

LAND USE/LAND COVER

Land use

- ✓ refers to “man’s activities and the various use which are carried on land”.

Land cover

- ✓ refers to, “natural vegetation, water bodies, rock/soil, artificial cover and others resulting due to land transformations”.
- ✓ Land use is generally inferred based on the cover, yet both the terms land use and land cover being closely related are interchangeable.
- ✓ For e.g., vegetation as a cover for agricultural crop and for forest and the respective activity is classified based on the contextual evidence.

Level-I	Level-II	Level-III
Built-up	Built-up (Urban)	Residential Area, Industrial Area, Recreational Area, Vacant Land , Public and Semi-public Area, Transportation and Communication, Public Utilities and Facility, Commercial Area, Plotted Land
	Built-up (Rural)	
Agriculture Land	Crop Land Fallow Land	
Forest	Dense Forest, Open Forest, Plantation, Mangroves	
Wastelands	Salt-affected, Gullied/Ravinous Land with/without scrub, Barren/Rocky, Sandy Area	
Waterbodies	Canal, Lakes/Ponds Reservoirs, Tanks, Cooling Pond	
Others	Quarry/Brick Kilns Dam/Barrage Coral reef/Atoll	

Source: Adopted from NUIS Manual, 2008.

Built-up Land:

It is an area of human habitation developed for non-agricultural use that has covered by buildings, transport and communications etc.

Agricultural Land:

It may be defined broadly as land primarily used for production of food and fibers.

Kharif Crop:

Crop season between June/July and September/October. This season coincides with the southwest monsoon.

Rabi Crop:

Crop season between November/December and February/March.

Zaid Crop:

These are the area cropped during the summer season which are mostly associated with fertile soils confined to plains or delta areas.

Double Crop:

Area shown more than one crop. These are the area cropped two or three seasons in the year. They are often associated with irrigated land

Fallow Land:

These are the land, which are taken up for cultivation but are temporarily allowed to rest. Uncropped for one or more seasons, but not less than one year.

Plantation:

These are the areas under tree crops planted adopting certain management techniques

Evergreen/ Semi-Evergreen Forest:

These are the areas that comprises of thick and dense canopy of tall trees, which predominantly remain green throughout the year.

Semi-Evergreen is a forest type which includes a combination of evergreen and deciduous species.

Deciduous Forest:

These are the forest types that are predominantly composed of species which shed their leaves once a year, especially during summer

Scrub Forest:

These are the forest areas where the crown density is less than 10% of the canopy cover generally seen at the fringes of dense forest cover.

Natural/Semi-Natural Grassland:

Grassland are the areas of grass along with other vegetation, predominated by former or grass like plants and non-grassy herbs.

Wastelands:

Wasteland is described as degraded land which can be brought under vegetative cover with reasonable effort. Land which is deteriorating for lack of appropriate water and soil management or on account of natural causes.

Scrub Land:

This is the land which is generally prone to deterioration due to erosion, with scrub dominating landscape. They have the tendency for intermixing with cropped areas.

Land without Scrub:

Similar to scrub land excepting that they possess sparse vegetation or devoid of scrub and they have a thin soil cover.

Shifting Cultivation:

Area of ground is cleared of vegetation and cultivated for a few years and then abandoned for a new area until its fertility has been naturally restored.

Water Bodies:

This category comprises areas with surface water, either impounded in the form of ponds, lakes and reservoirs or flowing streams, river and canals etc.

Gullied Land:

These are the first stage of excessive land dissection followed by their networking which leads to the development of Ravenous land

TABLE 2. Land use and land cover classification system for use with remote sensor data

Level I	Level II
1 Urban or Built-up Land	11 Residential
	12 Commercial and Services
	13 Industrial
	14 Transportation, Communications, and Utilities
	15 Industrial and Commercial Complexes
	16 Mixed Urban or Built-up Land
	17 Other Urban or Built-up Land
2 Agricultural Land	21 Cropland and Pasture
	22 Orchards, Groves, Vineyards, Nurseries, and Ornamental Horticultural Areas

	23 Confined Feeding Operations
	24 Other Agricultural Land
3 Rangeland	31 Herbaceous Rangeland
	32 Shrub and Brush Rangeland
	33 Mixed Rangeland
4 Forest Land	41 Deciduous Forest Land
	42 Evergreen Forest Land
	43 Mixed Forest Land
5 Water	51 Streams and Canals
	52 Lakes
	53 Reservoirs
	54 Bays and Estuaries

6 Wetland	61 Forested Wetland
	62 Nonforested Wetland
7 Barren Land	71 Dry Salt Flats.
	72 Beaches
	73 Sandy Areas other than Beaches
	74 Bare Exposed Rock
	75 Strip Mines Quarries, and Gravel Pits
	76 Transitional Areas
	77 Mixed Barren Land
8 Tundra	81 Shrub and Brush Tundra
	82 Herbaceous Tundra
	83 Bare Ground Tundra
	84 Wet Tundra
	85 Mixed Tundra
9 Perennial Snow or Ice	91 Perennial Snowfields
	92 Glaciers

Level 1

1. Urban or built-up

Level II

11. Residential

Level III

111. Single-family Units

112. Multi-family Units

113. Group Quarters

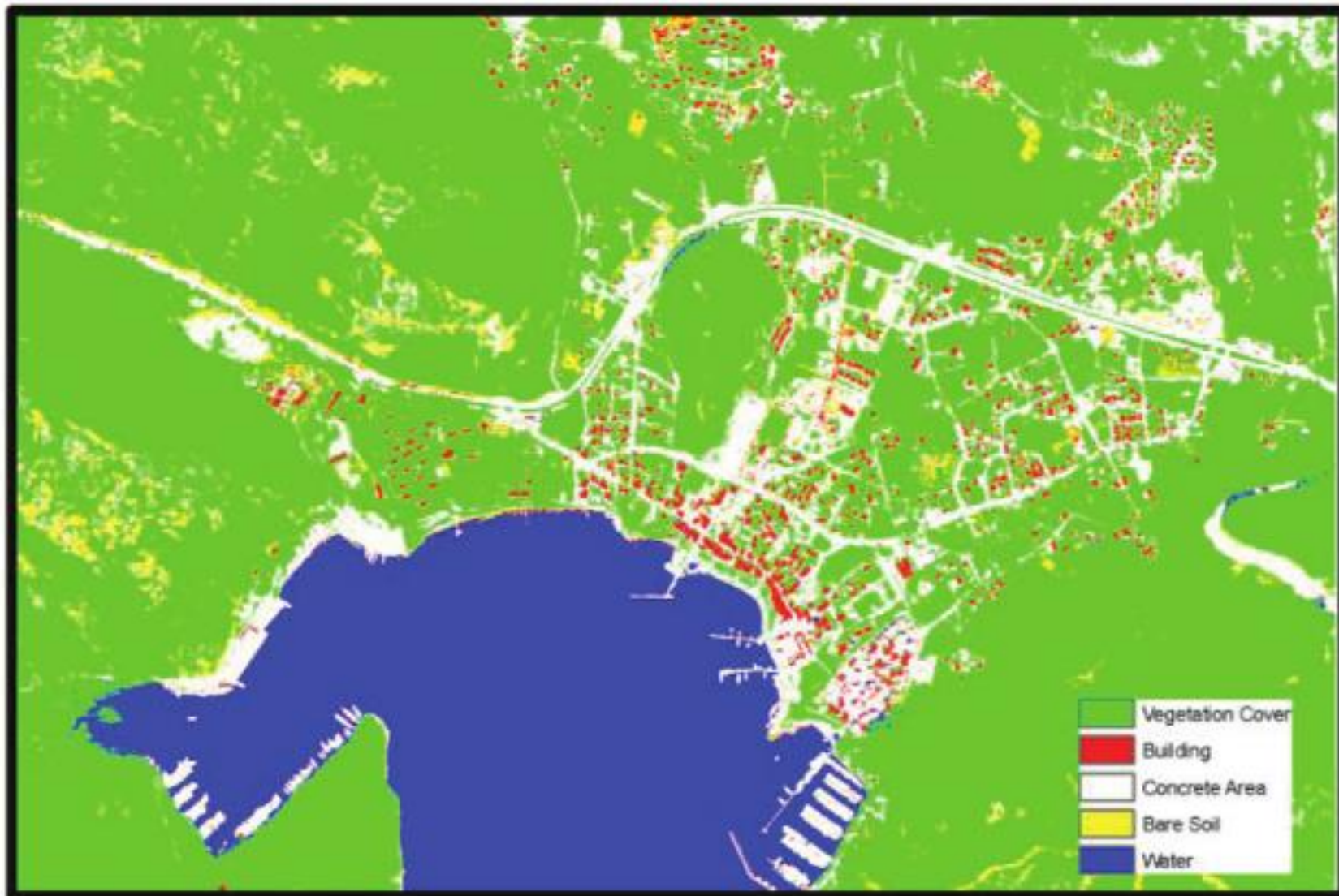
114. Residential Hotels

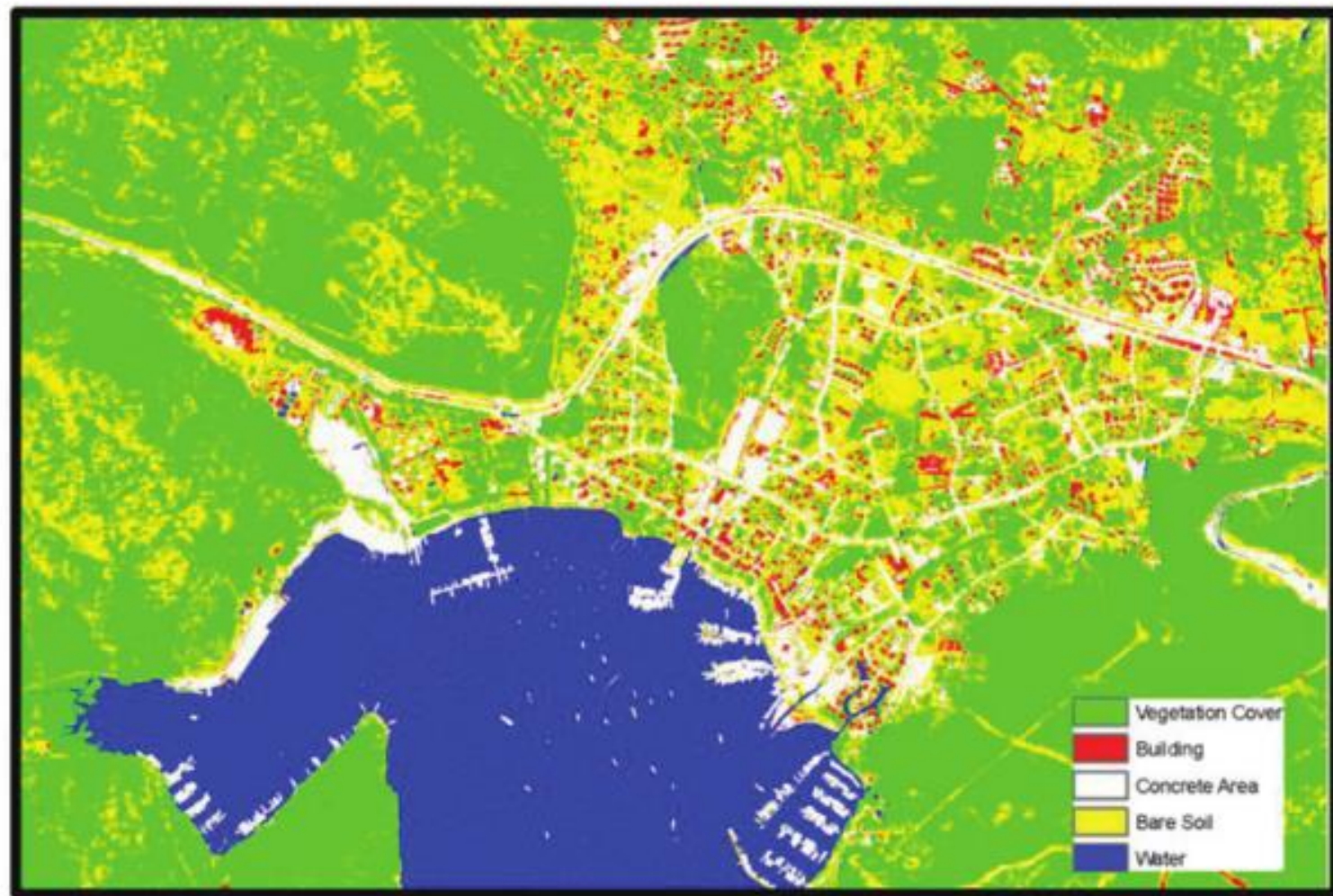
115. Mobile Home Parks

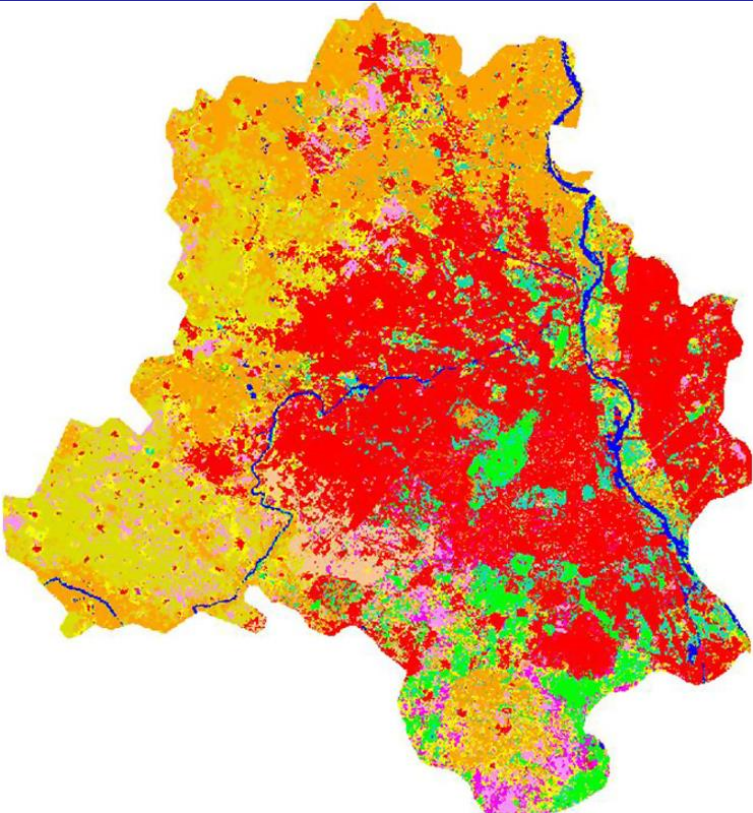
116. Transient Lodging

117. Other



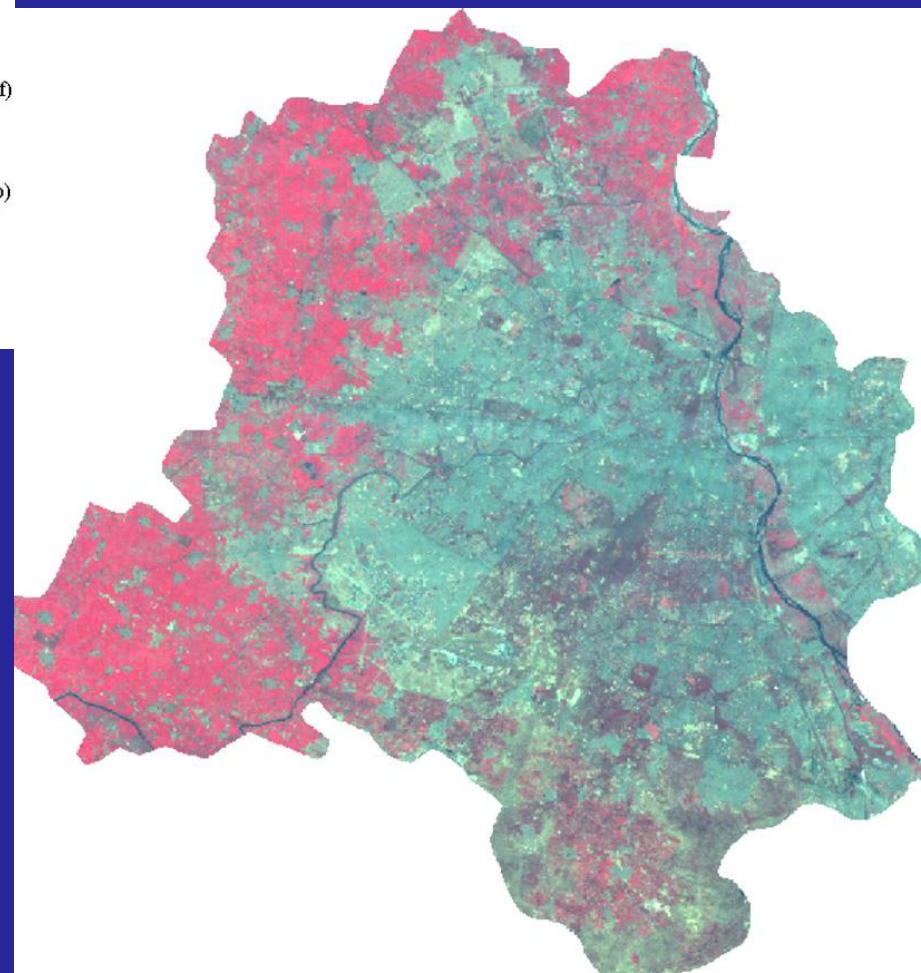






Legend

- Double Crop (Db)
- Kharif Crop (Kh)
- Rabi Crop (Rb)
- Zaid Crop (Zd)
- Current Fallow (Cf)
- Scrubland (Sc)
- Forest (Fo)
- Plantation (Pl)
- Water Bodies (Wb)
- Built up land (Bu)
- Wasteland (Wl)

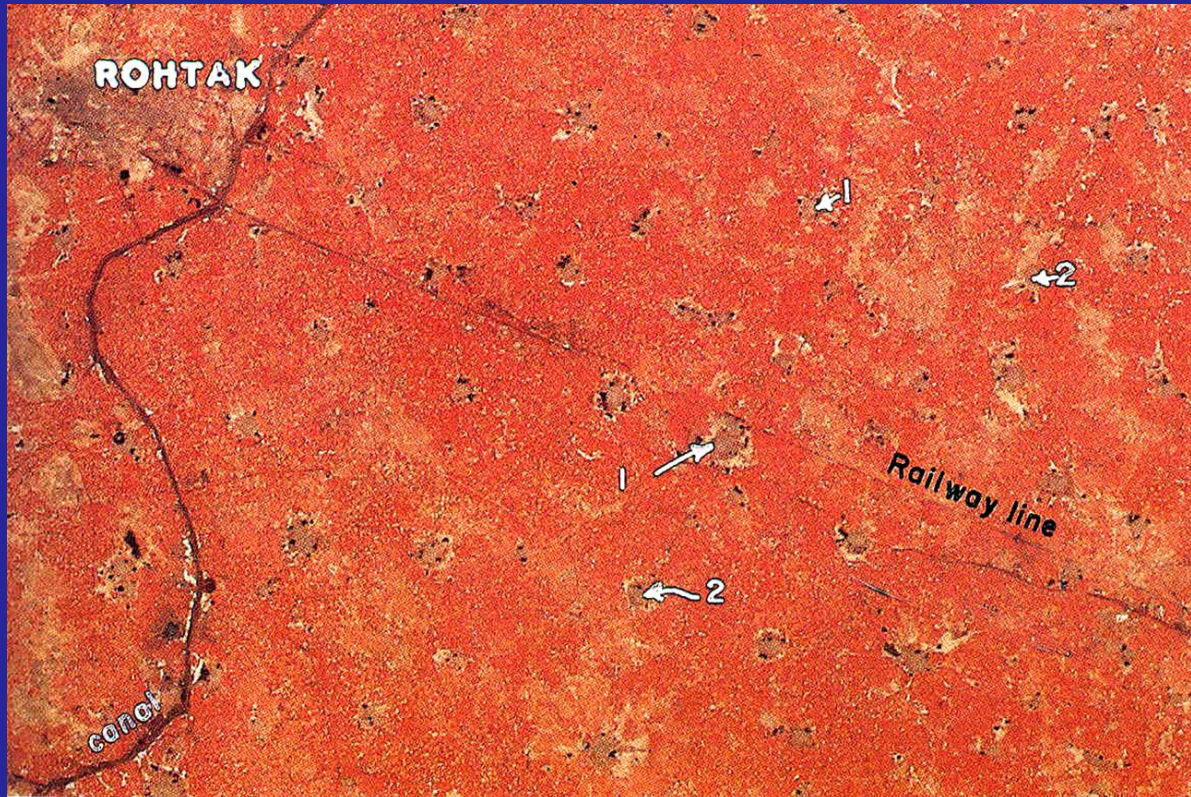


Land use/Land cover Classification System

LEVEL-I	LEVEL-II
1. BUILD-UP LAND	1.1 Built-up land (i) Urban (ii) Rural
2. AGRICULTURAL LAND	2.1 Crop land (i) Kharif (ii) Rabi (iii) Kharif + Rabi 2.2 Fallow 2.3 Plantation
3. FOREST	3.1 Evergreen/Semi-evergreen forest 3.2 Deciduous forest 3.3 Degraded or Scrub land 3.4 Forest Blank 3.5 Forest Plantation 3.6 Mangrove
4. WASTELAND	4.1 Salt affected area 4.2 Waterlogged land 4.3 Marshy/swampy land 4.4 Gullied/Ravinous land 4.5 Land with or without Scrub 4.6 Sandy area (coastal and desertic) 4.7 Barren rocky/Stony waste/Sheet rock area
5. WATER BODIES	5.1 River/Stream 5.2 Lake/Reservoir/Tank/Canal
6. OTHERS	6.1 shifting cultivation 6.2 Grassland/Grazing land 6.3 Snow covered/Glacial area

Definition and explanation of **BUILT-UP LAND*** 1 & 2

It is defined as an area of human habitation developed due to non-agricultural use and that which has a cover of buildings, transport, communication, utilities in association with water, vegetation and vacant lands,



Build-up land, big and small in size (1&2) appears bluish green in tone, dispersed, and with definite size and shapes. Rohtak is seen on the top left corner and the railway line across the centre

AGRICULTURAL LAND

- ✓ It is defined as the land primarily used for forming and for production of food, fiber, other commercial and horticultural crops. It includes crops (irrigated and un-irrigated), fallow, plantations etc.



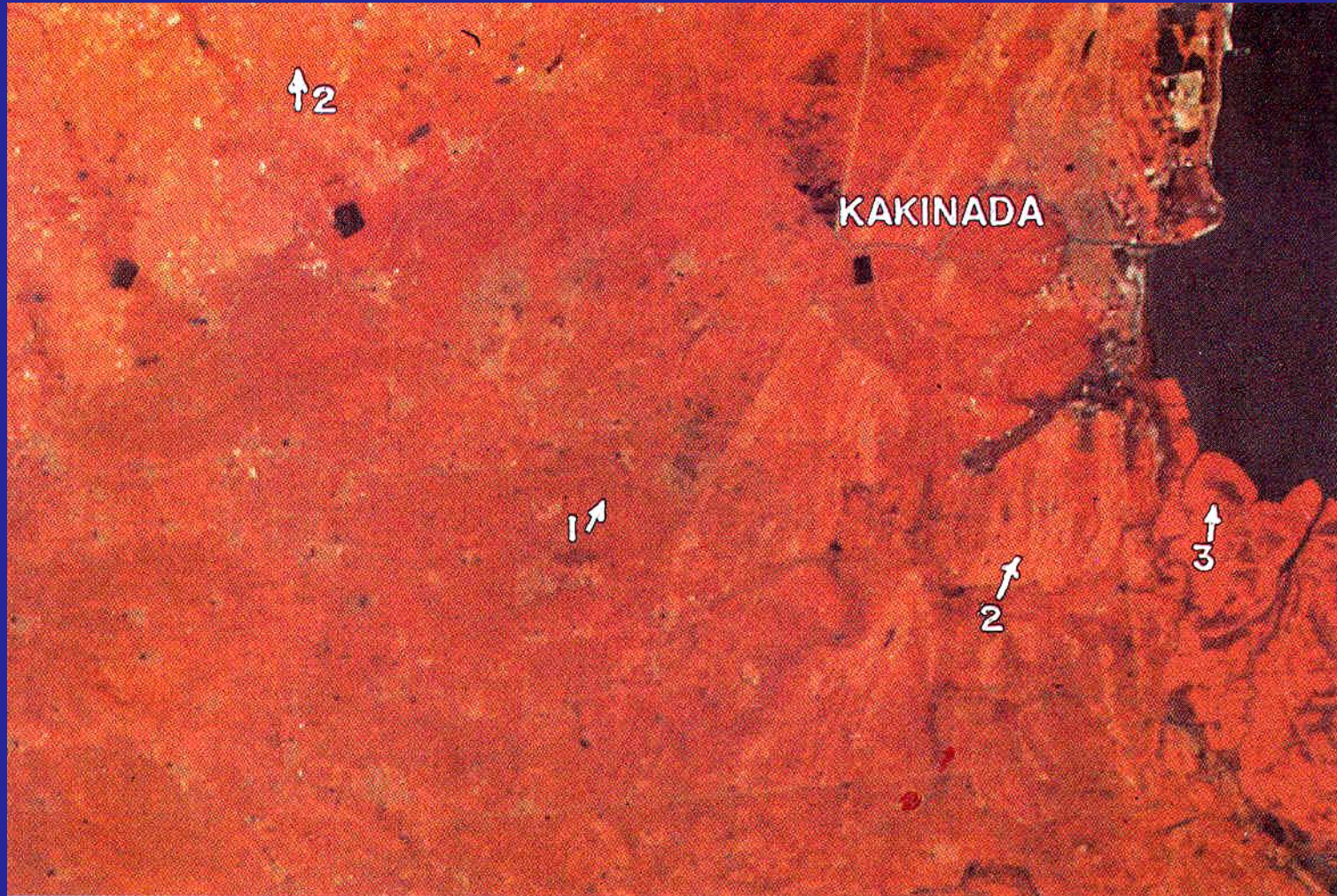
Definition and explanation of Crop land

It includes those lands with standing crop (per-se) as on the date of the satellite imagery. The crops may be of either Kharif*³ or Rabi*⁴ or Kharif + Rabi seasons.*⁵



Cropland (Kharif season) in parts of Srikakulam district, A.P. appear bright red to dark red in tone (1) irrigated, contiguous with smooth texture. Agricultural plantation (2) appear in orange red tone and contiguous and fallow land (3) appear in light yellow tone, small in size, non-contiguous and scattered on the imagery. The deciduous forest cover (4) on hills of Eastern Ghats is also clearly seen

IRRIGATED CROP LAND (KHARIF SEASON)



Irrigated crop land (Kharif season) in Godavari delta near Kakinada, A.P. appear in red tone (1) and un-irrigated crop and plantations on the sandstone upland and beach ridges appear in orange tone (2) on FCC imagery. A portion of the mangrove swamps (near the coast) is also seen (3)

IRRIGATED CROP LAND (RABI SEASON)

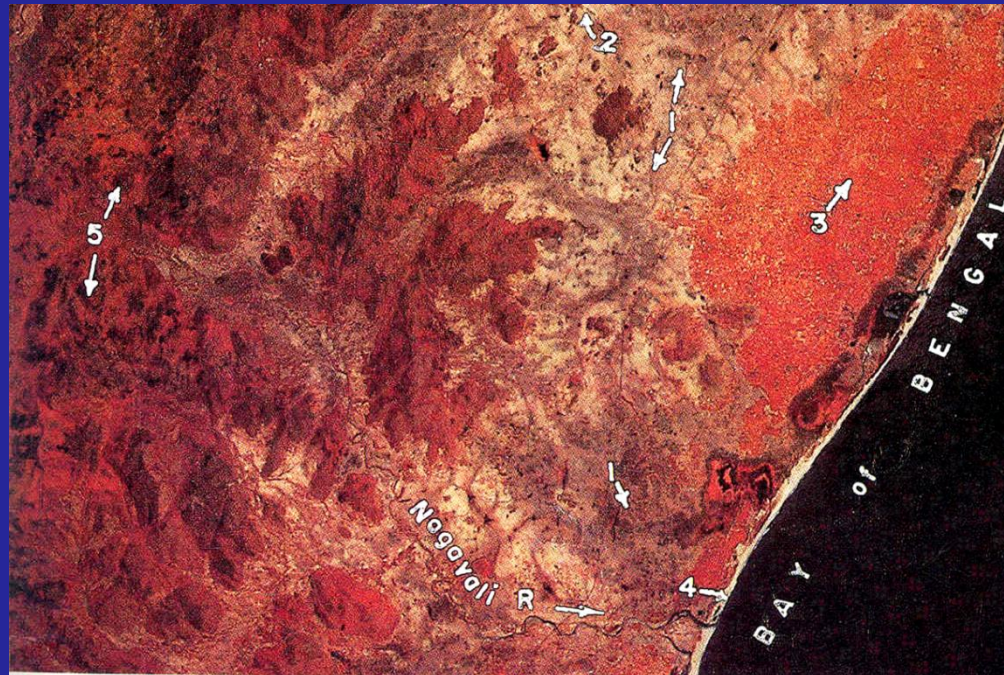


Irrigated crop land (rabi season) matured and contiguous in Godavari delta appear in bright red tone (1) and un-irrigated cropland (2) appears fallow on FCC imagery. The plantations on the upland are also clearly seen (3). *The area under crop (karif& rabi) is the double cropped area.*

Definition and explanation of Fallow land

It is described as agricultural land which is taken up for cultivation but is temporarily allowed to rest, un-cropped for one or more seasons, but not less than one year. These lands are particularly those which are seen devoid of crops at the time when the imagery is taken of both seasons.

It is the land, which remains vacant without crop during both Kharif and Rabi seas



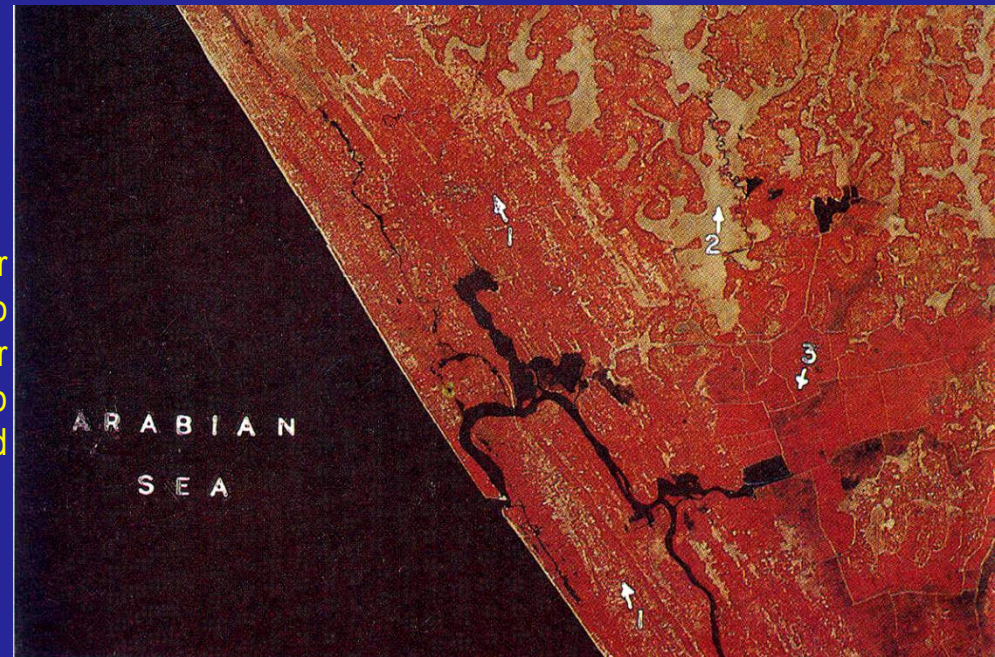
Fallow land (rabi season) in parts of Srikakulam district, A.P. appear in brown (moist soils) to yellow (sandy soil) tone (1). Agricultural plantations (3) appear in orange tone on FCC imagery. Coastal beach (4) and deciduous forest cover (5) on hills is also clearly seen.

Definition and explanation of **Plantations**

It is described as an area under agricultural tree crops, planted adopting certain agricultural management techniques. It includes tea, coffee, rubber, coconut, arecanut, citrus, orchards and other horticultural nurseries.

It is defined as the land primarily used for forming and for production of food, fiber; other commercial and horticultural crops. It includes crops (irrigated and un- irrigated), fallow; plantations etc.

Agricultural plantations (1) along the West Coast of Kerala appear dark red to red in tone, with regular shapes, contiguous, parallel to the coast on FCC imagery. Fallow land (2) in the lowlands appear greenish blue in tone, irregular in shape and non-contiguous. Crop land (3) appear bright red in tone, regular in shape and contiguous with distinct field boundaries and channels.



Definition and explanation of **FOREST** * 6 & 7

It is an area (within the notified forest boundary) bearing an association predominantly of trees and other vegetation types capable of producing timber and other forest produce.

Definition and explanation of **Evergreen/Semi-evergreen forest**

It is described as a forest which comprises of thick and dense canopy of tall trees which predominantly remain green throughout the year. It includes both coniferous and tropical broadleaved evergreen trees. Semi-evergreen forest is a mixture of both deciduous and evergreen trees but the latter predominate.

EVERGREEN FOREST



Evergreen forests (1) in the Western Ghat slopes to the north of Idukki in Kerala appear bright to dark red in tone irregular in shape, contiguous, and smooth in texture on FCC imagery. The grasslands (2) appear in light brown tone, irregular and contiguous.

Definition and explanation of Deciduous forest

It is described as a forest which predominantly comprises of deciduous species and where the trees shed their leaves once in year



Deciduous forests in parts of Nallamalai Hills, Prakasam district, A.P. appear in dark brown to red tone (1), irregular and contiguous on FCC imagery. The land with or without scrub is also clearly seen

Definition and explanation of Degraded forest or Scrub

It is described as a forest where the vegetative (crown) density is less than 20% of the canopy cover. It is the result of both biotic and abiotic influences. Scrub is a stunted tree or bush shrub



Degraded forest or scrub land near Madanapalle, Chittoor dt., A.P. appear light red in tone (1&2) irregular in shape, coarse in texture, non-contiguous on FCC imagery. The land with or without scrub and barren rocky areas are also seen (3)

Definition and explanation of **Forest Blank**

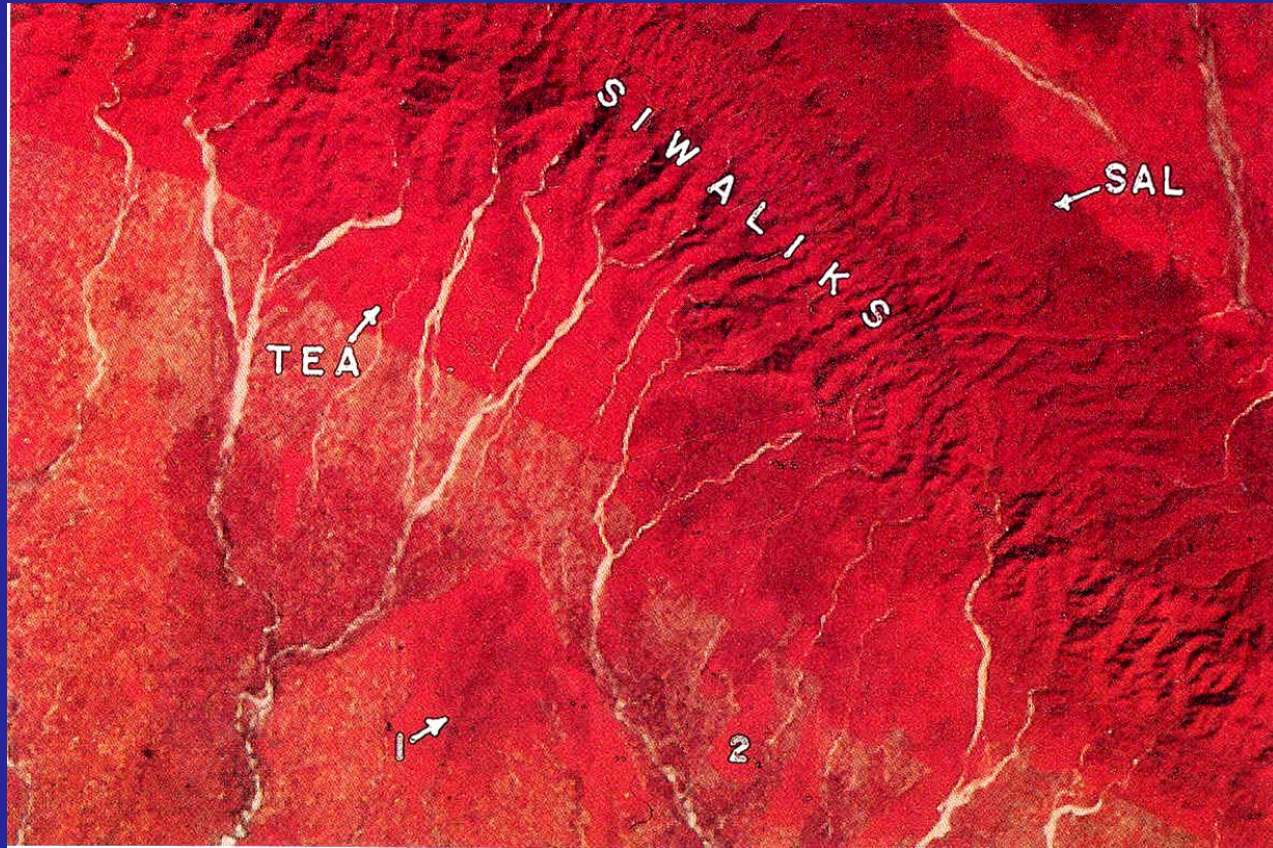
It is described as openings amidst forest without any tree cover. It includes openings of assorted size and shapes as seen on the imagery



Forest blanks in the Javadi hills, Vellore district, Tamil Nadu, amidst forest cover appear distinctly in the light reddish and yellow tone (1&2) small to big in size, irregular in shape, non-contiguous on FCC imagery. The unirrigated crop land in the plains are also seen (3).

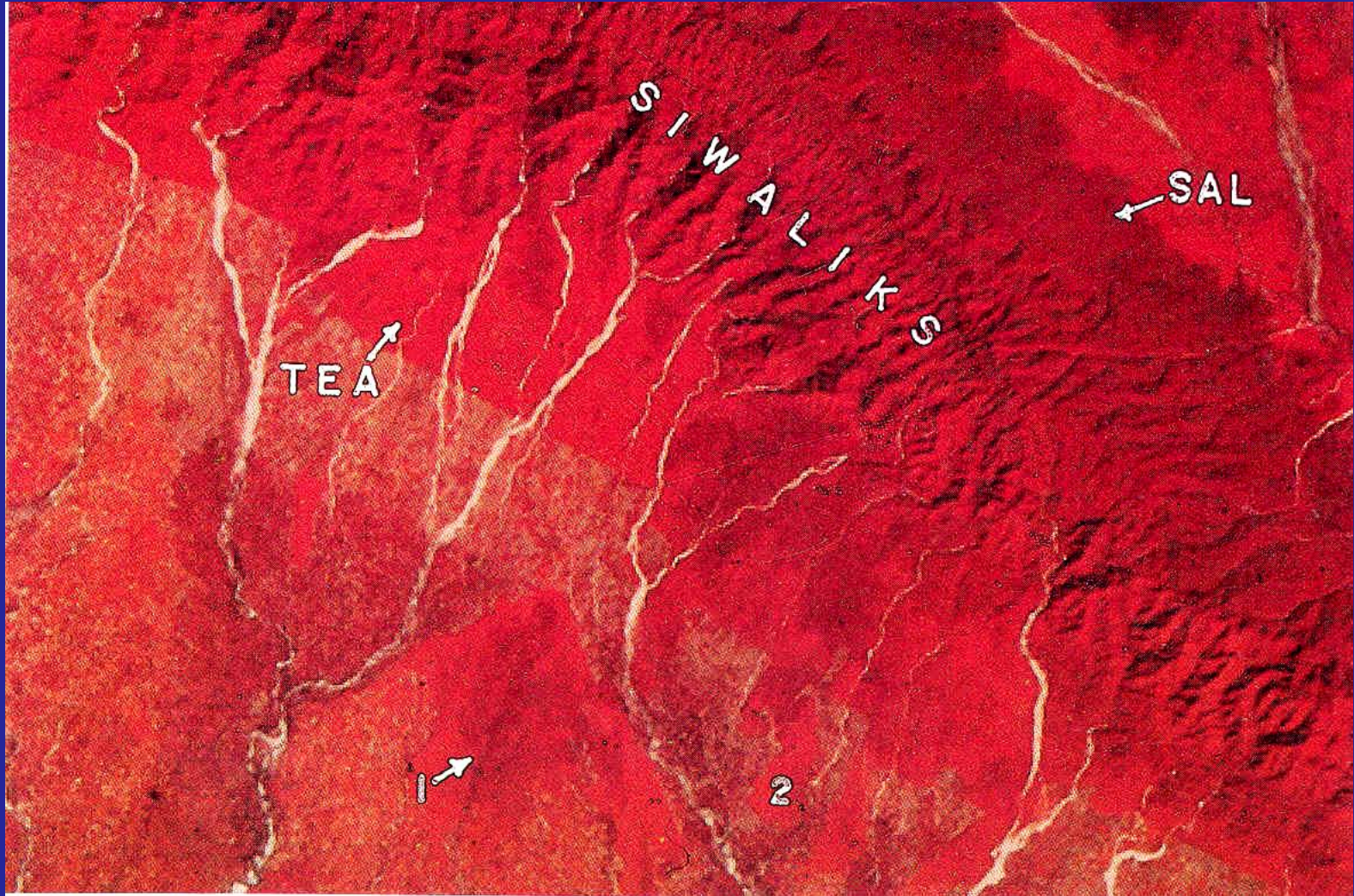
Definition and explanation of Forest Plantations

It is described as an area of trees of species of forestry importance and raised on notified forest lands. It includes, eucalyptus, casuarina, bamboo etc.



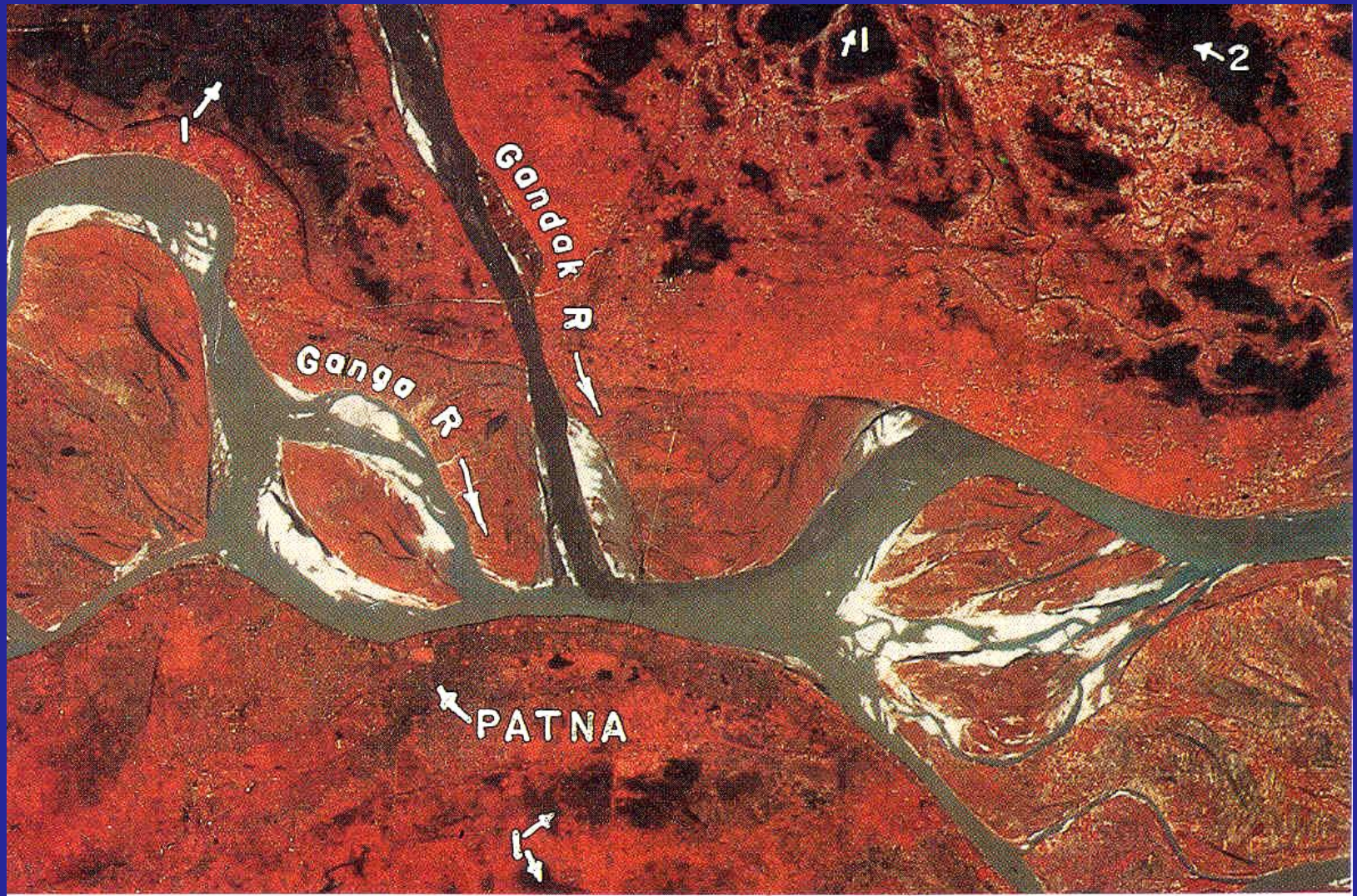
Forest plantations within the notified forest area in the foothills of Siwalik Himalayas in Northern Uttar Pradesh appear bright to light red in tone (1&2) regular in shape with sharp edges, smooth texture on FCC imagery. Tea and Sal plantations are also seen

FOREST PLANTATIONS



Forest plantations within the notified forest area in the foothills of Siwalik Himalayas in Northern Uttar Pradesh appear bright to light red in tone (1&2) regular in shape with sharp edges, smooth texture on FCC imagery. Tea and Sal plantations are also seen

WATER LOGGED AREA



Waterlogged area to the North South Patna of in the plains of Bihar appear dark bluish to blue in tone, amidst crop land (1&2), irregular in shape, with smooth to mottled texture, non-contiguous on FCC imagery

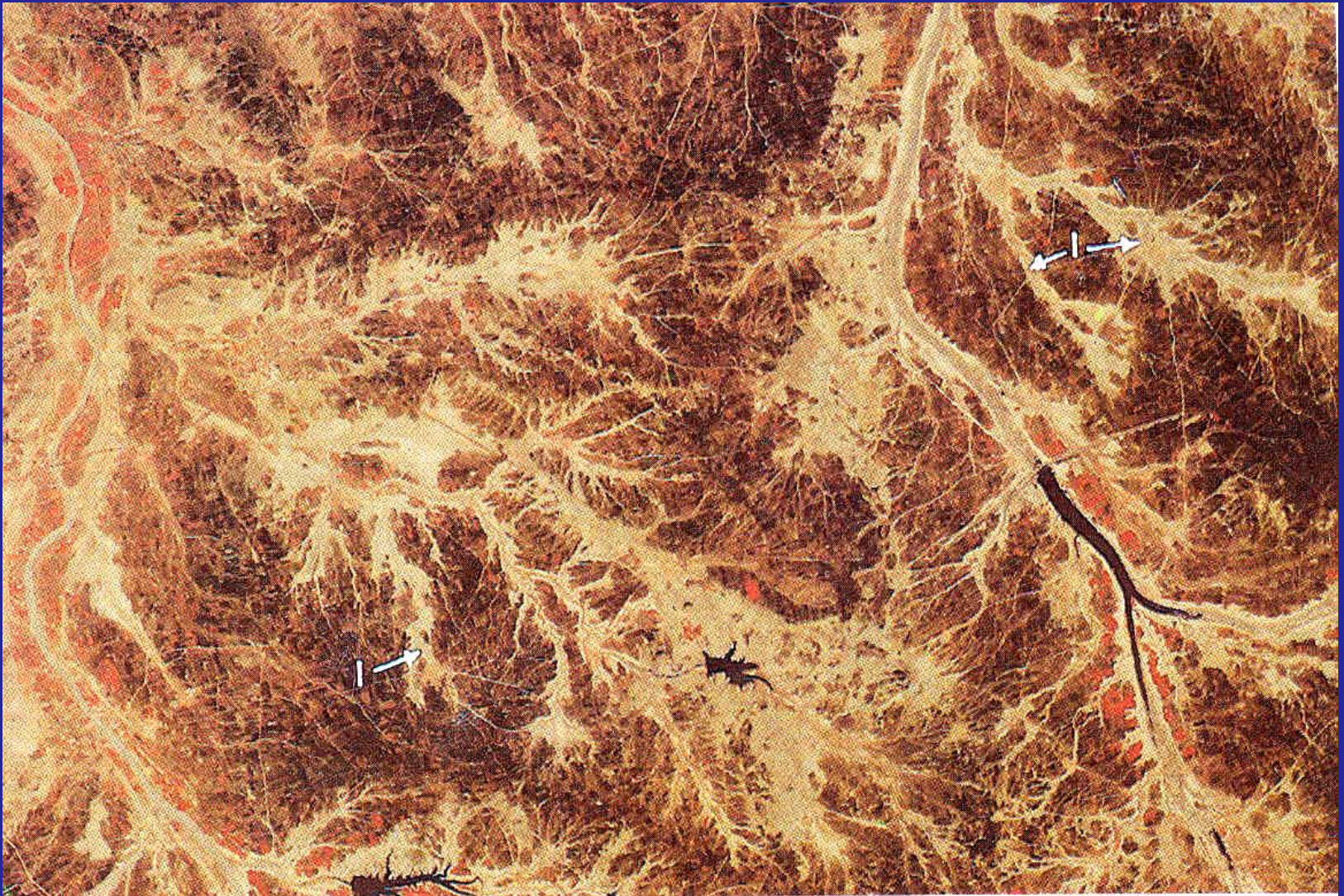
Definition and explanation of Gullied/Ravinous land

The gullies are formed as a result of localised surface runoff affecting the friable unconsolidated material in the formation of perceptible channels resulting in undulating terrain. The gullies are the first stage of excessive land dissection followed by their networking which leads to the development of ravinous land. The word 'ravine'^{*13} is usually associated not with an isolated gully but a network of deep gullies formed generally in thick alluvium and entering a nearby river, flowing much lower than the surrounding high rounds. The ravines, are extensive systems of gullies developed along river courses

13 ravine

For operational convenience, ravines can be classified as under i) shallow 3-6 m ii) Medium 6-9 m iii) Deep >9 m

GULLIES



Gullies along the stream course on black soils in parts of Jamnagar district, Gujarat appear light yellow to greenish in tone, (1), irregular in shape, coarse in texture with dendritic to sub-dendritic pattern on FCC imagery

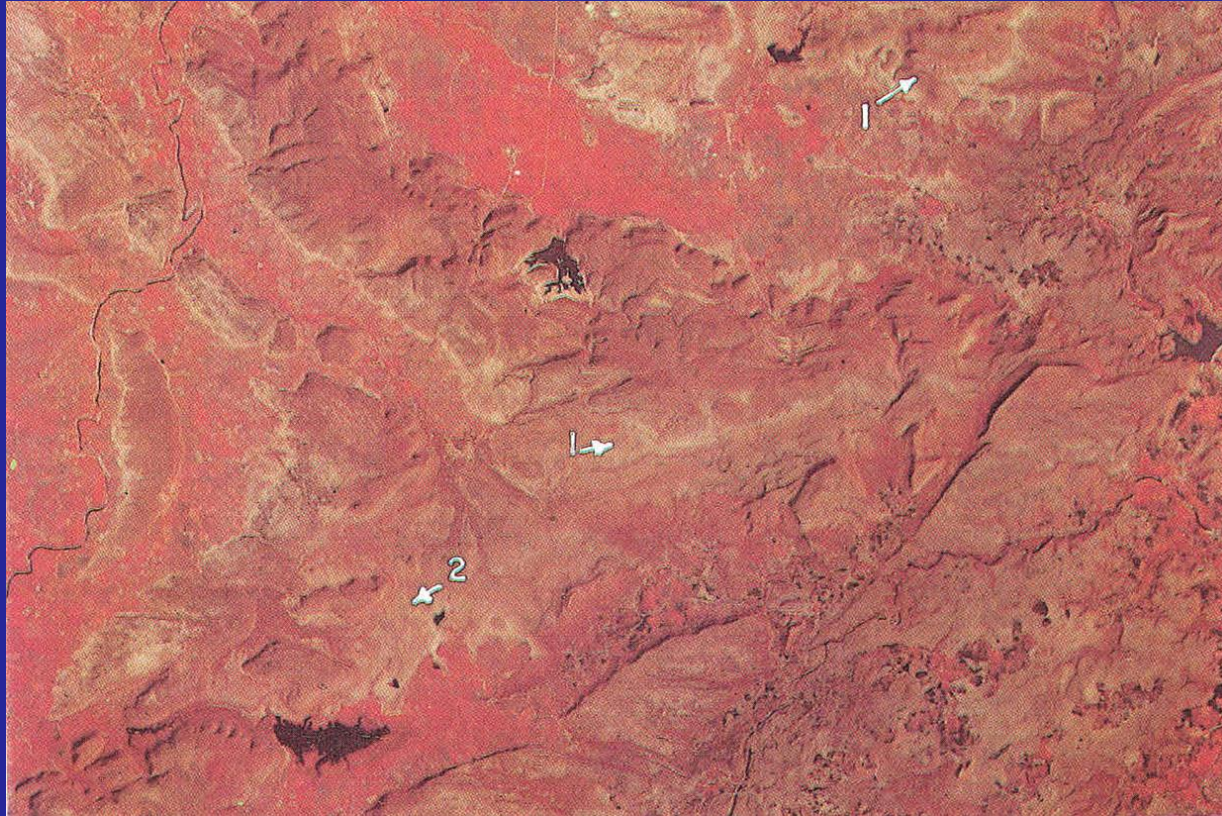
Definition and explanation of Land with or without scrub

They occupy (relatively) higher topography like uplands or high grounds with or without scrub. These lands are generally prone to degradation or erosion. These exclude hilly and mountainous terrain.



Definition and explanation of **Barren rocky/Stony waste/Sheet rock area***^{14,15}

It is defined as the rock exposures of varying lithology often barren and devoid of soil cover and vegetation. They occur amidst hill forests as openings or scattered as isolated exposures or loose fragments of boulders or as sheet rocks on plateau and plain



Barren rocky/sheet rock areas (1&2) in Central Madhya Pradesh appear light to dark brown in tone, irregular in shape, coarse in texture, contiguous and associated with hill slopes on FCC imagery

Water bodies

It is an area of impounded water, areal extent and often with a regulated flow of water. It includes man-made reservoirs/lakes/ tanks/canals, besides natural lakes, rivers/ streams and creeks.

Lake/Reservoir/Tank/Canal

It includes inland fresh water lakes, salt lakes, coastal lakes and lagoons

Definition and explanation of River/Stream

It is a natural course of flowing water on the land along definite channels. It includes from a small stream to a big river and its branches. It may be perennial or non-perennial.



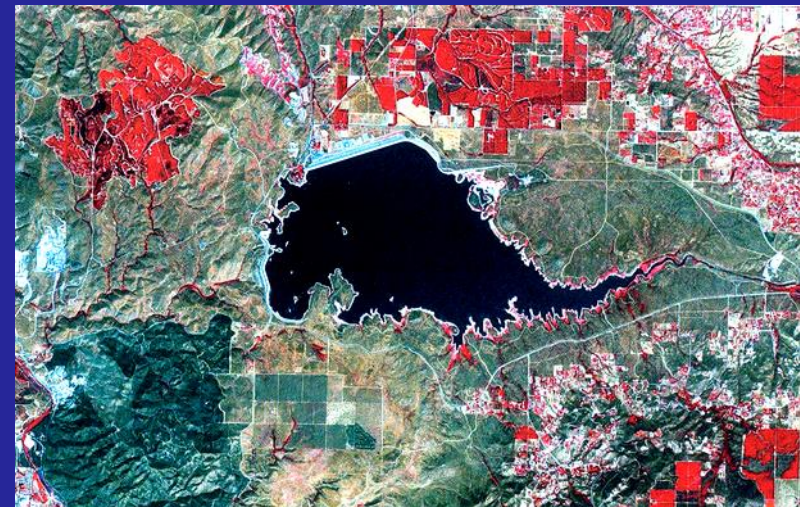
Rivers/streams in plains bordering Arunachal Pradesh and upper Assam appear dark blue in tone, long and narrow to wide in size, irregular in shape, contiguous, non-linear, in association with river sand which river sand appear in white tone(1) on FCC imagery. Forest plantations close to Dihang river is also seen in bright red tone (2)

Definition and explanation of Reservoir/Lakes/Tanks/Canal

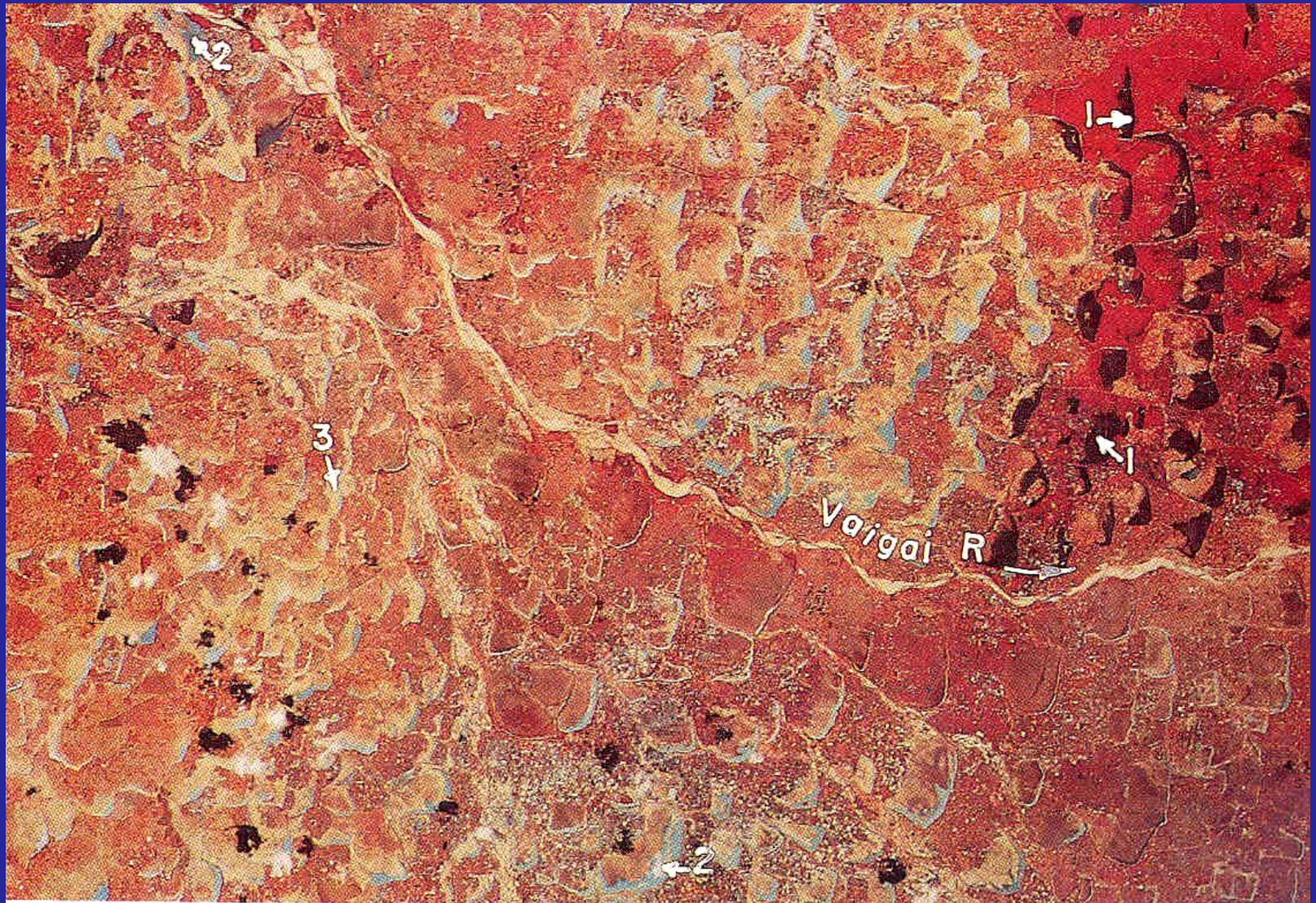
It is a natural or man made enclosed water body with a regulated flow of water. Reservoirs are larger than tanks/lakes and are used for generating electricity, irrigation and for flood control. Tanks are smaller in areal extent with limited use than the former. Canals are inland waterways used for irrigation and sometimes for navigation.



Stanley reservoir on Cauvery river in the hill forests of northwestern Tamil Nadu appear dark blue in tone, large in size, irregular in shape, contiguous on FCC imagery

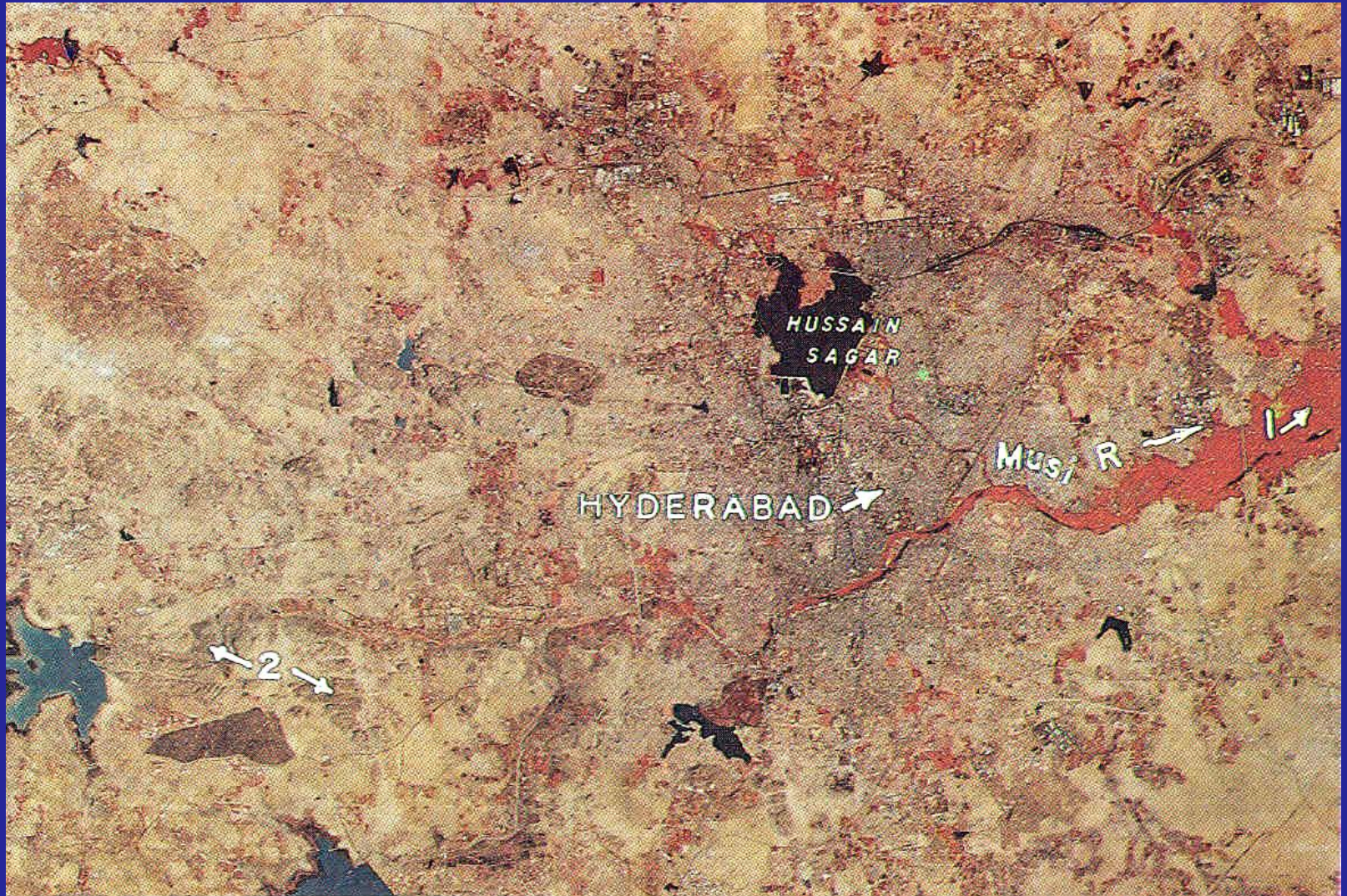


TANKS



Tanks in parts of Ramnad district of Tamil Nadu appear in dark blue tone (1) and in light blue tone (2), in varying size, irregular shapes, non-contiguous and dispersed on FCC imagery. The dry tank beds (3) with light yellow tone are also seen

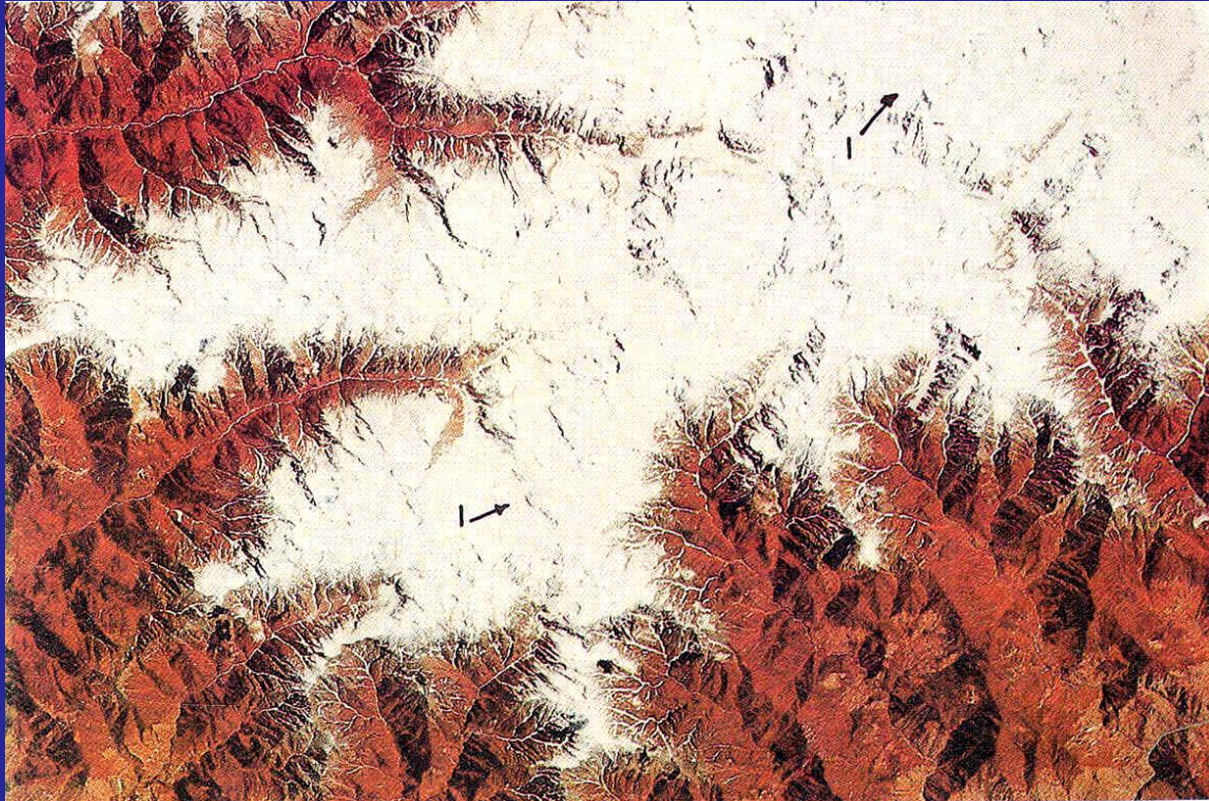
GRASSLANDS



Grasslands (1) on the banks of river Musi near Hyderabad, A.P. appear in bright red tone, linear and contiguous. The city of Hyderabad on the banks of river Musi appear in bluish green tone on FCC imagery. Barren rocky areas are also seen (2)

Definition and explanation of Snow covered/Glacial area

It is defined as a solid form of water consisting of minute particles of ice. It includes permanently snow covered areas as on the Himalayas. Glacier is a mass of accumulated ice occurring amidst permanently snow covered areas.



Snow covered/Glacial areas (1) in the Himalayas appear bright white in tone, irregular in shape, smooth in texture, contiguous pattern in association with mountain peaks and slopes on FCC imagery.

Others

Mining and industrial wastes, saltpans, reclaimed lands, classes relevant to a particular district will be mapped separately, wherever feasible. These will be classified under others.

Tidal/mud flats, which are visible during low tides along the coastal areas, will also be mapped separately if these are identified on satellite imagery. These will be classified under others.

MINING AREAS



Mining areas to the south and west of Dhanbad (Jharia Coal Fields) appear in light grey to black tone, (1&2) with irregular shape, mottled texture and contiguous pattern on FCC imagery. The lands with or without sand (scrub) are also seen (3)