Zoning Atlas for Siting of Industries

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About the Programme

- In 1995, Central Pollution Control Board started the environmental planning programme known as "Zoning Atlas for Siting of Industries" (ZASI) for identifying sites/zones for industries in a district based on environmental considerations.
- The programme in project mode continued till 2008
- During this period capacity was built in the participating SPCBs/PCCs in terms of training to officials, hardwares and softwares.
- More than 100 districts were covered in 21 participating States.
- It was an attempt to facilitate industrial siting, using environmental planning technique
- Provides environmentally acceptable sites based on the pollution potential of the source and assimilative capacity of the receiving environment
- ❖ Scale of the study was 1:250000

Objectives

> To zone and classify environment in a district

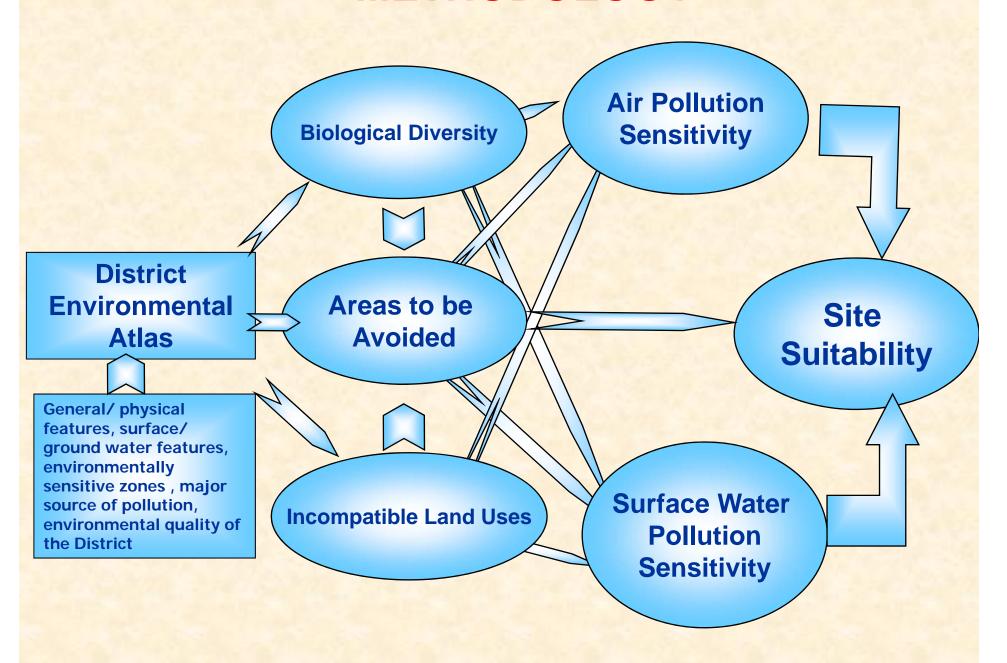
> To identify locations for siting of industries

> to identify industries suitable to the identified sites

TOOLS USED

- > Spatial environmental planning
- > Remote sensing
- Mapping
- > GIS

METHODOLOGY



STEPS FOR PREPARATION

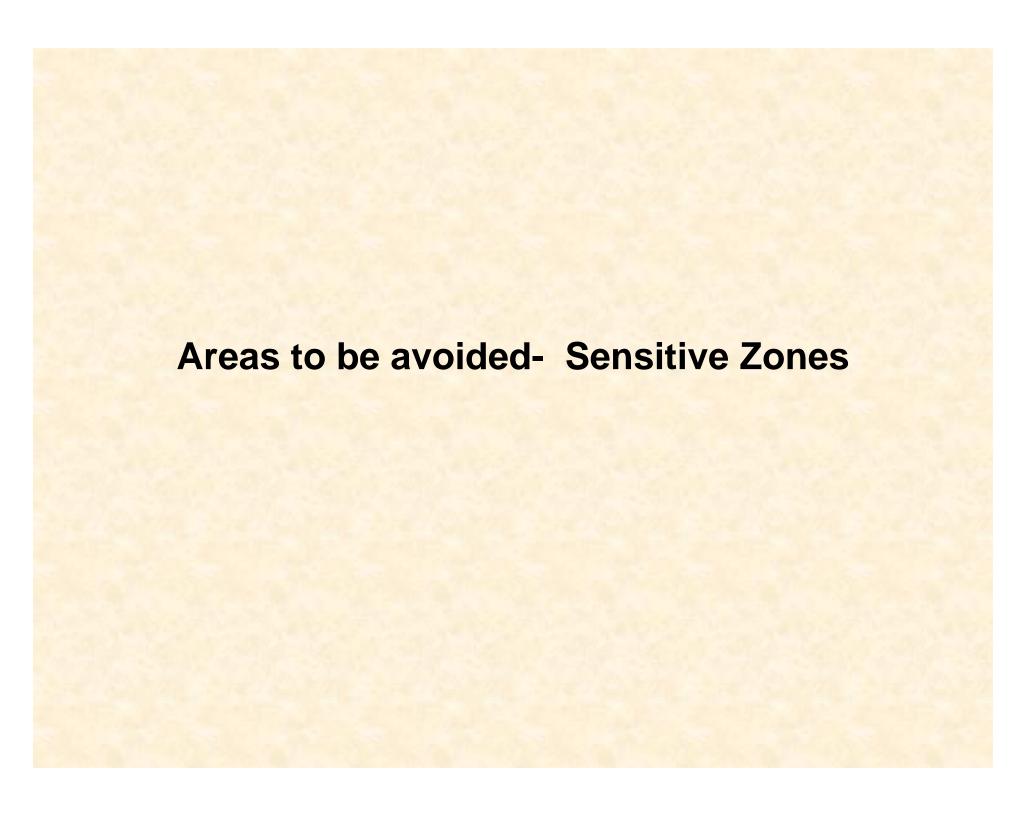
First Step

To prepare District Environmental Atlas which Contains information on administrative division of the district, physical features of the district, Land Capability, Climatic conditions, socioeconomic Conditions, Surface water use, quality, flow, Drainage Pattern, Ground water use, Potential, table, quality, environmental quality, pollution load etc.

Second Step

From the District Atlas, Zoning Atlases are prepared with following themes:

- Areas to be avoided (Biological diversity and Incompatible Landuse) - Environmentally Sensitive Zones
- ➤ Air Pollution Sensitivity (Sites for air polluting Industries)
- Surface Water Pollution Sensitivity (Sites for water polluting Industries)
- Suitability of sites/zones for industrial location



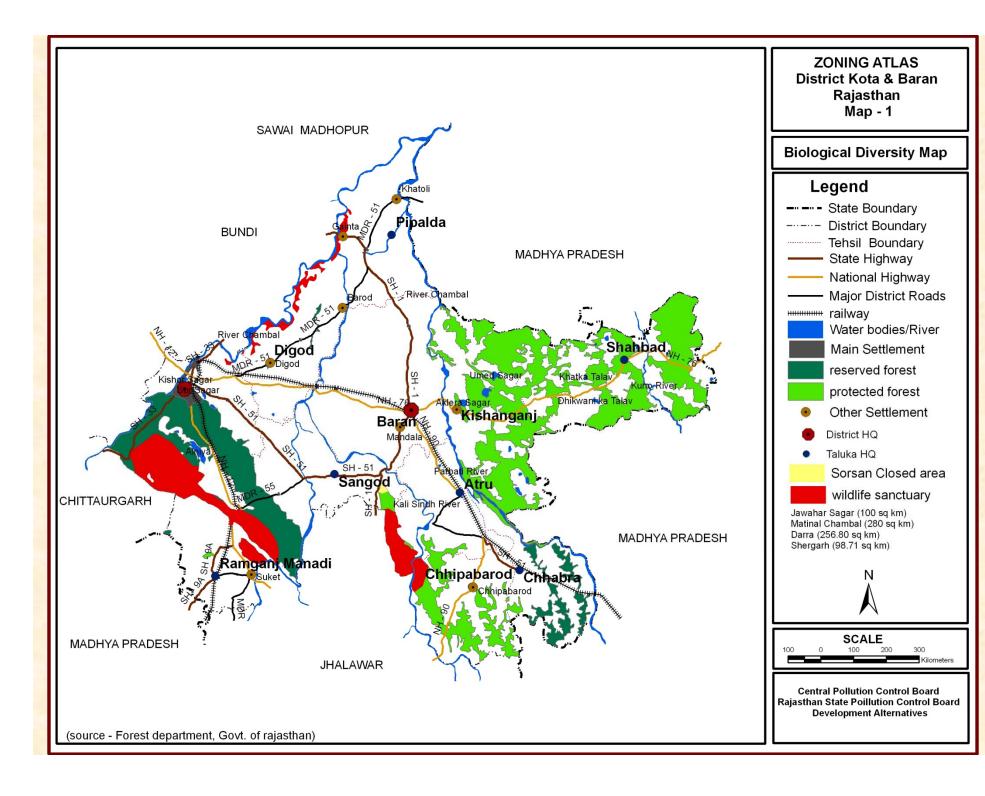
Biological Diversity /Incompatible Land Uses-Sensitive Zones

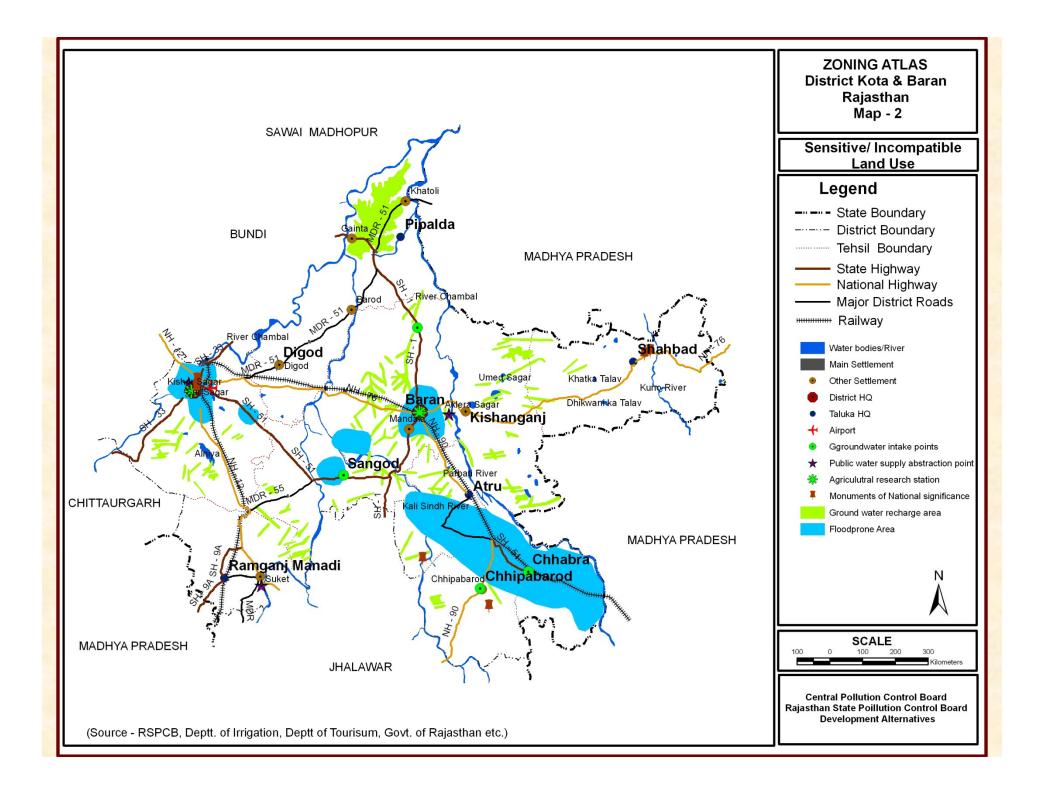
▶Biological Diversity:

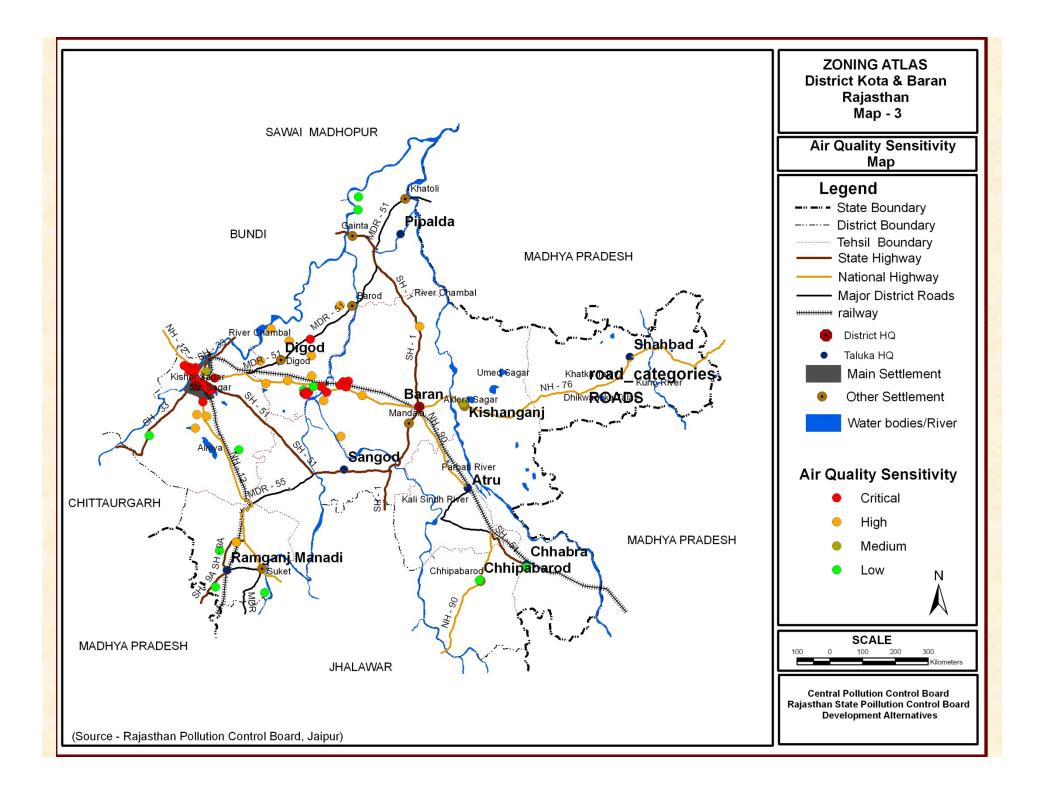
Sanctuaries, National parks, Game reserve, Tiger reserve/elephant reserve/turtle nesting ground, breeding grounds Core areas of Biosphere reserves, Wet lands, Areas with threatened (rare, vulnerable, endangered) flora/fauna, protected corals, Reserved/Protected Forest and any other locally specified.

> Sensitive/Incompatible Land Uses:

Public water supply areas (river, reservoir, gw) monuments, Flood prone areas, CRZ, World Heritage Site, Religious places, Tourist places, Protected tribal settlements, Agriculture Research Stations, Air Port and any other specified by State or local government







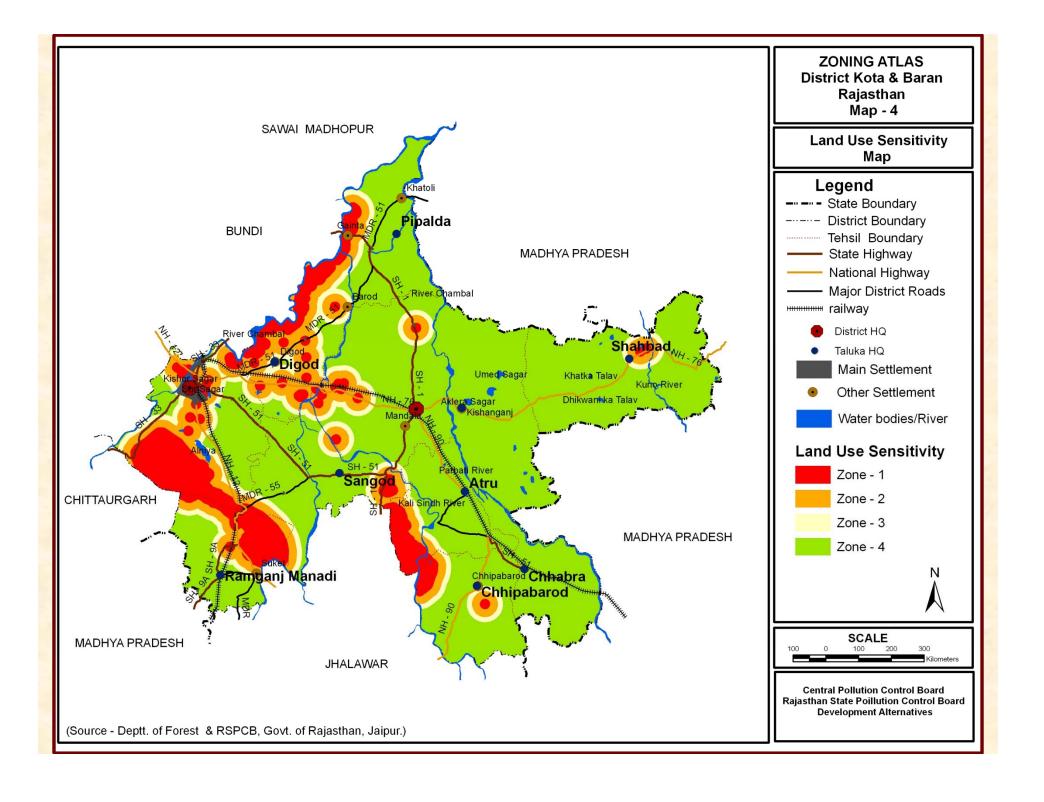
Categorisation of Industries

Industry Category	Impact Potential*
A1	> 7 km
A2	5 to 7 km
A3	2 to 5 km
A4	< 2 km

^{*} impact potential considered without pollution control equipment in operation

3. Land Use Sensitivity

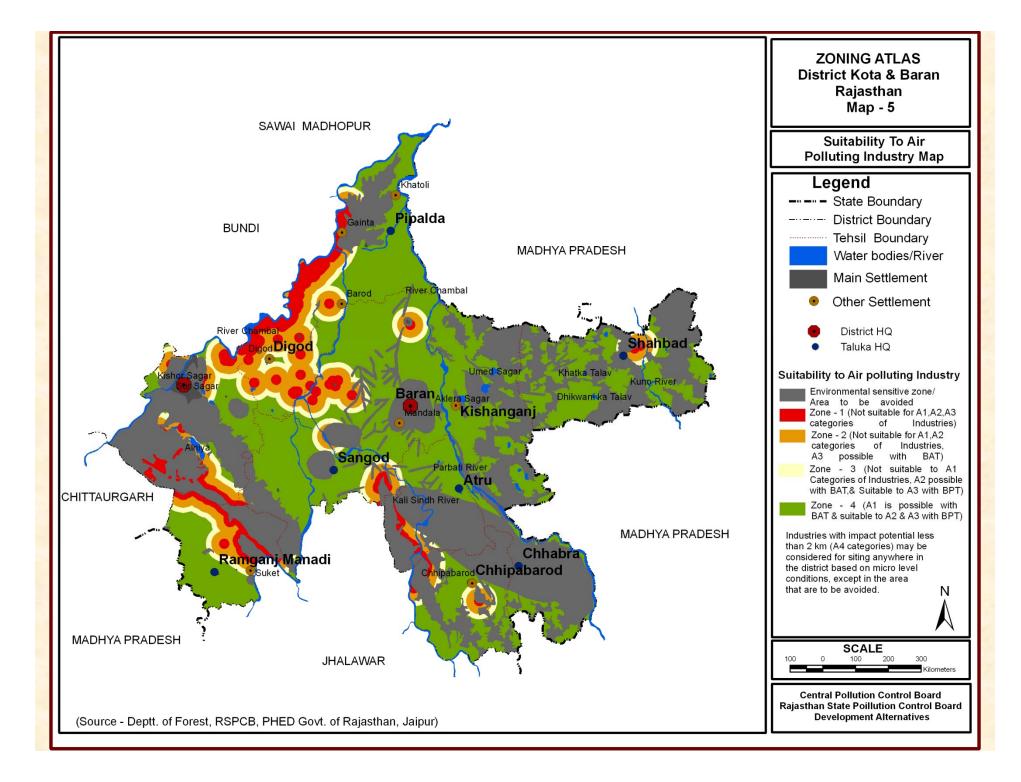
Feature	Zone – 1	Zone – 2	Zone – 3	Zone – 4
National Parks /Sanctuaries/ Mangrove area/ Wetlands	< 2 km	2 to 5 km	5 to 7 km	> 7 km
Tiger reserve/elephant reserve/turtle nesting ground, breeding grounds/ Game reserve	< 2 km	2 to 5 km	5 to 7 km	> 7 km
Core zone of biosphere reserve	< 2 km	2 to 5 km	5 to 7 km	> 7 km
Notified protected tribal settlements/ Critical'/'high' air polluted areas/ Agricultural research stations/Air Port	< 2 km	2 to 5 km	5 to 7 km	> 7 km
Areas with threatened (rare, vulnerable, endangered) flora/fauna, protected corals/ Habitat for migratory birds	< 2 km	2 to 5 km	5 to 7 km	> 7 km
Botanical gardens, Zoological gardens, Gene Banks	< 2 km	2 to 5 km	5 to 7 km	> 7 km
Monuments of national significance/ World Heritage Sites	< 2 km	2 to 5 km	5 to 7 km	> 7 km
Any other closed/protected area under the Wild Life (Protection) Act, 1972	< 2 km	2 to 5 km	5 to 7 km	> 7 km
Core areas of scenic areas/tourism areas/hill resorts/ religious places/pilgrim centres with more than 5 lakh visitors/tourists/pilgrims per year	< 2 km	2 to 5 km	5 to 7 km	> 7 km
Hilly stretches that act as barriers for dispersion of emissions, areas with frequent inversion conditions	< 2 km	2 to 5 km	5 to 7 km	> 7 km
Any other feature as specified by the State or local government/or locally applicable	< 2 km	2 to 5 km	5 to 7 km	> 7 km

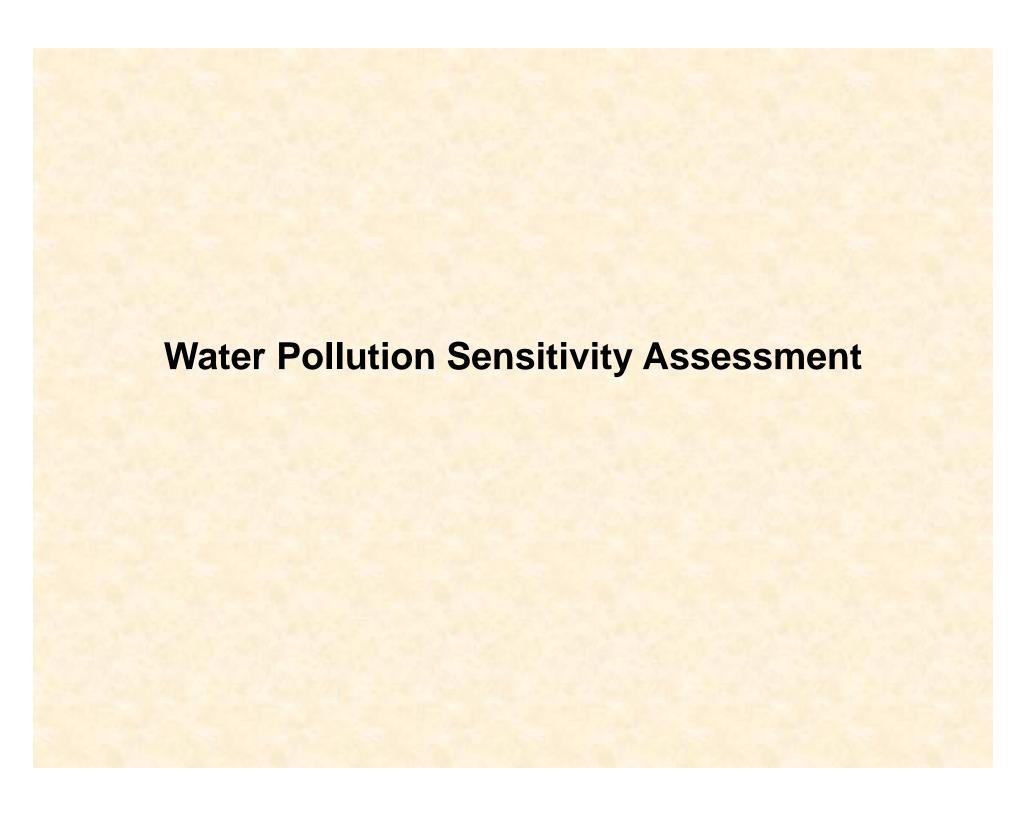


4. Site Suitability to Air Polluting Industries (without considering water pollution)

Air pollution sensitivity Industry category	Env. Sensitive Zones/ Areas to be avoided	Zone-1 (<2 km)	Zone-2 (2 to 5 km)	Zone-3 (5 to 7 km)	Zone-4 (> 7 km)
A1 (> 7km)	Not Suitable	Not Suitable	Not Suitable	Not Suitable	Possible
A2 (5 to 7 km)	Not Suitable	Not Suitable	Not Suitable	Possible	Suitable
A3 (2 to 5 km)	Not Suitable	Not Suitable	Possible	Suitable	Suitable

Industries with impact potential less than 2 km (A4 category) may be considered for siting anywhere in the district based on micro-level conditions, except in the areas that are to be avoided. However, in all the cases micro-level assessments are essential before taking final decision on site suitability. Also, 'consent to establish' is required in all cases.

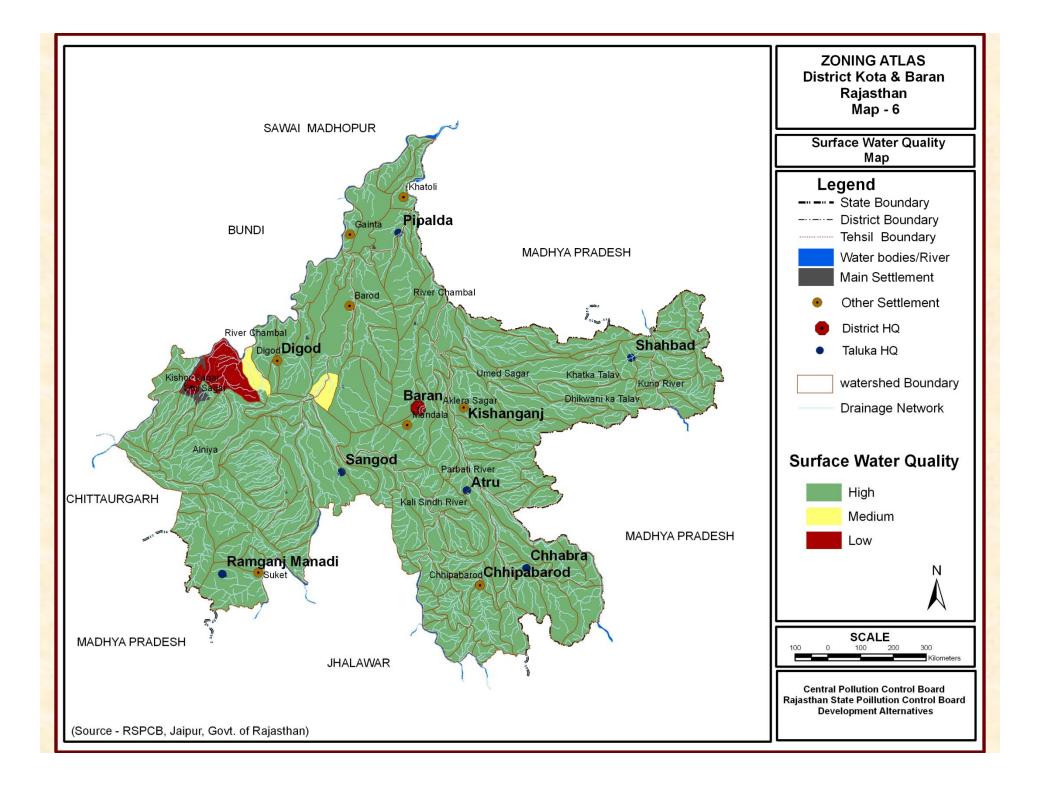




2. Surface Water Quality

High Quality Zone	Water quality is well within permissible criteria
Medium Quality Zone	Quality is in between 'high' and 'low'
Low Quality Zone	Water quality not meeting permissible criteria

Water Quality – As per Designated Best Use Criteria



1. Categorisation of Industries

Industry Category	Description	Impact Potential*
W1	 Industry with ≥25 kld discharge of effluents (irrespective of organic load) that are not easily bio-degradable (BOD/COD ≤ 0.4) or toxic or having TDS generation more than 10,000 mg/l Industry with 100-500 kld discharge of non-toxic effluents with organic load of >100 kg/d with BOD/COD ratio = 0.4-0.7) Industry with > 500 kld of discharge of non-toxic effluents (irrespective of organic load) that are less bio-degradable (BOD/COD=0.4-0.7) 	Very High
W2	 Industry with 100-500 kld discharge of non-toxic effluents with organic load of < 100 kg/day with BOD/COD ≤ 0.7 Industry with >500 kld discharge of non-toxic effluents (irrespective of organic load) that are less biodegradable (BOD/COD ratio of >0.7) Industry with ≥25 kld discharge of effluents (irrespective of organic load) having TDS generation >5,000 mg/l but ≤ 10,000 mg/l 	High
W3	 Industry with 25-500 kld of non-toxic effluents that are easily biodegradable or less biodegradable (BOD/COD ratio of > 0.7) Industry with ≥25 kld discharge of effluents (irrespective of organic load) having TDS generation ≤ 5,000 mg/l 	Medium to High
W4	Industry with <25 kld discharge of effluents that are easily biodegradable (BOD/COD ratio of > 0.7) and non-toxic	Low

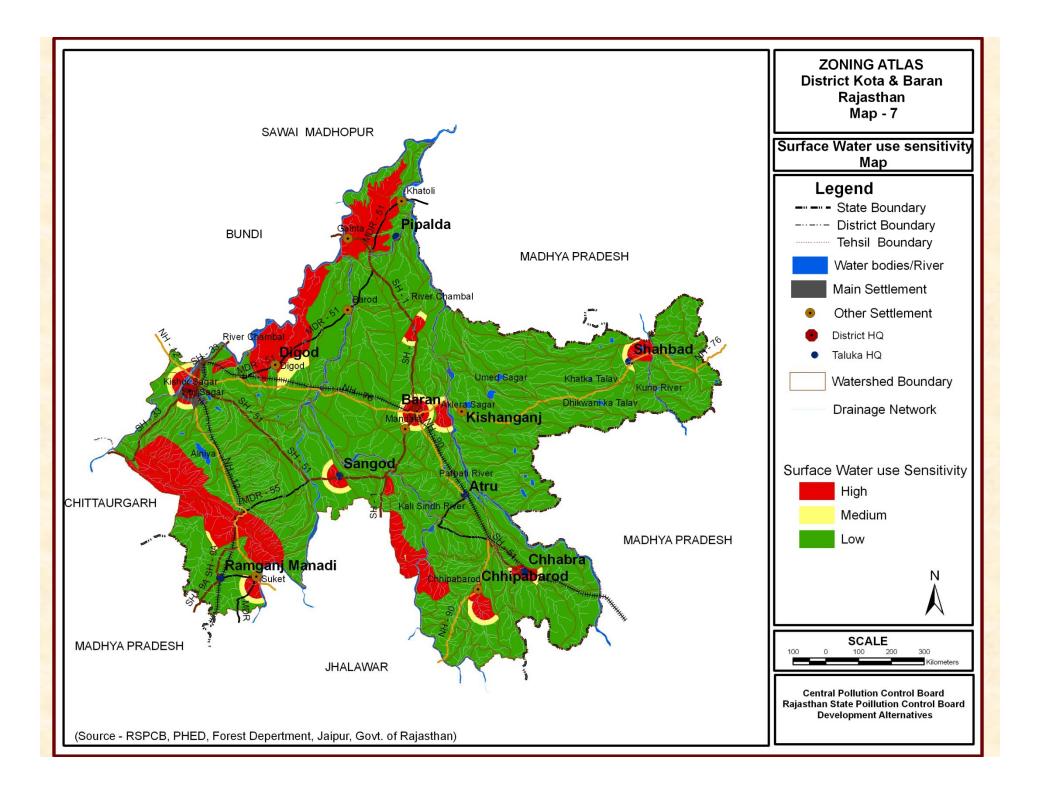
^{*} Impact potential considered without pollution control equipment in operation

3. Surface Water Use Sensitivity

Feature	High Sensitivity Zone	Medium Sensitivity Zone	Low Sensitivity Zone
National Parks /Sanctuaries/ Mangrove area/ Wetlands / Core zone of biosphere reserve	Watersheds upto 10 km from periphery	Watersheds 10 to 15 km	Watersheds > 15 km
Tiger reserve/elephant reserve/turtle nesting ground, breeding grounds/ Game reserve	Watersheds upto 10 km from periphery	Watersheds 10 to 15 km	Watersheds > 15 km
Gene Banks / Zoological gardens/ Botanical gardens/Wetlands	Watersheds upto 10 km from periphery	Watersheds 10 to 15 km	Watersheds > 15 km
Areas with threatened (rare, vulnerable, endangered) flora/fauna, protected corals/ Habitat for migratory birds	Watersheds upto 10 km from periphery	Watersheds 10 to 15 km	Watersheds > 15 km
Monuments of national significance/ World Heritage Sites	Watersheds upto 10 km from periphery	Watersheds 10 to 15 km	Watersheds > 15 km
Public drinking water supply or industrial water supply areas from rivers/surface water bodies with or without conventional treatment and areas known to be entirely dependence on surface water for drinking	Watersheds upto 5 km from periphery	Watersheds 5 to 7 km	Watersheds > 7 km
Coastal water used for salt pans, shell fishing, mariculture, bathing, contact water sports, and commercial fishing or having other ecological sensitivity	Watersheds upto 10 km from periphery	Watersheds 10 to 15 km	Watersheds > 15 km
River stretches or water bodies used for propagation of wild life and fisheries	Watersheds upto 10 km from periphery	Watersheds 10 to 15 km	Watersheds > 15 km
Catchment areas of irrigation projects (dams/reservoirs)	Watersheds upto 5 km from periphery	Watersheds 5 to 7 km	Watersheds > 7 km

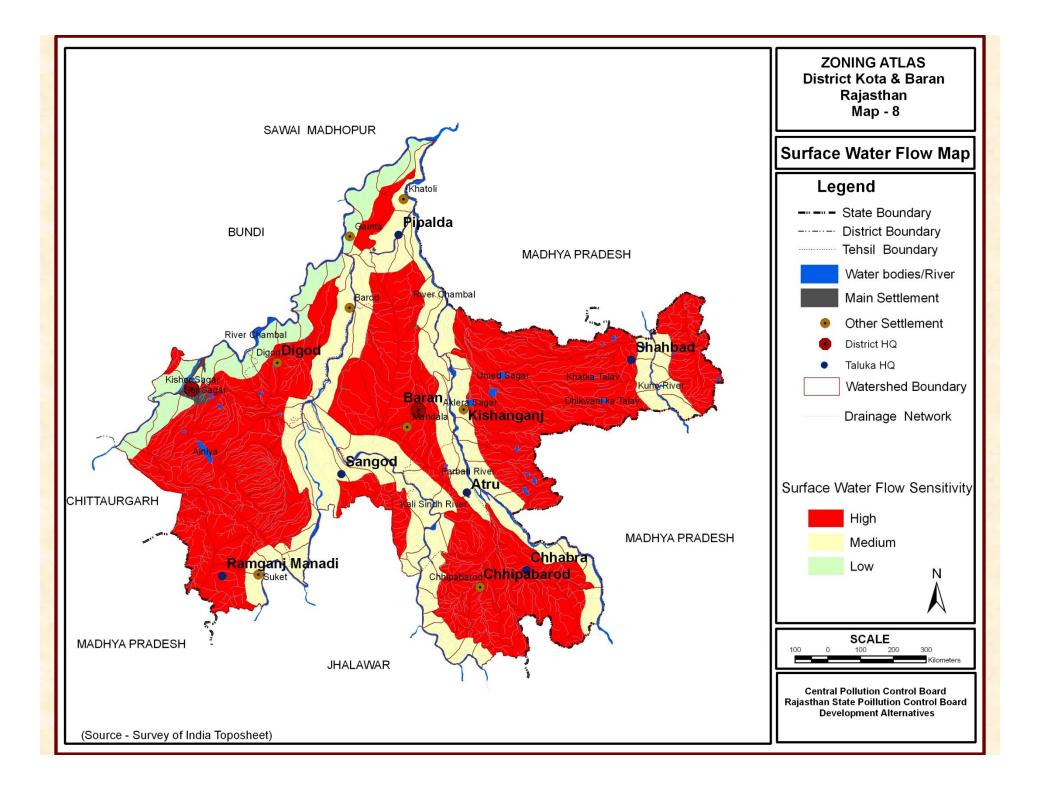
3. Surface Water Use Sensitivity ---- Contd...

Feature	High Sensitivity Zone	Medium Sensitivity Zone	Low Sensitivity Zone
Public water supply areas from ground water	Watersheds upto 5 km from periphery	Watersheds 5 to 7 km	Watersheds > 7 km
Ground water recharge areas	Watersheds upto 5 km from periphery	Watersheds 5 to 7 km	Watersheds > 7 km
Core areas of scenic areas/tourism areas/hill resorts with over 5 lakh tourists/ visitors per year	Watersheds upto 5 km from periphery	Watersheds 5 to 7 km	Watersheds > 7 km
Core areas of religious places, pilgrim centers including organized bathing areas with visitors/pilgrims over 5 lakhs per year	Watersheds upto 5 km from periphery	Watersheds 5 to 7 km	Watersheds > 7 km
Protected tribal settlements	Watersheds upto 5 km from periphery	Watersheds 5 to 7 km	Watersheds > 7 km
Agricultural research stations	Watersheds upto 5 km from periphery	Watersheds 5 to 7 km	Watersheds > 7 km
Critically polluted or 'low' water quality zone	Watersheds upto 5 km from periphery	Watersheds 5 to 7 km	Watersheds > 7 km
Any other closed/protected area under the Wild Life (Protection) Act, 1972	As per sensitivity of the feature	As per sensitivity of the feature	As per sensitivity of the feature
Any other feature as specified by the State or local government/or locally applicable	As per sensitivity of the feature	As per sensitivity of the feature	As per sensitivity of the feature



4. Surface Water Flow

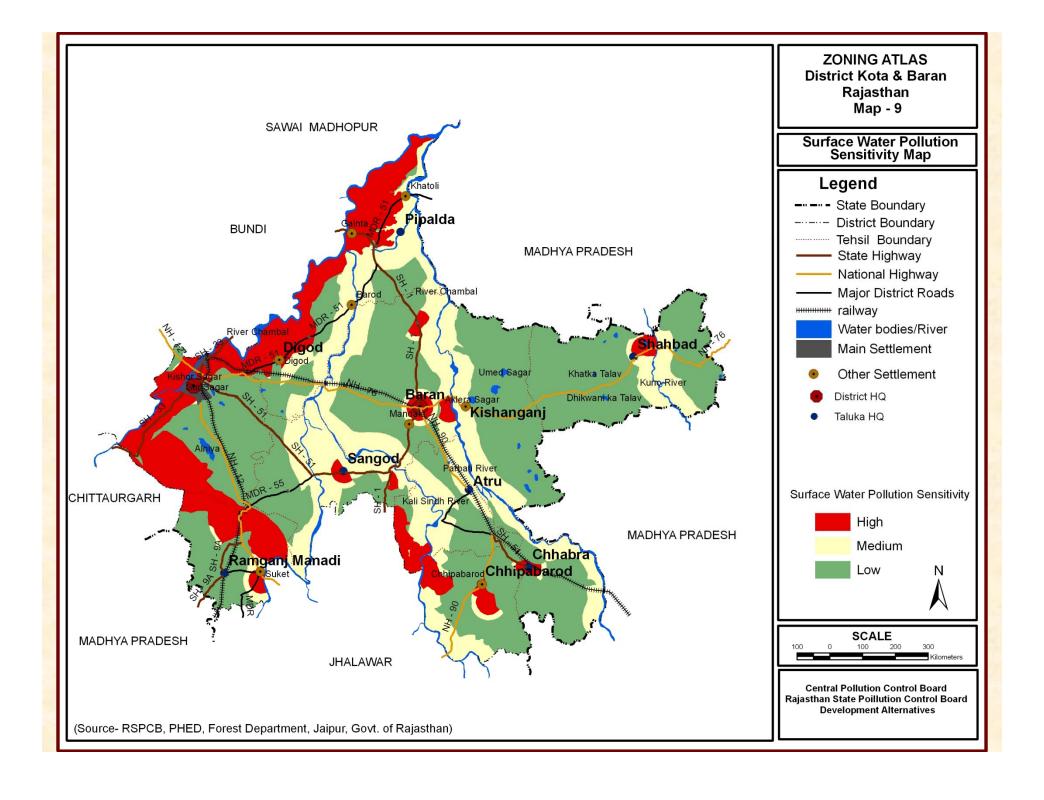
High Sensitivity Zone	Flows having at least 10 times dilution throughout the year for the pollution load proposed to be discharged from the industry into the river
Medium Sensitivity Zone	Flows having dilutions between 10 to 100 times throughout the year for the pollution load proposed to be discharged from the industry into the river
Low Sensitivity Zone	Flows having at least 100 times dilutions throughout the year for the pollution load proposed to be discharged from the industry into the river



5. Overlay/Decision Matrix

Overlay of Surface water use sensitivity and Surface water flow map

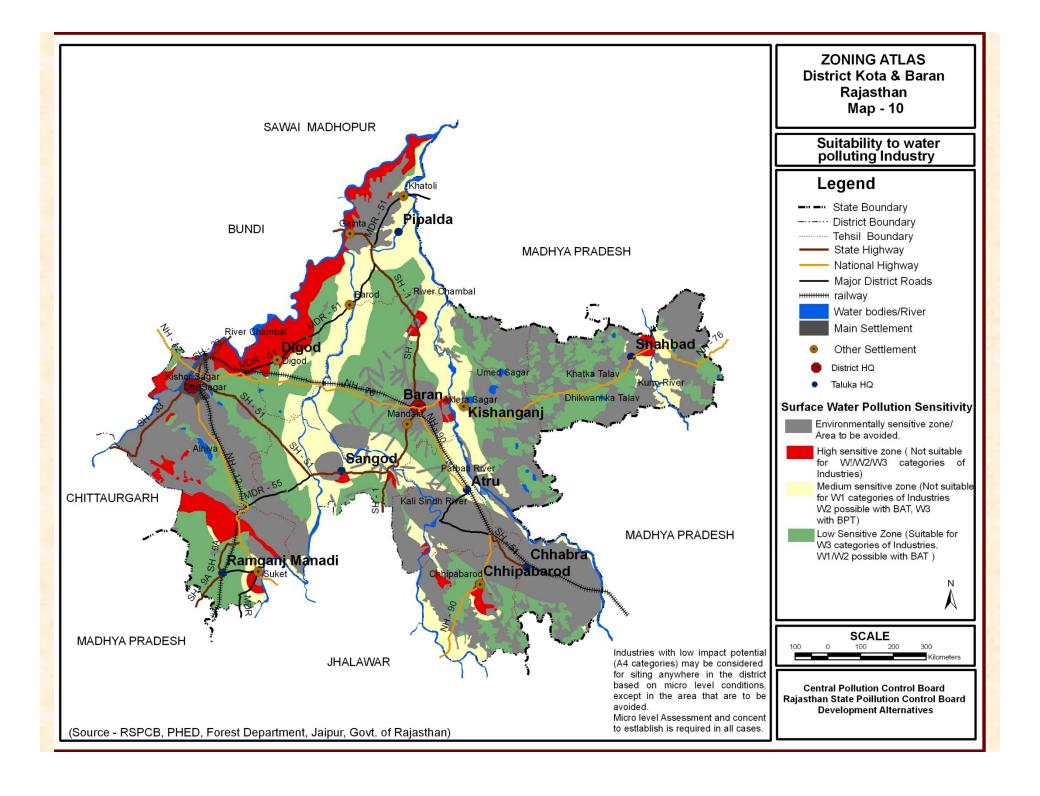
Surface Water Use Sensitivity	High	Medium	Low
Surface water flow			
High	High	Medium	Low
Medium	High	Medium	Medium
Low	High	High	High

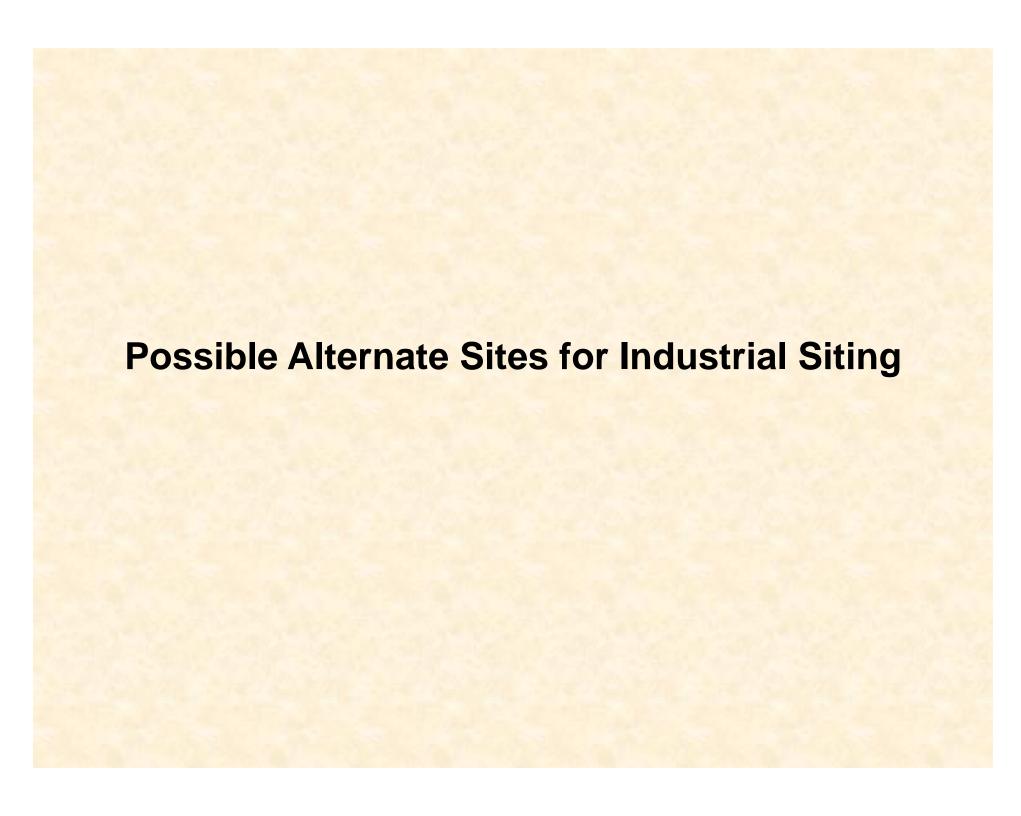


6. Site Suitability to Water Polluting Industries (without considering air pollution)

Water pollution sensitivity Industry category	Env. Sensitive Zones/ Areas to be avoided	High Sensitivity Zone	Medium Sensitivity Zone	Low Sensitivity Zone
W1 (very high potential)	Not Suitable	Not Suitable	Not Suitable	Possible
W2 (high potential)	Not Suitable	Not Suitable	Possible	Possible
W3 (medium to high potential)	Not Suitable	Not suitable	Possible	Suitable

Industries with 'low' impact potential (W4 category) may be considered for siting anywhere in the District based on micro-level conditions, except in the areas that are to be avoided. However, in all the cases micro-level assessments are essential before taking final decision on site suitability. Also, 'consent to establish' is required in all cases.





Site Suitability for Industries

1. Zoning of the District

- 1. Sensitive zones
- 2. Zone –1 High risk zone for air polluting industries (Z1)
- 3. Zone-2 High risk zone for air polluting industries (Z2)
- 4. Zone-3 Medium risk zone for air polluting industries (Z3)
- 5. Zone-4 Low risk zone for air polluting industries (Z4)
- 6. High risk zones for water polluting industries (Wh)
- 7. Medium risk zones for water polluting industries (Wm)
- 8. Low risk zones for water polluting industries (WI)

12 combinations of sites/zones are possible that may be considered for industrial siting

Z1Wh	Z1Wm	Z1WI
Z2Wh	Z2Wm	Z2WI
Z3Wh	Z3Wm	Z3WI
Z4Wh	Z4Wm	Z4WI

16 combinations of Industries

A1W1	A1W2	A1W3	A1W4
A2W1	A2W2	A2W3	A2W4
A3W1	A3W2	A3W3	A3W4
A4W1	A4W2	A4W3	A4w4

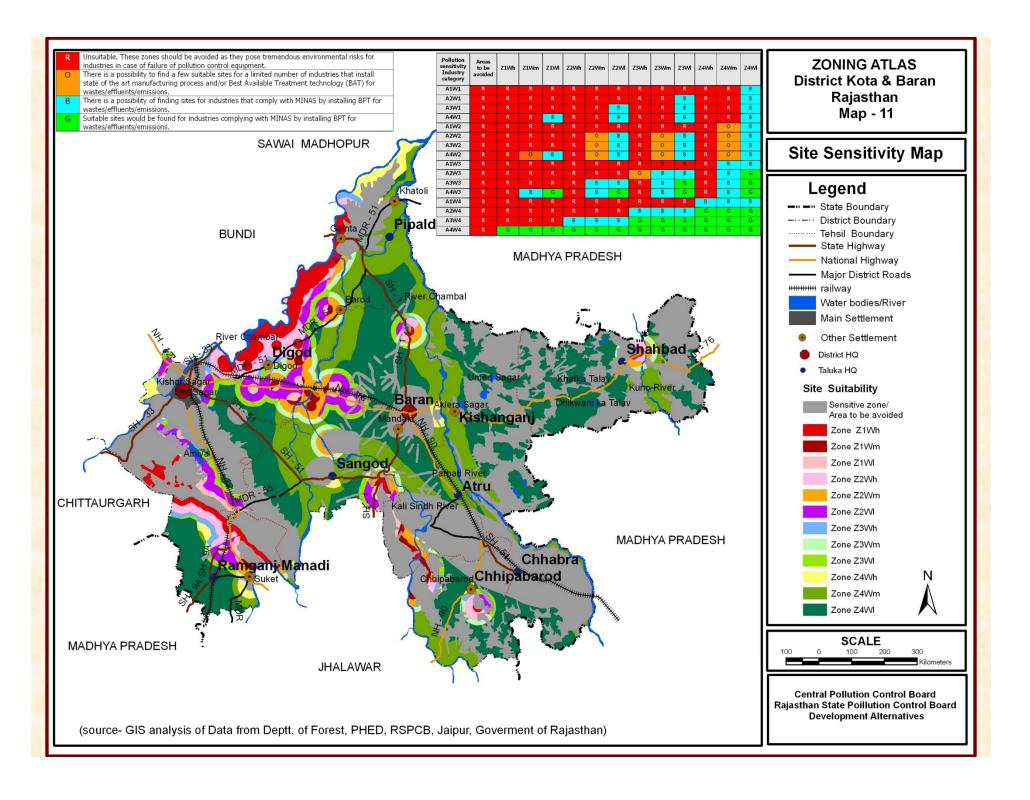
Site Suitability for Industries

Pollution sensitivity Industry category	Areas to be avoided	Z1Wh	Z1Wm	Z1WI	Z2Wh	Z2Wm	Z2WI	Z3Wh	Z3Wm	Z3WI	Z4Wh	Z4Wm	Z4WI
A1W1	R	R	R	R	R	R	R	R	R	R	R	R	В
A2W1	R	R	R	R	R	R	R	R	R	В	R	R	В
A3W1	R	R	R	R	R	R	В	R	R	В	R	R	В
A4W1	R	R	R	В	R	R	В	R	R	В	R	R	В
A1W2	R	R	R	R	R	R	R	R	R	R	R	0	В
A2W2	R	R	R	R	R	0	В	R	0	В	R	0	В
A3W2	R	R	R	R	R	0	В	R	0	В	R	0	В
A4W2	R	R	0	В	R	0	В	R	0	В	R	0	В
A1W3	R	R	R	R	R	R	R	R	R	R	R	В	В
A2W3	R	R	R	R	R	R	R	0	В	В	R	В	G
A3W3	R	R	R	R	R	В	В	R	В	G	R	В	G
A4W3	R	R	В	G	R	В	G	R	В	G	R	В	G
A1W4	R	R	R	R	R	R	R	R	R	R	В	В	В
A2W4	R	R	R	R	R	R	R	В	В	В	G	G	G
A3W4	R	R	R	R	В	В	В	G	G	G	G	G	G
A4W4	R	G	G	G	G	G	G	G	G	G	G	G	G

Index

- Unsuitable. These zones should be avoided as they pose tremendous environmental risks for industries in case of failure of pollution control equipment.

 There is a possibility to find a few suitable sites for a limited number of industries that install state of the
- There is a possibility to find a few suitable sites for a limited number of industries that install state of the art manufacturing process and/or Best Available Treatment technology (BAT) for wastes/effluents/emissions.
- B There is a possibility of finding sites for industries that comply with MINAS (Minimal National Standards) by installing BPT for wastes/effluents/emissions.
- G Suitable sites would be found for industries complying with MINAS by installing BPT for wastes/effluents/emissions.



Thank You