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Environmental and Land Acquisition Issues in the Road Sector**

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Mega projects in India: Environmental and Land Acquisition Issues in the Road Sector¹

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Abstract

Mega projects (primarily infrastructure) receive a sizable investment (~10%) of the gross fixed capital formation in India. Environmental clearances and land acquisitions have been the two major reasons for delays in the projects. However, there has been a steady increase in the proportion of projects running on schedule and a sharp decline in the proportion of projects with cost overruns. These accomplishments have been achieved due to better financing, project management, and reform in the regulatory frameworks related to environmental and land acquisition aspects.

The acceptance of a user fee and development of alternate sources of revenue have helped attract larger investments in mega projects. With increasing private sector participation, delays due to project management are expected to reduce. The modifications in the regulatory framework on environmental and land acquisition issues are moves in the right direction. However, methods used for assessments related to environmental impact and land acquisition are still manual, making the whole process time consuming. Technology could be a good instrument in reducing the time required for these assessments as well as in bringing transparency in the system. Decentralization with capacity building at the state level would also help in the long run in reducing these delays.

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1. Introduction

Mega projects (primarily infrastructure) receive a sizable investment (~10%) of the gross fixed capital formation in India (Table 1). These investments have been made by both the government (central and state) and the private sector. The proportion of private sector investment has been increasing over the years. The governance structure is federal, which has a central (national) government, 28 state governments and six union territories. States and union territories are subnational governments. Mega projects could be initiated and financed by the central or state governments, depending on the infrastructure domain. Environmental clearances have to pass through both central and state regulatory frameworks. Land acquisition is executed by the state government at the request of the project initiator.

Some of the striking features of these projects include a steady increase in the proportion of projects running on schedule (Figure 1) and a sharp decline in the proportion of projects with cost overruns (Figure 2). These accomplishments have been achieved due to both better project management and reform in the regulatory frameworks related to environmental and land acquisition aspects (Ministry of Statistics and Program Implementation, 2008). Various committees have identified environmental and land acquisition issues as the two largest sources of delay in megaprojects. An analysis of 897 projects implemented between March 1994 and September 2007 and having project cost over Rs 200 million (\$ US 4 billion) revealed that 31% of the projects faced cost overrun while 35% of the projects faced time overruns. 10% of the projects faced both cost and time overruns (Ministry of Statistics and Program Implementation, 2008).

Table 1: Investment Indicators in India

| Item | Share of GDP % (year) |
|-----------------------------------|----------------------------|
| Gross fixed capital formation | 22.7 (2003) 33.8 (2005) |
| Investment in all infrastructure | 3.5 (2004) |
| Investment in road infrastructure | 0.5 (2004) |

Source: Postigo (2008), ADB (2005), Johnson (2006), World Bank (2007)

In this paper, we briefly describe the evolution of the regulatory frameworks related to environmental and land acquisition aspects in infrastructure development in India. We examine the efforts made in the direction of making the process quicker and hassle free.

We also discuss examples of two projects, one implemented by the central government and another by the state government, from the road sector to understand the implementation aspects. Based on these, we identify the key findings in the Indian context.

2. Evolution of Regulatory Frameworks

2.1. Environmental Issues

The environmental acts and notifications, as they evolved, are presented in Table 2. Initially, laws were enacted for environmental concerns related to water, air, noise etc, as and when they became areas of concern. Later, an integrated law was passed by the government.

As the number of projects and private investments increased, bureaucratic delays became a concern. Laws were modified to overcome these delays. Between 1980 and 1998, nine Acts, Bills, and Amendments related to environment were enacted. These included the Forest Conservation Act 1980, the Environment Protection Act 1986, the National Environment Appellate Authority Act 1997, and the Coastal Regulation Zone notification 1991.

The Environment Protection Act (EPA) 1986 came into existence soon after the Bhopal gas tragedy. It became an umbrella legislation, and attempted to seal the existing gaps in the law. It empowered the central government to take measures to protect and improve the quality of the environment, by setting standards for emissions and discharges, by regulating the location of industries, and by protecting public health and welfare (EPA, 1986).

The need for the Environmental Impact Assessment (EIA) was formally recognized at the Earth Summit held at Rio de Janeiro in 1992. In India, the EIA Notification was enacted in 1994, with the EPA as its legislative foundation (MoEF, 2008). The Act has been amended in 1997, 2006, and 2007. The process of getting the clearances as per the EIA Act is illustrated in Figure 3. Thirty-two categories of developmental projects require EIA approval (Table 2). In addition, all developmental projects, whether or not mentioned in the schedule, and if located in an environmentally fragile region, must obtain clearance from Ministry of Environment and Forest (MoEF), a central government entity set up in 1985. Prior to this clearance, they must also obtain clearance from the State Pollution

Control Board (SPCB). If the location involves forestland, a No Objection Certificate (NOC) shall be obtained from the State Forest Department (SFD). Both SPCB and SFD are the state entities functioning in the geographical region where the project exists.

Over the years, regulations have been simplified with an aim to reduce the total time required for the approval process. The simplifications include reducing the number of interfacing agencies and approvals, and allowing parallel activities for clearances. As per the EPA Amendment Act 2007, environmental clearance for project proposals were to be granted usually within the mandated time frame of 120 days from the date of receipt of complete information from the project authorities. The project clearances had been delayed due to non-submission of the requisite information. Some of the steps taken to expedite the process included (Wildlife Protection Society, 2008):

- A time limit of 90 days for completing appraisals, 30 days for communicating the decision, and 60 days for completing the public hearing by SPCB was fixed.
- The investment limit for a project requiring MoEF clearance was raised from Rs 500 million (\$ US 10 billion) to Rs 1000 million (\$ US 20 billion) for new projects.
- The requirement of public hearing for Small Scale Industries (SSIs) located in industrial areas/estates. These include widening and strengthening of highways, offshore exploration activities beyond 10 km (6 mi) from the nearest habitat, mining projects of major minerals with lease upped 49 acres (20 hectares), modernization of existing irrigation projects and units to be located in Export Processing Zone (EPZ) and Special Economic Zone (SEZ).
- The requirement of the EIA report for pipeline projects was dispensed with.
- NOC/consent to establish was not insisted upon at the time of receipt of the application for environmental clearance.
- Authority was delegated to the state governments for granting environmental clearance for certain categories of thermal power projects.

2.2. Land Acquisition Issues

The land acquisition policy has experienced less number of modifications in the Act. The prevailing laws related to land acquisition are: (i) Land Acquisition Act of 1894, (ii) The National Highways Act of 1956, (iii) National Policy on Resettlement and Rehabilitation for Project-Affected Families of 2003, and (iv) State government policies (few state governments have special policies).

The Land Acquisition Act of 1894 empowered state governments to acquire land for any public purpose project. It provides three methods for arriving at the value of land, which were: (i) government approved rates, (ii) capitalized value of average annual income from the land, and (iii) prevalent market rate based on the land transactions data. The process of land acquisition under this Act is illustrated in Figure 4. As the figure shows, much depended on the District Collector's satisfaction.

The National Highways Act of 1956 had provisions for acquiring land through a competent authority (a person authorized by the central government by notification in the official Gazette). Under the Act, publication of the intent of the government to acquire land, surveys, hearings of objections, and the declaration of acquisition were to be completed within a year. This Act reduced the time frame significantly. This Act included provisions for compensation to only the title holders based on the market value of the land, additional payments for trees, crops, houses, or other immovable properties, and payments for damage due to severing of land, residence, or place of business.

The National Policy on Resettlement and Rehabilitation for Project-Affected Families of 2003 provided additional compensation to project-affected families, over and above the provisions of the Land Acquisition Act. It recognized the multipurpose use of land by both title holders and non-title holders of the land. State laws varied in terms of their compensation package and the definition of project affected people to some extent.

Poor compensation and undervalued market price of land have led to many disputes by the affected population. The undervaluation was as high as four to ten times, due to both regulatory arbitrage (government has to provide clearance for land use change) and information asymmetry (title holders may be difficult to identify due to poor record keeping) (Morris and Pandey 2007). As of November 2008, the central government was considering the modification of the prevalent Land Acquisition Act by modifying the definition of "public purpose," increasing the compensation package, imposing restrictions on non-used land, and simplifying the process of dispute resolution.

2.3. Direction of Movement

Both environmental and land acquisition Acts were moving in the direction of process simplification and speedier response. However, the Acts also tried to retain enough restrictions so that no compromise was made on the environment and the livelihood of the affected people.

In the next section, we provide details of two projects to better understand the implementation aspects, derive key findings, and to suggest steps for further improvement.

3. Implementation: Example from the Road Sector

3.1. National Highway Development Program (NHDP)

This project was conceived in 1998 to upgrade, rehabilitate, and widen major highways in India. It is carried out by the National Highways Authority of India (NHAI) under the Ministry of Road, Transport and Highways. The project has the following phases:

3.1.1. Phases of NHDP

The details of the NHDP can be found at www.nhai.org and http://en.wikipedia.org/wiki/National_Highways_Development_Project.

Phase I: To connect four major cities Delhi, Mumbai, Chennai, and Kolkata. This was popularly known as the Golden Quadrilateral (GQ). It was approved in the year 2000. The total length of the project was 7,507 km (4,692 mi). As of December 31, 2008, 6,370 km (3,981 mi) has been completed. It was funded largely by the road cess and borrowing by the government. Road cess was a form of tax, levied on fuel (petrol and high speed diesel), under the Central Road Fund Act, 2000. As per the Act, 57.50% of the petrol and 28.75% of high speed diesel cess was allocated for the development and maintenance of National Highways. While the cess started as Rs 1/litre (\$0.02/litre) on petrol and high speed diesel in 2000-01, it was increased to Rs 1.50/litre (\$0.033/litre) in 2003. In 2005, it was increased to Rs 2/litre (\$0.04/litre) for both petrol and high speed diesel.

Phase II: To construct North-South and East-West corridors comprising National Highways to connect four extreme points of the country: Srinagar in the north to Kanyakumari in the south and Silchar in the east to Porbandar in the west. Total length of the envisaged network was 7,300 km (4,563 mi). As of December 31, 2008, 640 km (400 mi) of the National Highways under this phase had been completed. 52,000 km (3,228 mi) was under progress while the rest was yet to be awarded. It has been funded largely by the road cess and the borrowing by the government

Phase III: To improve the existing National Highways of 12,230 km (7,643 mi). This phase mainly included connectivity to state capitals, major commercial hubs, and ports. 44 km (27.5 mi) had been completed (4 laning) while 2,030 km (1,268 mi) was under progress. 10,156 km (6,347.5 mi) was yet to be awarded as of December 31, 2008.

Phase IV: To widen the existing National Highways which were not a part of the earlier phases. This phase mainly included widening of single lane National Highways to two or more lanes. The length of the network in this phase was expected to be 20,000 km (12,500 mi).

Phase V: To upgrade 5,000 km (3,125 mi) of four lane highways to six lanes including some portions of GQ. Work on 1,030 km (644 mi) was under progress as of December 31, 2008. Rest was yet to be awarded.

Phase VI: To construct 1,000 km (625 mi) of expressways to connect major hubs in the country.

Phase VII: To provide faster connectivity to the highways by improving the urban road network. Construction of flyovers and bypass roads for seamless movement on the highways are also part of this phase.

While some parts of Phase I and II were done on PPP basis (primary funding from government borrowing and road cess), Phase III to VII have been envisaged to be done in PPP mode. This policy change was possible because of the commercial viability shown through some stretches of Phase I and II. For projects which were commercially not viable, viability gap funding (VGF) was provided as a grant from the pool of road cess collected. VGF was to bridge the gap between desired rate of return by the private player and the actual financial rate of return from the project.

3.1.2. Details on GQ

The GQ passed through 13 state boundaries (Figure 5). Contracts were awarded from Feb 2002 for the construction of the corridor. It was planned to be completed in 2004. As of December 31, 2008, 85% of the project (6,370 km (3,981 mi) out of 7,507 km (4,692 mi)) had been completed. In the words of the Secretary, Department of Road Transport and Highways, “Reasons for delay in completion are land acquisition and environmental issues, and in some cases failure of contractors to keep up with this time line”. Another

reason for the delay was existence of many religious institutions (including prayer places) on the highway land. Contractors faced stiff resistance in moving them. They also had to reconstruct or shift the whole structure in some cases, leading to cost and time overruns (Mile by Mile, 2005). In some places, the proposed highway divided the land and the village on two side of the road. This also attracted resistance from the landowners. Over bridges/underpasses had to be constructed to facilitate the movement of land owners/cultivators and animals in such cases.

3.2. Bangalore Mysore Infrastructure Corridor

The Bangalore Mysore Infrastructure Corridor (BMIC) was envisaged, as early as 1988, with the twin objectives of (i) connecting Bangalore and Mysore (two rapidly growing cities in Karnataka) with an expressway and (ii) developing the infrastructure around the periphery of Bangalore city and around the expressway. The project was awarded by Karnataka (a state government within whose jurisdiction the stretch was) on a “Build Own Operate Transfer “ (BOOT) basis to Nandi Infrastructure Corridor Enterprises Ltd (NICE) in October 1998 on negotiation basis, after an unsuccessful round of bidding for the project. The project was awarded after negotiation, based on the feasibility study carried out by NICE. The project scope included construction of the expressway between Bangalore and Mysore and five townships along the expressway (Raghuram and Sundaram, 2009 forthcoming).

The clearance from Karnataka SPCB required public hearings. The first public hearing was held on 9 March 2000 in Bangalore and subsequent hearings were to be conducted at Mandya and Mysore. These hearings were postponed due to lack of information among the public regarding the project. Conceding to the request of various organizations, the Deputy Commissioner, Bangalore Urban District promised to release necessary documents in the public domain. Hearings were then conducted on 30 June in Mysore, 3 July in Mandya, and 5 July in Bangalore. On 1 August 2000, the Karnataka State Pollution Control Board (KSPCB) issued a NOC to the project contingent on several conditions. On 8 August 2001 the MoEF gave a clearance to the road/expressway component of the project, subject to meeting the specified conditions.

The approval did not go well with the environmentalists. They believed that 2,968 acres (1,327 hectares) of the Badamanavarthi Kaval forest in Bangalore Urban District, and 4,075 acres (1,822 hectares) of the Handigundi and Chikkamanagude forests in Bangalore

Rural District would be destroyed as a part of the project. These were one of the few remaining natural forests of the Bangalore region. Many environmentalists claimed that rare species of flora and fauna were affected. The executive summary report provided by NICE, which was the only document in public domain, did not mention anything about this impact. Contamination of water (in lakes in the vicinity) was another challenge that the project was facing.

NICE had entered into an agreement with Bangalore Water Supply and Sewerage Board (BWSSB) for use of more than 150 MLD of water which was 1/4th of the amount of the water supplied to Bangalore city. Thus, the project was expected to adversely affect supply of water to the city. In addition, there were ongoing disputes on the Cauvery river water between Tamil Nadu and Karnataka. BMIC was expected to receive 85 MLD of waste water free for non potable use, depriving farmers who used it for various agricultural purposes. This decision was also a region with extensive irrigation network based on the River Cauvery basin.

In January 2008, BWSSB decided not to permit NICE to shift water and sewerage lines into four locations as it could have affected the water supply and sanitation in the city. Shifting of the pipeline was essential for the completion of the alignment in the prevalent form. In spite of repeated request from NICE, the pipelines were not shifted stating technical opinions. On 24 January 2008, the High Court of Karnataka directed the BWSSB to shift the water and sewage pipelines in four locations so that NICE could complete the peripheral road, which was part of the BMIC project.

The notice for land acquisition was served under the Karnataka Industrial Areas Development Board (KIADB) Act and the purpose was stated as industrial use. Some farmers contested that the notice was vague in its message as the exact use was not stated. A single bench (when a single judge carries out the hearing) of the High Court of Karnataka decided in favor of these farmers. However, the division bench (when two judges carry out the hearing against the judgment of a single judge bench) of the High Court and subsequently, the Supreme Court (highest court of appeal in India) decided that it was difficult for the government to state the purpose for each land parcel for such vast land acquisition. Thus the government was well within its right to acquire land by mentioning broad usage of the land.

The amount of land acquired was also not clear. The government order (GO) of 1995 identified 18,313 acres (7,414 hectares) as the land requirement for the project. In 1997 the FA specified 20,193 acres (8,186 hectares) of land while the formal award of the contract to NICE in 1998 specified 23,846 acres (10,659 hectares). By 2004, KIADB had notified 29,258 acres (12,631 hectares) for land acquisition. The discrepancy in land requirement created both political and legal obstructions for the project. One of the possible reasons for the varying requirement was that the land acquisition plan was based on a communication sent by NICE and not on the approved drawings/maps of the project. Another reason could be the collusion of vested interests. The decision to notify or denotify a plot could have been taken depending on the personal gain that could be made by the politicians and the administrators. This rent seeking was facilitated by the absence of any detailed project report which gave the decision makers absolute discretion.

The project created further controversies when the more than half a dozen top officials, who awarded the project, accepted employment offers from the private party after their retirement and within few years of the award itself.

4. Summary and Key Learnings

Shift from Negotiation to Competitive Bidding. Initial projects were awarded on negotiation basis, as not many private players were interested in the bidding process. This situation changed over the years for three reasons: (a) risk profiles (primarily traffic and regulatory) become clearer and (b) some projects demonstrated viability, and (c) user charges were accepted with time. Competitive bidding had established trust in the public and political circles. In the future, the projects were expected to be awarded only on competitive bidding.

Project Structure/Size. Initially, projects of smaller sizes were awarded as no bidder was ready to take a long term contract. However, the average length of award has been increasing over the years. In a network infrastructure like roads, it is very important to have the whole network in good quality for optimal returns. One poor stretch of road may dissuade a section of users from using the whole corridor as the perceived benefit may become marginal. In such cases, all the private players stand to lose due to the poor maintenance by one player. The government was yet to come up with a mechanism to ensure that all the players within a sub network provide good quality service.

Willingness to Pay. Initially the infrastructure was understood as a facility to be provided by the government and there were protests against asking commuters to pay for the use of roads. However, with time, users realized the benefit from such roads and slowly agreed to the concept of a user fee.

Regulatory Delays. The environmental regulations were simplified and to a large extent and as time went on the time span for each of the activities, as related to regulation, was specified in the Act. Resettlement and rehabilitation (R&R) controversies (core of land acquisition problems) were also dealt with by modifying the regulation and allowing for higher compensation. However, this was a lengthy process as land markets were distorted due to regulatory and informational asymmetry which lead to excessive under pricing of land under present circumstances.

Conflict of Interest due to Staffing of Top Positions. In the case of BMIC, many top officials joined NICE immediately after their retirement. It may be alleged that some have given undue favors to NICE, while acting on behalf of the government, in order to attract employment from NICE after their retirement. One of the members of the high level committee (HLC) (which had found the project suitable), was later appointed as the chairman of the committee to investigate the allegation of excess land grant by the government during the award of the project. In this case, a person who was party to the award could not have done justice in the investigations. The government is struggling with these issues and as of yet has not come up with any concrete plans to tackle them.

Judicial Activism. The judiciary has also influenced the progress of the projects. Some projects moved faster because of judicial intervention, while others were delayed due to the decision making process of lower courts. The courts have also been instrumental in prompting the government to make/amend laws related to environmental and land acquisition issues.

Religious Sentiments. Some of the projects have been delayed as the prayer halls were encroaching on the right of way of the road. Sometimes, road alignments had to be diverted to avoid hurting religious sentiments. In some case, these building were reconstructed or shifted by the government to clear the way. These were not considered in the original estimate and hence led to cost and time overruns.

Absorption of Economic Loss due to Delays. The economic costs of delays are very high for mega projects. In case of a road project, congestion would lead to higher inventory carrying costs, higher inventory requirements, increased pollution, and higher fuel consumption. In most cases, the cost gets transferred to the tax payers and users of the facility in the long run. The fairness of this transfer can be questioned.

5. Scope for Further Improvement

Use of Technology for Faster and More Transparent Assessment. Environmental and land acquisition assessments were based on field surveys carried by the consultants. Many times, these studies were questioned by the social activists and local groups. In most cases this process requires a long time for megaprojects. Sometimes, there are long gaps (time delays) between the completed field surveys and actual award of the project. These lead to changes at the ground level conditions and hence higher level of dissatisfaction. Satellite images may be used to identify the number of people affected by a project as well as the exact land use pattern. The images can also be used at the planning level to identify the corridors which will affect the fewest number of people. The use of technology would also help in identifying environmental and land acquisition issues during the preliminary stages of the project itself and at a much lower cost. Such identification would help in deciding the project with the least conflicts.

Independent Land Value Evaluators. As stated earlier, the land was identified and acquired by the District Collector and he/she only decides the price of the land. This procedure was not a fair process. The idea of using market price (market value was decided based on the stamp duty charged (a state government levied tax on the sale of property) on the land in the vicinity of the project) has also not worked well as the land market was highly underpriced. For paying low stamp duty, a price much lower than the under priced value was quoted. In India, there are no independent land value evaluators and there is no legislation that identifies such a profession. The creation of such evaluators would make the process more transparent and trustworthy for the losers of the land.

Other Sources of Revenue. Apart from cess and government borrowing, the user fee idea has been accepted as a source of revenue within the last one decade. In recent years, land development rights and advertisement rights have been an additional source of revenue. With the help of these two income sources, corridors with lower traffic (lower

user fee revenue) could also be seen as feasible. In recent years, projects with “viability gap funding” (one time or annuity based) have also been awarded. This method opened the door for private sector investment on low density corridors which were not financially viable, even after adding alternate sources of revenue.

Decentralization, Transparency, and Capacity Building. The decision making can be decentralized by making the state government entities responsible for most of the clearances. This change reduces the number of agencies required for approval and also the time required for approval. However, the process of decision making will have to be made more transparent before such decentralization can be done. The state government employees also need to be technically equipped to make these decisions. Special capacity building exercises need to be developed. Training also needs to be provided on various aspects of public-private partnership and project management. This training would equip the decision makers in identifying the right private player for the project and also in monitoring the contracts awarded.

6. Concluding Remarks

The acceptance of a user fee and development of alternate sources of revenue had helped attract larger investments in megaprojects. With increasing private sector participation, delays due to project management is expected to reduce significantly and the focus would be left to environmental and land acquisition issues. The modifications in the regulatory framework on these issues are moves in the right direction. However, methods used for assessments related to environmental impact and land acquisition are still conducting manual surveys, making the whole process time consuming. Technology could be a good instrument in reducing the time required for these studies as well as in bringing transparency in the system. Decentralization with capacity building at the state level would also help in the long run in reducing these delays.

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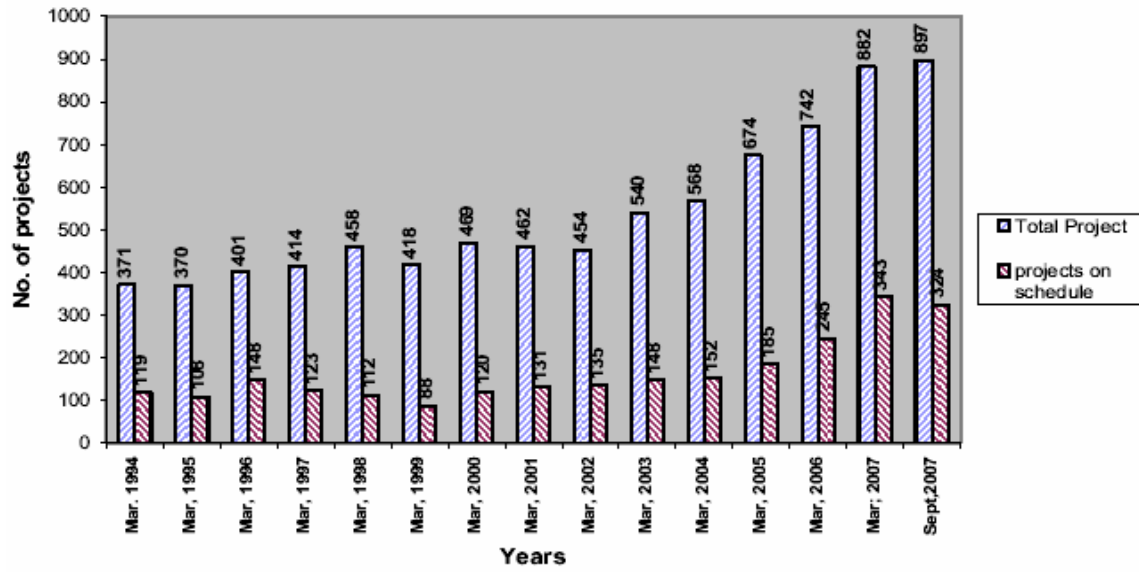
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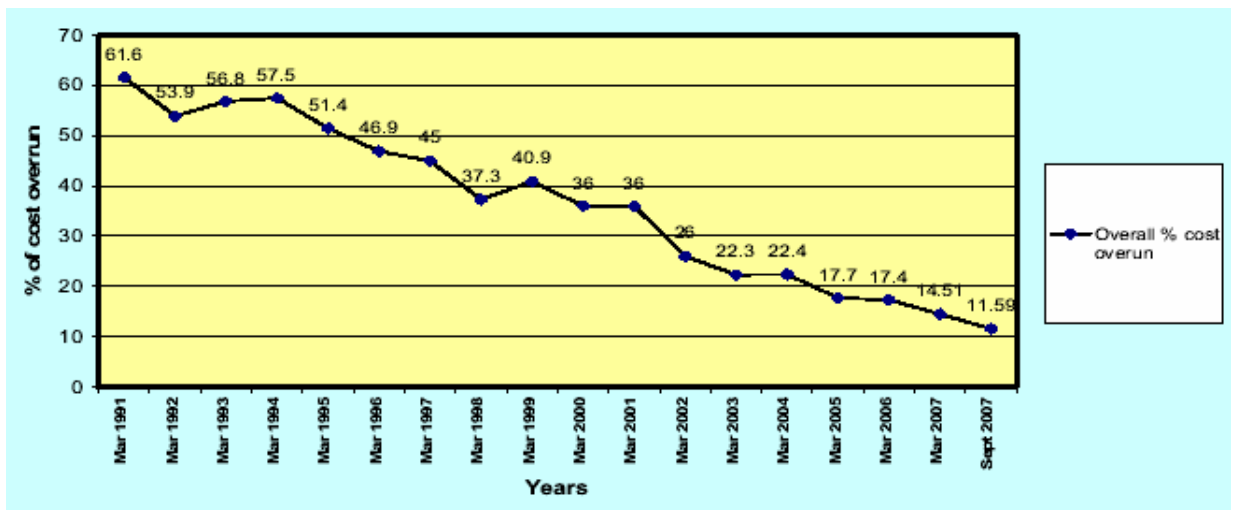
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Figure 1: Proportion of Projects on Schedule (of Total Projects)



Source: Ministry of Statistics and Program Implementation (2007)

Figure 2: Percentage of Cost Overrun



Source: Ministry of Statistics and Program Implementation (2007)

Table 2: Environmental Acts and Notifications in India

The first environment related Act was the Easement Act, 1882 which allowed private rights to use groundwater. The Indian Forest Act, 1927 was enacted to consolidate the laws related to forests. The Factories Act, 1948 ensured the welfare of workers and its application in hazardous processes. The River Boards Act, 1956 enabled the setting up of a central government advisory River Board to resolve issues in inter-state cooperation. Subsequently, the following acts were passed: Wildlife Protection Act, 1972; Water (Prevention and Control of Pollution) Act, 1974; Air (Prevention and Control of Pollution) Act, 1981; Forest (Conservation) Act, 1980; and Atomic Energy Act, 1982.

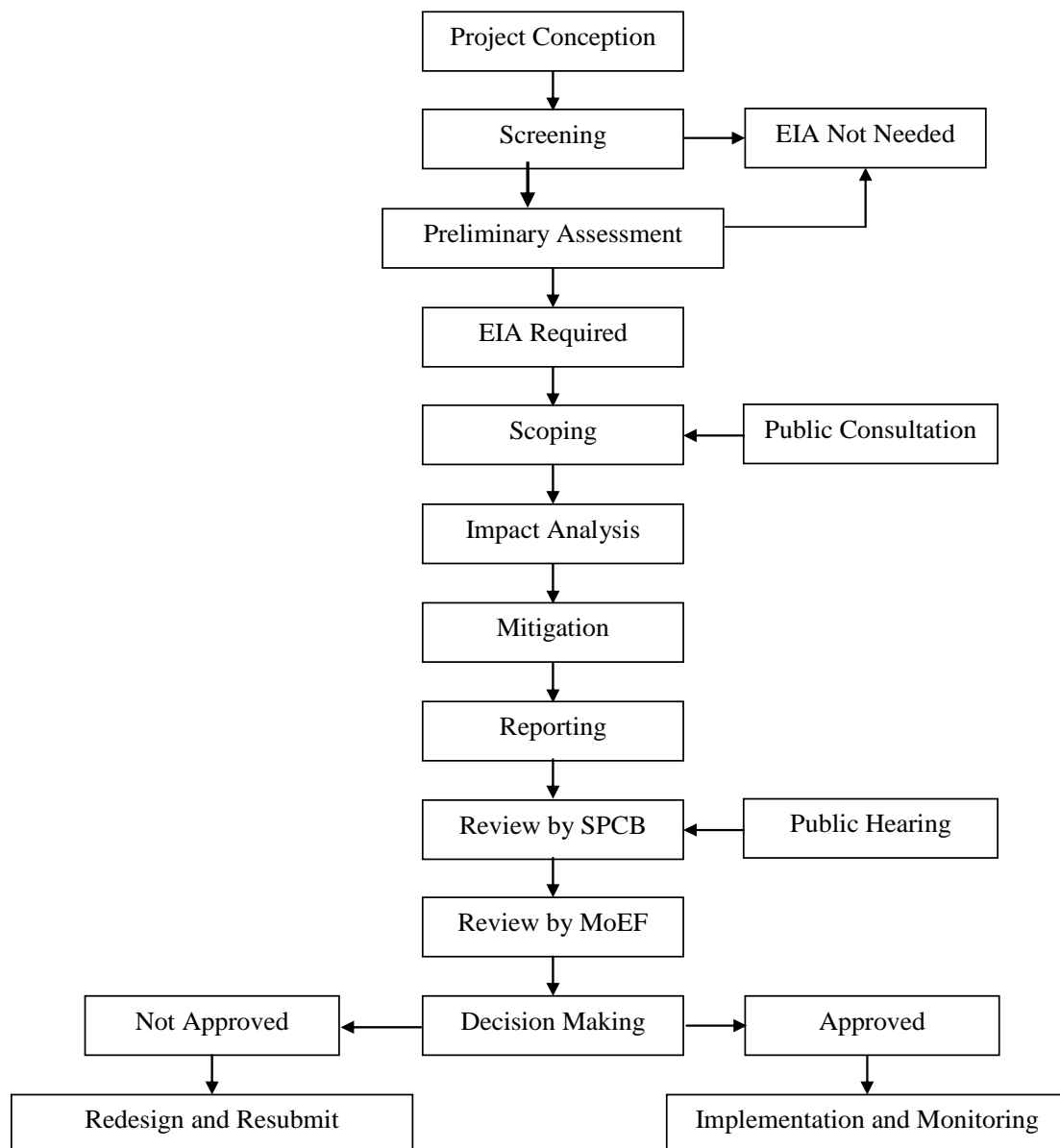
The Environment (Protection) Act, 1986 (EPA) authorized the central government to protect and improve environmental quality, control and reduce pollution from all sources, and prohibit or restrict the setting up and operation of any industrial facility on environmental grounds. Under this umbrella Act, rules were passed to control handling of different types of waste: hazardous, hospital, municipal, biomedical, and municipal solid; to regulate activities in the coastal area; to provide incentives by branding environmentally-friendly products; to prescribe pollution emission norms for new non-commercial vehicles; to regulate the production and consumption of ozone depleting substances; to reduce noise pollution; and to provide for the conservation of biological diversity.

Under the EPA, many projects required an environmental impact assessment (EIA). The EIA process (Figure 3) begins with whether EIA is required and if so, impact analysis and mitigation before final clearance have to be reported and approved. Possible mitigation measures include: change in project sites, routes, processes, raw materials, operating methods, disposal methods, disposal routes or locations, timing or engineering designs; introducing pollution controls, waste treatment monitoring, phased implementation, landscaping, personal training, special social services or public education; offering (as compensation) restoration of damaged resources, money to affected persons, concessions on other issues, or off site programs to enhance some other aspects of the environment or quality of life for the community.

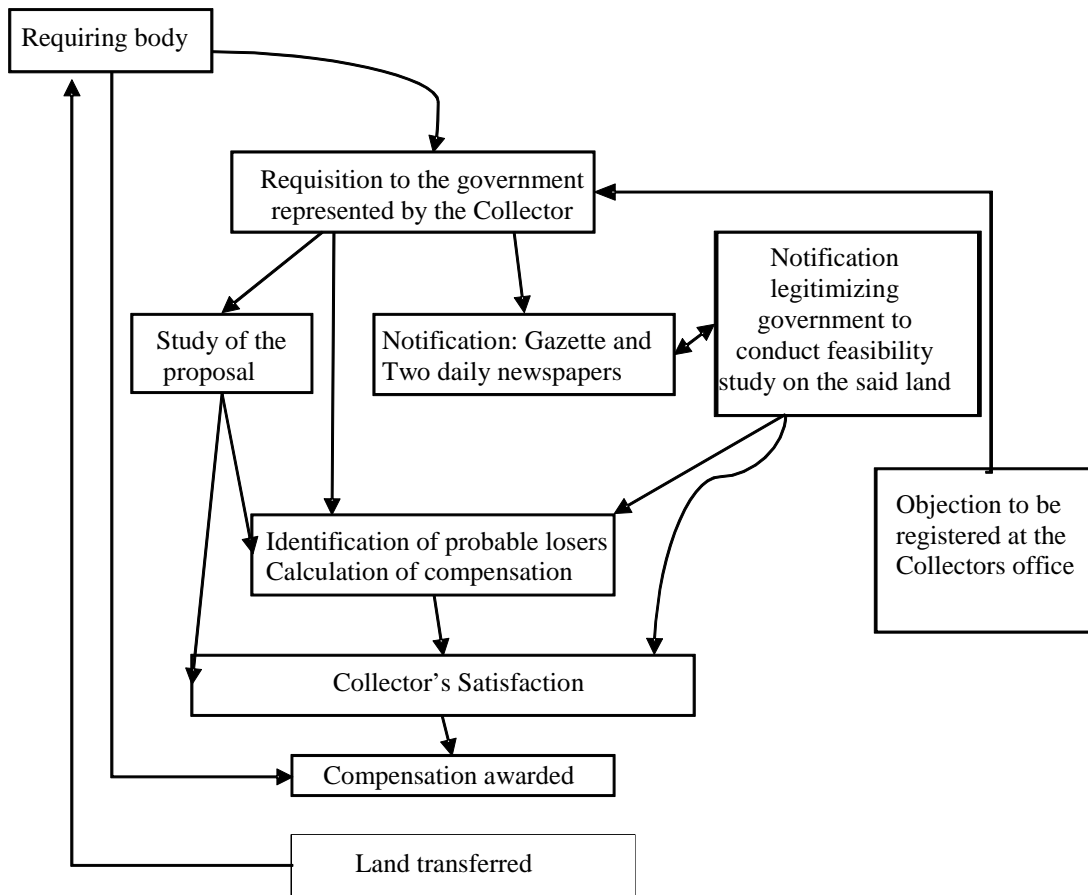
Thirty two categories of projects require the EIA clearance. They include projects related to nuclear power, river valley projects (hydel-power, irrigation, flood control etc), thermal power plants, mining, highways, ports, and airports. Setting up manufacturing industries like petroleum refineries, chemical fertilizers, pesticides, petrochemical complexes and intermediates, bulk drugs and pharmaceuticals, synthetic rubber, asbestos and asbestos products, hydrocyanic acid, pulp and paper, dyes, cement, and paints. Heavy industries like; primary metallurgical industries (iron and steel, aluminium, copper, zinc, lead and ferro alloys), electric arc furnaces and electroplating. Exploration, production, transport and storage of oil and gas, and new construction projects and industrial estates would also require clearance.

In order to facilitate speedy redressal of environment related disputes, the National Environmental Tribunal Act, 1995 and the National Environment Appellate Authority Act, 1997.

Source: <http://www.indiacore.com/environment.html>, www.indlaw.com

Figure 3: Environmental Approval Process

Source: MoEF (2006)

Figure 4: Land Acquisition Process under the Land Acquisition Act of 1894

Source: Chakrabarti B (2008)

Figure 5: Golden Quadrilateral

