

# Land use planning in India

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## Abstract

India was the first country to provide for the protection and improvement of environment in its constitution. Land use planning (LUP) or siting of industries has been taken up at the State and Central (Federal) levels over the last few decades. LUP is critical for all types of industries and new residential colonies, but is especially so for the chemical industries. With the experience gained, more coherence in LUP policies is emerging. A few prominent cases of siting of industry, some mixed with public outcry, that have affected the policies are noted in the text. Various factors which affect LUP in India are: population density, infrastructure (roads, power, communication, etc.), level of industrialization in different parts, need for creation of jobs, eco-sensitive regions, tribal regions, historical monuments, etc. This paper discusses the current scene in India and the near future aspects.

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## 1. Introduction

Improper siting of a hazardous industry can result in injury to workers, nearby inhabitants, and the environment. Protection and improvement of environment is enshrined in the constitution of India, probably the first country to do so [1]. Land use planning (LUP) helps in sustainable industrial development based on the pollution carrying capacity of the land and the location of residences, eco-sensitive zones, historical monuments, etc. This takes care of both the industrial risks and the environmental degradation aspects.

Informal LUP has been in vogue for a long time all over the world by consensus or concerns of the local municipalities. This generally resulted in a cluster of industries close to a cluster of housing. However, in many places where jobs were of more concern than a cleaner or safer environment, public continued to suffer. With improvements in living standards came an interest in a cleaner environment resulting in an annual 'Earth Day' celebrations starting June 1972. The Flixborough accident of 1974 in UK, wherein 28 people died, woke Europeans to the dangers of the chemical industry.

The Bhopal gas tragedy of 1984, wherein several thousand died instantly and many more since then, brought home to the whole world the significant dangers of having chemical plants and habitation close to each other.

Over the years, companies and governments have taken actions in reducing the hazards by way of reducing inventories, taking best available safety measures and practising ALARP strategies (As Low As Reasonably Practicable). Companies and their Associations have also adopted 'Responsible Care' principles. These play complementary roles to the various rules formulated to rein in the hazardous chemical industries. These rules are mentioned in Section 3 after discussing some famous cases of informal LUP application in Section 2 below. Section 4 discusses siting of industries. Compared to some other countries, India significantly uses the Environment Laws along with hazardous chemicals related laws to regulate the siting of chemical industry. This is partly because the whole gamut of laws for hazardous chemicals are being formulated under the Environmental Protection Act (EP Act, 1986) and the nodal ministry is the Ministry of Environment and Forests, not the Ministry of Industries or the Ministry of Labour or Ministry of Urban Development, etc. By and large, the laws so formulated are having the desired effects. Earlier, the laws were formulated under The Factories Act, 1948. In the aftermath of the Bhopal gas tragedy,

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these were found wanting. Hence, the EP Act (1986) was formulated with very wide reach.

## 2. Some famous industry siting cases in India

A few cases related to the controversial siting of chemical plants in India are mentioned below.

The area where the Union Carbide plant producing pesticides was located in Bhopal was meant for use of non-hazardous industries. However, the company got the approval based on the products manufactured, and not on the nature of the chemicals used or the intermediates produced and stored. This illustrates how the laws are successfully contravened if the authorities do not know as much as does the industry. This and other lacunae in laws have been taken care of by the promulgation of 'Manufacture, Storage and Import of Hazardous Chemicals Rules (MSIHC Rules), 1989' by the Government of India under the Environment Protection Act (1986). It is further discussed in Section 3.

An oil refinery was set up about 50 miles away from the world famous Taj Mahal at Agra to supply petroleum products to North India. Concern about the effects of acid rain from its gaseous effluents (SO<sub>2</sub>, SO<sub>3</sub>, etc.) resulted in numerous court cases and international experts providing divergent views. Tests conducted using SF<sub>6</sub> also did not settle the controversy. To satisfy the public outcry, the height of the chimney had to be doubled to 120 m and only ultra low sulphur crude is processed. The outcry also resulted in the closure of many traditional small foundries close to the Taj Mahal. An area of over 10,000 km<sup>2</sup> around the Taj Mahal has been specially zoned as the Taj Trapezium with very strict rules on industrial and transport activities.

A fertilizer plant being planned near Bombay had to be relocated due to public outcry about expected pollution and endangering the local eco-system. A chemical company near Bombay, objecting to a new housing complex nearby for safety reasons, was asked by the court to buy that land. The housing construction stays stopped and the company has not yet bought the land. The case is being contested in a higher court.

These cases tell that LUP has been in vogue in a diffused manner for long. In framing broad guidelines and rules, the Government of India had to keep in mind the various factors involved, such as: population density, infrastructure for industrial growth (roads, power, communication, etc.), incentives for industrialization in different parts, size of industry (small scale or large scale), need to create jobs, location of defence establishments, eco-sensitive regions, coastal regions, tribal regions, historical monuments, transportation routes to the facility, safety and security aspects, etc.

## 3. Land use regulations

The land use planning for the whole country is, for the most part, controlled through the Environmental (Protection)

Act, 1986 [EP Act, 2]. The Ministry of Environment and Forests, Government of India, is the Nodal ministry for this. The Bhopal gas tragedy of 1984 played a significant role in drafting and enactment of EP Act by the Parliament of India. It is an umbrella Act with very wide reach. It empowers the Government to take all necessary measures to protect and improve the quality of the environment and to prevent, control and abate industrial risks and environmental pollution. It includes promulgating restriction of areas in which any industries, operations or processes shall not be carried out or shall be carried out subject to certain safeguards. Part of the EP Act is in Table 1. The headings of various chapters and topics therein have been mentioned to illustrate the reach of the Acts of Parliament in India on which the efficacy of the Act depends. These headings also inform the reader as to what each item covers. The details are available at the website [2].

Clearance from the Government of India is required for expansion or modernization of any existing industry or if a new project is planned as listed in Table 2 [3]. This table includes all chemical industries, nuclear power plants, large civilian structures, etc.

Numerous sets of rules have been made under the EP Act. Some of those related to the hazardous chemicals are:

- i. Manufacture, Storage and Import of Hazardous Chemicals Rules (MSIHC Rules), 1989.
- ii. Hazardous Wastes (Management and Handling) Rules, 1989.
- iii. Rules for the manufacture, use, import, export and storage of hazardous micro-organisms, genetically engineered organisms or cells (1989).
- iv. Public Liability Insurance Act (1991).
- v. The Bio-Medical Waste (management and handling) Rules, 1998.
- vi. Manual on emergency preparedness for chemical hazards (1992).
- vii. The Chemical Accidents (emergency planning, preparedness, and response) Rules, 1996.
- viii. A guide to safe transport of hazardous chemicals (1995). This is not a rule per se, but is used extensively by the transporters as well as regulators to ensure safe transport of hazardous chemicals.

Most of these have been revised and amended over the intervening years. The latest versions are available at website [3]. Of these, the MSIHC rules have had a very significant effect on the location and running of hazardous chemical plants as well as isolated storages like bulk depots and terminals without any manufacturing facilities nearby. The comprehensive list of processes involved includes all hazardous ones (Table 3) [4]. The occupier (person or group who owns the facility) has to submit safety reports, on-site and off-site emergency plans, provide information to public, interact with the local authorities and community on an on-going basis. The worst-case scenario has to be considered. All these have to be approved by the regulatory bodies at the State and the

Table 1  
The Environment (Protection) Act, 1986 [2]

No. 29 of 1986 [23 May 1986]

An Act to provide for the protection and improvement of environment and for matters connected there with:

Whereas the decisions were taken at the United Nations Conference on the Human Environment held at Stockholm in June 1972, in which India participated, to take appropriate steps for the protection and improvement of human environment;

And whereas it is considered necessary further to implement the decisions aforesaid in so far as they relate to the protection and improvement of environment and the prevention of hazards to human beings, other living creatures, plants and property (emphasis added);

BE it enacted by Parliament in the 37th year of the Republic of India as follows:

#### Chapter I: Preliminaries

##### 1. Short title, extend and commencement

(1) This Act may be called the Environment (Protection) Act 1986

(2) It extends to the whole of India

##### 2. Definitions

This section defines “environment”, “environmental pollutant”, “environmental pollution”, “handling”, “hazardous substance”, and “occupier” (The details under each paragraph have been omitted in this table. They are very significant to understand the importance of the Act. Refer to <http://www.envfor.nic.in/legis/env/env1.html> Author will be glad to be of any help.)

#### Chapter II: General powers of the Central Government

##### 3. Power of the Central Government to take measures to protect and improve environment

##### 4. Appointment of officers and their powers and functions

##### 5. Power to give directions

##### 6. Rules to regulate environmental pollution

#### Chapter III: Prevention, control, and abatement of environmental pollution

##### 7. Persons carrying on industry operations, etc., not to allow emission or discharge of environmental pollutants in excess of standards

##### 8. Persons handling hazardous substances to comply with procedural safeguards

##### 9. Furnishing of information to authorities and agencies in certain cases

##### 10. Powers of entry and inspection

##### 11. Power to take sample and procedure to be followed in connection therewith

##### 12. Environmental laboratories

##### 13. Government analysts

##### 14. Reports of Government analysts

##### 15. Penalty for contravention of the provisions of the Act and rules, orders and directions

##### 16. Offences by companies

##### 17. Offences by government departments

#### Chapter IV: Miscellaneous

##### 18. Protection of Action taken in good faith

##### 19. Cognizance of offences

##### 20. Information, reports and returns

##### 21. Members, officers and employees of the authority constituted under Section 3 to be public servants

##### 22. Bar of jurisdiction

##### 23. Powers to delegate

##### 24. Effect of other laws

##### 25. Power to make rules

##### 26. Rules made under this Act to be laid before parliament

Central levels. The Bhopal plant of Union Carbide would not have been permitted under these rules since worst-case scenarios involving raw materials and intermediates too would have had to be considered. The approvals are given only when the authorities are satisfied that the hazardous facility is located away from any habitation and is able to handle emergencies that may arise. In the latter context, the occupier has also to provide a list of all major accidents that have happened in similar facilities worldwide and prove his capability to handle such accidents at his site without causing harm to workers, public and the environment. Generally, the safety levels accepted are those prevalent in the Europe even though it can be argued that India should have more strict

safety regulations since the infrastructure available to handle emergencies is relatively poor compared to that in Europe and the population affected by any accident is significantly higher in India because of higher population density.

The chemical accidents (emergency planning, preparedness, and response) rules 1996, gives details of constitution and functions of Central, State, District and local crises groups and information to be provided to the public. The manual on emergency preparedness for chemical hazards gives procedures and safeguards for prevention of accidents and also remedial measures. Some states have further tightened the requirements and issued their own guidelines. For example, the State of U.P. has issued intensive guidelines on

Table 2  
List of projects requiring clearance from the central government [3]

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1. Nuclear power and related projects such as heavy water plants, nuclear fuel complex, rare earths
  2. River valley projects including hydel power, major irrigation and their combination including flood control
  3. Ports, harbours, airports (except minor ports and harbours)
  4. Petroleum refineries including crude and product pipelines
  5. Chemical fertilizers (nitrogenous and phosphatic other than single super phosphate)
  6. Pesticides (technical)
  7. Petrochemical complexes (both olefinic and aromatic) and petro-chemical intermediates such as DMT, Caprolactum, LAB etc. and production of basic plastics such as LLDPE, HDPE, PP, PVC
  8. Bulk drugs and pharmaceuticals
  9. Exploration for oil and gas and their production, transportation and storage
  10. Synthetic rubber
  11. Asbestos and asbestos products
  12. Hydrocyanic acid and its derivatives
  - 13 (a) Primary metallurgical industries (such as production of iron and steel, aluminium, copper, zinc, lead and ferro alloys); (b) Electric arc furnaces (mini steel plants)
  14. Chlor-alkali industry
  15. Integrated paint complex including manufacture of resins and basic raw materials required in the manufacture of paints
  16. Viscose staple fibre and filament yarn
  17. Storage batteries integrated with manufacture of oxides of lead and lead antimony alloys
  18. All tourism projects between 200 and 500 m of high water line and at locations with an elevation of more than 1000 m with investment of more than Rs. 5 crores (1 crore = 10 million; Rs. 45 = US \$ 1 (January 2006))
  19. Thermal power plants
  20. Mining projects (major minerals) with leases more than 5 ha
  21. Highway projects except projects relating to improvement work including widening and strengthening of roads with marginal land acquisition along the existing alignments provided it does not pass through ecologically sensitive areas such as National parks, sanctuaries, tiger reserves, reserve forests
  22. Tarred roads in the Himalayas and or forest areas
  23. Distilleries
  24. Raw skins and hides
  25. Pulp, paper and newsprint
  26. Dyes
  27. Cement
  28. Foundries (individual)
  29. Electroplating
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Table 3  
Manufacture, storage, and import of hazardous chemicals rules (1989): schedule 4 [4]

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1. List of facilities for processing, production or treatment of organic or inorganic chemicals for which clearance is required:
    - (a) alkylation
    - (b) amination by ammonolysis
    - (c) carbonylation
    - (d) condensation
    - (e) dehydrogenation
    - (f) esterification
    - (g) halogenation and manufacture of halogens
    - (h) hydrogenation
    - (i) hydrolysis
    - (j) oxidation
    - (k) polymerization
    - (l) sulphonation
    - (m) desulphurization, manufacture and transformation of sulphur-containing compounds
    - (n) nitration and manufacture of nitrogen-containing compounds
    - (o) manufacture of phosphorous-containing compounds
    - (p) formulation of pesticides and of pharmaceutical products
    - (q) distillation
    - (r) extraction
    - (s) solvation
    - (t) mixing
  2. Installations for distillation, refining or other processing of petroleum or petroleum products
  3. Installations for the total or partial disposal of solid or liquid substances by incineration or chemical decomposition
  4. Installations for production, processing or treatment of energy gases, for example, LPG, LNG
  5. Installations for the dry distillation of coal or lignite
  6. Installations for the production of metals or non-metals by a wet process or by means of electrical energy
-

Table 4

Locational policy for small scale industries in India [7]

In tune with the liberalised licensing policy, the locational policy has also been significantly amended

- There is no requirement of obtaining industrial approval from the Central Government (except for the industries under compulsory licensing) for locations not falling within cities having a population of more than 1 million
- In respect of units proposed to be located in cities with population greater than 1 million, industries of a non-polluting nature such as electronics, computer software and printing, may be located within 25 km of periphery of urban areas
- Other industries are permitted only if they are located in industrial areas designated prior to 25 July 1991
- Zoning and land use regulations as well as environmental legislation continue to regulate industrial locations

Table 5

Ministry of environment and forests [8]

(1) Short title and commencement

1. These rules may be called Environment (siting for industrial projects) Rules, 1999

(2) Prohibition for setting up of certain industries

1. No new unit of the industries listed in Annexure I shall be allowed to be set up in the following areas:

- i. the entire area within the municipal limits of all Municipal Corporations, Municipal Councils and Nagar Panchayats (by whatever name these are known in each state) and a 25 km belt around the cities having population of more than 1 million;
- ii. seven kilometers belt around the periphery of the wetlands listed in Annexure II;
- iii. twenty-five kilometers belt around the periphery of National Parks, Sanctuaries and core zones of biosphere reserves;
- iv. 0.5 km wide strip on either side of national highways and rail lines.

2. Establishment of new units with certain conditions: establishment of new units of the industries listed in Annexure I shall be allowed in 7–25 km belt around the periphery of the wetlands listed in Annexure II only after careful assessment of their adverse ecological and environmental impacts

3. Restrictions on the units in Taj Trapezium: establishment of new units and expansion or modernization of existing units of the industries listed in Annexure I in the 10400 km<sup>2</sup> (approx.) area between 26°45'N and 77°15'E to 27°45'N, and 77°15'E to the West of Taj Mahal and between 27°00'N and 78°30'N, and 78°30'E to the East of Taj Mahal, known as the Taj Trapezium, shall be regulated as per the guidelines laid down specifically for this area by the Central Pollution Control Board (CPCB), entitled 'Inventory and Assessment of Pollution Emission in and around Agra–Mathura Region (Abridged)'

4. Establishment of new units around archaeological monuments: new units of industries listed in Annexure III shall not be allowed to be set up within 7 km periphery of the important archaeological monuments listed in Annexure IV

5. Application of other Acts and Rules not barred: the provisions of this rule shall be in addition to and not in derogation of, the Forest (Conservation) Act, 1980, and the rules made there under, the areas covered by the Notifications S.O. No. 102 (E) dated 1 February 1989; S.O. 114 (E) dated 20 February 1991; S.O. No. 416 (E) dated 20 June 1991; S.O. No. 319 (E) dated 7 May 1992

#### Annexure I

1. Petroleum refineries
2. Chemical fertilizers
3. Petro-chemical complex (both olefinic and aromatic) and petrochemical intermediates such as DMT, caprolactam LAB etc. and production of basic plastics such as LLDPE, HDPE, PP, PVC
4. Hydrocyanic acid and its derivatives
5. Primary metallurgical industries (such as production of iron and steel, aluminium, copper, zinc, lead and ferro alloys)
6. Viscose staple fibre and filament yarn
7. Storage batteries integrated with manufacture of oxides of lead and antimony alloys
8. Distilleries
9. Raw skins and hides, and tanneries
10. Dyes and dye intermediates
11. Pesticides
12. Bulk drugs and pharmaceuticals
13. Caustic soda/chlorine
14. Pulp and paper
15. Cement

#### Annexure II

1. Chilka, Orissa
2. Keoladeo Ghana National Park, Rajasthan
3. Sambhar, Rajasthan
4. Wullar, Jammu and Kashmir
5. Loktak, Manipur
6. Harike, Punjab

#### Annexure III

It has items 1–9 and item 14 of Annexure I above

#### Annexure IV

It lists scores of monuments located in different parts of the country. India being a large and old country has a long list of famous monuments, which need to be protected. Details can be had from the website mentioned earlier

'On-site Emergency Plans' [5] and 'Prior Permissions and Licensing' [6].

All the new major hazard companies procure a lot more land than their current or projected future needs so that any accident has none or limited off-site consequences. Purchase of extra land is easy since these companies are located far away from cities where the land is cheap and government gives incentives to locate there. Actually, this extra land can become a very good source of revenue since the prices go up as the area gets industrialised and the company can sell part of excess land to other permitted industries after obtaining proper permission from the competent authorities. Housing or general commercial activity (like shopping malls) is not permitted in these areas. The idea is that those not connected with the hazardous industry in any manner should not really be there anytime.

In most cases, the Central Government has delegated powers under the EP Act to the State Governments as well as to specific bodies, such as the Central Pollution Control Board, with the proviso that the Central Government can take back any and all powers if it is dissatisfied with the working of the state units.

The small-scale sector of industry (SSI) is specially protected in India. There are some products that are reserved for them, though the list of such reserved products has been severely pruned over the last decade. This sector provides more jobs than the large-scale sector does and contributes over 30% to India's exports. SSI is spread over the whole country, including areas where the infrastructure is bare minimal. These units also have to follow the MSIHC rules as far industrial risks are concerned. Since the amounts of chemicals they handle at any given time are generally small, they are not required to submit a safety report. However, the rest of the regulations about emergency plans and interaction with the public, etc., have to be followed. As far pollution is concerned, each unit is assumed to add only a small amount to the pollution. Hence, the environmental regulations for SSI are less strict (Table 4) [7].

#### 4. Siting of industries

The Central Government had issued environmental guidelines for siting of industries in August 1985, relating to areas to be avoided for siting of industries, precautionary measures to be taken for site selection as also aspects of environmental protection, which should be incorporated during the implementation of the industrial development projects. With the experience gained and new developments in science and technology, the Government of India decided to extensively revise the environmental guidelines and legislate them in order to protect the sensitive areas such as national parks, sanctuaries, wetlands and archaeological monuments. The Government has issued environment (siting for industrial projects) rules, 1999. Parts of it are mentioned in Table 5 [8]. The Bhopal plant of Union Carbide manufacturing pesticides would be

in Annexure I of Table 5 and hence would not be allowed in the municipal limits of the city. The 25 km exclusion would not have applied since the population of Bhopal was below 1 million. However, the MSIHC rules discussed above would have required the worst-case scenario and hence the plant would have had to be located several kilometres outside the municipal limits of any town.

Major plants are not allowed in sensitive areas near international borders and in some areas infested by terrorists since these are difficult to run and maintain due to the reluctance of the skilled labour to move to such areas. There are no guidelines issued for this since perceptions keep changing but entrepreneurs also understand the reasons.

Transport of hazardous materials to and from the industry is also considered if a transport accident has the potential to impact seriously the eco-system or the human beings. A guide to safe transport of hazardous chemicals (1995) has been issued by the Ministry of Environment and Forests.

Separate sets of regulations have been issued for coastal and eco-sensitive zones. These restrict industrialisation further to what the general EP Act does.

#### 5. Conclusions and future directions

It may appear from the above that there is more emphasis on environmental aspects than the industrial risks in the Acts and Rules promulgated by the Government of India. However, it is evident that any industry that would be high in industrial risks would also be high in one or the other aspect of industrial pollution, while the reverse may not always be true. Hence, the EP Act (1986) along with the various rules formulated under it suffice to cover the industrial risks.

The land use planning in India, primarily as an after effect of the Bhopal gas tragedy is being done under various names: Environmental (protection) Act, 1986; siting of industry and zoning atlas. Some of the 25 States and six Union Territories that comprise India are making their own regulations that further restrict the siting of industry.

Implementation of the regulations has improved significantly due to public outcry, actions by national and international environment activists, focussing of attention by the media, and strict directives of the courts. Large companies have also become responsive to this societal need realising that it also makes good business sense. Increasing number of seminars and courses are being organised at local and national levels and in colleges to make all stakeholders aware about health, safety and environment.

#### Acknowledgements

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- [3] <http://www.envfor.nic.in/legis/legis.html>. See this site for all legislations (and amendments) discussed in this paper and many more. It is a very user-friendly site.
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