shares its interstate border with Rajasthan, many cases are on the border buffer line. Authentication of such cases is very difficult. For such issues there is no solution.**
- **Study on the cultivation practices and other forest based livelihoods is essential to understand how the ecological changes will come in the region due to the practice of agriculture done on forest lands under FRA.**

Meaning of Community Forest Rights

Local Community's Relation with Biodiversity for Survival & in Daily Life

- Wild edibles (flora & fauna)
- Medicinal plants (>90% from forest areas, better than cultivated one)
- NTFPs/ MFPs (>90% from forest areas, significant role in local economy)
- Fodder (better quality & quantity, diversity, richness)
- Fuel (better-comfortable-viable options- many species availability)
- Agro-forestry support (soil binders, local seeds, fruits, climbers, etc.)
- Water regime balance through forest cover (stop desertification & soil erosion)
- Pasture system (cover, abundance, diversity of grasses, ecological shifting)
- Agriculture (ecosystem supported agriculture, low input, quality production)
- Oil yielding plants (edible, economic, species conservation)
- Dye yielding plants (traditional, economic, species conservation)
- Beverage making plants (tradition, economic, species conservation, medicine value)
- Religious & Spiritual uses of species/ Sacred elements (conservation)
- Poisonous plants (hunting, fish catching, species conservation, association)
- Natural-Traditional routes and groves (landscape level relation)
- Hut construction material (shelter, safety, storage, social need, diversity, durability)
- Craft making (tradition/ culture, diversity, economic, species association)
- Habitat conservation, protection, cultural diversity, Survival supports