

Executive Summary

Introduction

The Government of India incorporated a plan scheme in the Tenth Five Year Plan for preparation of **State of Environment Report (SoER)** of the various States. Accordingly, this report has been prepared under the directive from Ministry of Environment of Forest (MoEF), Government of India who are funding the project and providing over all guidance. The task of preparing the report for Rajasthan State had been assigned to the Rajasthan State Pollution Control Board which has been selected as the State Host Institute (SHI) for preparing the report while overall co-ordination, guidance and formatting of the report has been carried out by Administrative Staff College of India (ASCI), Hyderabad which is the National Host Institute (NHI) for the purpose.

Realising the importance of State of Environment Report (SoER) and looking at the inter disciplinary nature of the work, the State Government constituted a State Steering Committee at the State level for over all coordination and guidance in the project. Nodal Officers were appointed from different departments to collect relevant data. It was decided to prepare the report Sector wise and sectors to be included in the report were identified. Resource Persons were appointed for all the sectors to prepare sector wise reports.

The State of Environment Report – Rajasthan, aims to acquaint Non-Governmental Organizations (NGOs), concerned citizens, Government officials and public at large, with the environmental issues involved in various developmental sectors and impact of their activities on the environment. So, in a way, it is not a development report on various activities but aims to bring out environmental concerns that arise while carrying out development activities.

This has been the first exercise of this nature taken up by the State Board and has been a new experience for the panel experts to look into various sectoral activities from environmental view.

DPSIR Framework

For the preparation of SoER, **DPSIR (Driving Force-Pressure-State-Impacts-Response)** Framework developed by the OECD, the European Commission and the World Resources Institute (WRI) has been used.

The format outlines the following:

Driving Forces: These are the underlying human activities that lead to environmental change. These may be general trends in demography, economic development, government policies, corporate activities and consumer activities.

Pressures: They are the more specific economic, social, institutional or other pressures on the environment that may contribute to or cause particular environmental states and impacts of concern. Specific pressures for priority issues are presented under respective sectors. For example, in the case of water pollution relevant pressures include the inadequate infrastructure of sanitation facilities and safe water provision for an expanding population.

State: The condition or quality of the environment and trends in that condition brought about by human or other pressures. These have to be described for priority issues by presenting quantitative and qualitative data.

Impacts: The consequences of pressures and states in particular those on human health, the economy, equity and quality of life.

Responses: These include all actions taken to address environmental issues by government, NGOs, businesses, research institutions or other initiatives.

The SoER for the State of Rajasthan has been developed on the basis of above DPSIR frame work.

It was felt that the Driving forces to all the sectors within the State are common. Therefore all the driving forces have been detailed in the beginning. However, the remaining aspects i.e. pressures, state, impact and responses have been dealt sector-wise.

Driving Forces

The major driving forces identified for the State of Rajasthan are:

- Population Growth: From 1951 to 2001 growth in Rajasthan has been 351% exceeding National average of 285%.
- Cultural Tourism: Rich in traditional arts, ethnic culture, fabulous palaces, temples and havelies attracting a lot of tourists.
- Industrialization and urbanization: Rapid economic growth and growing urbanization due to industries, service sector growth and migration from rural areas
- Mining: Potential rich in limestone, marble, granite, gypsum and non-ferrous metals- copper, zinc and lead exists in the State.
- Limited Water & Energy Resources: The State constitutes 10% of the country's area but bestowed with only 1.17% of its water resources. Groundwater table all over the State is going down.

1. Energy Sector

The energy sector plays a pivotal role in the overall development of the economy. The per capita availability and consumption of the inanimate energy (primarily in the form of electricity) is an important index of the overall development of a country. Rajasthan uses three major sources of energy – firewood/dung cakes in rural area, electricity and petroleum products.

Pressures

Tremendous demand has brought the following pressures on the energy sector:

- Increasing demand for energy & limited alternative sources impose a huge pressure on this sector.
- Coal based thermal power is the only viable source of energy available.
- Poor quality of coal (with 30 to 40% ash) is the main cause of air pollution and land degradation. Locally available lignite has similar problems.
- Low energy efficiency is a major concern for the State.

State

The highest consumption of energy is by the industrial sector followed by the agriculture and commercial sector. The requirement of energy has been growing steadily over the years. To counter the energy needs, many Thermal and Hydel

power schemes have been set up. The peak demand by the end of 11th plan would be 7250 MW while the capacity likely to be available would be 5692 MW. The possible sources for future demand are the Lignite based power generation at Giral, gas based power plant at Dholpur and coal based thermal power plant at Chabra.

Impact

The impacts of the power plants however are huge as listed below:

- Due to high ash generation, super thermal power stations like Kota have accumulated large ash deposits in ash ponds creating air pollution and endangering ground water quality.
- Air pollution from stack gases and fugitive emissions
- Main pollutants are SPM & RSPM, oxides of Sulphur, oxides of Nitrogen and Carbon dioxide that also pose threat to human health and to the environment.

Response

In response to the Energy impacts, the following steps have been taken:

- MoEF Notification - 1999, (Amended 2003) has been issued on management of fly ash. The salient features specify precisely that all coal/lignite based thermal plants are to utilize 100% fly ash within 9 years and that clay bricks/tiles manufacturers within 100 Kms radius are to use 25% of the ash.
- Strict enforcement of Standards prescribed for Stack Emissions Under EP Act.
- Efforts are being made to improve the power plant performance including the plant load factors.
- Initiation of steps towards developing Non-conventional sources of energy through windmills and solar energy based captive power plants. A Biomass based power plant of 7.8 MW capacity has been set up in Padampur (Sri Ganganagar) and a few more such plants are being set up in other parts of the State.

2. Forests and Biodiversity Sector

Forests constitute an important component of the physical environment of the State. They are not only home to the biological diversity but also protect the watersheds and maintain their productivity. Rajasthan's terrestrial ecosystems are characterized by deficit of forests and by arid environment. Lack of administrative capacity and due to the ever-increasing pressure of human and livestock, regeneration of the forests could not take place. Biological diversity (or biodiversity) is the variety of all life forms

and their conservation, which is a core requirement for ecologically sustainable development.

Pressures

The pressures encountered in case of Forests and Biodiversity conservation are:

- Overgrazing of forest areas and wastelands by animals.
- Forest lands are encroached by marginal agriculture and increasing human settlements.
- Extensive mining is causing severe fragmentation of habitats & forest areas.
- Harvesting and legal/illegal trade and commerce in flora and fauna are depleting the forest resource.

State

The existing forestlands are approximately 9 % (3.2 M Ha) area of the State of Rajasthan. Most of the forests are dry deciduous type and concentrated in the Aravalli and Vindhyan hill systems in eastern Rajasthan with the western part having many grasslands. The forests are rich in flora and fauna. Biodiverse resources like wetlands, deserts, trees also exist outside forests. A strong social forestry programme is ongoing to preserve forests and biodiversity since 1980s. Two wetlands, Keoladeo National Park Ghana & Sambhar Lake are listed under Ramsar Convention having about 3000 known species of plants & animals and large number of undocumented insects, butterflies & microorganisms. A Wildlife & Protected Area Network has been created within the State with two national parks and 25 wildlife sanctuaries.

Impact

The current impacts encountered due to extreme exploitation of forests and biodiversity are:

- Degradation of watersheds has lead to loss of productivity and livelihoods
- Soil erosion has lead to loss of productive lands
- A major impact of loss of vegetation cover in naturally vegetated lands has been the spread of desertification and increase of wastelands.
- Biodiversity resources have been shrinking due to spread of weeds and alien species, loss of natural vegetation in fallows along with spread of invasive alien species.

Response

In response to the impacts on the forest the following steps have been taken:

- Augmentation of forest cover through afforestation programmes
- Initiation of participatory approach for management of forests and biodiversity
- Strengthening and widening of the Protected Area Network
- Preparation of a State Biodiversity Strategy & Action Plan
- Increasing concern and recognition of issues and problems related to the same.
- Interventions of the Courts with more interest in environmental issues

3. Mining Sector

Rajasthan being rich in minerals has vast mineral reserves. Among them are the metallic minerals like Copper, Lead and Zinc and Non-metallic as Soapstone, Silica Sand, Limestone, Marble Gypsum etc., which are found in good quality and large quantities.

Pressures

Pressures are encountered on account of increasing demand which include:

- Increasing demand by various users for various purposes.
- Opening of new mines generate more pressure.
- The mining being carried out by small lease and quarry holders is causing immense pressure on the environment. These leases which are mostly in clusters are having very small areas due to which it is difficult for them to comply with various environmental laws.
- Mines located in remote areas, including in forest areas are very difficult to monitor.

State

Exploration of mineral reserves has been growing steadily. Aspects of the same are listed below:

- Production of Important minerals like Lead, zinc, copper, limestone, gypsum, lignite and marble has been increasing.
- 17 large-scale cement units have come up with lime stone utilization of 1.0 to 3.0 MTA each.

- Zawar, Dariba and Agucha (lead and zinc) and Khetri (copper) are of National importance. Hindustan Zinc Limited today is one of the top six global companies.
- Mining of gypsum in Western Rajasthan constitutes 90% of the country's production.
- Mining for lignite and oil exploration in Barmer are giving encouraging results.
- Mining receipts for last three years are increasing and also contribute 29.7% of non tax revenue.
- It provides direct employment to about 5.0 lac workers, while indirect employment is about 10.0 lac.
- As on 1/4/2005 there are 1205 mining leases (ML) for major minerals and 7771 M.L. for minor minerals. Besides there are 15000 quarry licenses.
- Rajasthan produces non-metallic minerals of the order of 24% of total national production.

Impact

The above status of the mining sector has resulted in various impacts on the environment as recorded below:

- Land degradation in and around mining areas- In Ramganj Mandi where kota stone is mined, there are mountains of overburden and rejects, causing air pollution and blocking natural drainage.
- Degradation of forest and loss of biodiversity.
- Soil contamination rendering it unproductive.
- Surface and ground water pollution- A study conducted by GSI, has revealed groundwater pollution around zinc/copper mines.
- Noise and vibrations in extraction, processing and delivery.
- Injuries during blasting and landslides occur as negligible safety norms are followed.
- Occupational diseases due to exposure to deadly dust and gases.

Response

Control on the activities and an impact of mining is being strived for through issue of various Notifications and Judgments as below:

- Aravalli Notification Dt. 7th May, 1992 under E.P. Act prohibits the carrying on of the certain process and operations including mining in the areas specified, except with the prior Environmental Clearance from the competent authority.

- An insertion of rule 23 A in MCDR 1988 of mine closure plan was made on 10/04/2003 to substantiate the reclamation and rehabilitation works at mines.
- The Supreme Court vide their order dated 16.12.2002 have put restrictions on mining in areas under Aravalli Range.

4. Industry Sector

Shortage of basic infrastructure requirements like water and power has limited the growth of industries in Rajasthan. To encourage industrial growth, especially that of small-scale industries, State government has from time to time modified policies to encourage their growth. Mineral based industries form the major share of total industrial production.

Pressures

Pressures that amount to in this sector include:

- State government has from time to time modified policies to encourage industries like simplified Sales Tax Act, Rural Non-Farm Policy 1995 for growth of rural industrialization and setting up of Industrial Estates.
- Monitoring of SSI units is difficult as the State lacks in such resources
- Rajasthan is water scarce with competitive use of it in agriculture and domestic sector.
- The Rivers and nallas also have a low bearing capacity for effluents.
- Location of industries in agriculture areas has led to changes in Land Use patterns.

State

The Status of Industries can be summarized below as:

- The major industries in Rajasthan are: cement, textile and textile-processing, nonferrous smelters for zinc and copper, dimensional stones like marble and granite and handicrafts and gem & jewelry
- RIICO has developed 251 industrial areas, 6 Growth Centers and 10 I.I.D. centers. As on 31.3.2005, 39731 plots are allotted on which 19388 units are operating.
- Out of 263250 large & medium and SSI registered units, only 19388 are in the industrial areas. Thus remaining 243862 units and large number of unregistered units are situated in areas other than industrial areas.

- Concept of Common Effluent Treatment Plants (CETP) has been adopted widely in the State, especially by textile processing industries in western Rajasthan.

Impact

The well-known impacts of industries on the environment, which are further classified into:

- Water Pollution: through pollution of surface and ground water along river Bandi/Luni river due to textile processing units in Pali and Balotra.
- Air Pollution: due to the thermal power, cement, limekilns and stone crushers which are major sources of particulate emissions.

Response

Due to the current state and Impacts of the industries, the following response has been adopted:

- The developing agency of an industrial area is required to obtain Environmental Clearance for the specified categories from the competent authority before setting up of new industrial areas
- RIICO has set up an Advisory Cell for pollution control in industrial areas.
- PILs are logged in Hon'ble High Court against industries at Pali, Balotra, Sanganer and Bagru.
- Central Government has provided grants for establishing CETPs .
- The RSPCB has taken recourse to initiate legal action and has even issued closure directions against several polluting industries.

5. Urban Sector

Rajasthan, the largest State (in area) in the country is at present in the process of rapid urban transition, which has been generating enormous strains on the infrastructure network and natural resources that support the urban centers.

Pressures

The pressures due to urban growth are:

- Migration, which adds to the severity of urban problems.
- Absence of proper settlement policy as migrants occupy open lands in the form of slums.
- Towns are sprawling fast while infrastructure to extend basic services is not keeping pace.

- Increase in population density in core areas is exerting pressure on roads, power supply, water supply, drainage and municipal solid waste management.
- Growth in vehicular traffic is in geometric proportion to the growth in population

State

The current status of urban sector in Rajasthan is listed below:

- Population growth rate of the State has been faster than that at National level.
- Migration accounts for almost 50 percent of total urban decadal growth.
- In 2001, there were 216 census towns against 141 in 1971. Thus urbanization is a situation which needs to be planned for.
- Growth rate in 80 towns with population below 20,000 is negative due to massive migration to the cities.
- Increased opportunities for employment in secondary and tertiary activities has been the major cause of accelerated urban growth

Impact

The major Impacts are the ever-increasing urban problems like:

- Housing: As per census 2001, out of 21476 lakh residential houses only 13.40 lakhs (62.4%) were in good condition; 35.3% liveable and 2.3 percent in dilapidated condition.
- Increase in poverty conditions as majority of the migrants to the urban areas are labourers
- Vehicular traffic: There has been rapid increase in number of vehicles in Rajasthan. Air quality survey has revealed that, though air quality in cities is within permissible limits, occasionally NO_x (caused by automobiles) concentrations exceed permissible limits.
- Solid Waste : Solid waste collection efficiency is very low and in cities, the solid waste collected is disposed off without following sanitary landfill practices.
- No drainage and waste water management: sewage collection, treatment & disposal system is lacking except in Jaipur city
- Discarded plastic materials are becoming a growing menace in urban areas and endangering the health of residents as well as damaging the flora and fauna.

Response

In response to the urban crisis, following steps have been taken:

- City Development Plans are being prepared under UIDSSMT, JNNURM and other Central/State assisted schemes. Under JNURM environmental integration at city level & Slum Improvement Programmes are in progress
- RUIDP with the assistance of ADB is implementing infrastructural development in six towns of the State.
- Municipal Solid Waste Rules -2000 issued by GOI are being implemented
- As per guidelines of Bio Medical Waste Rules 1998-2000, CBWTF are being established in 11 major cities.
- Mandatory provisions have been made for construction of rain water harvesting structures in buildings on plots measuring 300 sq.m and above.

6. Agriculture and Rural Sector

Agriculture and rural sector in India in general and Rajasthan in particular is perceived to be environmentally benign. But studies shows that because of increasing stress on natural resources both due to economic activities and lifestyles, the rural environmental attributes are having negative impacts on health, productivity and livelihood of the people and the environment.

Pressures

The pressures pertaining to agricultural and rural sector are:

- Most part of Rajasthan falls under arid and semi arid climate with 8 out of 10 years with average rainfall less than 20% of the average
- There is indiscriminate and excessive withdrawal of ground water and no restriction on boring and deepening of wells even in dark zones
- There is low efficiency of water usage in canal irrigation systems
- Monoculture is common - Crop rotation is not practiced.
- Continuous and increasing use of chemical fertilizers & pesticides contaminate the land /ground water and also vast tracks of forest land have been put under agriculture

State

The current state of the agriculture and rural sector can be summarized as:

- The rainfall fluctuates from year to year as well as from month to month affecting agriculture and its produce.

- There has been conspicuous increase in actually cultivated area over the years.
- There is a increasing trend of production which can be attributed to increasing area under irrigated farming, increased use of manure and fertilizers, plant protection measures adopted and efforts made under agriculture extension and research.
- As seen in earlier sections, tube well and well irrigation and withdrawal of water in rural areas has increased dramatically in the last 3 decades.

Impact

The impacts of agriculture and the rural sector are:

- Mechanised farming if practised, poses a threat to natural vegetation and soil erosion.
- Predominantly ground water irrigation exists which is of poor quality leading to salinity.
- Canal water has its own problems of water logging, drainage & water losses.
- Increased use of chemical fertilizers & pesticides contaminating land.
- Increased levels of ground water pollution and contamination.
- Due to poor housing facility and the use of wood as fuel, indoor pollution is more severe in rural areas than outdoor pollution in urban areas.

Response

In response to the critical impacts on the environment by the agriculture sector, the following steps have been taken:

- Banning the use of harmful pesticides like DDT
- Encouraging the use of bio-fertilizers.
- Subsidy has been offered on water saving devices e.g. sprinkler system and drip irrigation
- Emphasis on integrated watershed management
- Successful use of bio drainage to reduce water logging in Indira Gandhi Canal
- Initiation of rural development schemes and preparation of development plans.

7. Tourism Sector

Rajasthan's rich historical, cultural, architectural and natural heritage has tremendous potential of attracting foreign as well as domestic tourists; accordingly plans are

being made at government level, to give a quantum boost to this industry. Tourism industry is also one of the least polluting industries.

Pressure

The pressures mounting on the environment due to the tourism industry can be summarized as:

- Increasing influx of domestic/foreign tourists in huge numbers with their own needs.
- Transportation Infrastructure which is not sufficient
- Land and Accommodation needs for the huge numbers of tourist.
- Civic Facilities along with other facilities for the tourists.
- Pressure on Wildlife and Forest due to noise of vehicles, feeding and breeding of wild animals and transmission of diseases
- Indirect adverse impacts on adjoining forest areas are the cutting of trees, Illegal mining, encroachment and diversion of forest lands

State

The current status of the industry can be glanced in the following:

- Number of Tourist Arrival in Rajasthan has increased upto 50% in the past 5 decades.
- The tourist visits are mainly related to its historic & cultural significance as also pilgrims visiting fairs/festivals for which Rajasthan is famous.
- There are an equal number of foreign and domestic tourists visiting the State.
- There is a need for accommodation for the tourists due to the huge numbers they come in.
- An Eco-Tourism policy has been formulated for the industry to be in harmony with nature.

Impact

The impacts of tourism on the environment can be generalized in the following:

- It has some impact on Environment, Wildlife & Forest.
- There is an impact on Civic Amenities due to lack of Water supply, Sewage disposal, Land availability, Solid waste management, Road Transport and Public Facilities.

Response

To promote and regulate the negative impacts of tourism the following steps have been taken:

- A Tourism Policy of Rajasthan 2001 has been formulated.
- Eco-tourism: Policy & Guidelines, 2002 by Govt. of India have been set to develop tourism in harmony with nature.
- State Government has taken initiatives in hotels for installing air / water polluting control system/solar heaters/water-harvesting structures.
- Polluting vehicles are not allowed in National Parks and Camp Tourism/ Eco-Friendly nature tourism is being promoted.
- Studies are proposed to assess the carrying capacity of tourist places for required action.

8. Transport Sector

Given the rapid growth in urbanization, industrialization and modernization there has been spurt in mobility demand both from passenger segment as well as freight. Transportation sector did not keep pace with developmental activities and increasingly different parts of the country and the State itself are experiencing the glaring inadequacies of the transportation infrastructure.

Pressures

The pressures on the environment on account of transportation are because of:

- Industrial and agricultural production is increasing at high rates demanding better transport networks.
- The low quality of transport infrastructure and increased usage contributes to traffic accidents further accentuated by lack of traffic discipline.
- Places of tourist interest are spread all over the State and hence efficient, fast and comfortable transportation is becoming primary requirement.
- Initially, railways carried bulk load of goods and passengers. Today roads carry more than 4 times the goods, and more than 10 times the passenger traffic.

State

Much of the problems arise due to the medium and means of transportation which are:

- Poor fuel quality has given rise to pollution.
- Improper vehicle maintenance, which adds to the pollution factor.

- Old vehicle technology, which is not environment friendly.
- Inadequate traffic planning adding to the problems of the cities and the citizens.
- Poor road conditions due to lack of space, maintenance and funds for better transportation.
- Large number of old vehicles, which contribute significantly to air pollution.

Impact

The impacts on the environment are:

- Deteriorating Air Quality because of the mixture of un-burnt hydrocarbons (HC), Carbon Monoxide (CO), Oxides of Nitrogen (NOx), Sulphur Oxides (SOx), Lead (Pb) and Suspended particulate matter (SPM) which are major air pollutants and also hamper the human system in addition to the environment.
- High noise levels exist in the cities because of heavy traffic.
- Traffic congestions and accidents occur frequently as safety is the last priority in design.
- There is increased pressure on road network due to ever increasing number of vehicles.

Response

In response to the impacts of the transport sector, following steps have been taken:

- Government of India has made it mandatory to conform to EURO II norms.
- National Quadrangular project has been undertaken. Rajasthan too has benefited from this.
- Supreme Court has made it mandatory for four cities namely Jodhpur, Kota, Alwar and Jaipur to prepare long-term transportation & air quality improvement strategy.
- State Government has taken measures including compulsory PUC, wearing of helmet by driver and pillion rider of two wheelers and fastening of seat belts by drivers and front seat passengers of four wheelers. Besides, construction of flyovers and road improvement projects are being executed in all major towns.

Outline for Environmental Strategy-The Way ahead

In the light of National Environmental Policy, 2006 an outline can be derived from the State of Environment Report. This however needs to be fine tuned with inputs from the Steering Committee & workshops. Further to strategy, preparation and implementation of sector wise action plans would be ideal.

An Outline of the Environmental Strategy would be as follows:

- Focus on Department wise Environmental Coordinators in critical sectors & efforts to build their capacities.
- Attempt to set modest environmental targets (output based or outcome based) for select departments
- Ensuring that a part of the funds allocated to each department as percentage basis is earmarked for environmental activities to be carried by the respective department.
- Evolve a mechanism involving planning department in coordination with environment Department for monitoring & evaluating the achievement of the targets set in an objective and independent manner and
- Either Chief Secretary or Chief Minister's office depending on feasibility should periodically review the progress.

Sectoral perspective in respect the eight sectors has been outlined in brief in this chapter.

Regional workshops were held at Udaipur and Jodhpur. The comments received were in general, regarding an improvement in quality and quantity of data. Some of the comments and data received have been incorporated in the report. Preparation of SoER is not a one-time exercise and to be meaningful and useful, it has to be updated periodically. Its various comments received during the regional workshops have been recorded and shall be taken into consideration at the time of the next upgradation exercise.

A copy of the report has been placed on the website www.rpcb.nic.in for general information to the public and for their suggestions.